

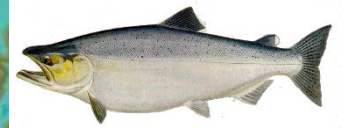
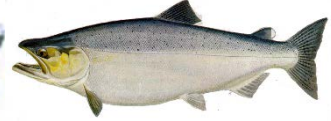
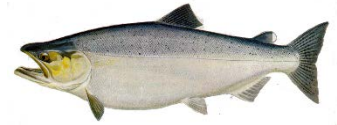


# A Reconciliation Approach to Species Conservation

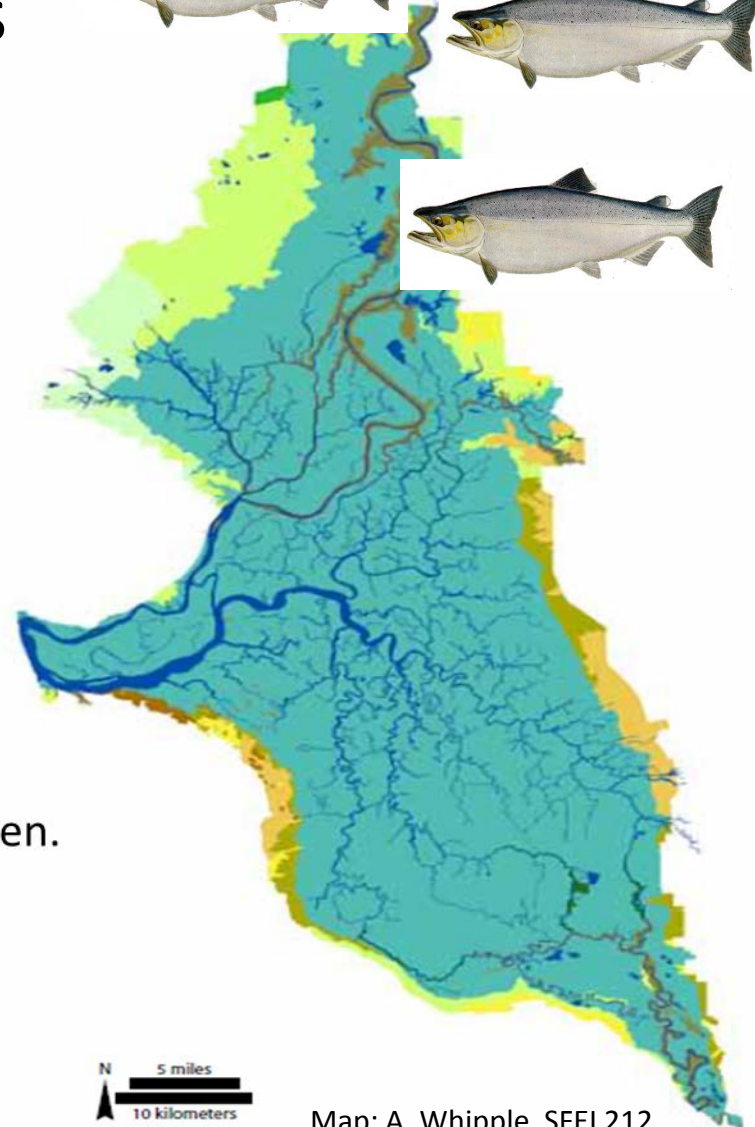
John Durand  
Center for Watershed Sciences  
University of California, Davis

Water Education Foundation Executive Briefing  
March 25, 2015

# Where We're Coming From



- Four overlapping salmon runs
  - Largest commercial fishery on west coast of N. America

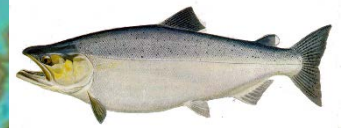
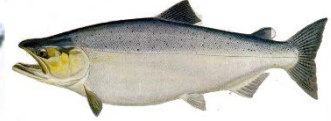
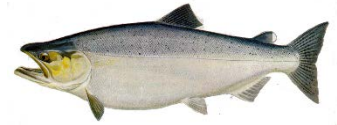


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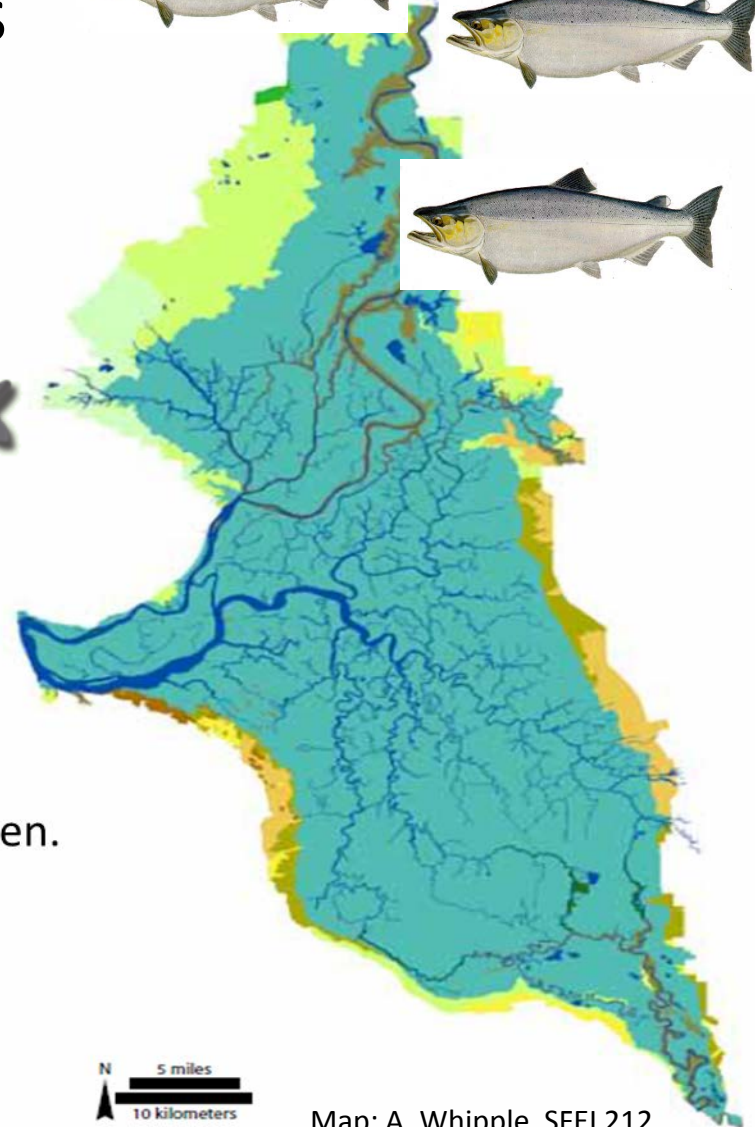
Map: A. Whipple, SFEI 212

# Where We're Coming From



- Four overlapping salmon runs
  - Largest commercial fishery on west coast of N. America
- Two smelts
  - Abundant

Then.

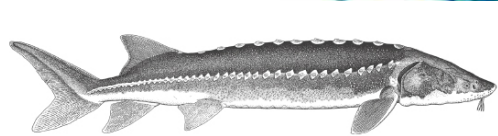


N  
5 miles  
10 kilometers

Map: A. Whipple, SFEI 212



# Where We're Coming From

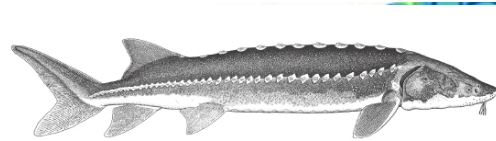
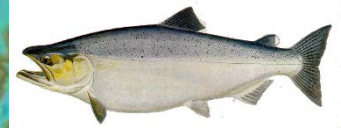
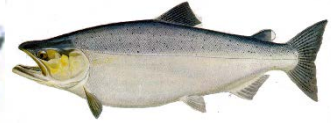
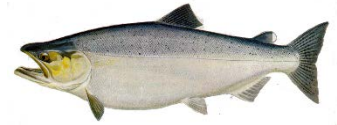


Then.

- Four overlapping salmon runs
  - Largest commercial fishery on west coast of N. America
- Two smelts
  - Abundant
- Two sturgeon
  - Moderate fisheries



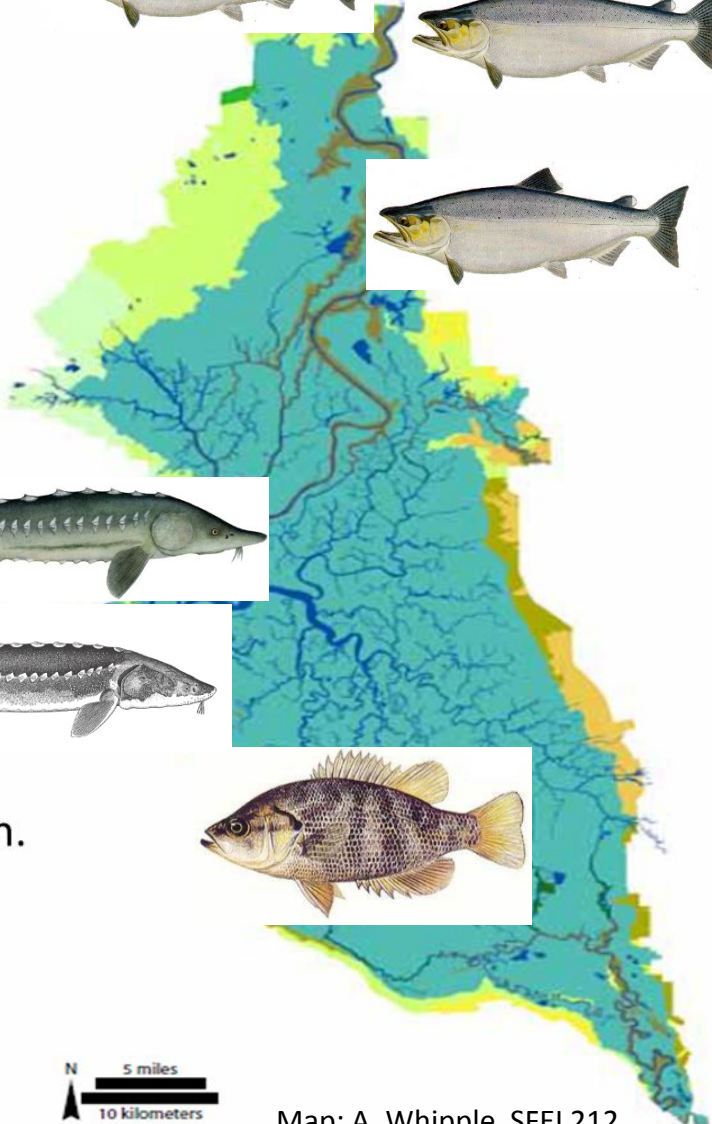
# Where We're Coming From



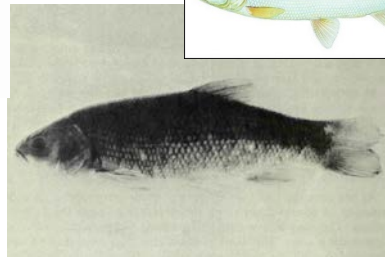
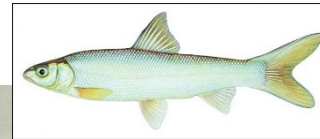
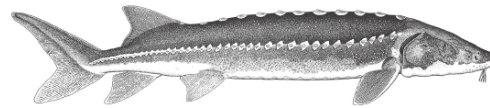
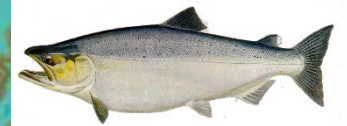
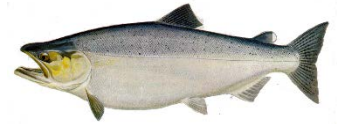
Then.



