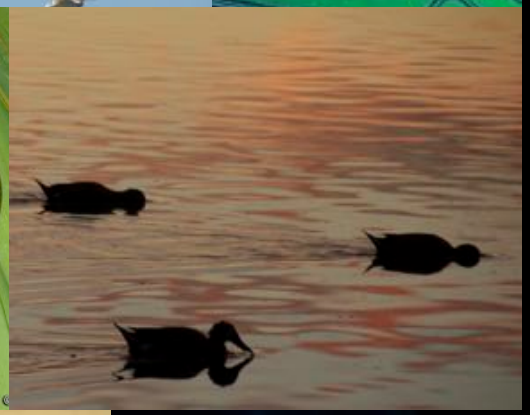
# Fins, Feathers and Fish Food on Floodplain Farm Fields

**Jacob Katz – California Trout**




# Managing floodplains for multiple uses:

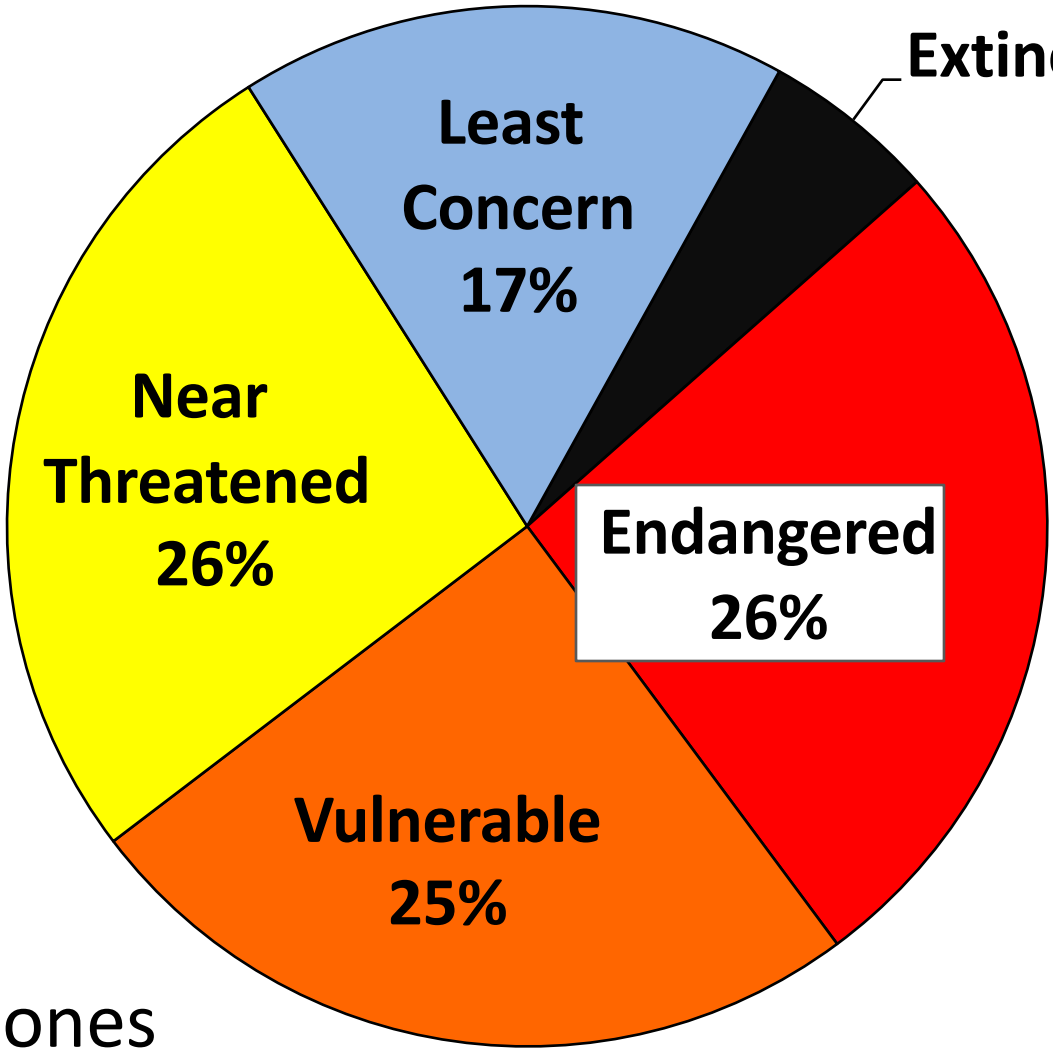
- Flood protection
- Agriculture
- Aquifer recharge
- Critical habitat for native fish, birds and wildlife
- Food web production

