

# Managing floodplain productivity:

Slow it down, Spread it out, Grow 'em Up

Jacob Katz – California Trout



C. Jeffres

# Inland Sea



K. STREET, FROM THE LEVEE.

**INUNDATION OF THE STATE CAPITOL,  
City of Sacramento, 1862.**

Published by A. ROSENFIELD, San Francisco.

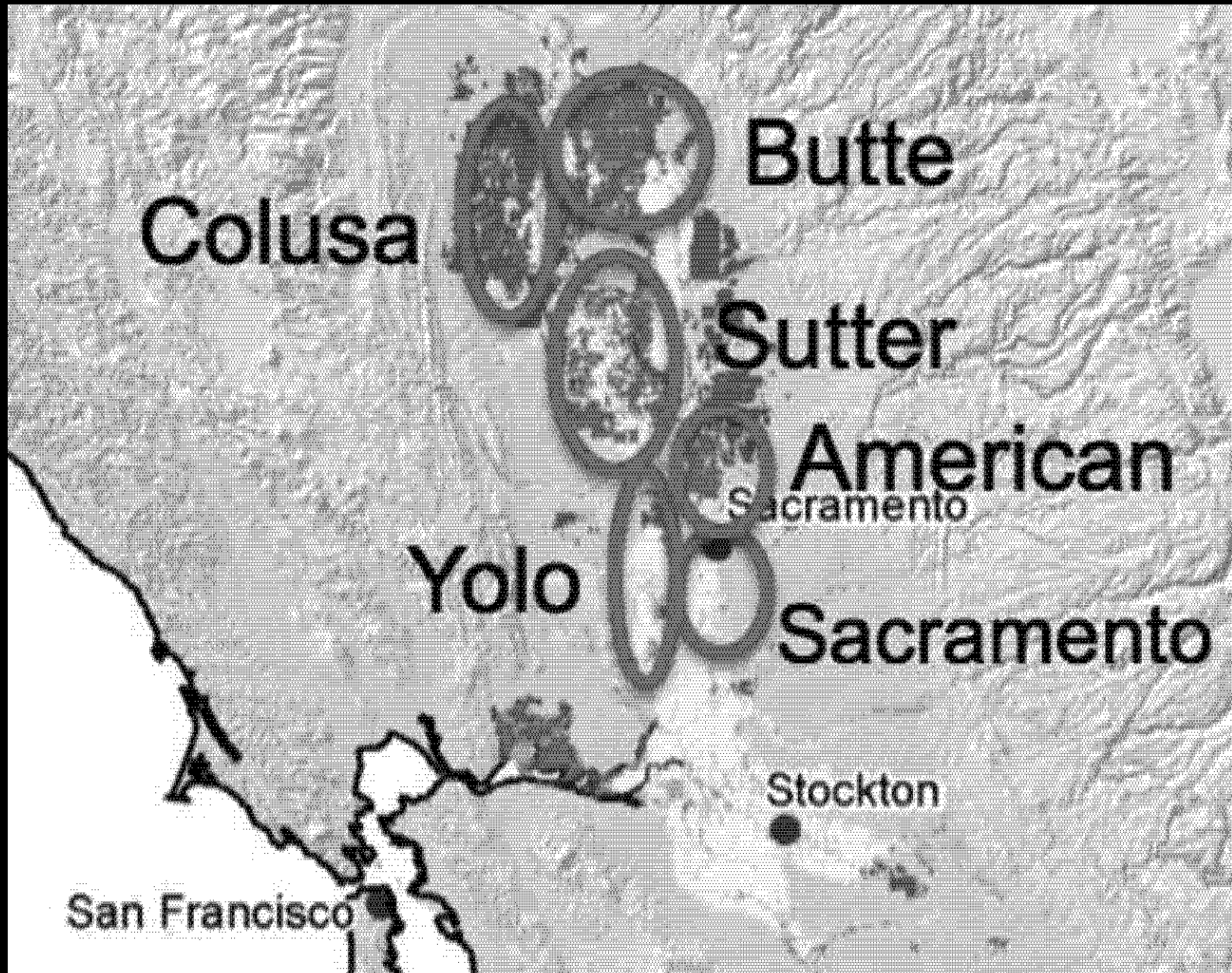


J street

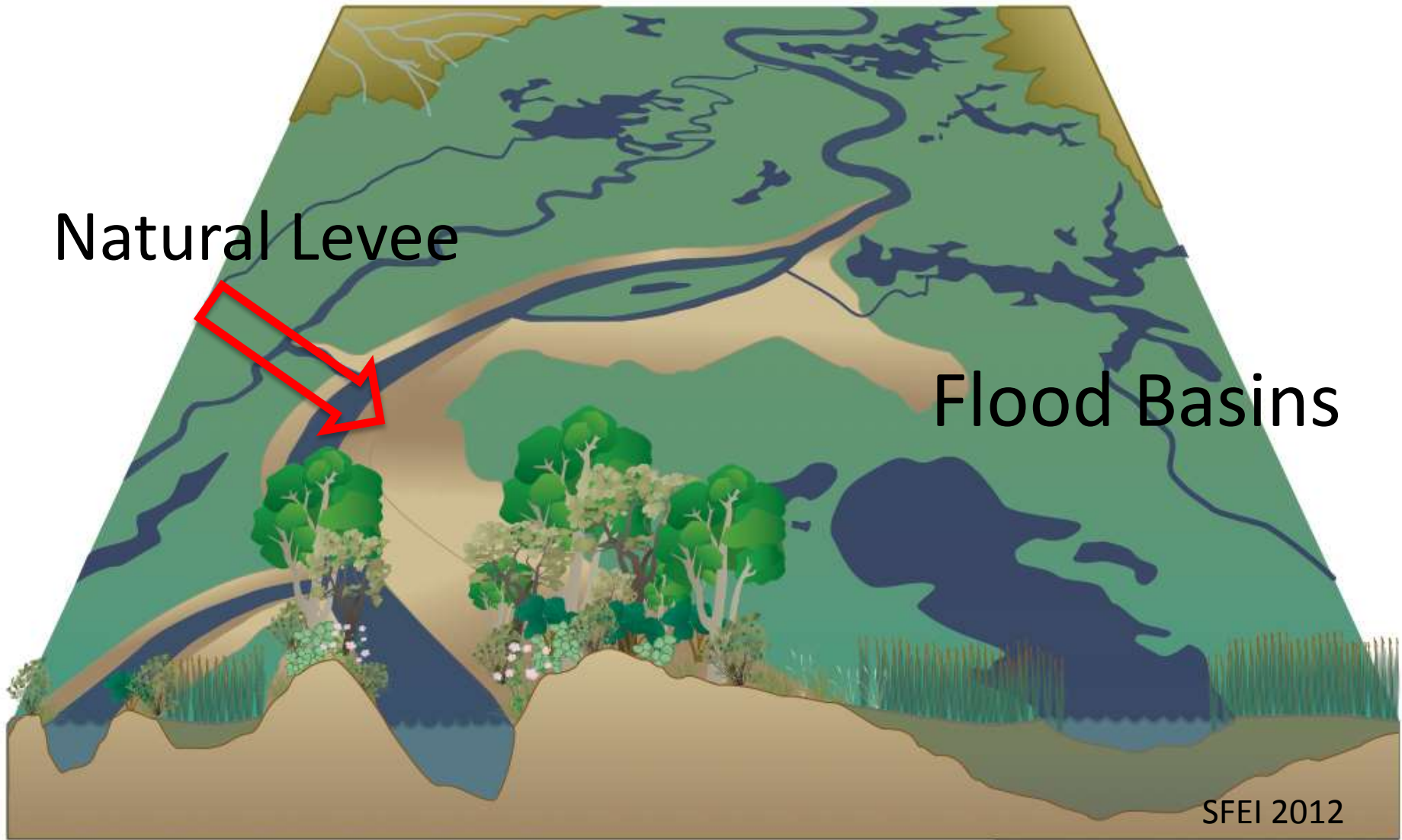


# Flood of 1862

# Sac Valley Flood Basins

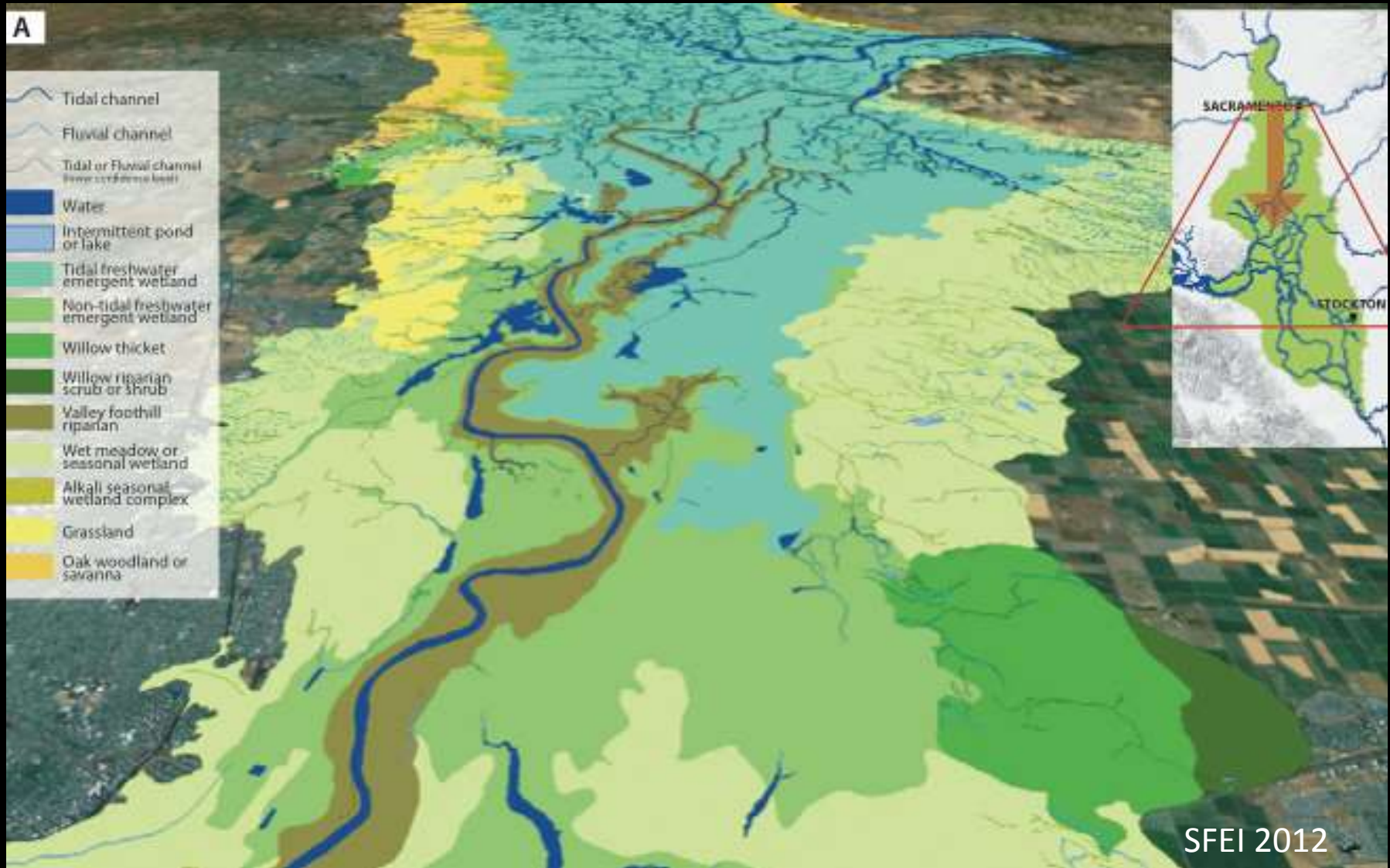






# Fluvial Processes

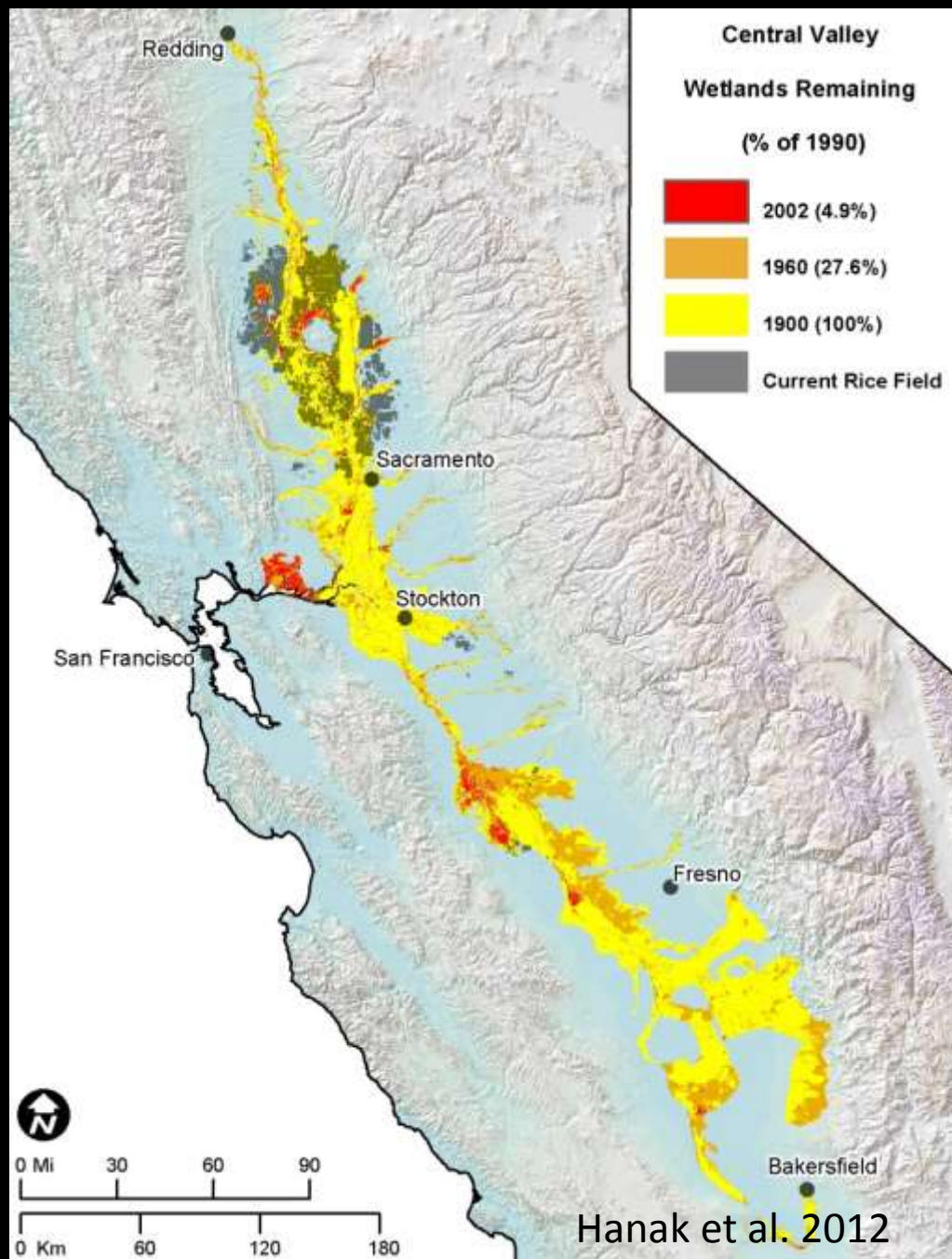