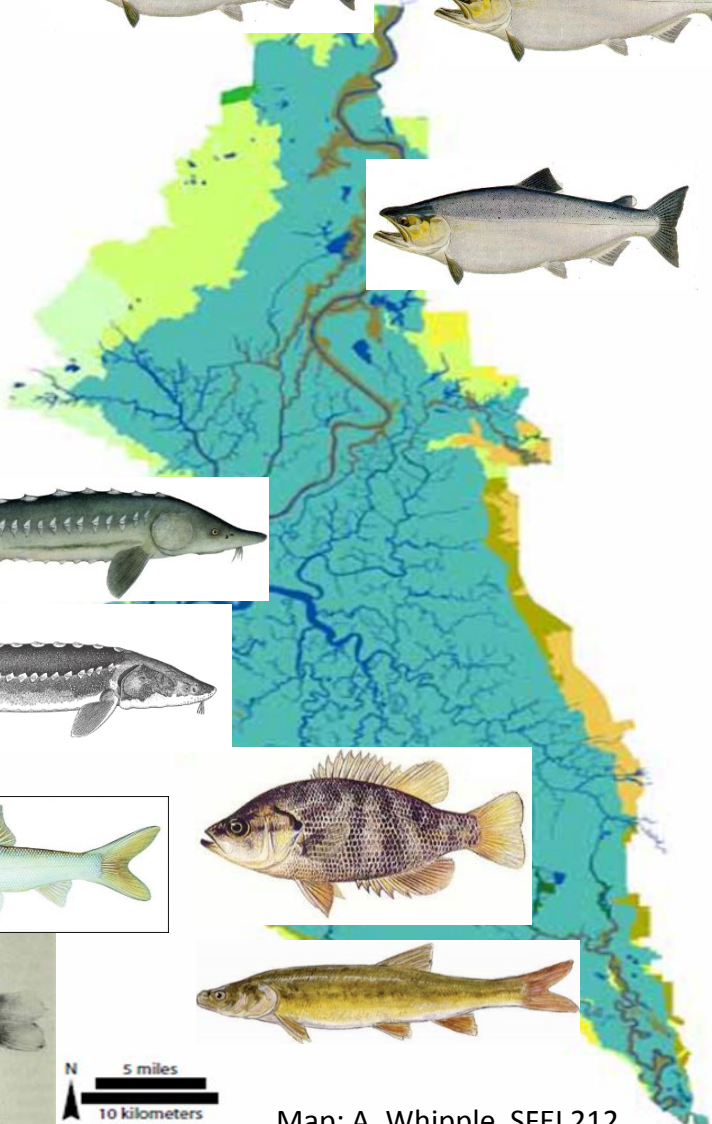
- Four overlapping salmon runs
  - Largest commercial fishery on west coast of N. America
- Two smelts
  - Abundant
- Two sturgeon
  - Substantial fishery
- One endemic sunfish
  - Abundant



# Where We're Coming From

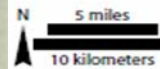
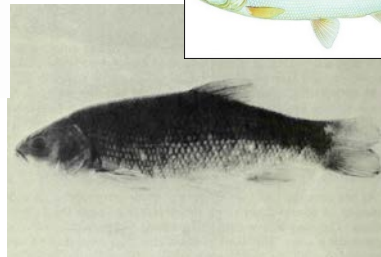
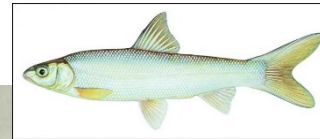
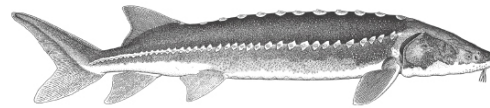
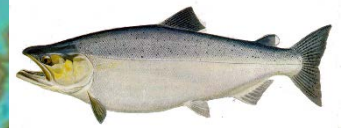


- Four overlapping salmon runs
  - Largest commercial fishery on west coast of N. America
- Two smelts
  - Abundant
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- One endemic sunfish
  - Abundant
- Suite of radiated minnows
  - Abundant





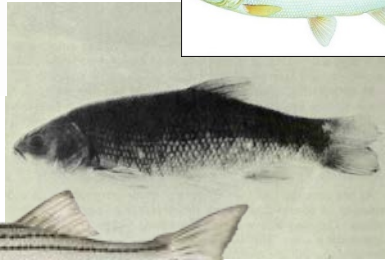
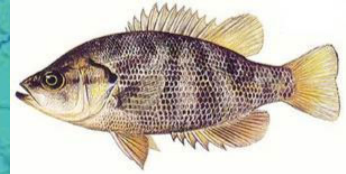
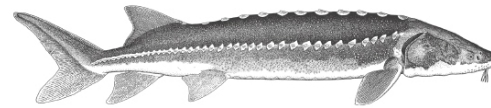
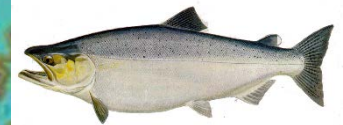
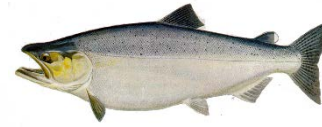
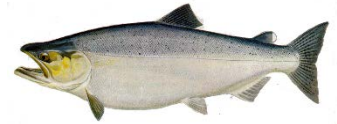
# Where We're Coming From



Map: A. Whipple, SFEI 212

- Four overlapping salmon runs
  - Largest commercial fishery on west coast of N. America
- Two smelts
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- One endemic sunfish
  - Abundant
- Suite of radiated minnows
  - Abundant
- Bay Shrimp
  - Substantial fishery

# Where We're Coming From



- Four overlapping salmon runs
  - Largest commercial fishery
  - on west coast of N. America
- Two smelts
  - Abundant
- Two sturgeon
  - Substantial fishery
- One endemic sunfish
  - Abundant
- Suite of radiated minnows
  - Abundant
- Bay Shrimp
  - Substantial fishery
- Naturalized striped bass
  - Substantial sport fishery

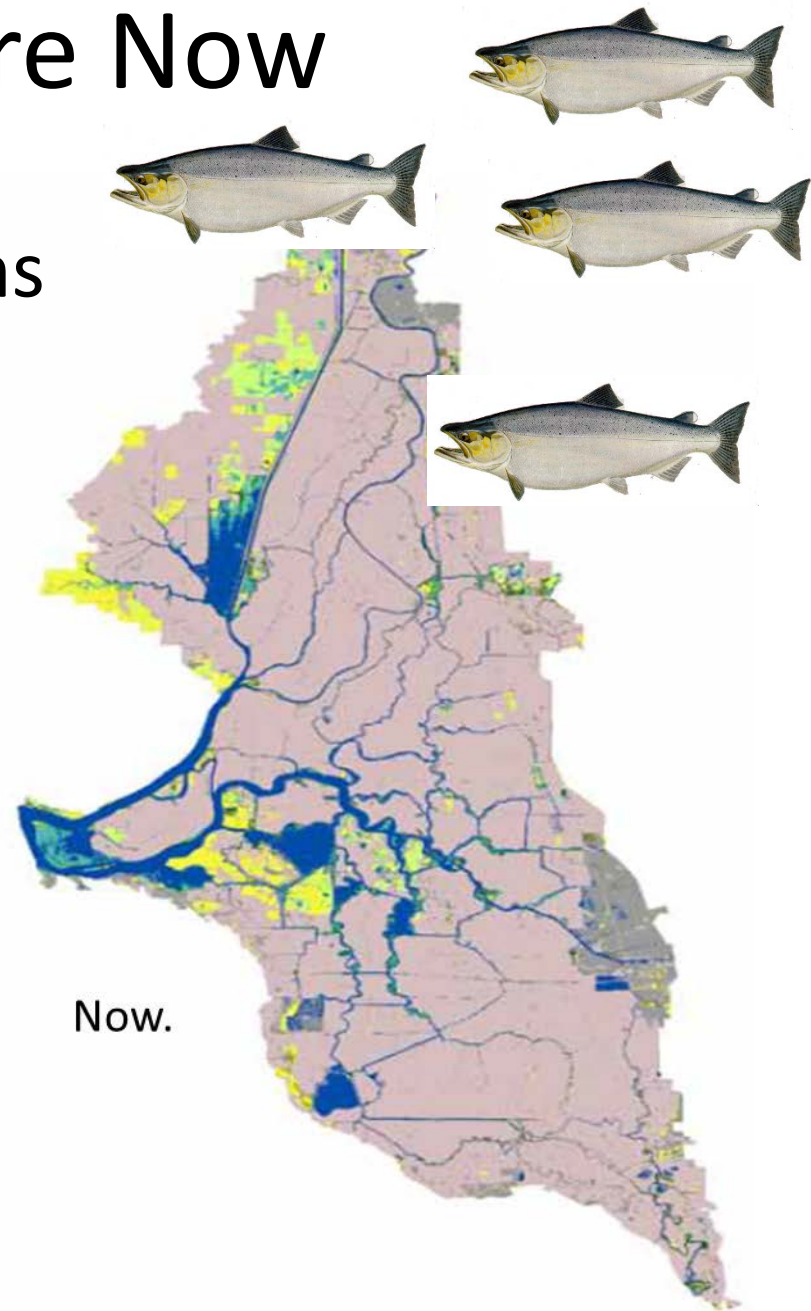


# Where We Are Now



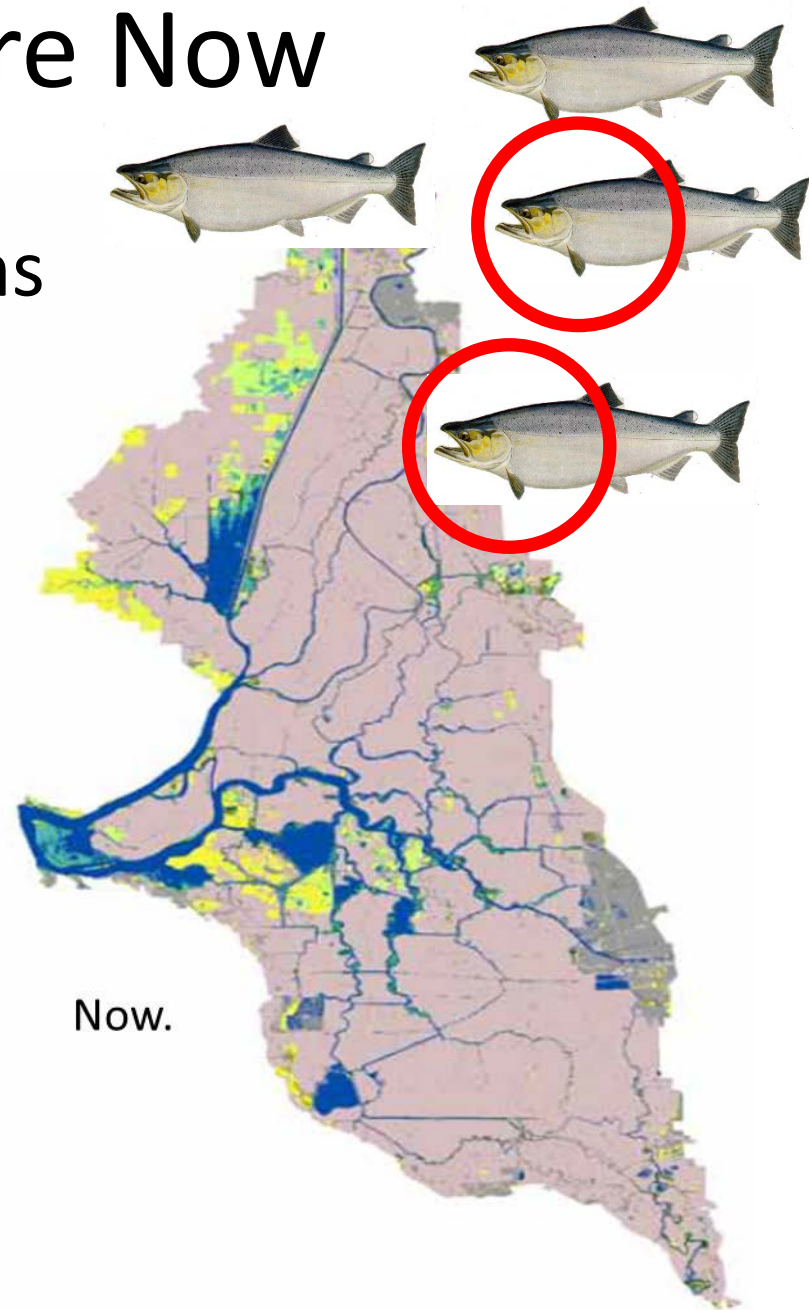
# Where We Are Now

- Four overlapping salmon runs



# Where We Are Now

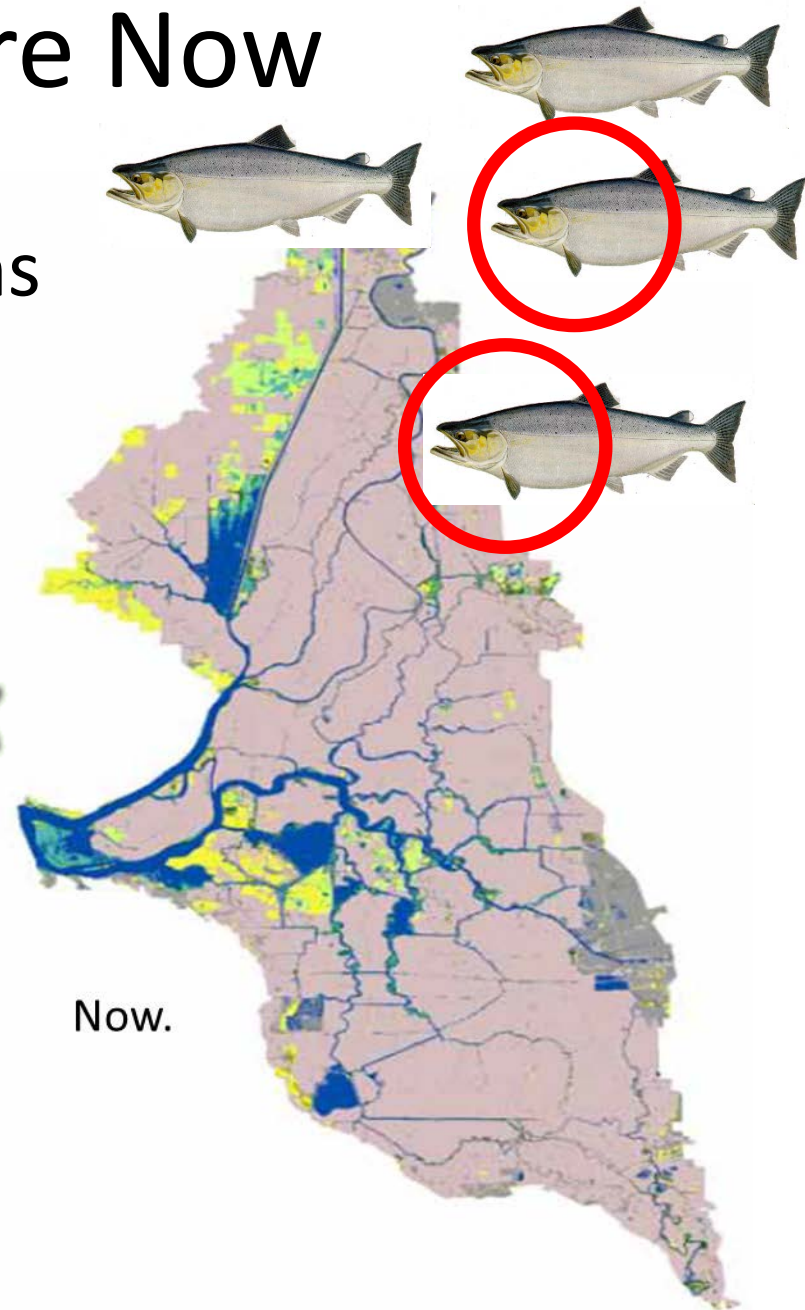
- Four overlapping salmon runs
  - In decline or endangered