# Reclamation

# 13,000 miles of levees

# Drainage

# CA NATIVE FISHES




83%
Extinct or in decline

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

N=129

# Central Valley Chinook

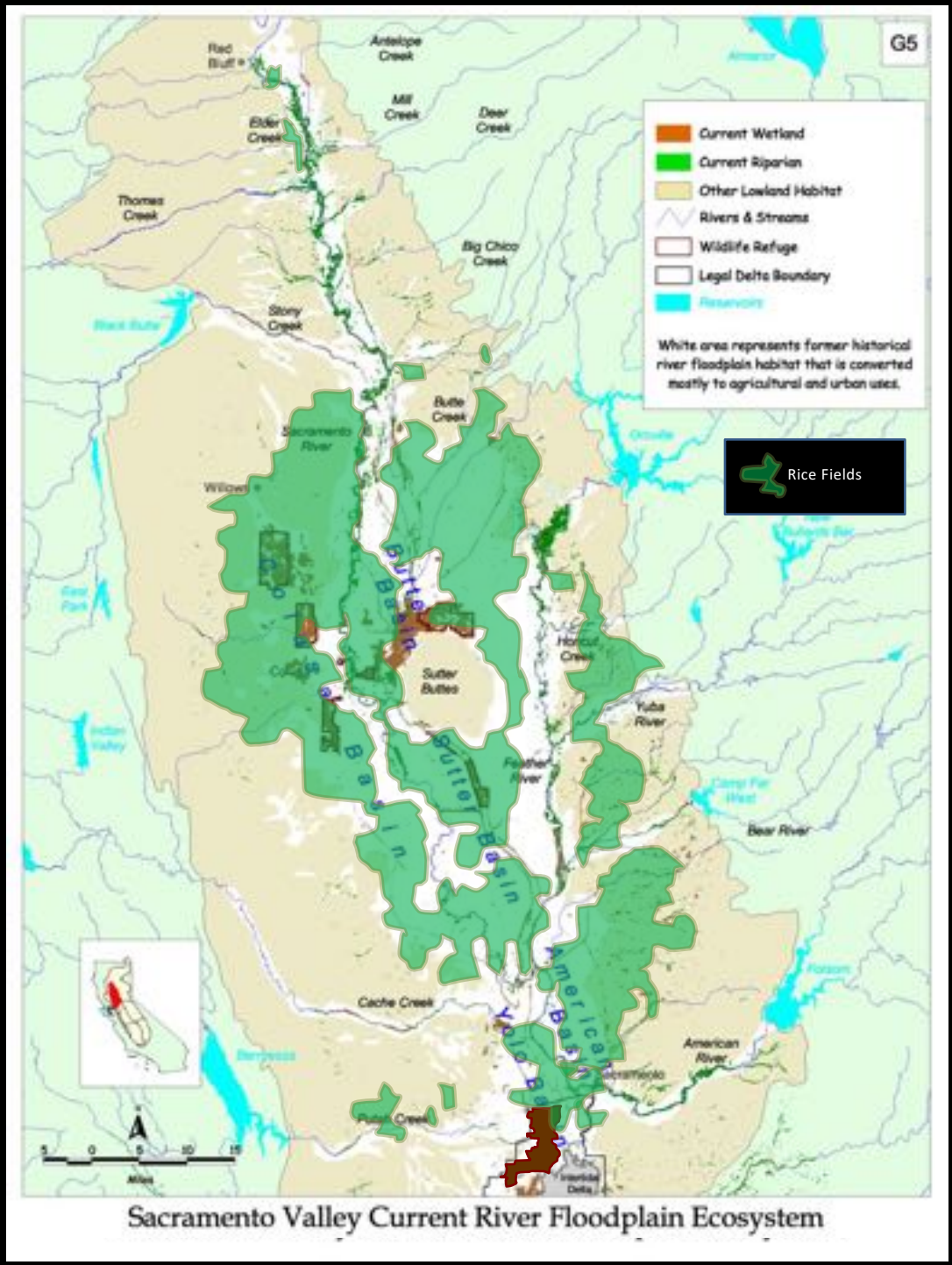
Of 4 runs