# A Shifting Mosaic of Wetland Habitat Types





# 13,000 miles of levees





Central Valley  
Floodplain  
reduced  
by more  
than **95%**

**Rearing  
Habitat  
lost**



# Cosumnes River 2008



No Dams = Floods with winter rain events = inundates floodplain



River

Floodplain

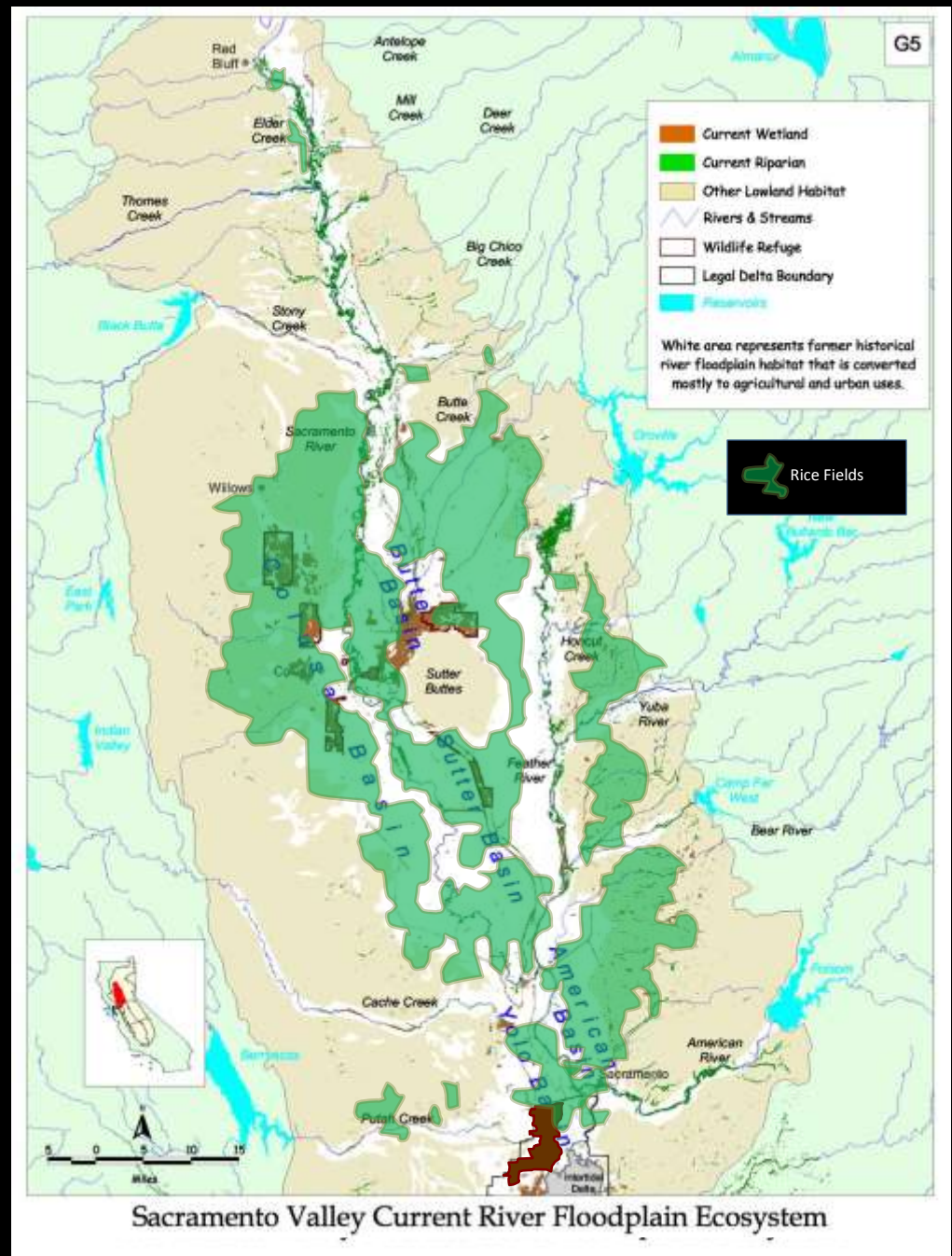


# Historic:

Fall run Chinook evolved rearing on floodplains

## TODAY:

- **95%** of floodplains lost
- drained and converted to rice.
- In California 550,000 acres of rice is farmed annually.
- Now, many of the rice fields are managed for migrating birds during winter months.