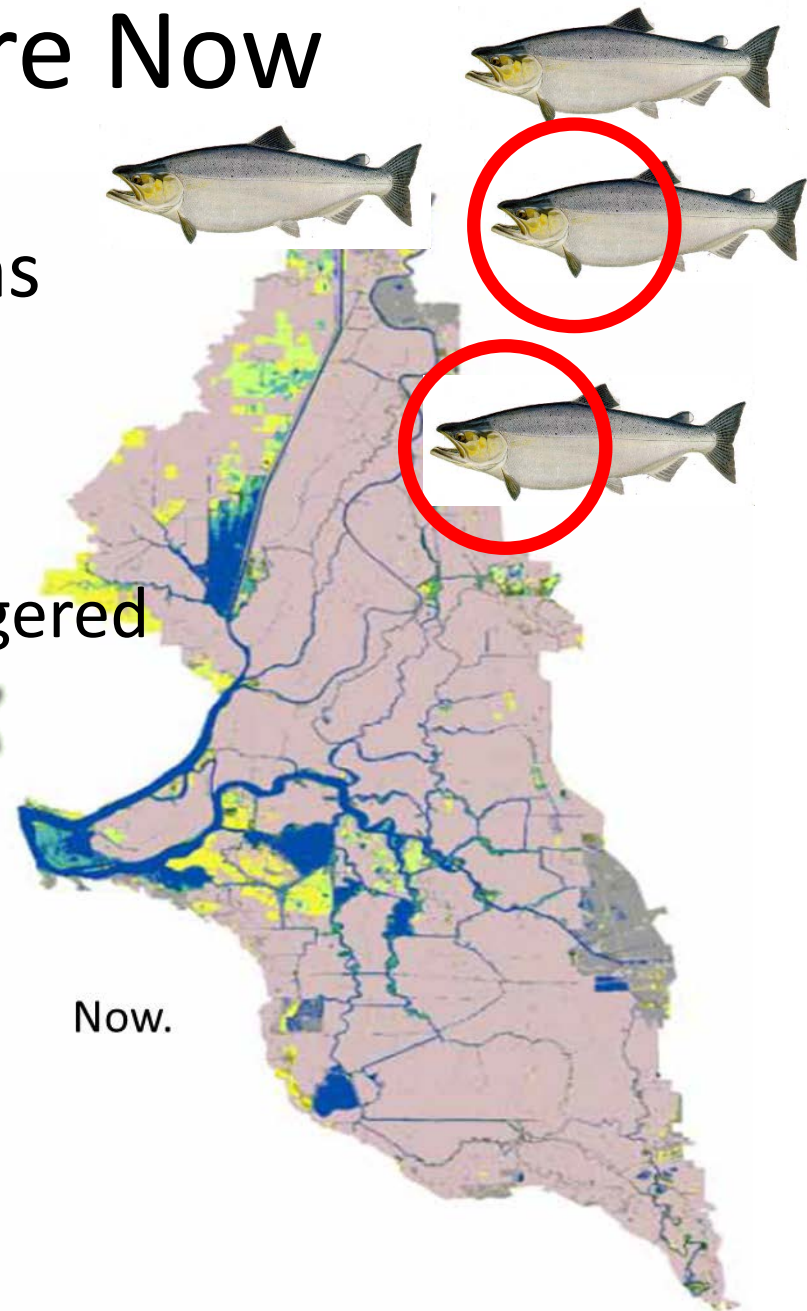
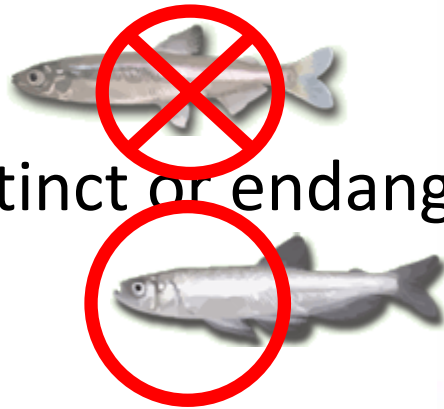
# Where We Are Now

- Four overlapping salmon runs
  - In decline or endangered
- Two smelts



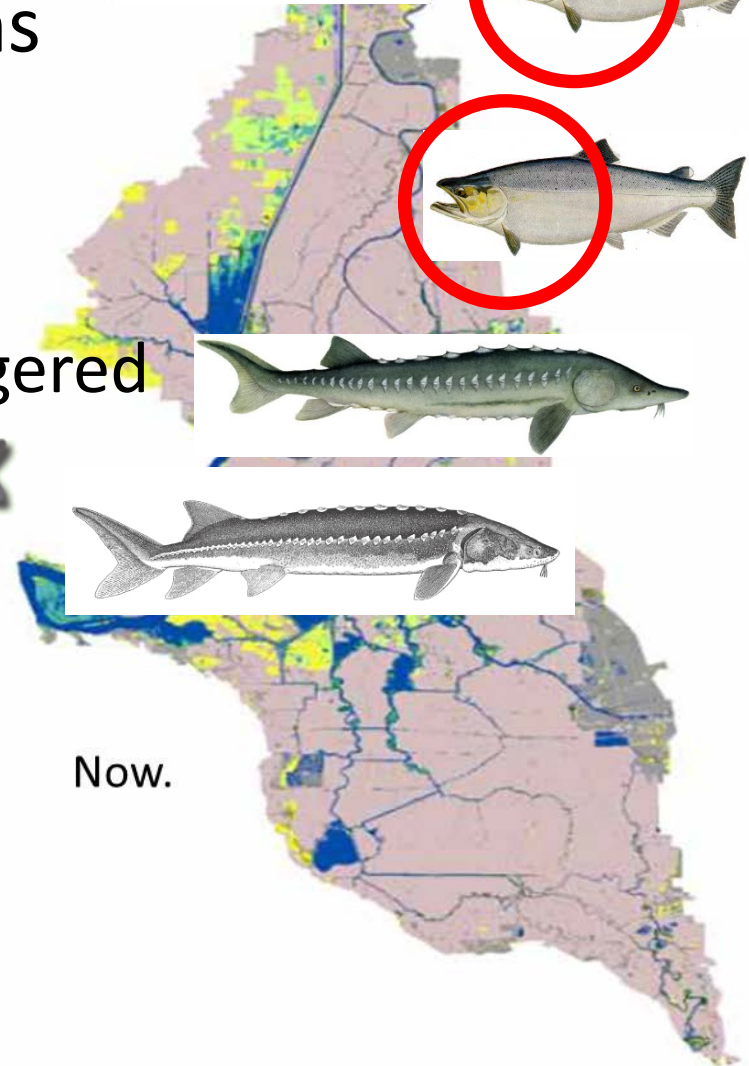
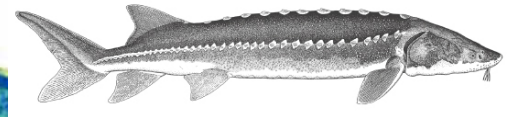
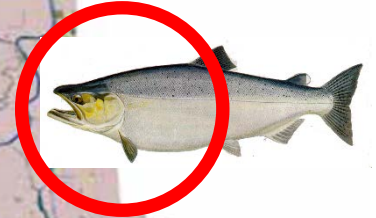
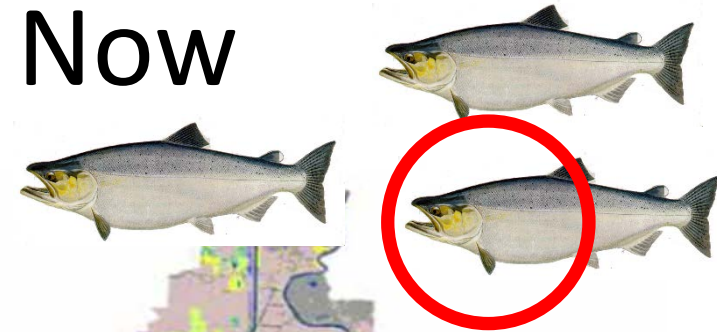
# Where We Are Now

- Four overlapping salmon runs
  - In decline or endangered
- Two smelts
  - Functionally extinct or endangered



# Where We Are Now

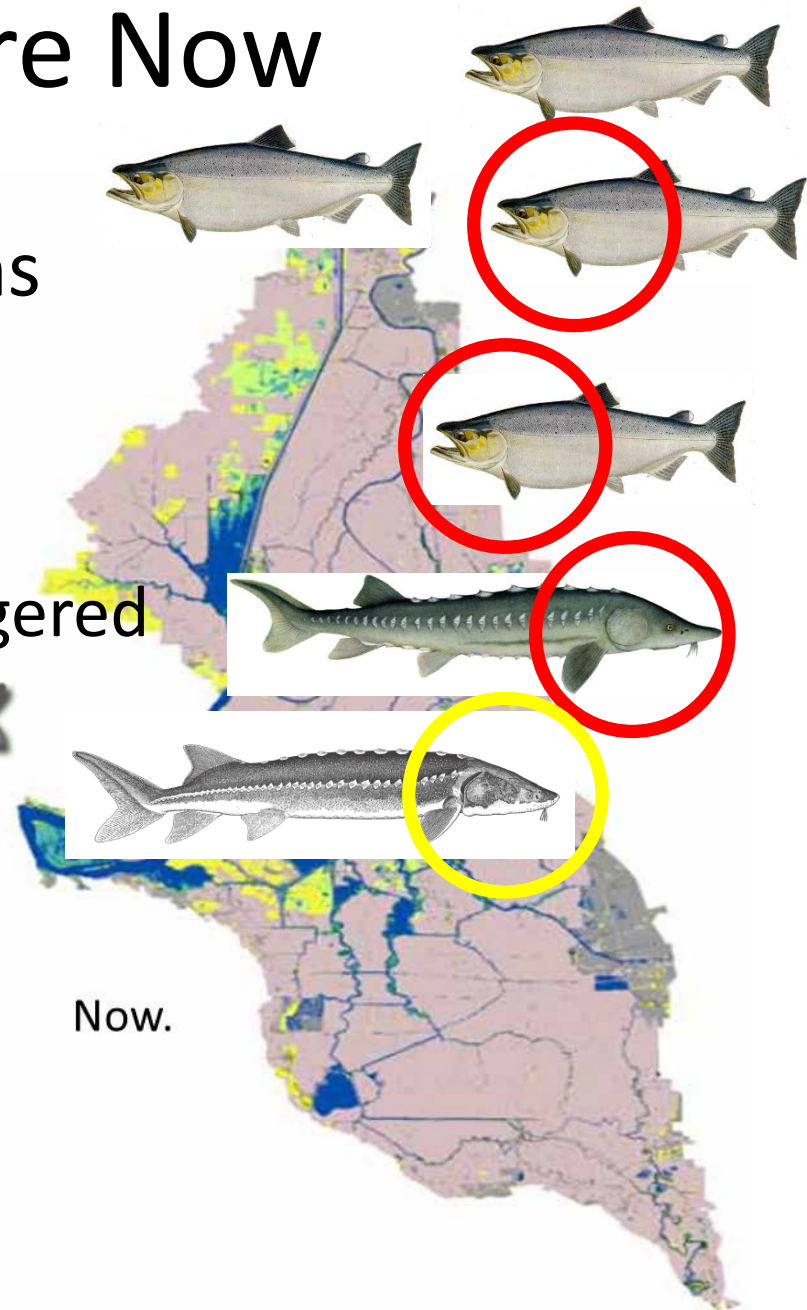
- Four overlapping salmon runs
  - In decline or endangered
- Two smelts
  - Functionally extinct or endangered
- Two sturgeon