3 are endangered, the other is dominated by hatcheries

**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.

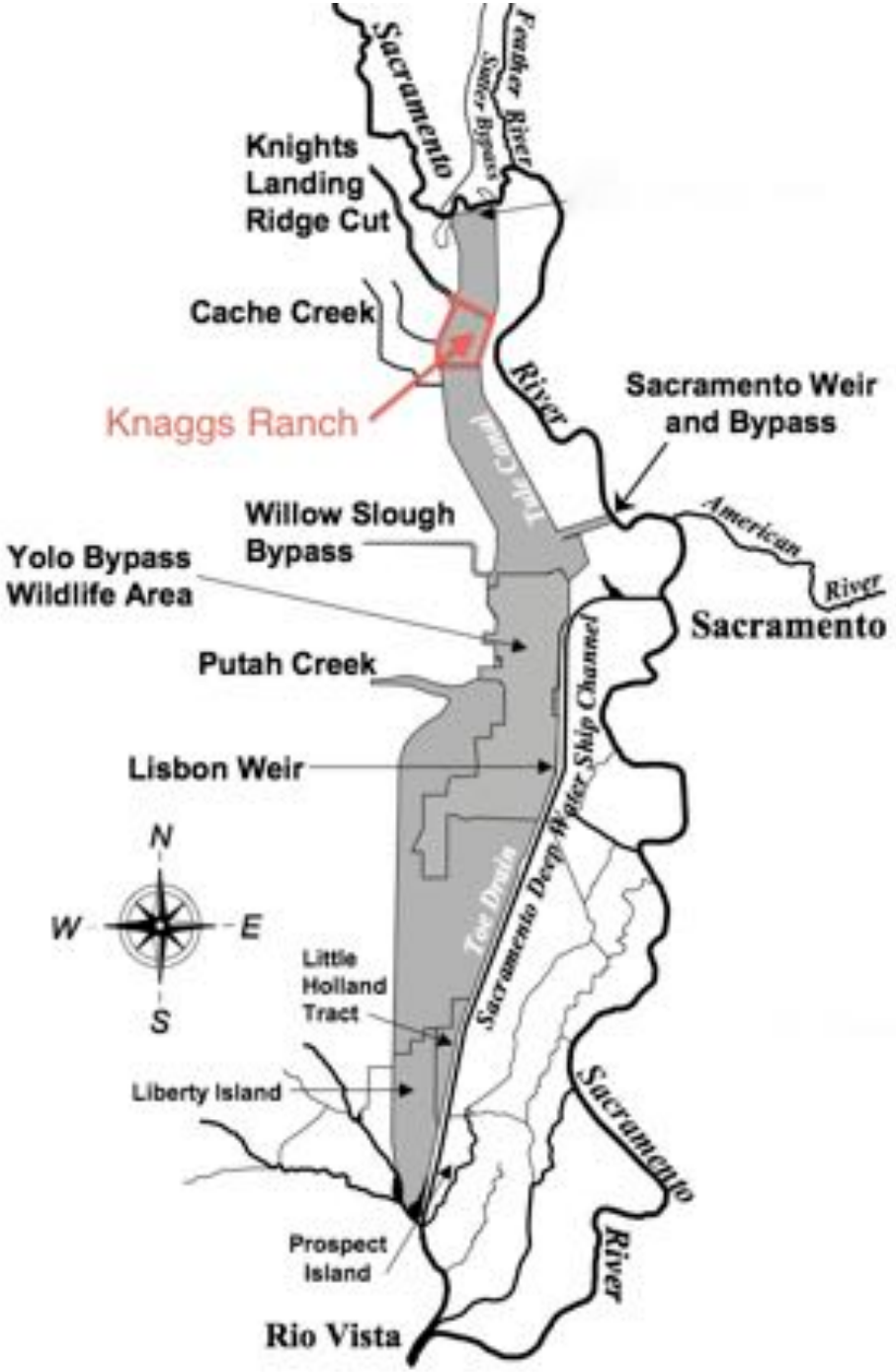


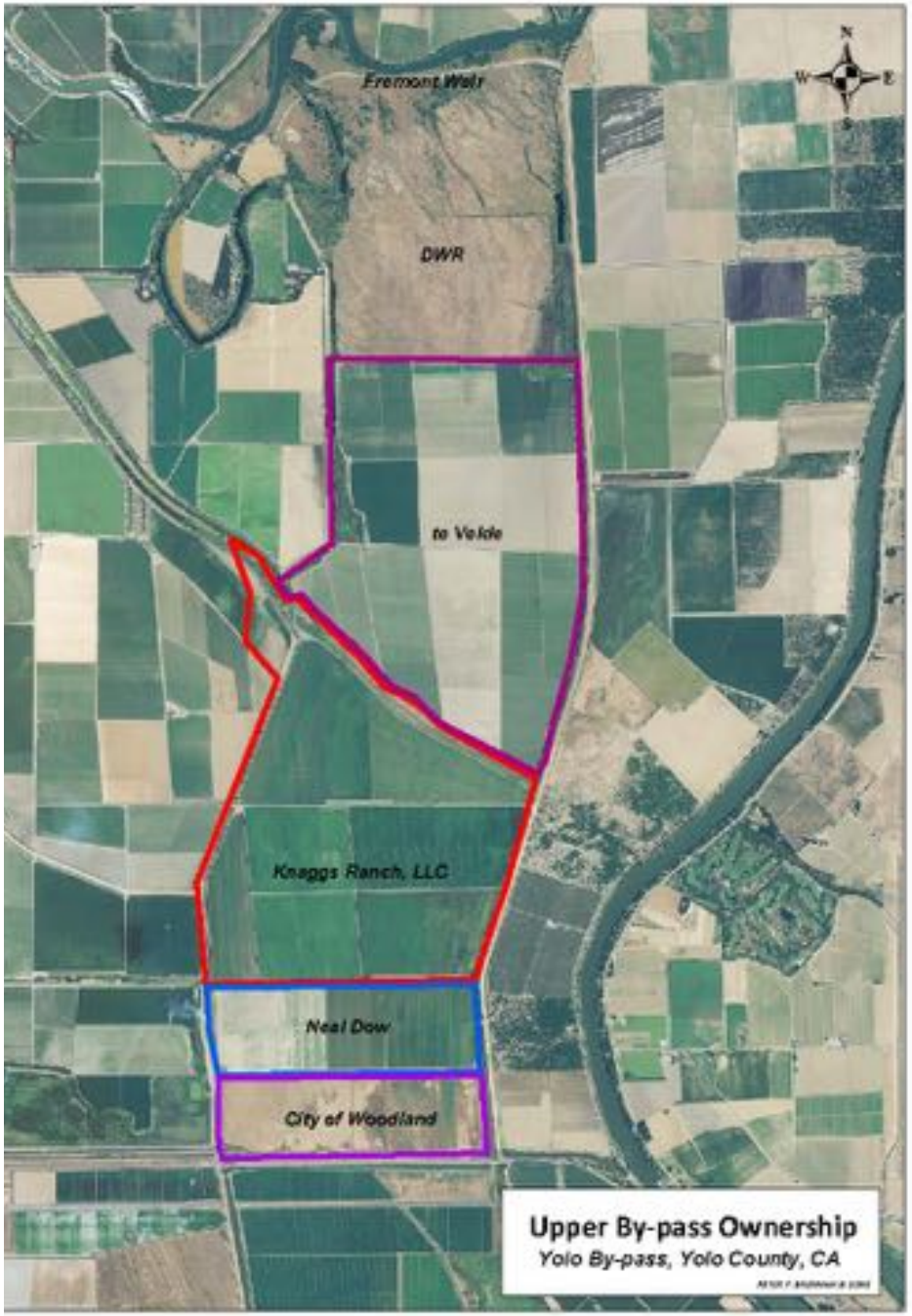
Sacramento Valley Current River Floodplain Ecosystem