**We are never going back**



**American/ Natomas Basin**

**Yolo Basin**

**Sacramento Basin**

© aerialarchives.com



**But We Must Look Back  
In Order  
to Build a Better Future**





# **Process- Based Solutions**

**We must have a  
working understanding  
of natural systems  
in order to build  
a Central Valley that works  
for People, Fish and Wildlife**

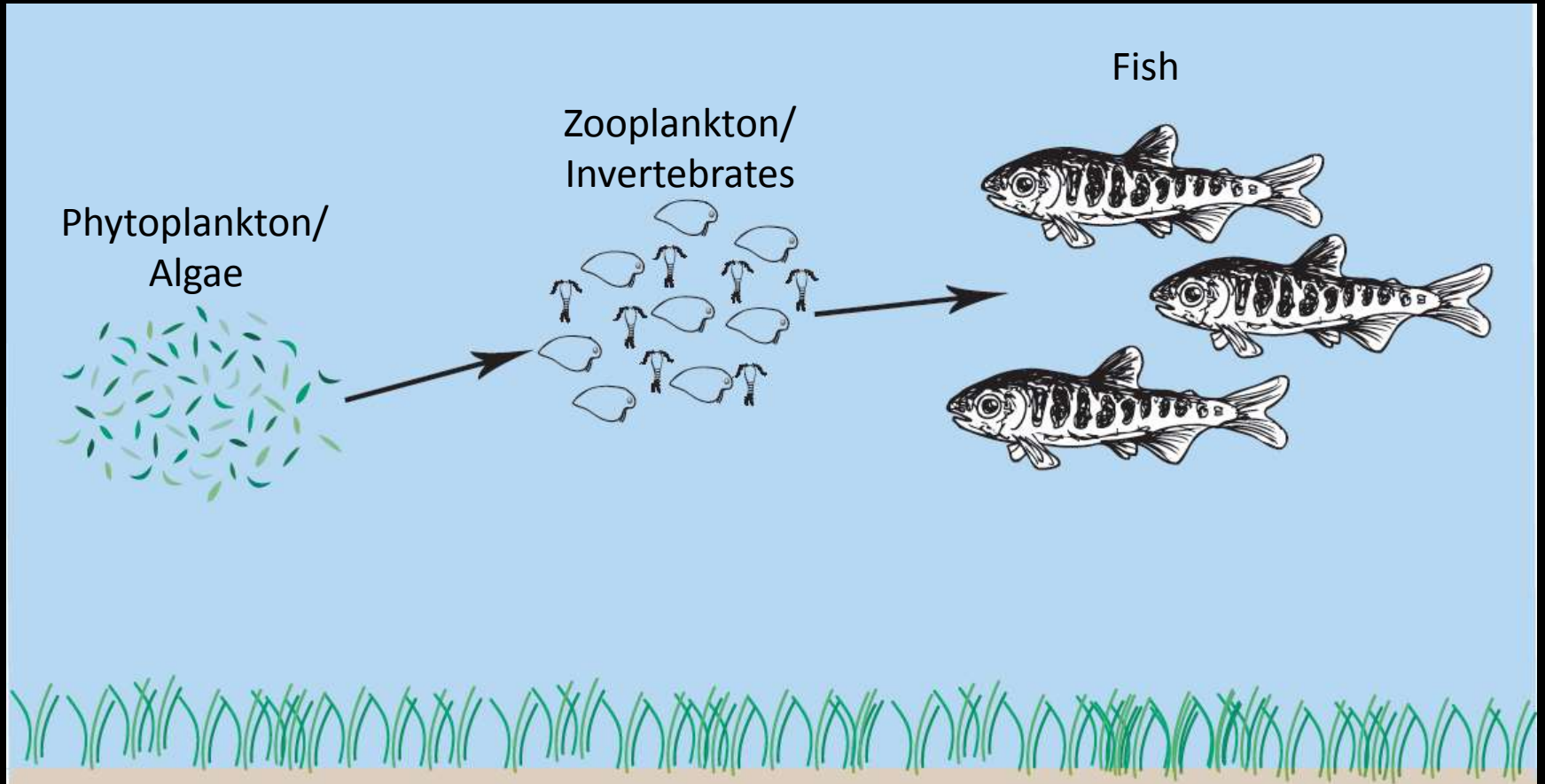
An aerial photograph showing a wide river flowing from the top left towards the right. The river is surrounded by a patchwork of green agricultural fields, some of which are divided by thin white lines. The sky is overcast with grey clouds. The text "More Photic Zone!" is overlaid in the upper right corner.

# More Photic Zone!

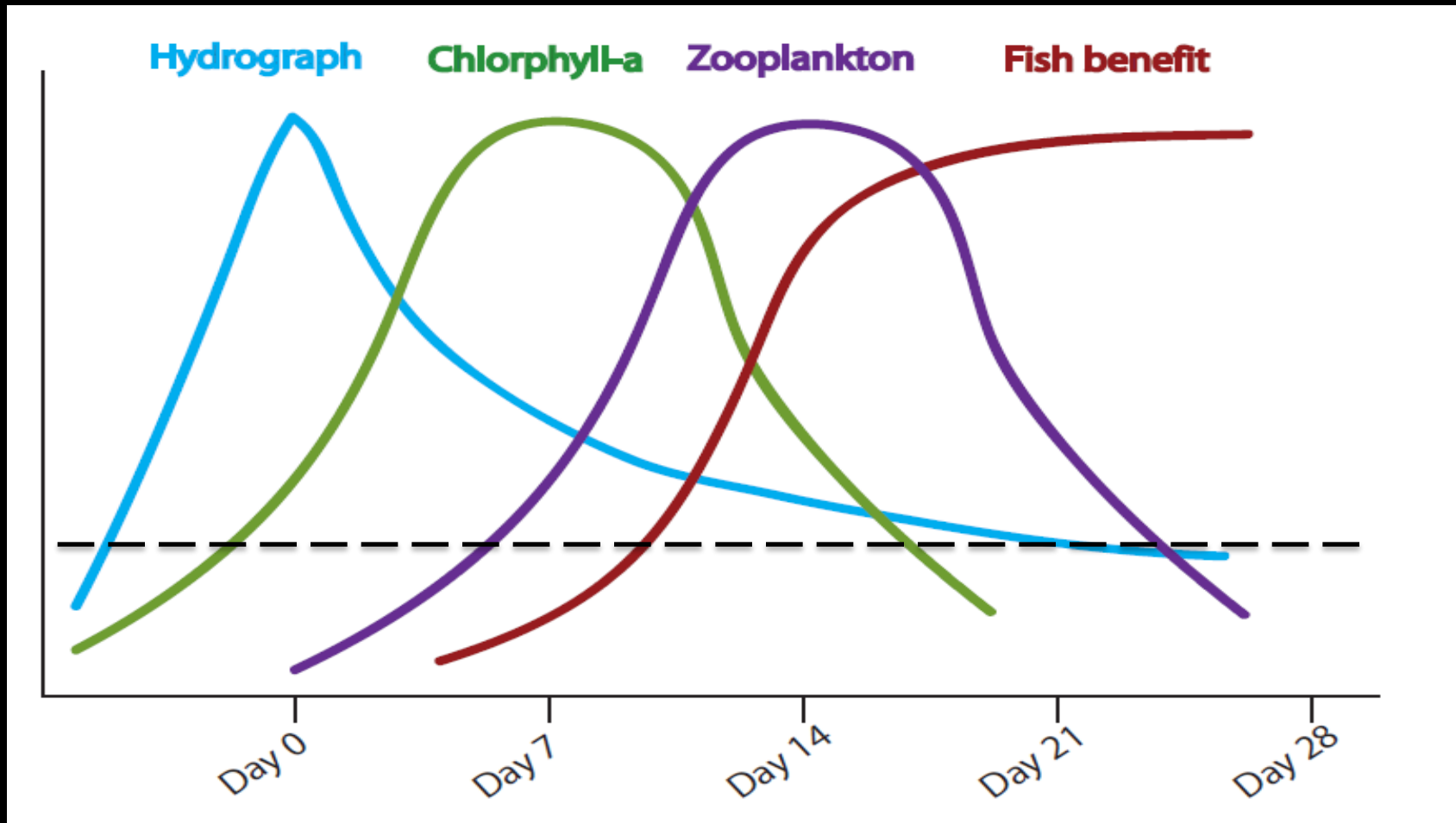
Bright idea!