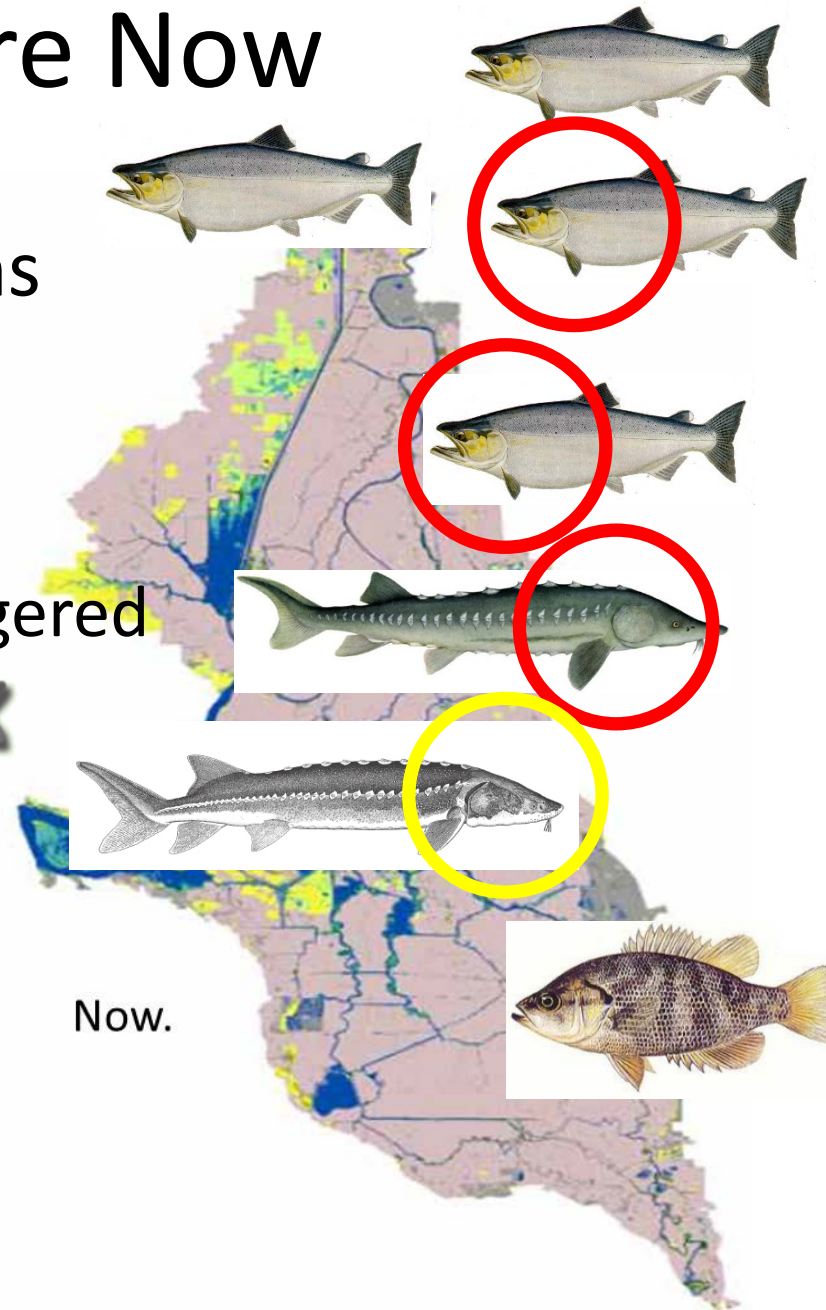
# Where We Are Now

- Four overlapping salmon runs
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- Two smelts
  - Functionally extinct or endangered
- Two sturgeon
  - In decline or endangered



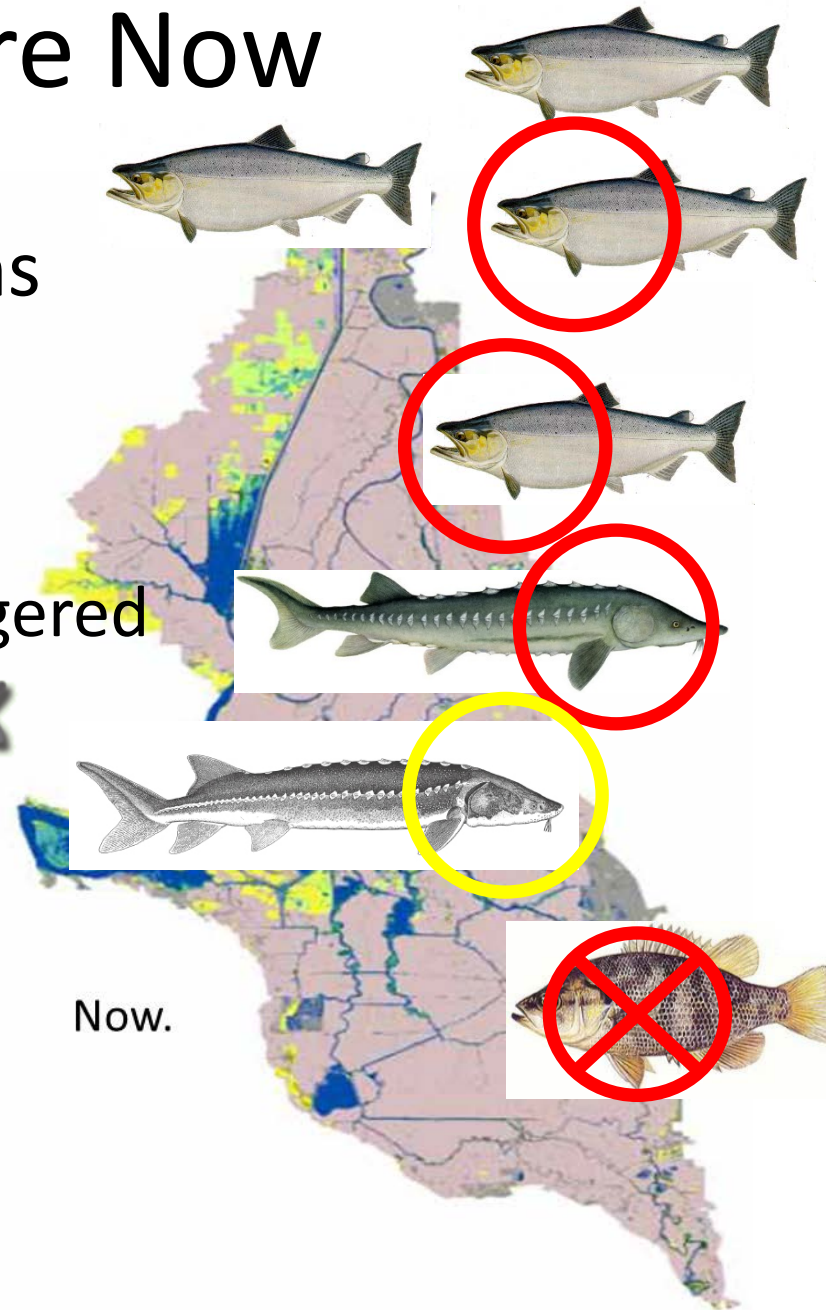
# Where We Are Now

- Four overlapping salmon runs
  - In decline or endangered
- Two smelts
  - Functionally extinct or endangered
- Two sturgeon
  - In decline or endangered
- One endemic sunfish



# Where We Are Now

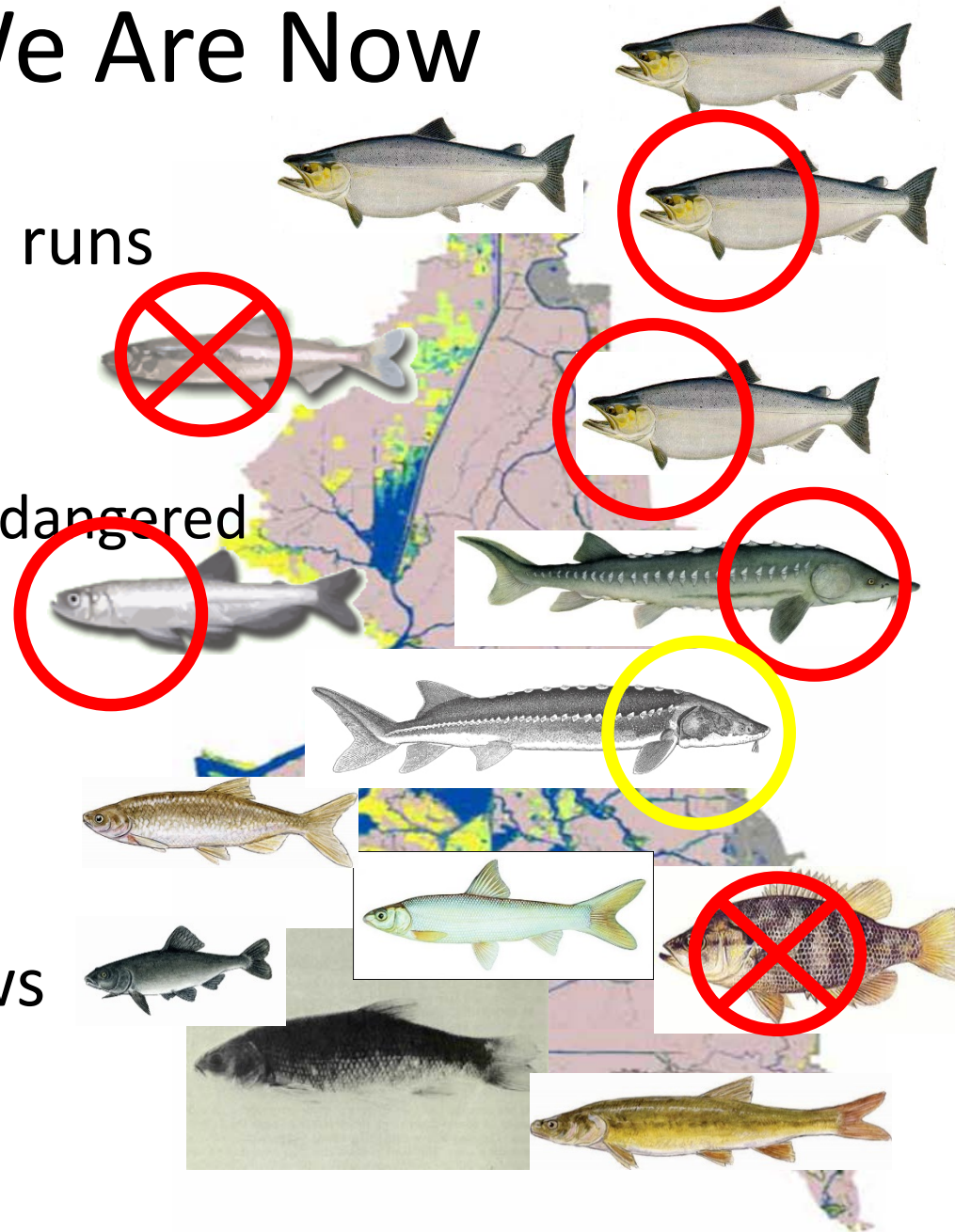
- Four overlapping salmon runs
  - In decline or endangered
- Two smelts
  - Functionally extinct or endangered
- Two sturgeon
  - In decline or endangered
- One endemic sunfish
  - Functionally extinct





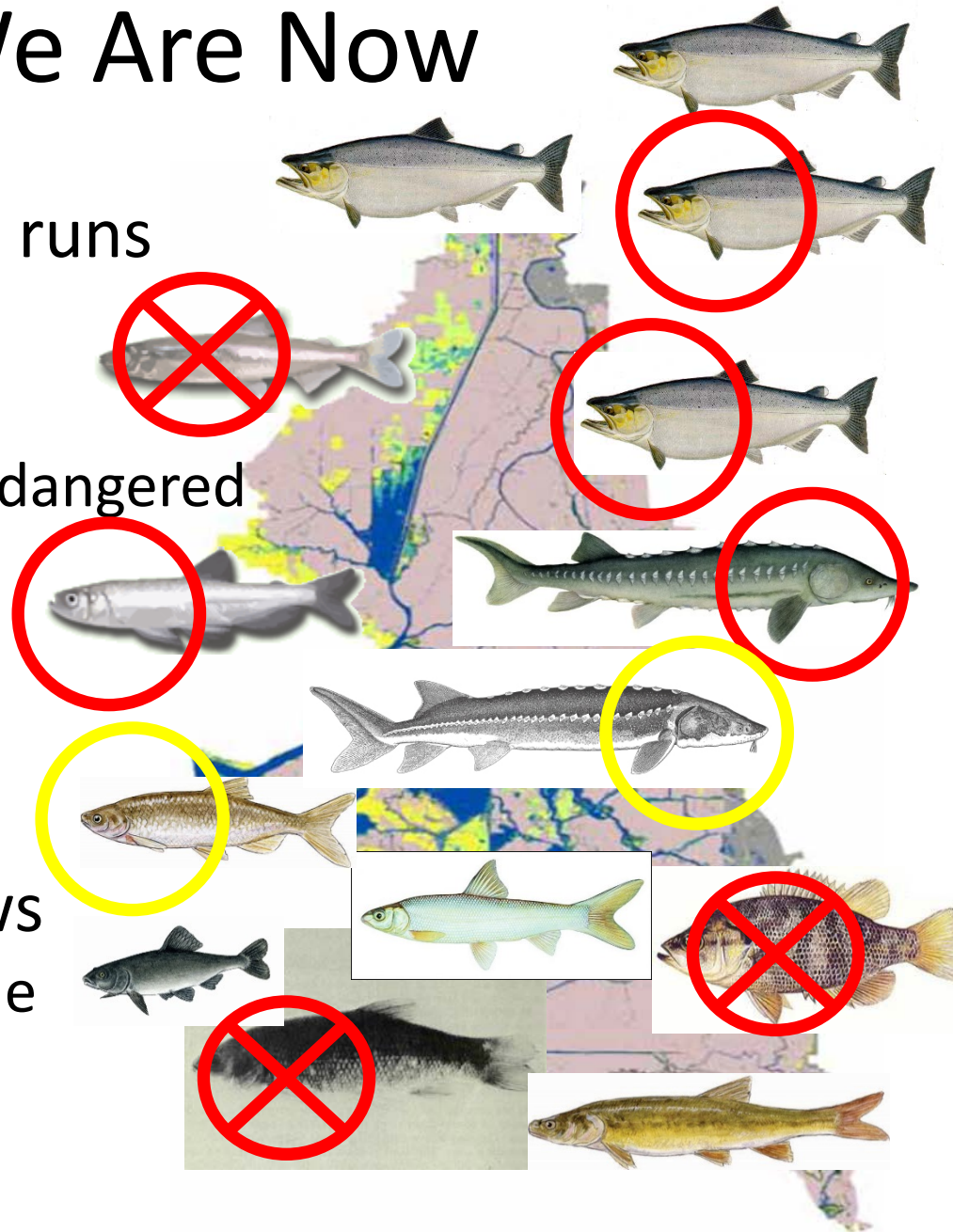
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- Four overlapping salmon runs
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  - Functionally extinct
- Suite of radiated minnows