# We are never going back

# Mimicking natural floodplain processes in post-harvest floodplain rice fields

# Knaggs Ranch on Yolo Bypass

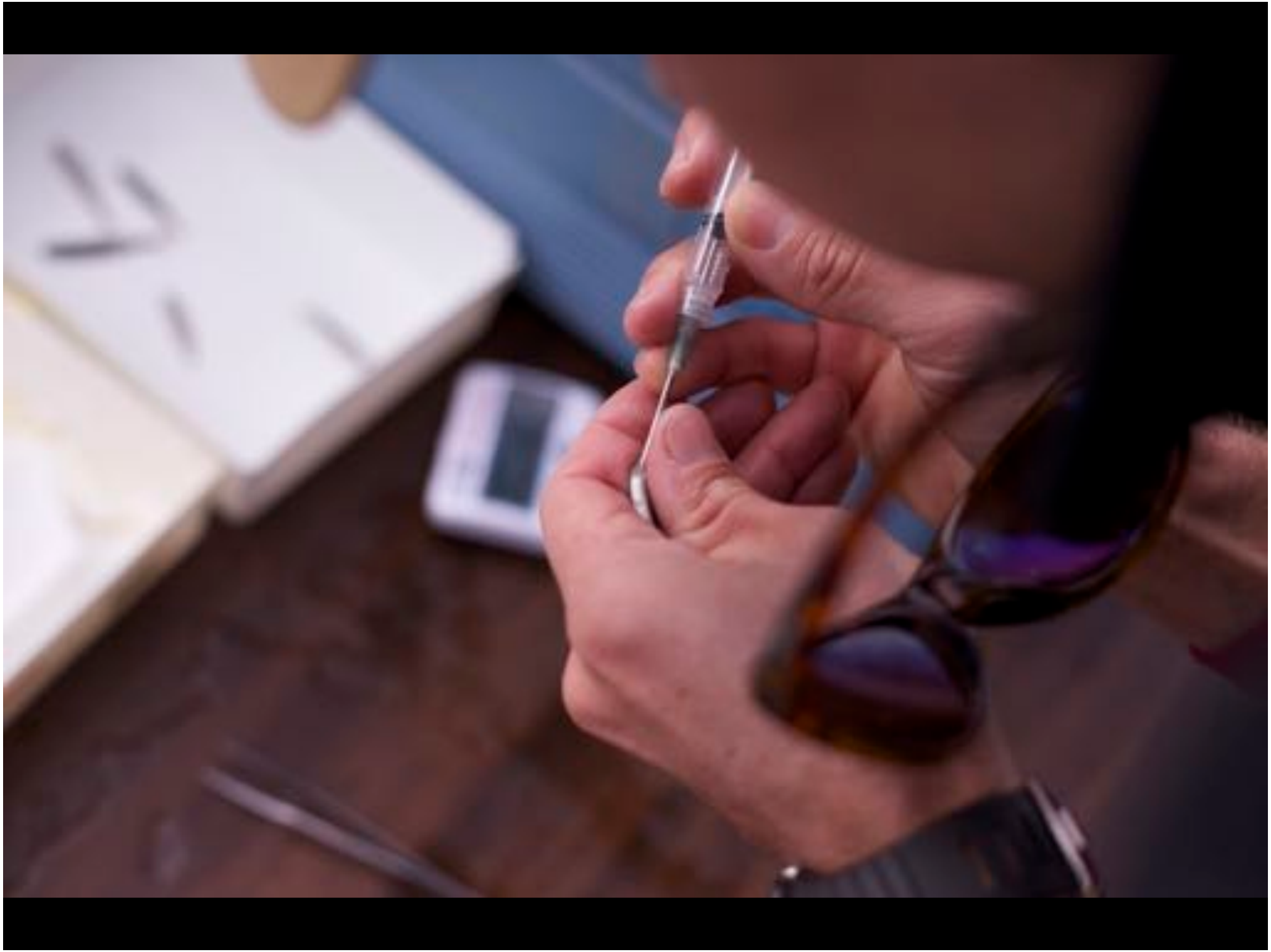


# Post Rice Harvest - November


Carson Jeffres

# Passive integrated transponder  (PIT tags)



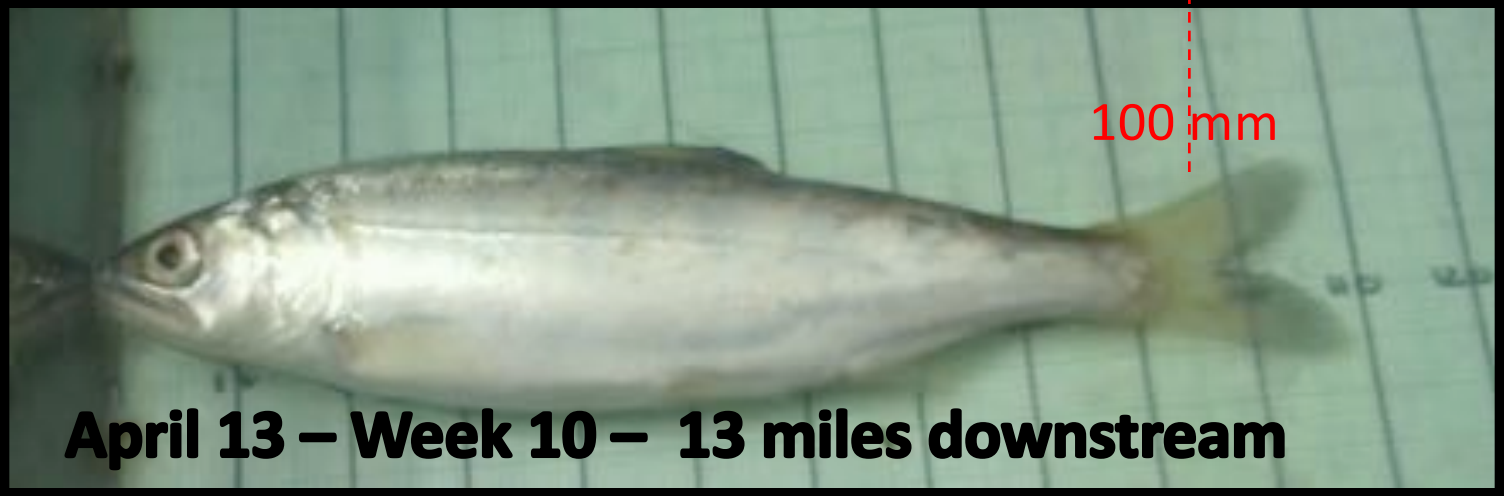

Fish measured every 2 weeks