# Floodplain Food Web



# Timing, Duration, Magnitude





# Mimicking Natural Process to Restore Ecological Function

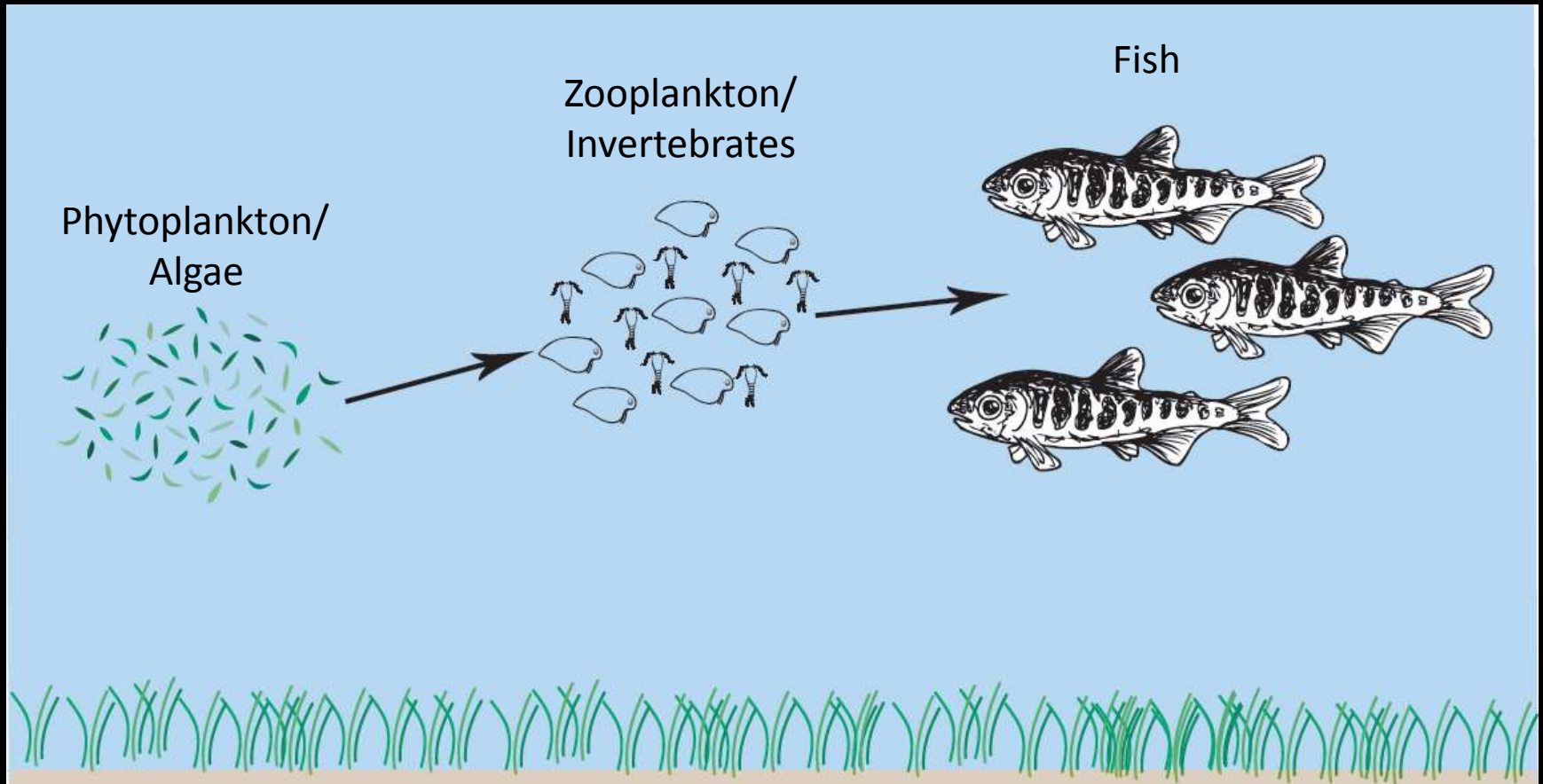
**Restored Floodplains**



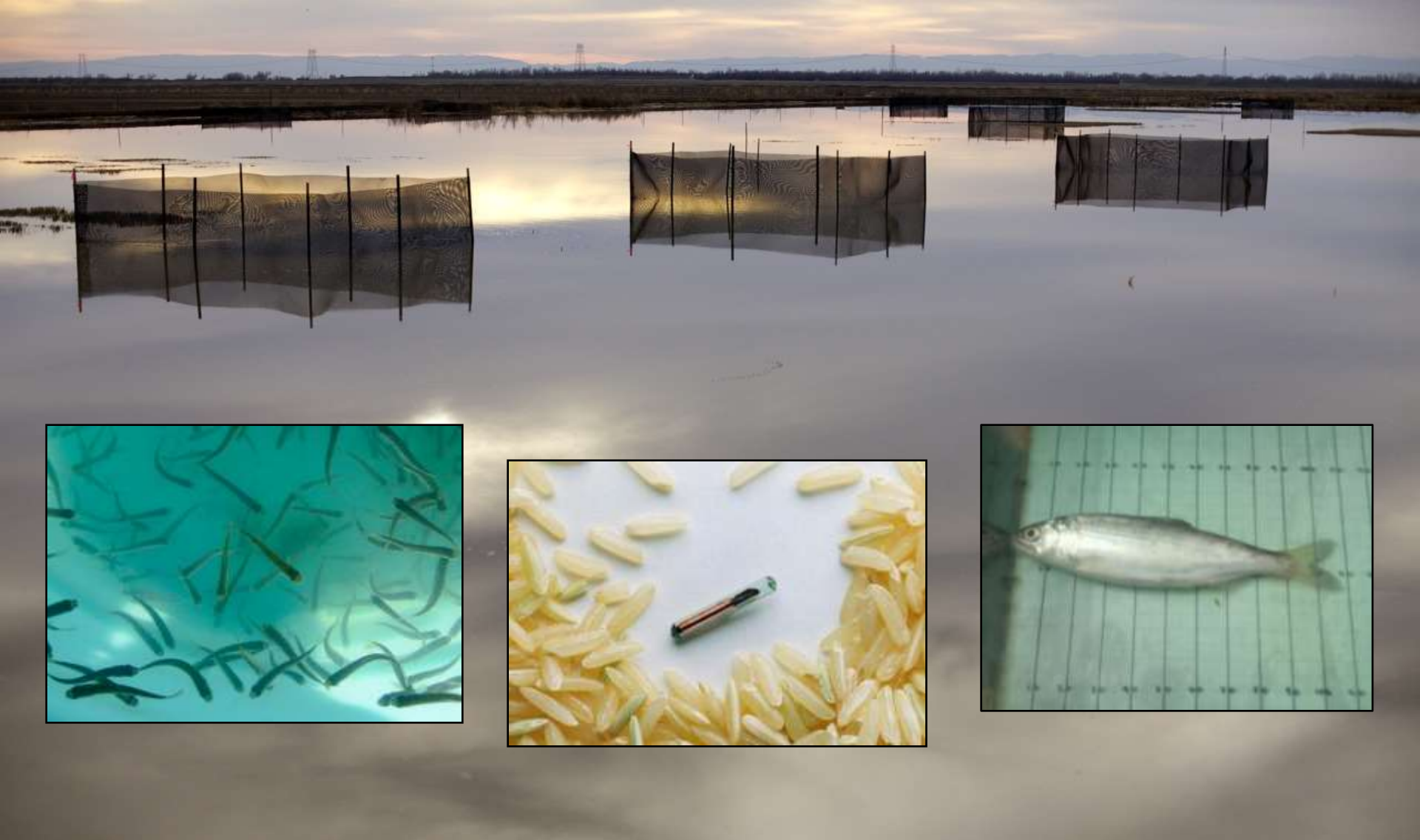
**Managed Ag Floodplains**



# Mimicking Natural Process to Restore Ecological Function



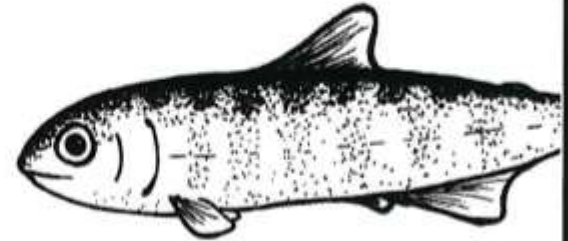
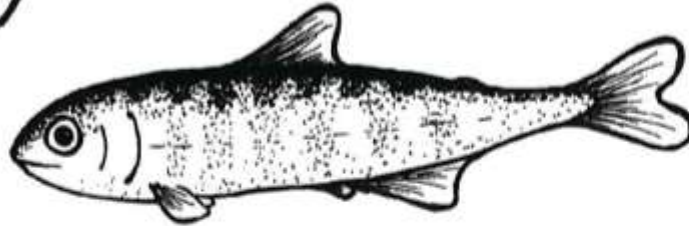
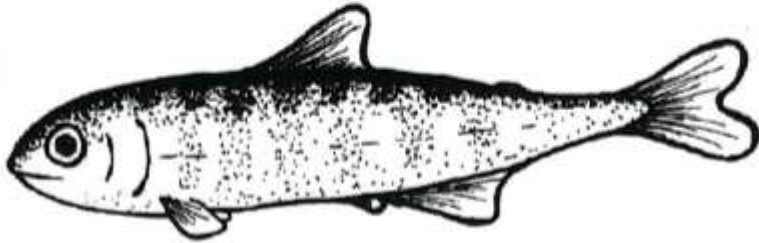
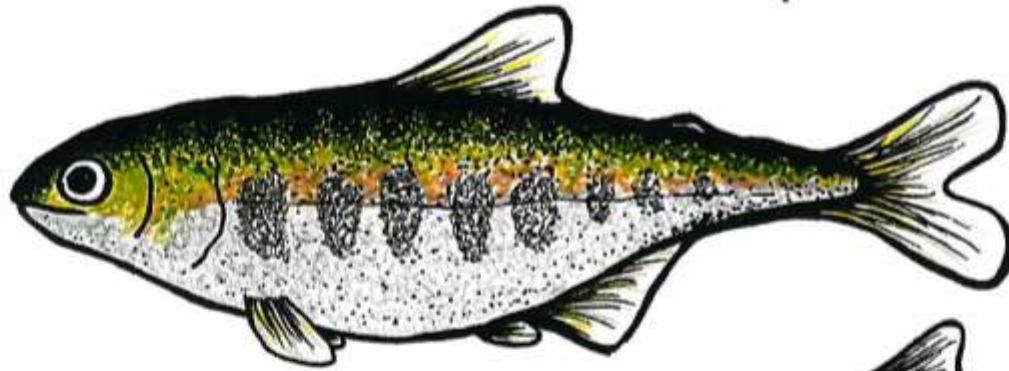