# Where We Are Now

- Four overlapping salmon runs
  - In decline or endangered
- Two smelts
  - Functionally extinct or endangered
- Two sturgeon
  - In decline or endangered
- One endemic sunfish
  - Functionally extinct
- Suite of radiated minnows
  - Extinct, stable or in decline



# Where We Are Now

- Four overlapping salmon runs
  - In decline or endangered
- Two smelts
  - Functionally extinct or endangered
- Two sturgeon
  - In decline or endangered
- One endemic sunfish
  - Functionally extinct
- Suite of radiated minnows
  - Extinct to vulnerable
- Bay Shrimp





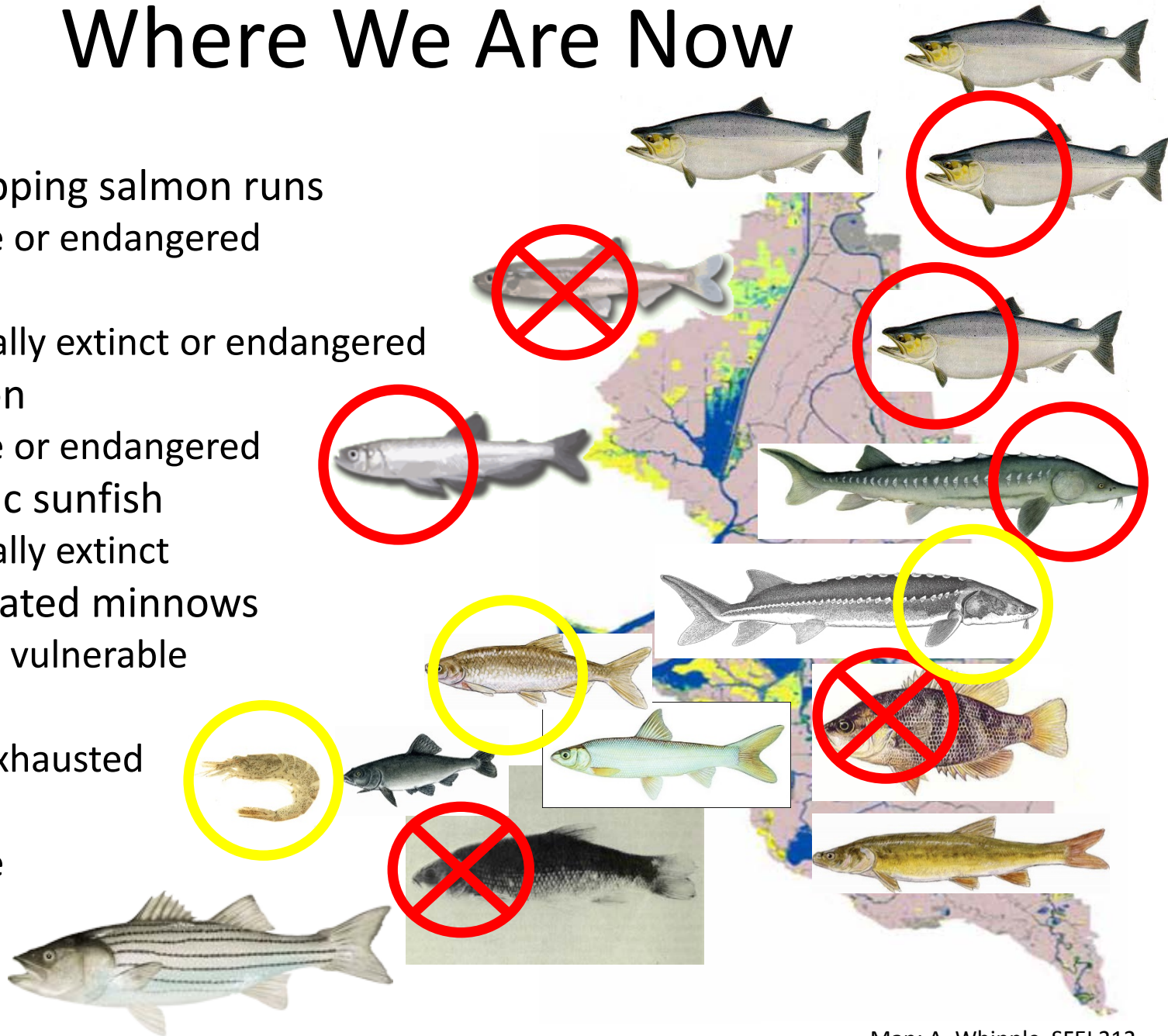
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  - Functionally extinct or endangered
- Two sturgeon
  - In decline or endangered
- One endemic sunfish
  - Functionally extinct
- Suite of radiated minnows
  - Extinct to vulnerable
- Bay Shrimp
  - Fishery exhausted



# Where We Are Now

- Four overlapping salmon runs
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- Two smelts
  - Functionally extinct or endangered
- Two sturgeon
  - In decline or endangered
- One endemic sunfish
  - Functionally extinct
- Suite of radiated minnows
  - Extinct to vulnerable
- Bay Shrimp
  - Fishery exhausted
- Striped Bass
  - In decline



# Where Are We Heading?





And how did we get here?

# Drivers of Ecosystem Change

- Deposition of Mining Sediment



# Drivers of Ecosystem Change

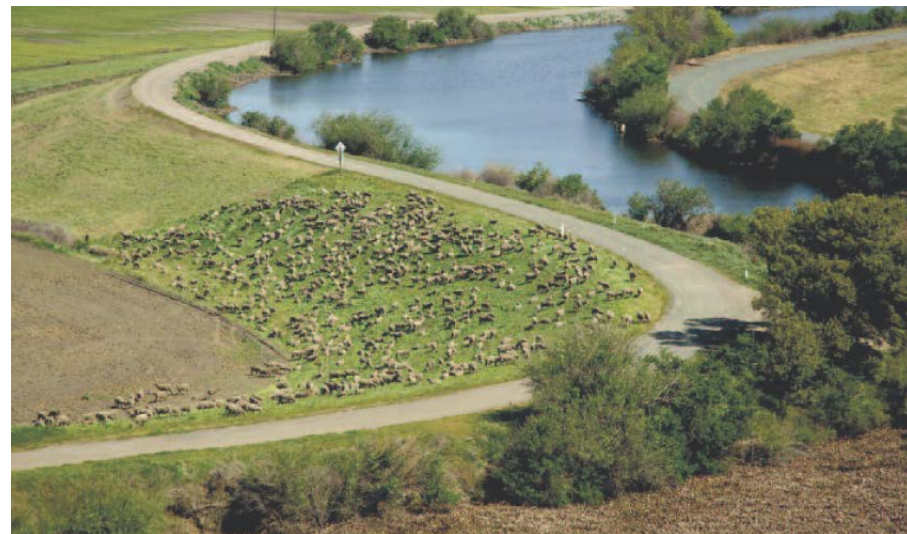
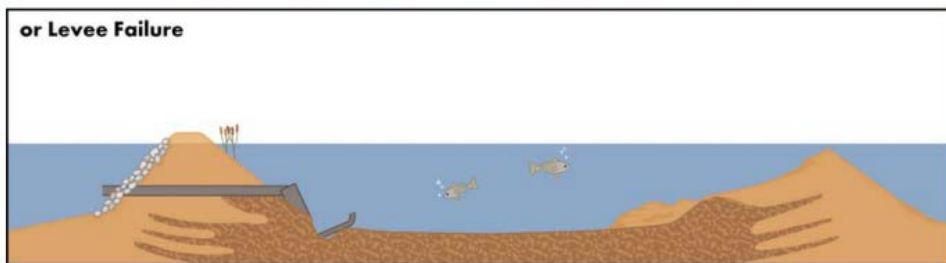
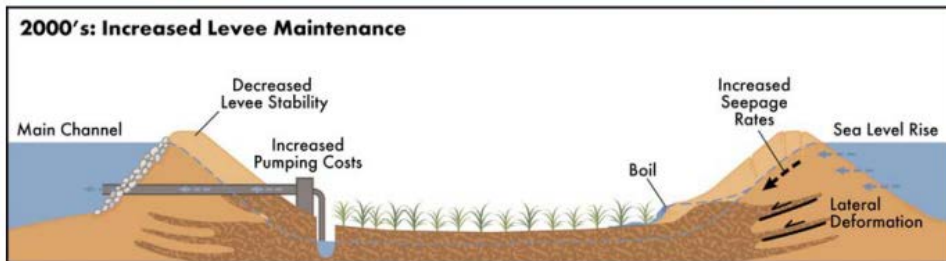
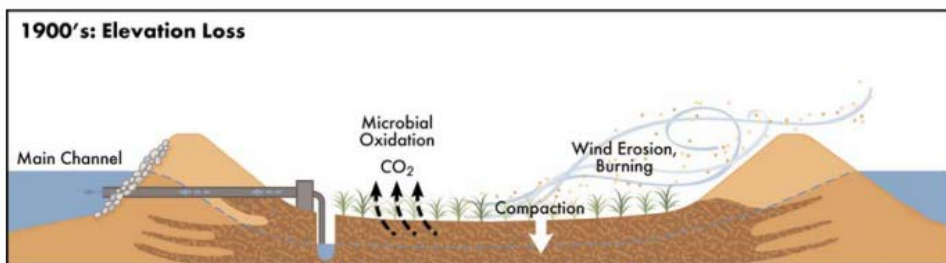
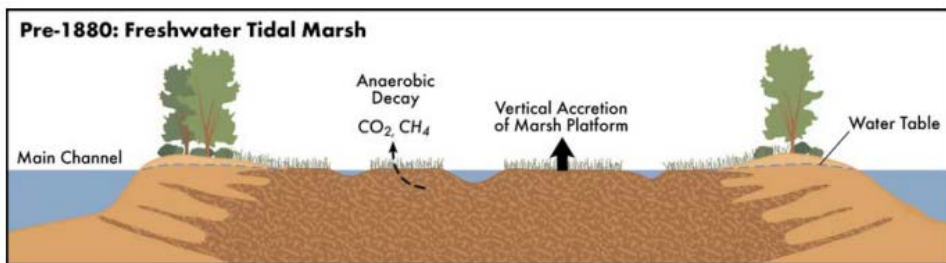
- Levee Construction