# After 6 weeks field drained

Fish measured and tags read


Jan 31 – Week 0 – planted in rice field


March 12 – Week 6 – released from rice field

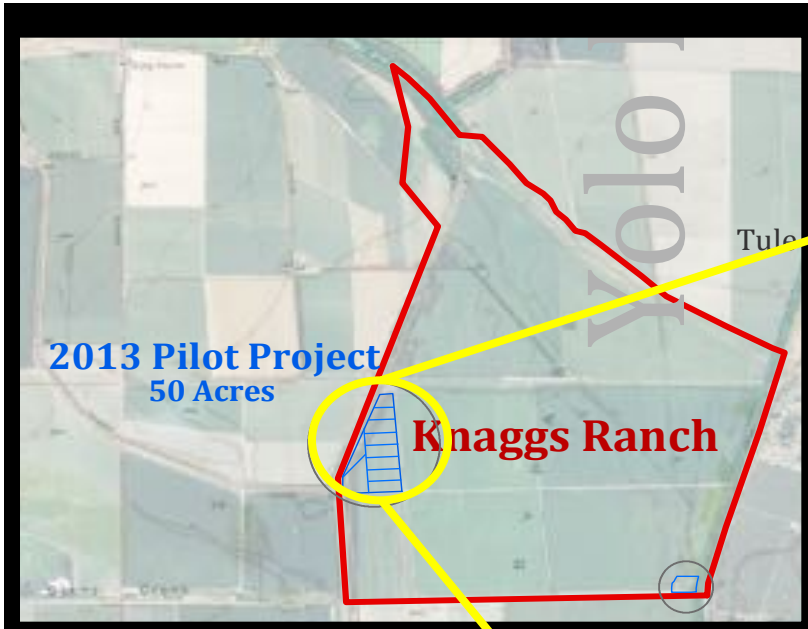



April 13 – Week 10 – 13 miles downstream

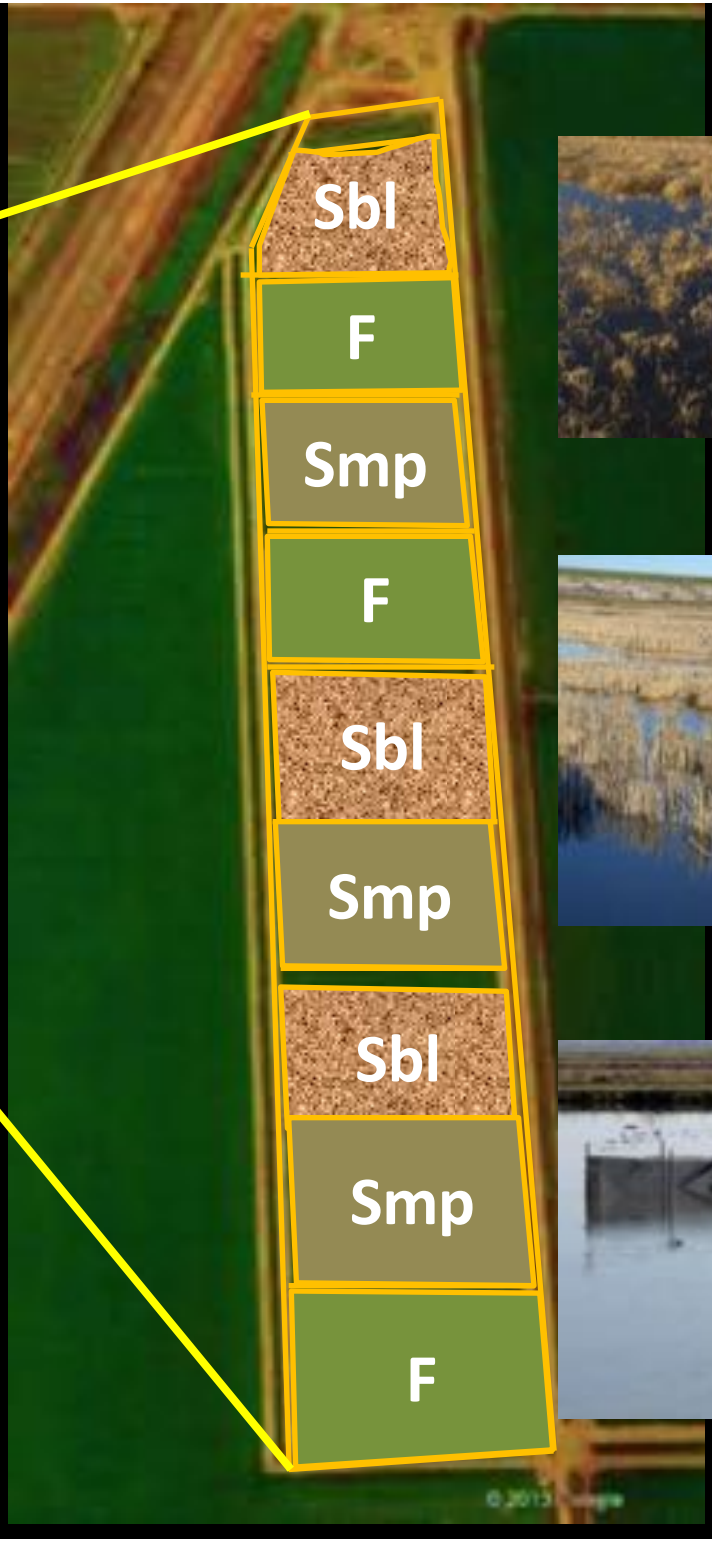
GROWTH

# Central Valley Waterfowl


Nine 2-acre fields




# Farm Practices And Fish?




Substrate type?