Mimicking historic floodplain processes  
in post-harvest floodplain rice fields

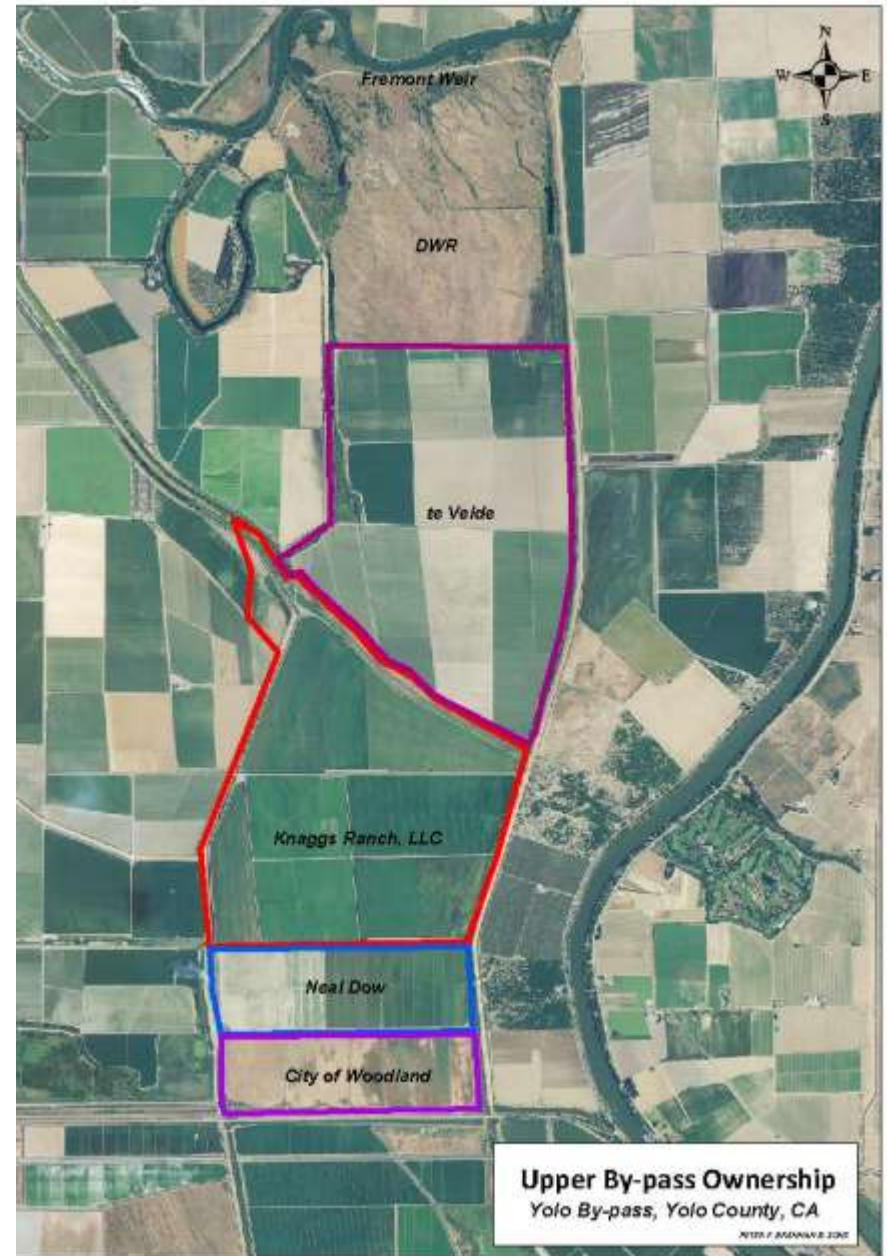
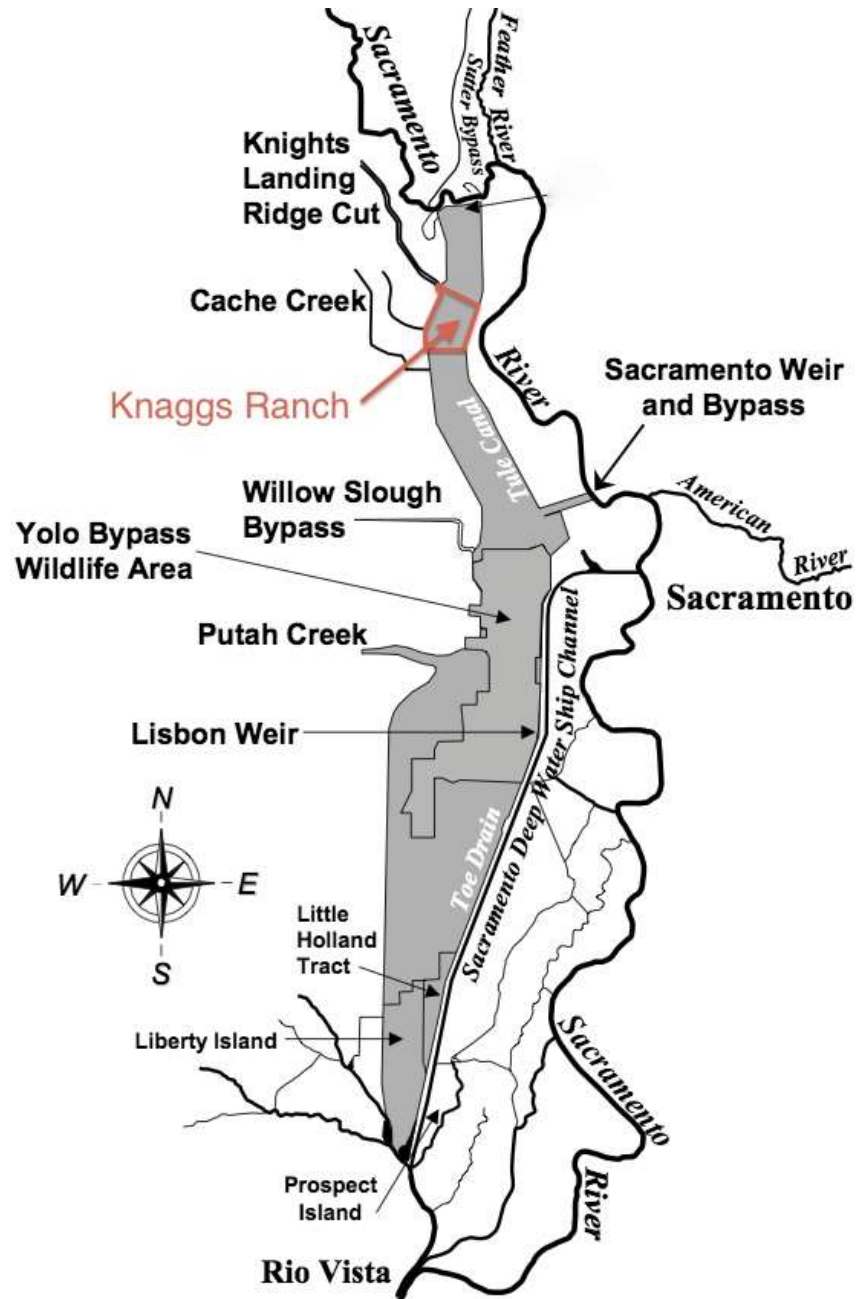
# The Nigiri Project

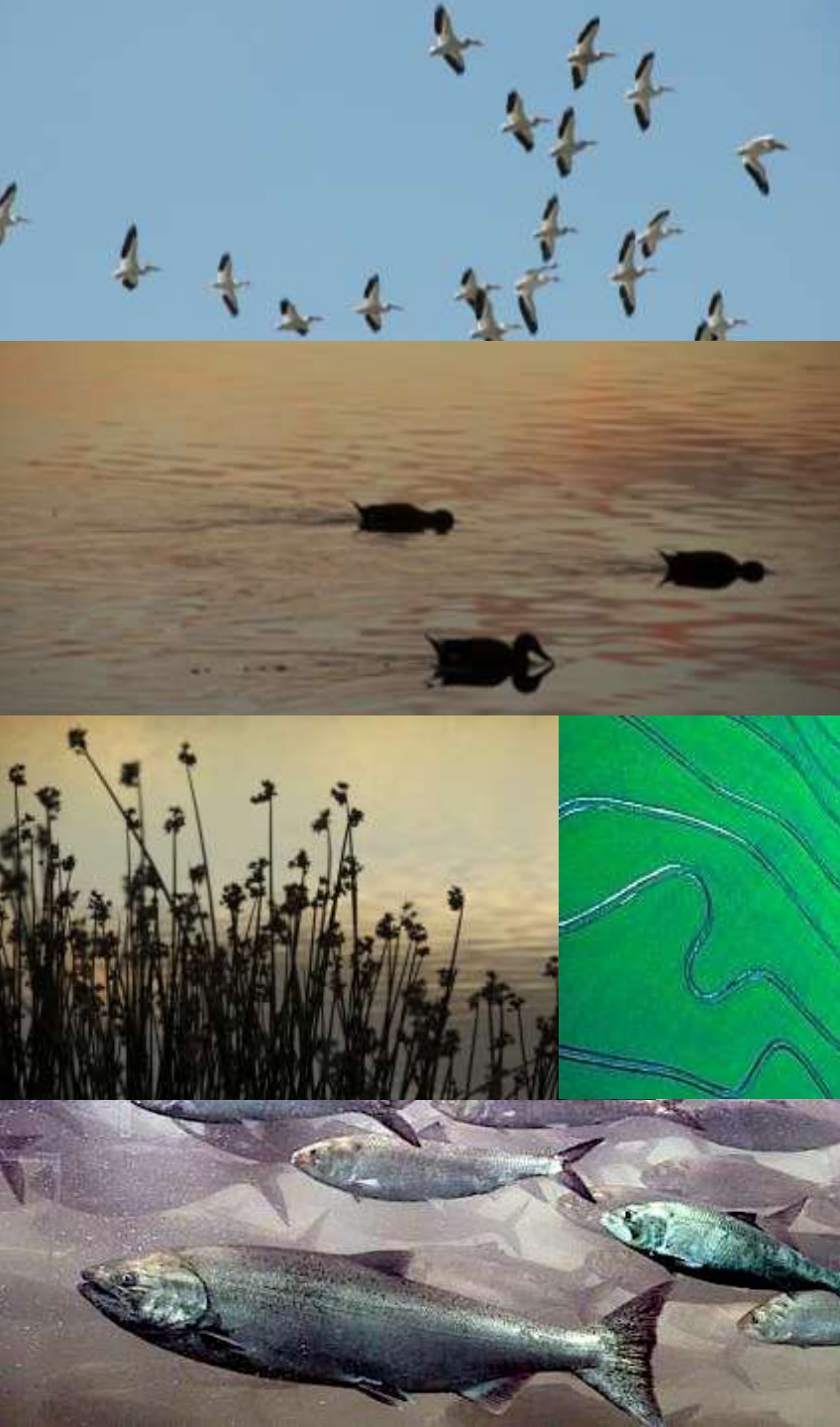
Floodplain Fatties





# Knaggs Ranch on Yolo Bypass





## Managed floodplain for multiple uses:

- Flood protection
- Agriculture
- Fish habitat
- Waterbird habitat
- Aquifer recharge