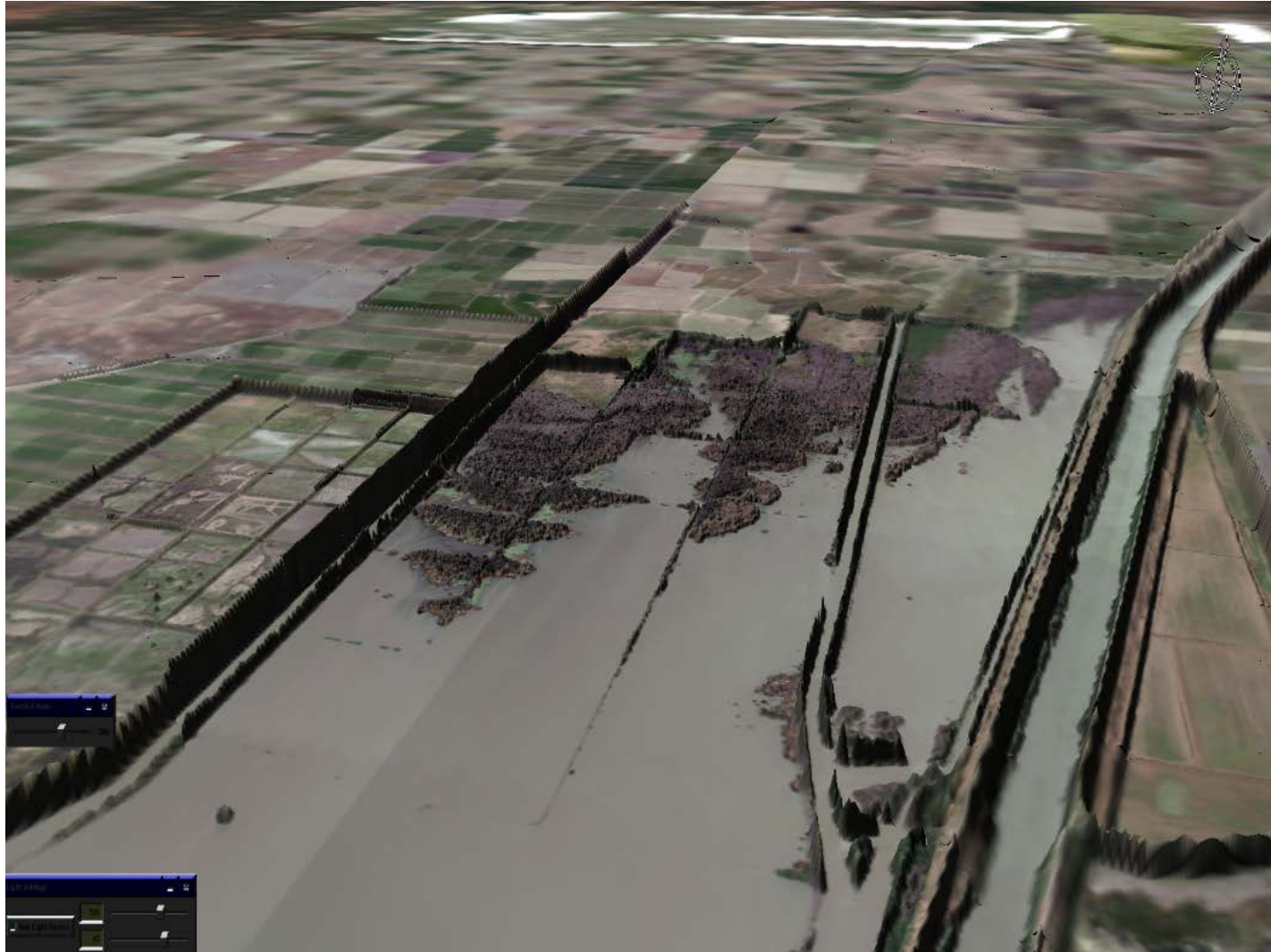
# Drivers of Ecosystem Change

- Subsidence



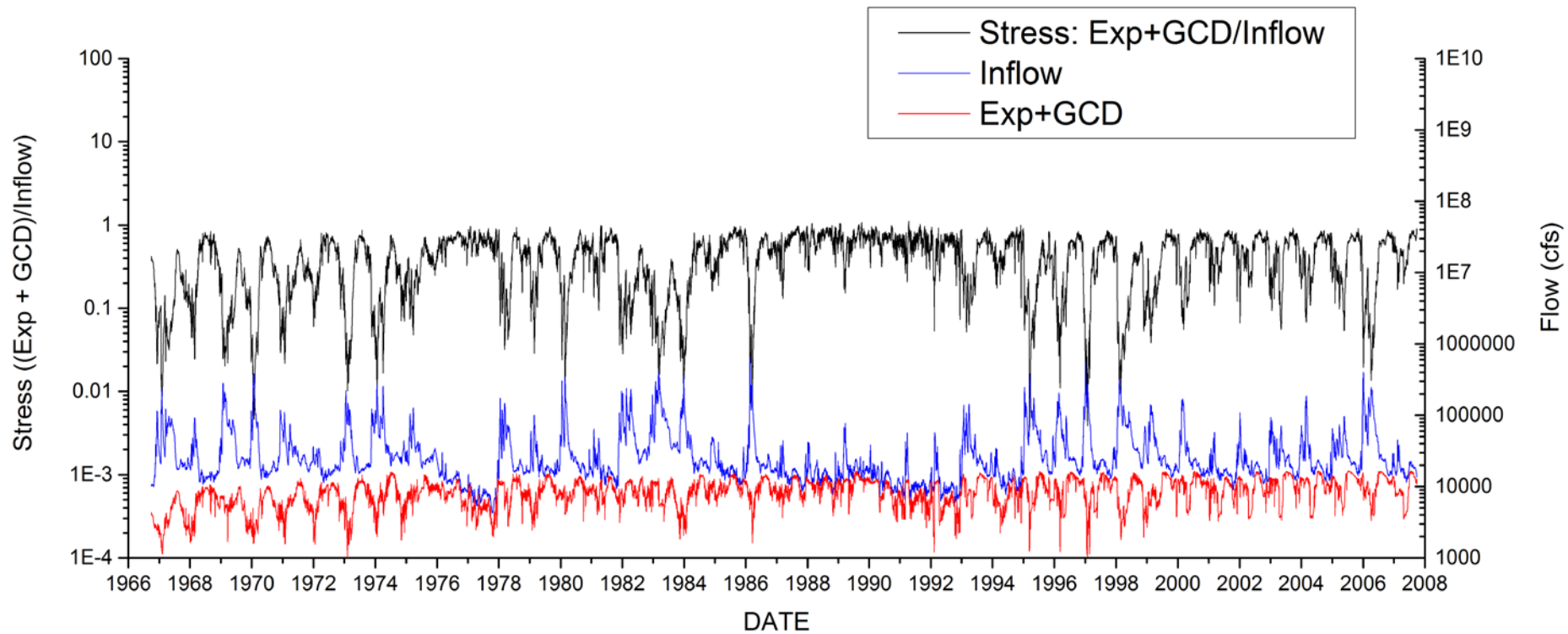
# Drivers of Ecosystem Change

- Reclamation of Intertidal Regions



# Drivers of Ecosystem Change

- Drought





# Drivers of Ecosystem Change

## Flow Regime Shifts



Shasta Dam



Top of California Aqueduct

# Drivers of Ecosystem Change

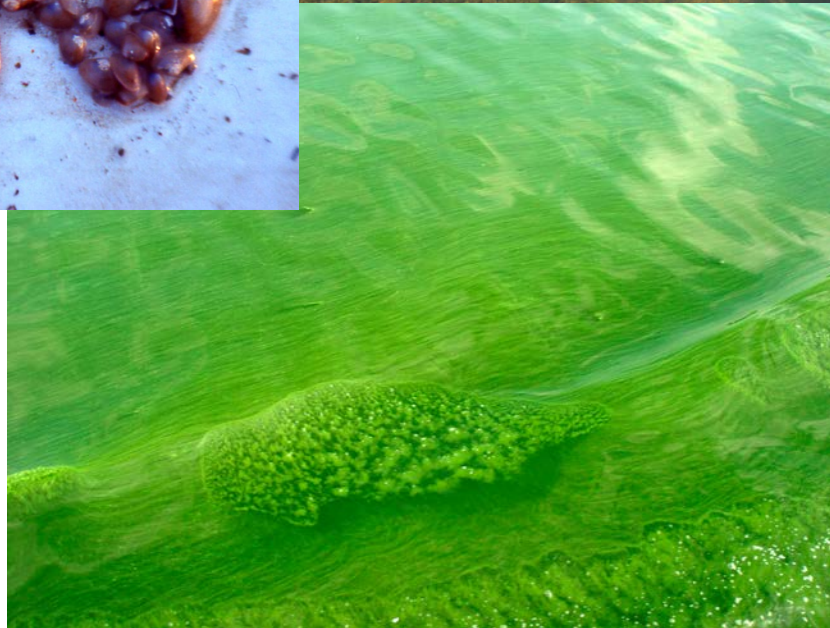
- Nutrients & Toxins
  - WWTF
  - Non-point
  - Agriculture
  - Legacy





# Drivers of Ecosystem Change

- Alien Species

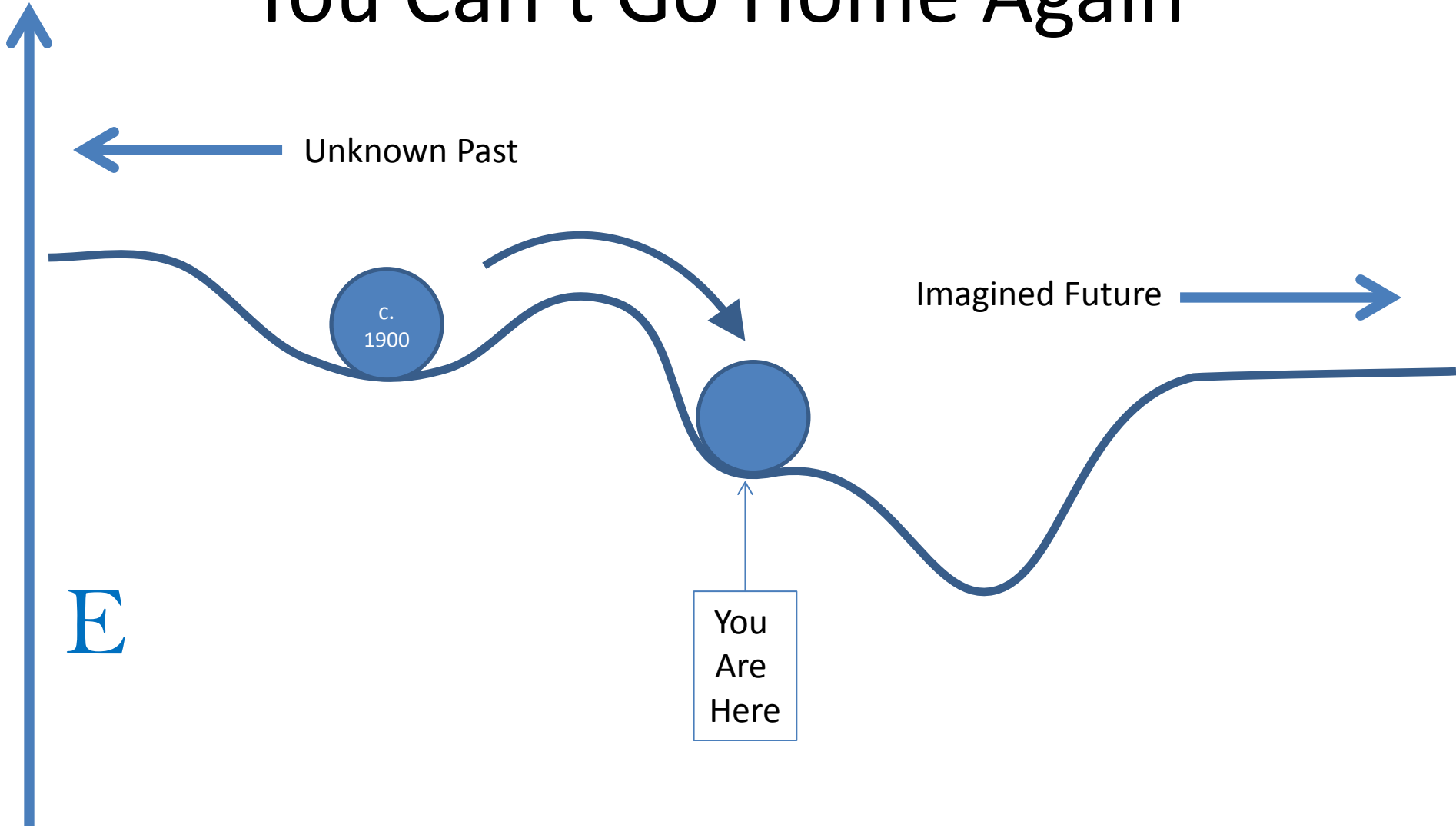




# The Upshot:

- Reduced habitat
  - Reduced food
  - Unfavorable conditions
- 
- > Recruitment failures
  - > Lost migratory corridors
  - > Alien paradise

# You Can't Go Home Again



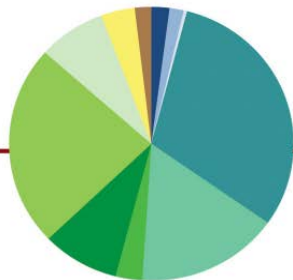
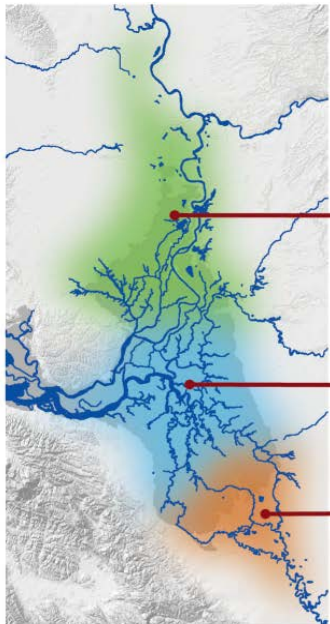
# What Does an “Imagined Future” Look Like?