Fallow

Stubble

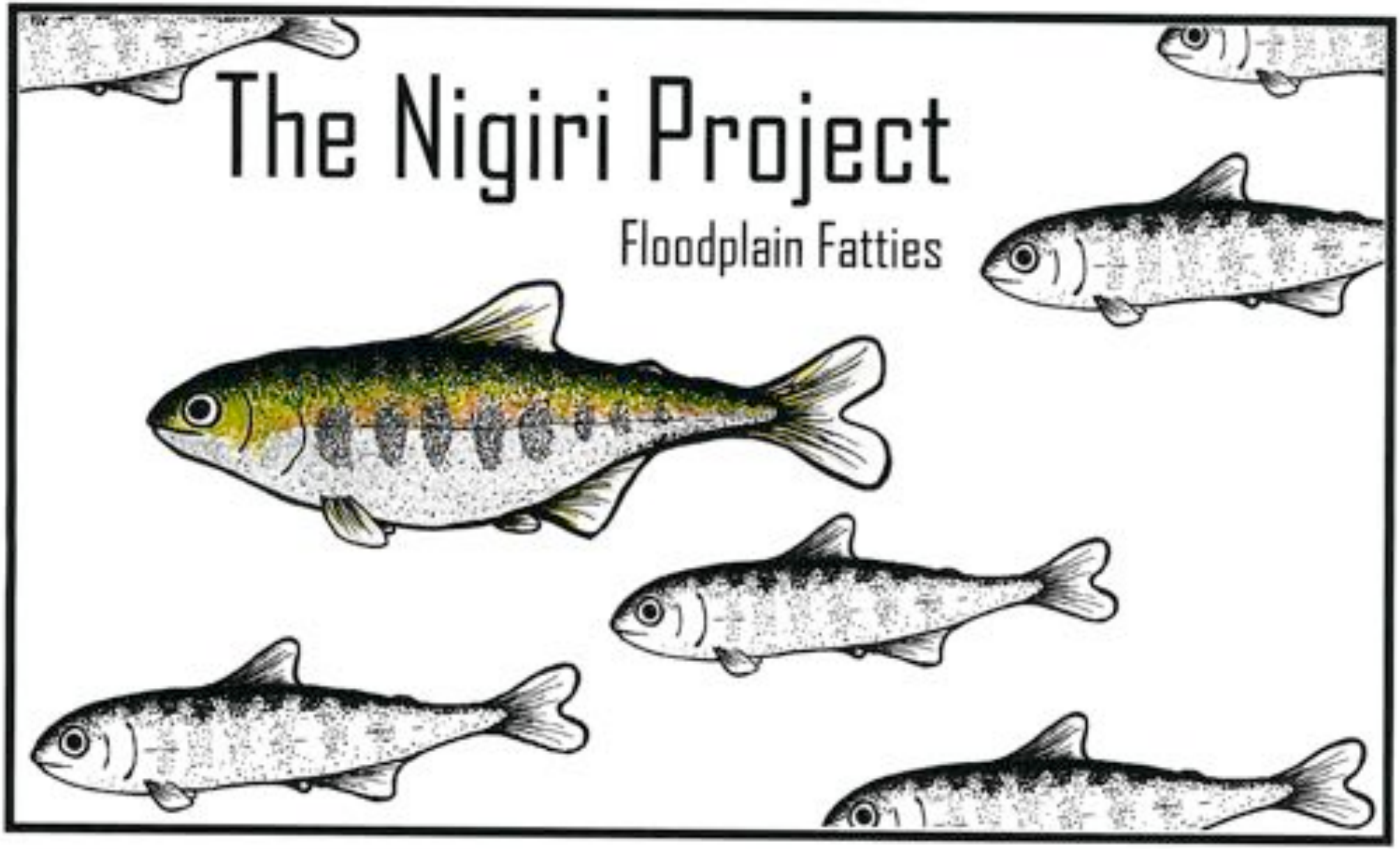
Stomped

# Replicated Ag Floodplains at Knaggs Ranch
## Hypotheses tested

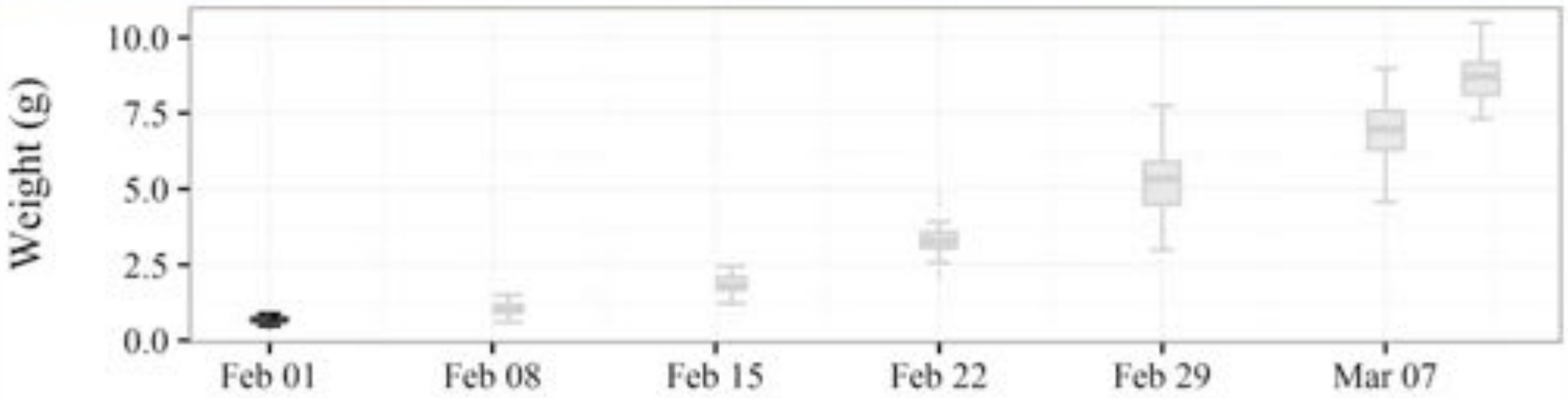
- 2013 — Substrate effects
- 2014 — Depth refugia
- 2015 — Draining techniques
- 2016 — Survival over time