## Post Harvest - November







Carson Jeffres







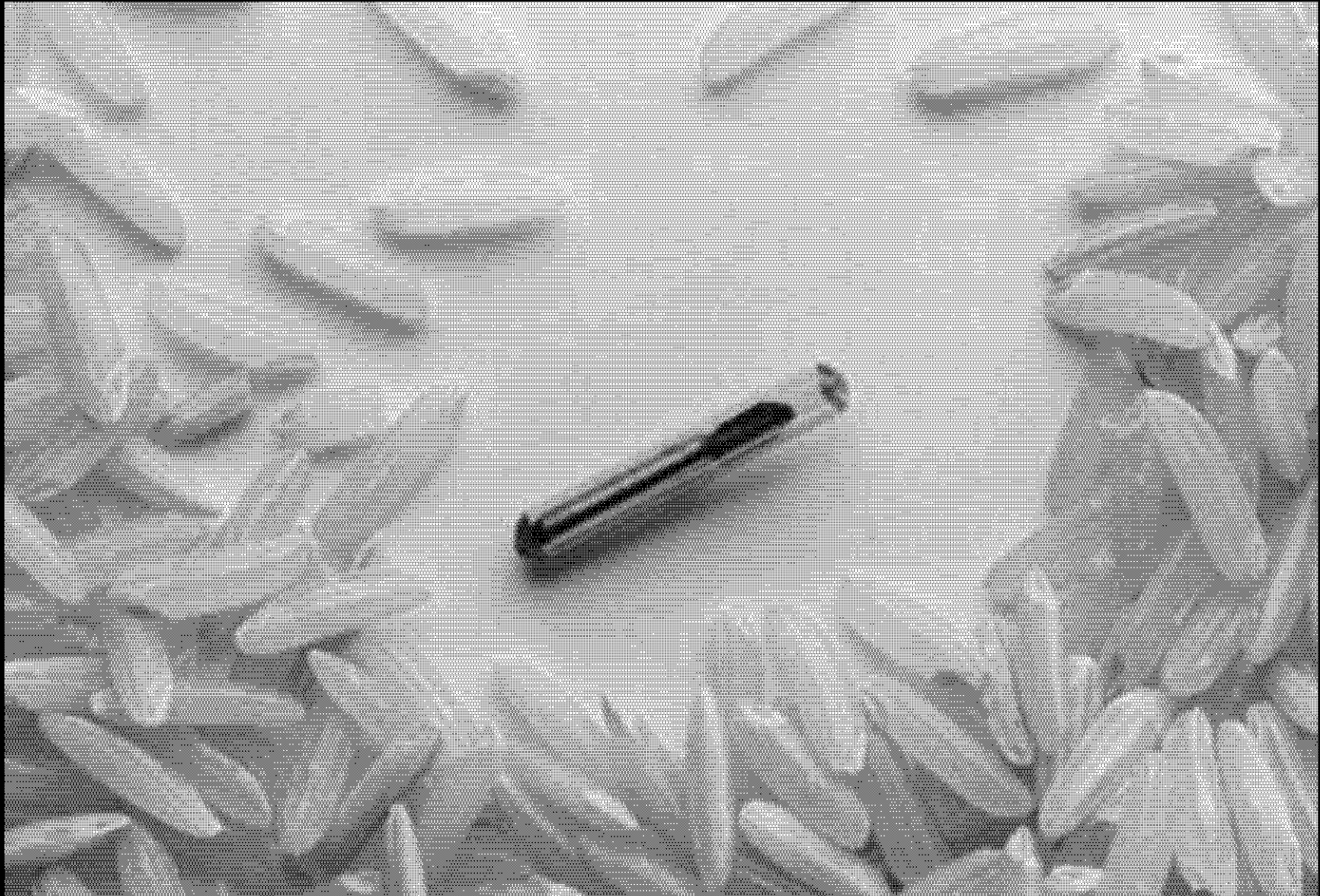








# Passive integrated transponder (PIT tags)







Fish measured every 2 weeks



After 6 weeks field drained







Fish measured and  
tags read

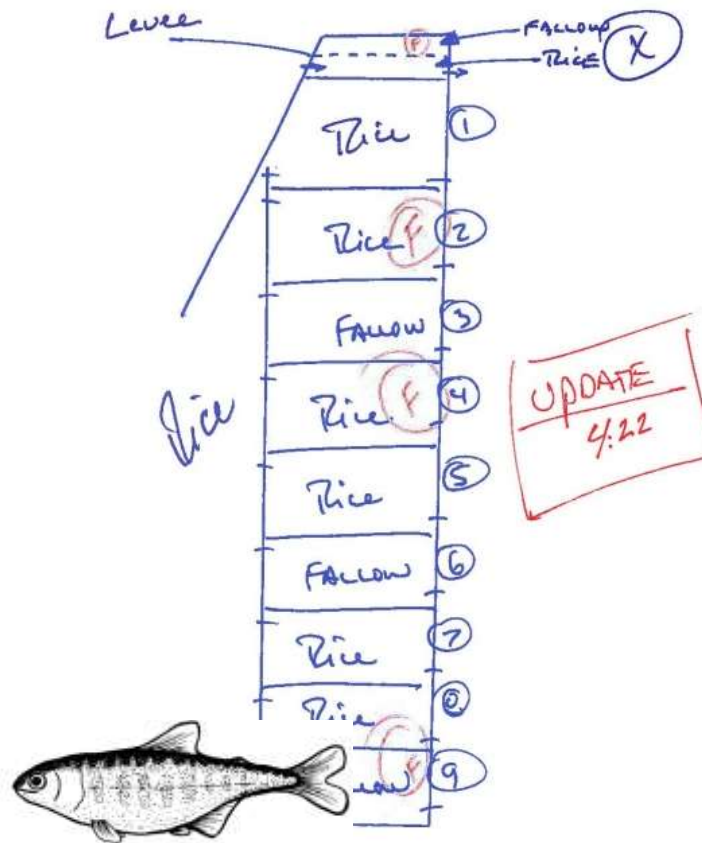


G  
R  
O  
W  
T  
H



# 2013

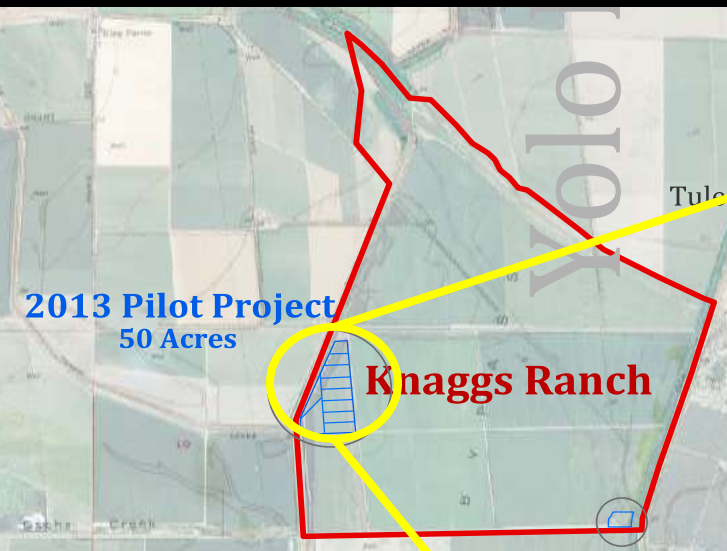
5-3





Nine 2-acre fields





**2013: Feb 18 – Apr 4**

42,000 hatchery fish



Fallow



Stubble



Stomped

Day 0

Day 38



3/19

53 mm

1.5 g

4/27

90 mm

9.4 g

0.94 mm/d

0.18 g/d



**2014**

**2013 Pilot Project**  
50 Acres

**Knaggs Ranch**

45,000 hatchery fish,  
400 Feather River "wild" fish

**All Fields Stomped**

**3**

**Ditch Depth  
Treatments**

0"

18"

36"

18"

0"

36"

0"

36"

18"







2014

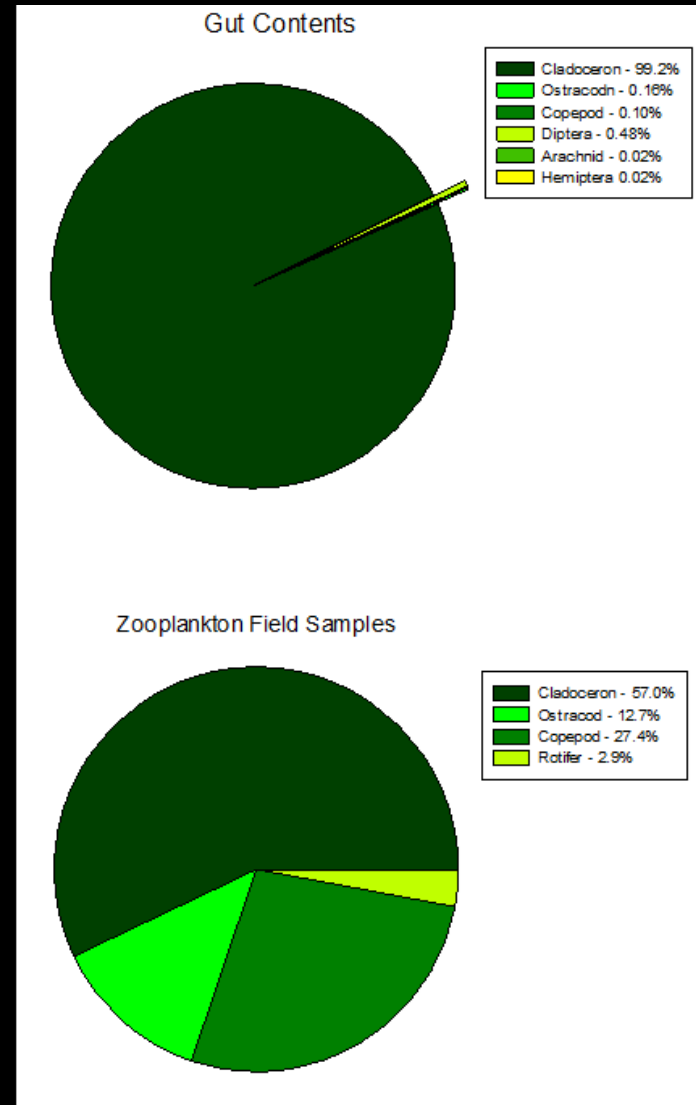
Similar Growth

Better  
Survival

(Approx. 60%)

# Knaggs Gut Contents

- Contents from a single 79mm salmon
  - ~460 individual cladocerans





Slow it down!

Spread it out!