## Inrichting Aakvlaai





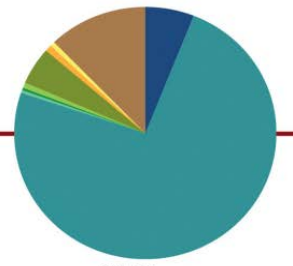
# Looking to the Past



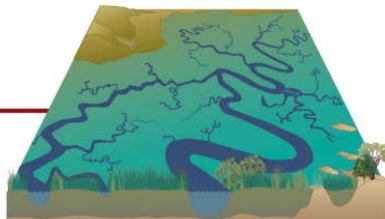
360,000 acres



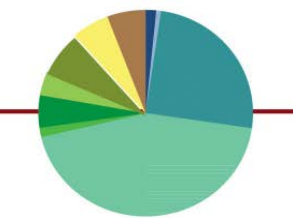
North Delta: flood basins



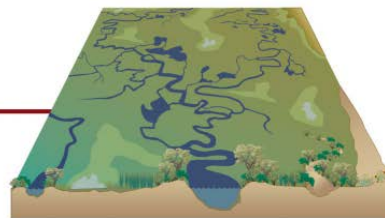
300,000 acres



Central Delta: tidal islands

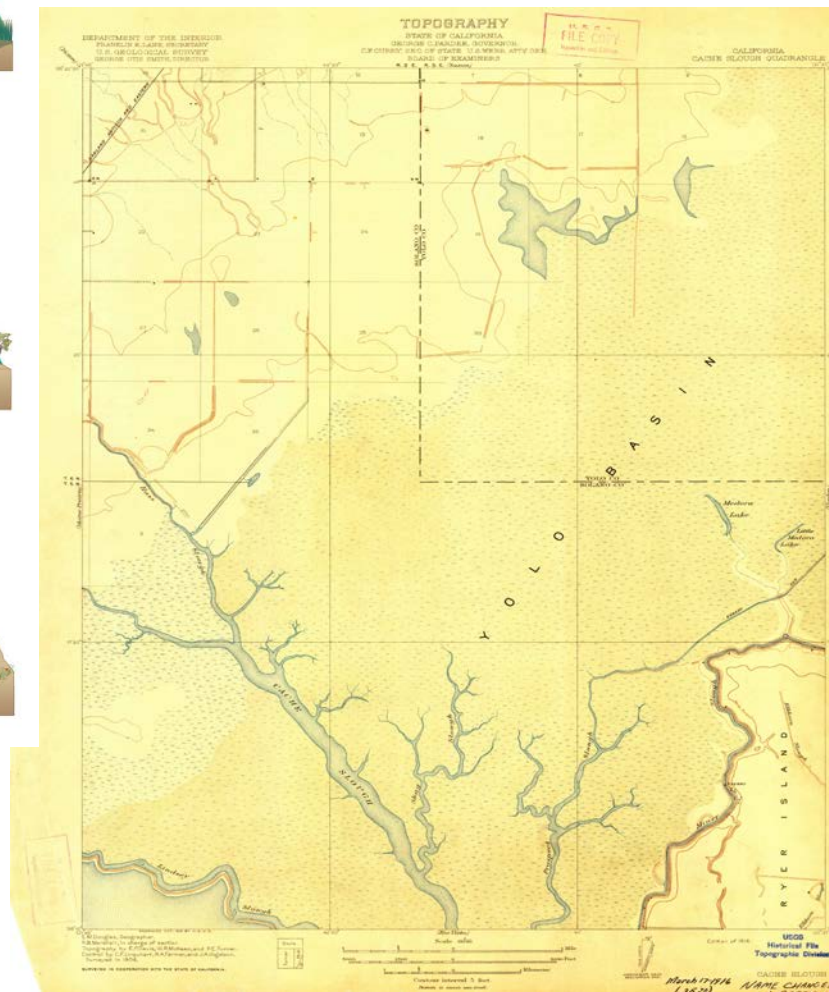


120,000 acres



South Delta: distributary rivers

- Water
- Pond/lake
- Seasonal pond/lake
- Tidal freshwater emergent wetland
- Non-tidal freshwater emergent wetland
- Willow
- Valley foothill riparian
- Wetland/woodland

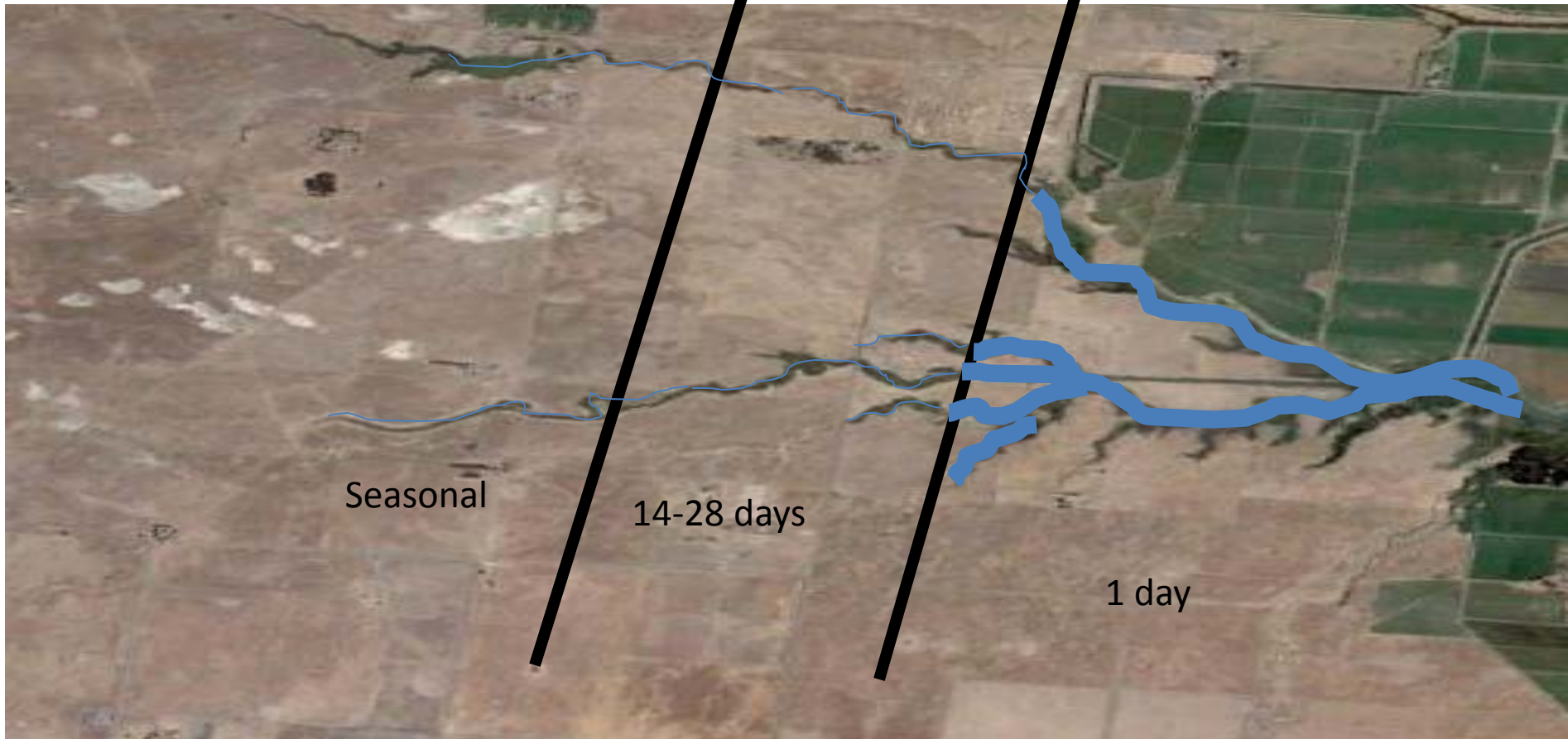


# Naturalistic Slough Function

Storm flow exchange

Spring tidal  
exchange limit

Daily tidal  
exchange limit



Seasonal

14-28 days

1 day

# Constraints

Storm flow exchange

Spring tidal  
exchange limit

Daily tidal  
exchange limit



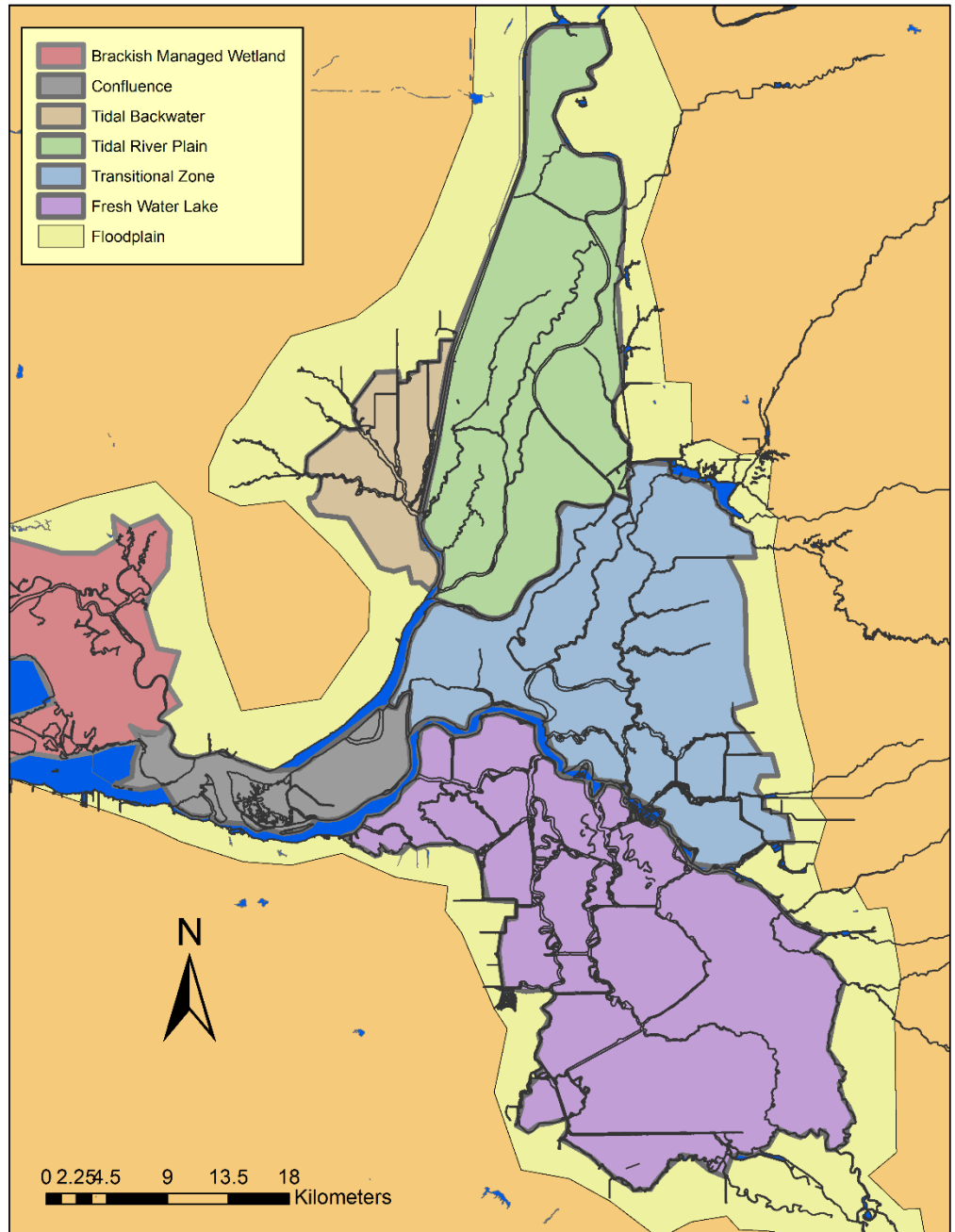


- Postage stamp approach may not scale up



# Reconciliation Approach

- Regional Strategies



# Reconciliation Approach

- Regional Strategies
- Water Management Changes
  - Agriculture
  - Export
  - Flood control
  - Species-specific closures



# Reconciliation Approach

- Regional Strategies
- Water Management Changes
  - Environmental Management
    - Salinity
    - Residence Time
    - Connectivity

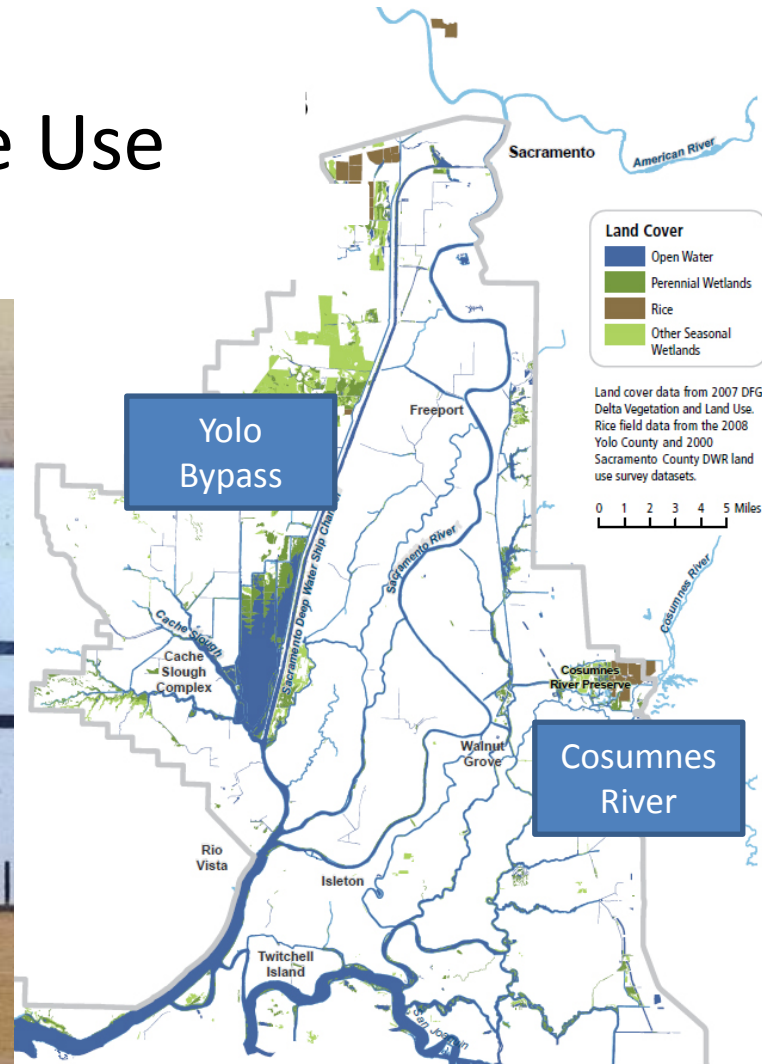
# Reconciliation Approach

- Regional Strategies
- Water Management Changes
- Habitat Construction/Multiple Use
  - Floodplains