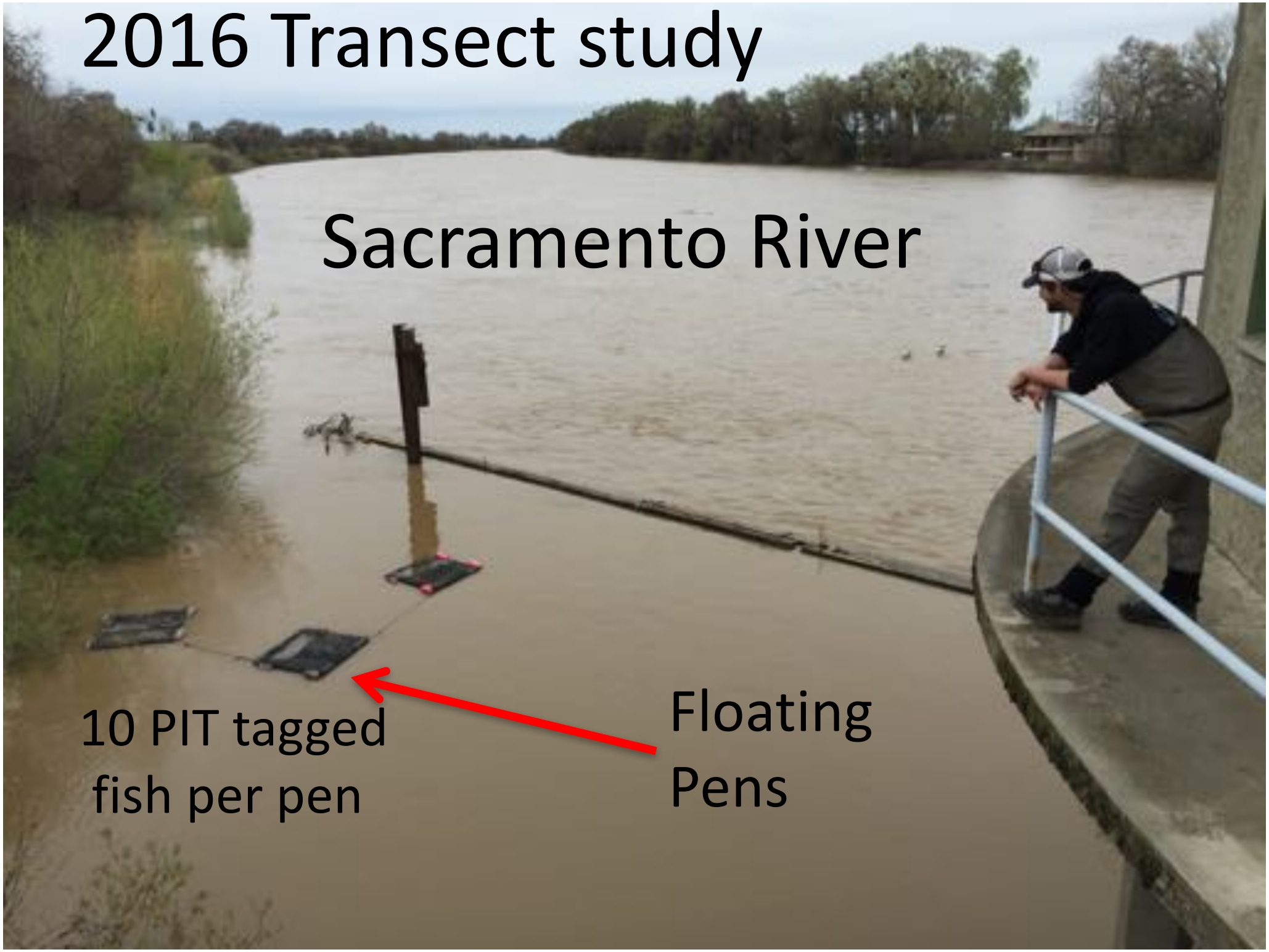
# 2015:
# Fish at
# Multiple Locations