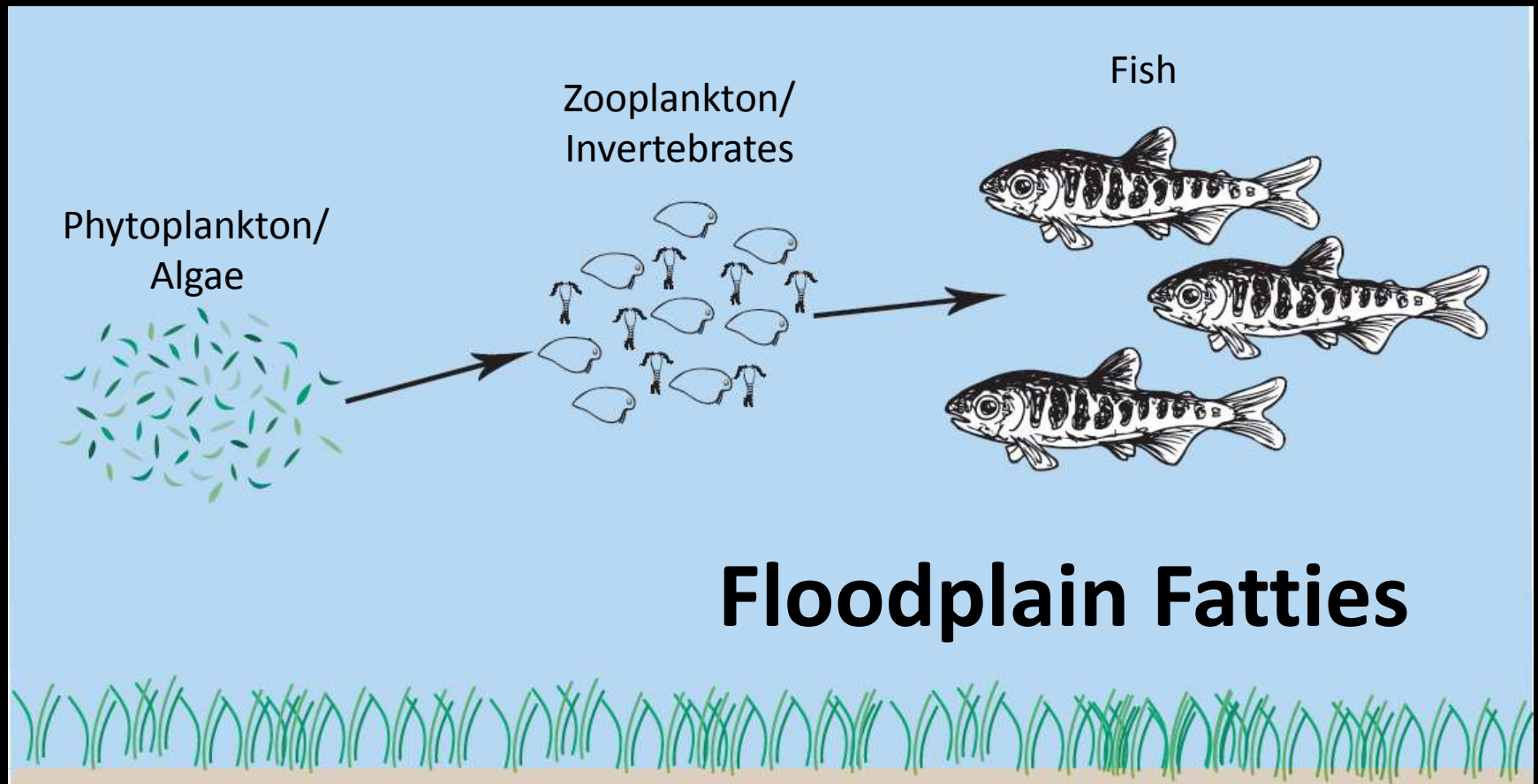


Grow them up!





# Mimicking Hydrologic Process To restore Ecological Function



Yolo, Sutter, Cosumnes, same process different bugs

# Fish need to Eat

Feather River – “wild”



Yolo Bypass reared

February 24 2014

## Process-Based Solutions

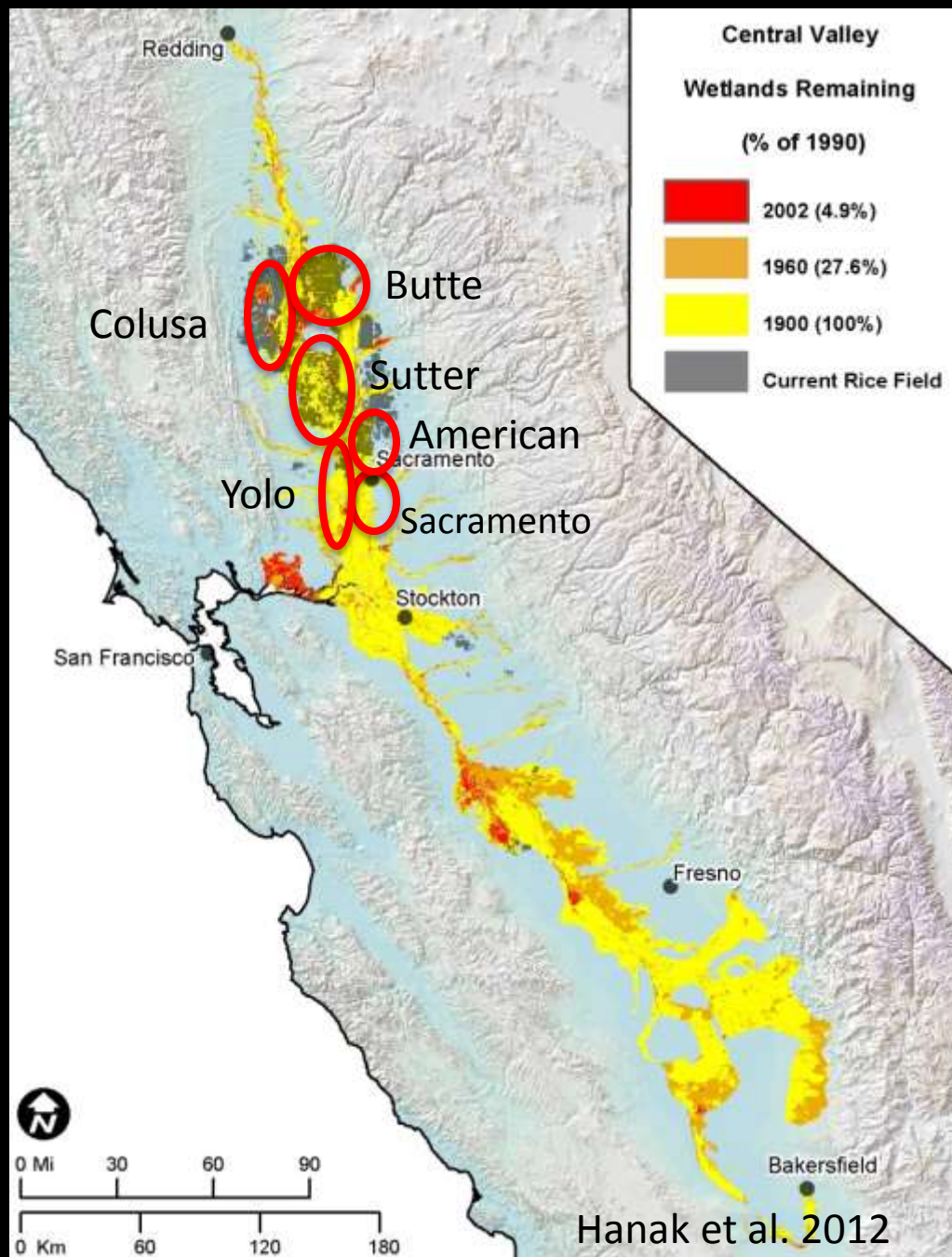
# Process–Based Solutions:

Only landscape-level riverine processes  
can create and maintain  
the diverse mosaic of habitat types  
needed for the full lifehistory expression  
on which resilient,  
self-sustaining  
populations of wild fish depend





# Landscape Scale Connectivity



# Sac Valley Flood Basins

Large & Flat =

High residence  
time of flood  
waters =

Aquatic  
productivity



Thicktail chub  
**extinct**





# A Cooperative Partnership

## California Trout

The California Department of Water Resources

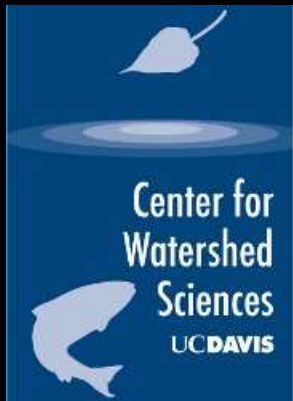
The UC Davis Center for Watershed Science

Cal Marsh and Farm Ventures, LLC

Knaggs Ranch, LLC

The U.S. Bureau of Reclamation

NOAA – Southwest Fisheries



This work is collaborative and could not be achieved without the effort of many:



Ted Sommer, Louise Conrad, Gina Benigno,  
Steve Brumbaugh, Josh Martinez (DWR),  
Carson Jeffres, Peter Moyle, Nick Corline,  
Miranda Tilcock (UCD), Josh Israel (US  
Bureau of Reclamation), Joe Kiernan (NMFS),  
Jason Roberts (DFW), John Brennan, David  
Katz and Huey Johnson  
(Cal Marsh and Farm)

# Questions?



Carson Jeffres

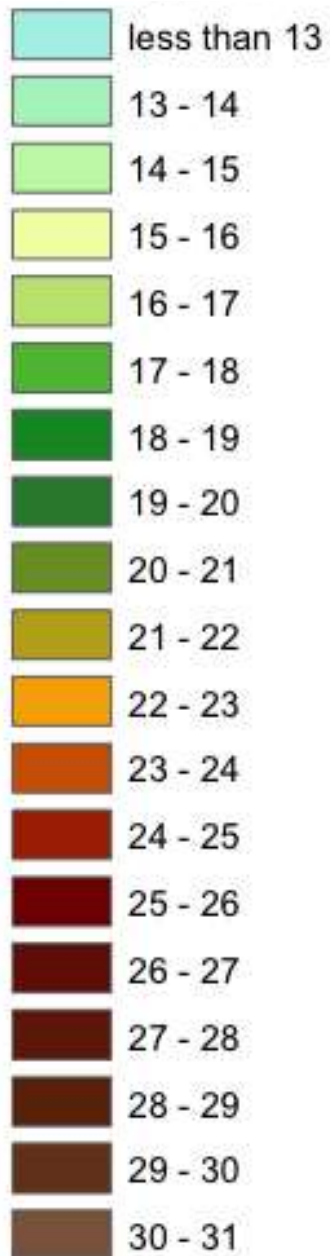


# Process-Based Reconciliation

Integrating a working knowledge of natural process, into management of natural resources