**River**

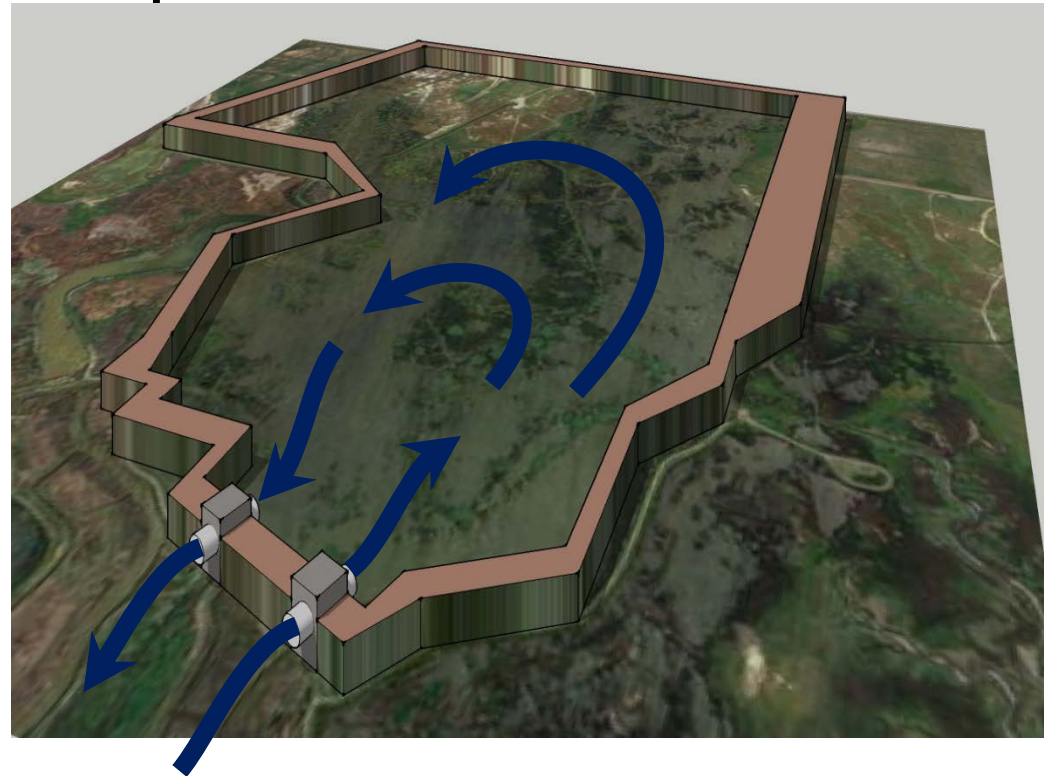


**Floodplain**



# Reconciliation Approach

- Regional Strategies
- Water Management Changes
- Habitat Construction/Multiple Use
  - Floodplains
  - Ponds/  
Managed Wetlands





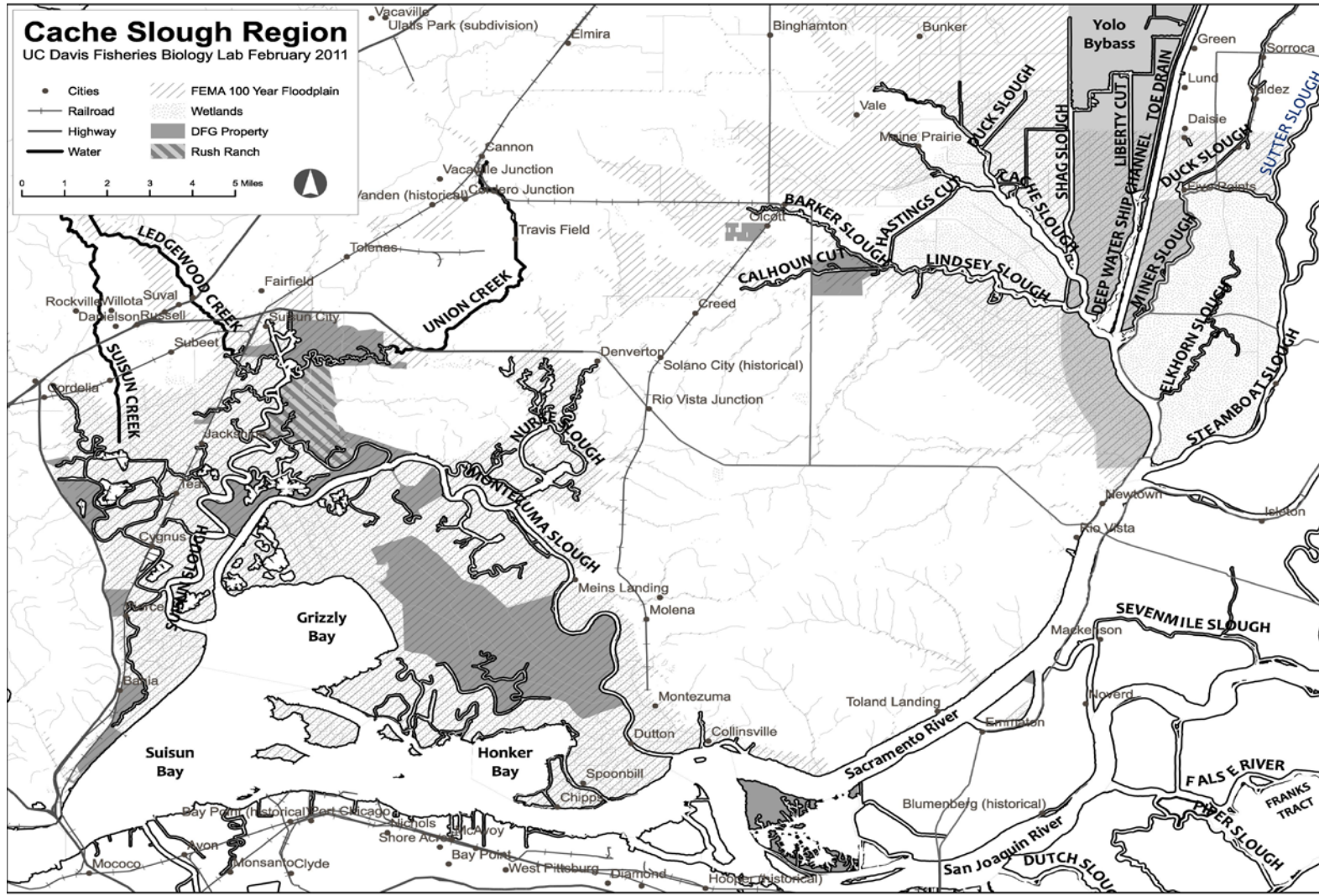
# Reconciliation Approach

- Regional Strategies
- Water Management Changes
- Habitat Construction/Multiple Use
  - Floodplains
  - Ponds
  - Managed Wetlands
  - Levees/Gates





# Mimicry of Nature in Function, if Not Structure



# The Co-Equal Goals

February 21, 2014

State Nation/World Ag Sectors Opinion Special Sections Classifieds Advertising About Subscribe Social Media

## Ranchers credited for helping Modoc sucker fish recover

Tim Hearnden

Published:  
February 14, 2014 11:20AM



Ranchers' efforts to keep livestock from grazing near sensitive streams are being credited for helping the Modoc sucker recover to the point that they have been proposed for removal from Endangered Species Act protection.

YREKA, Calif. — Ranchers' efforts at modifying their practices helped a Modoc sucker recover to the point that it is no longer listed under federal protection.

to the California Department of Water Resources, which manages public and private lands.

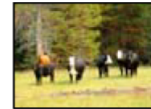
Search...

## Public Lands Grazing & Yosemite Toad

### CATTLE EXCLUSION EXPERIMENTS

- 2006-2008
- 3 Sierra National Forest Allotments
- 9 Meadows, 36 breeding pools
  - Toad occupied & toad unoccupied pools

Cattle Grazing



Yosemite Toad

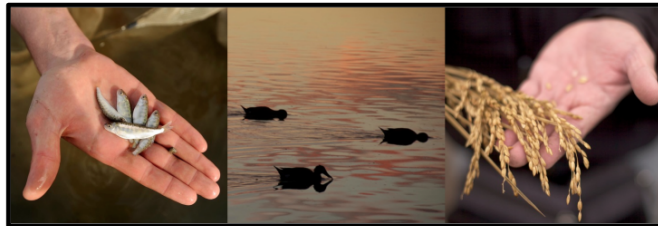


### RESULTS

#### The Knaggs Ranch

#### Experimental Agricultural Floodplain Pilot Study 2011-2012

#### Year One Overview



A win, win, win for salmon, waterfowl and agriculture.

Photos: J. Katz

A cooperative project of the  
**Center for Watershed Sciences at the  
University of California, Davis**  
&  
**California Department of Water Resources**

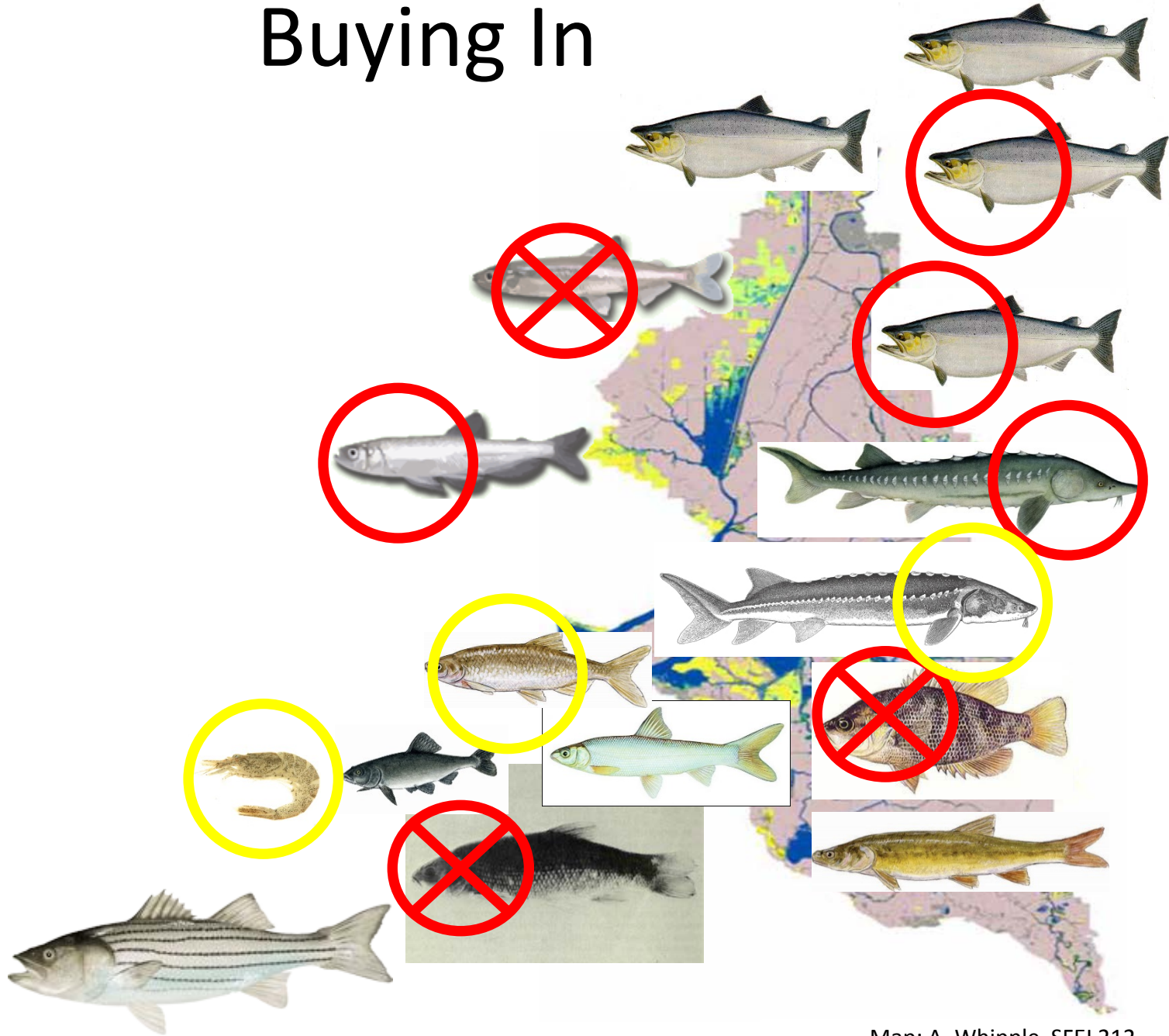
In cooperation with landowner partners  
**Cal Marsh and Farm Ventures, LLC**  
**Knaggs Ranch, LLC**

**DENVERTON  
FOSTERING PARTNERSHIP, NOT DIVISIONS,  
BETWEEN BIRD AND FISH RESEARCHERS**

by Dr Kevin Ringelman and Denise de Carion, UC Davis

magnitude below  
significantly different  
ecology & Management.

# Buying In







<https://watershed.ucdavis.edu/>

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