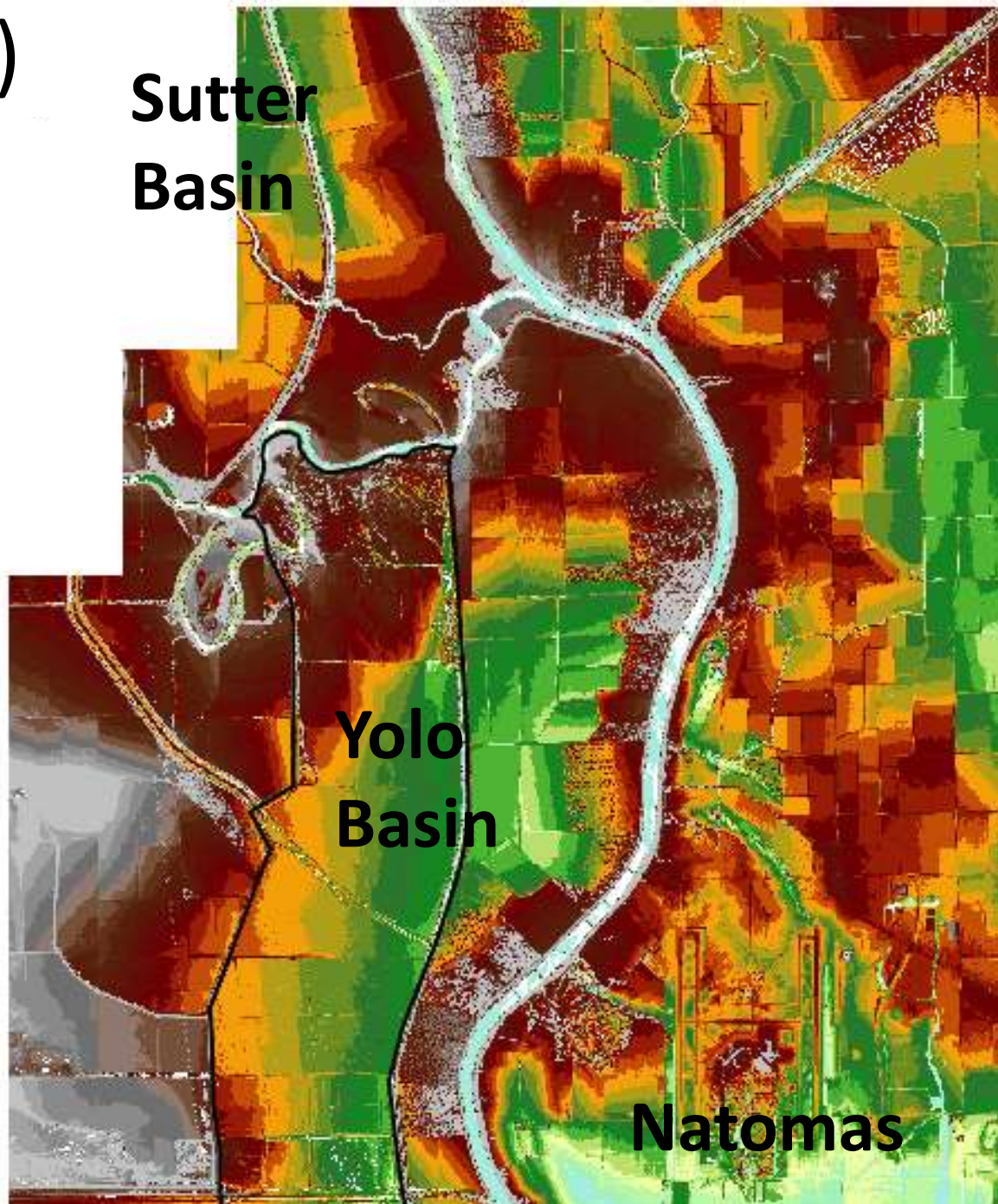
# Elevation (feet)



**Sutter  
Basin**

**Yolo  
Basin**

**Natomas**









# Flooding instead of burning



# Central Valley Waterfowl



Unassisted access to diverse  
habitats in space and time →

expression of diverse  
life history strategies →

limited gene flow  
between breeding groups →

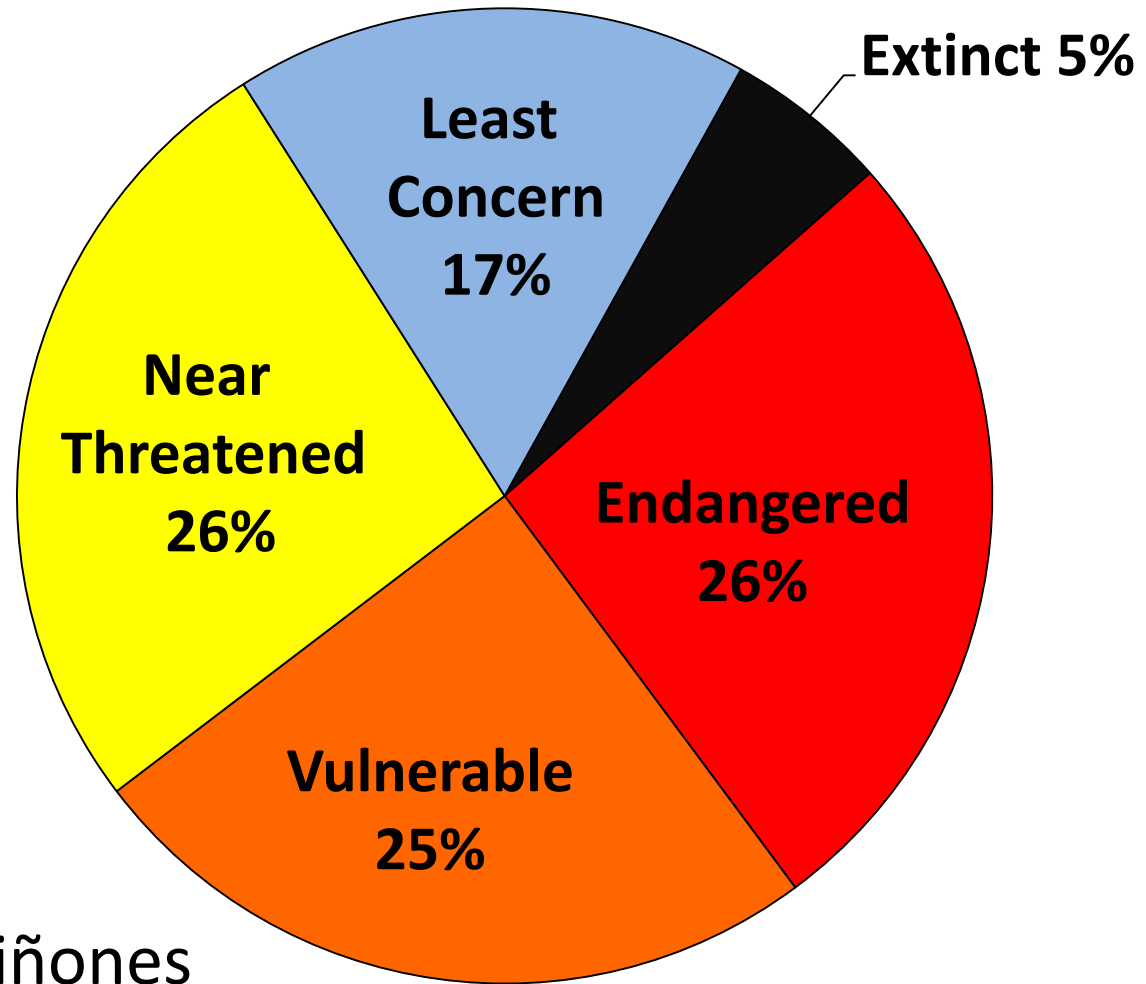
adaptation to local environmental conditions  
via natural selection →

evolution and maintenance  
of discrete populations (runs)





# CA NATIVE FISHES 2011

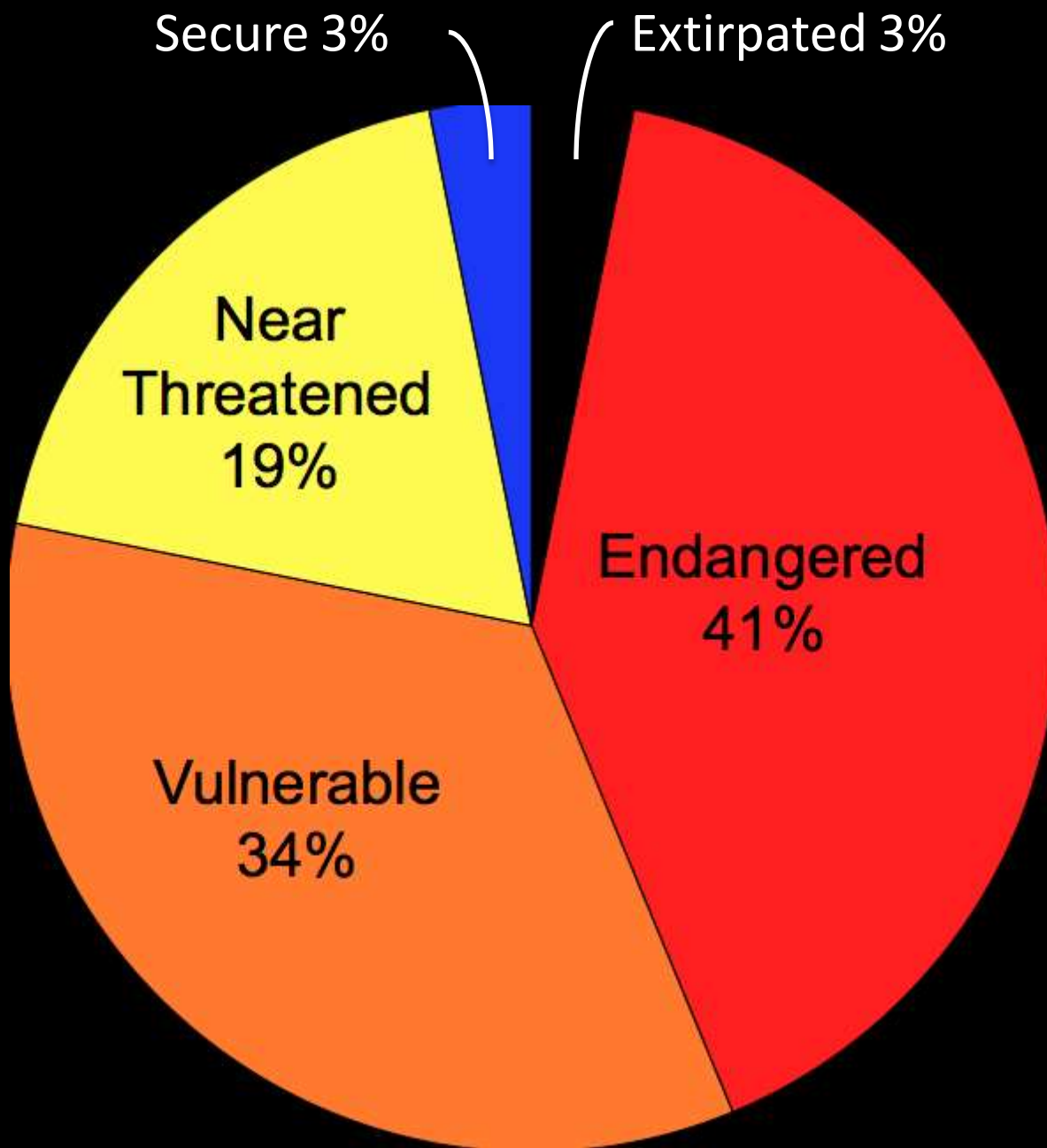


**83%**

Extinct or  
in decline

Moyle, Katz & Quiñones  
Biological Conservation,  
Vol 144, issue 10, Oct. 2011

**N=129**



Vast  
Majority  
(94%) of  
California  
native  
salmonids  
in sharp  
decline



Native species must  
to be able to  
recognize their  
environment

We are never going back!

But we must look back in order to  
move forward.

We must have a working  
understanding of how natural systems  
worked in order to build better more  
effective systems