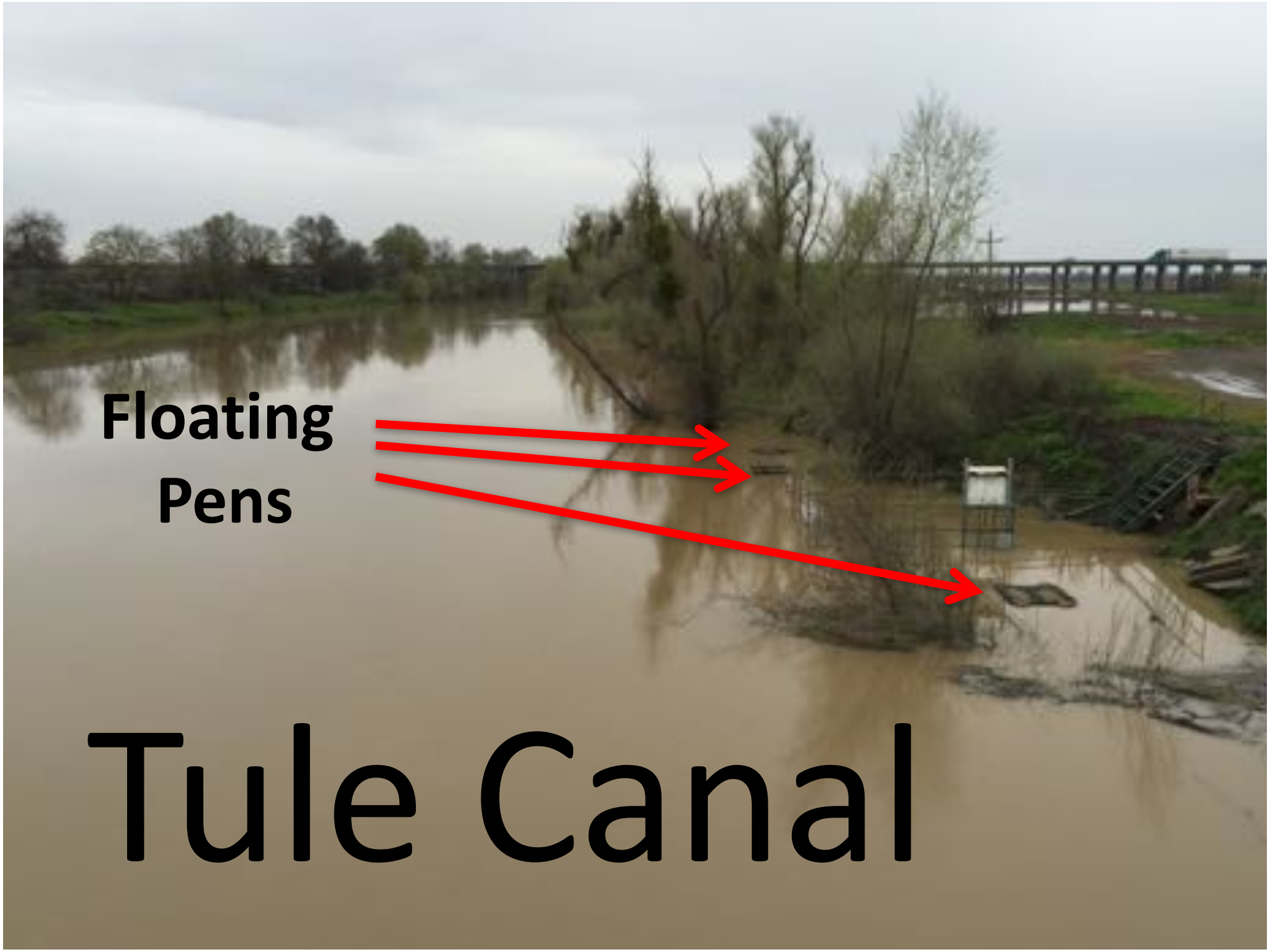
# Same Results



# Stocking day

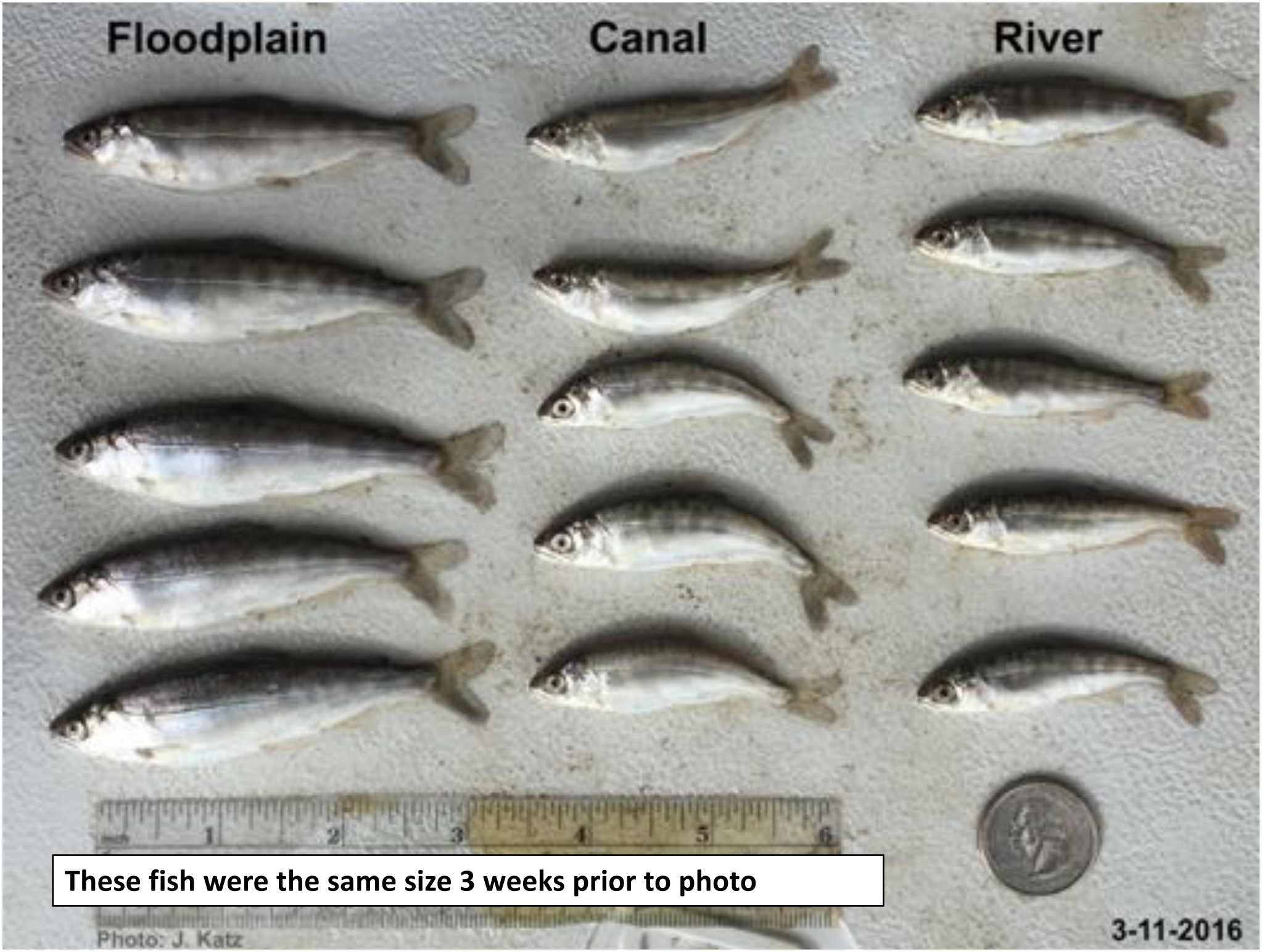



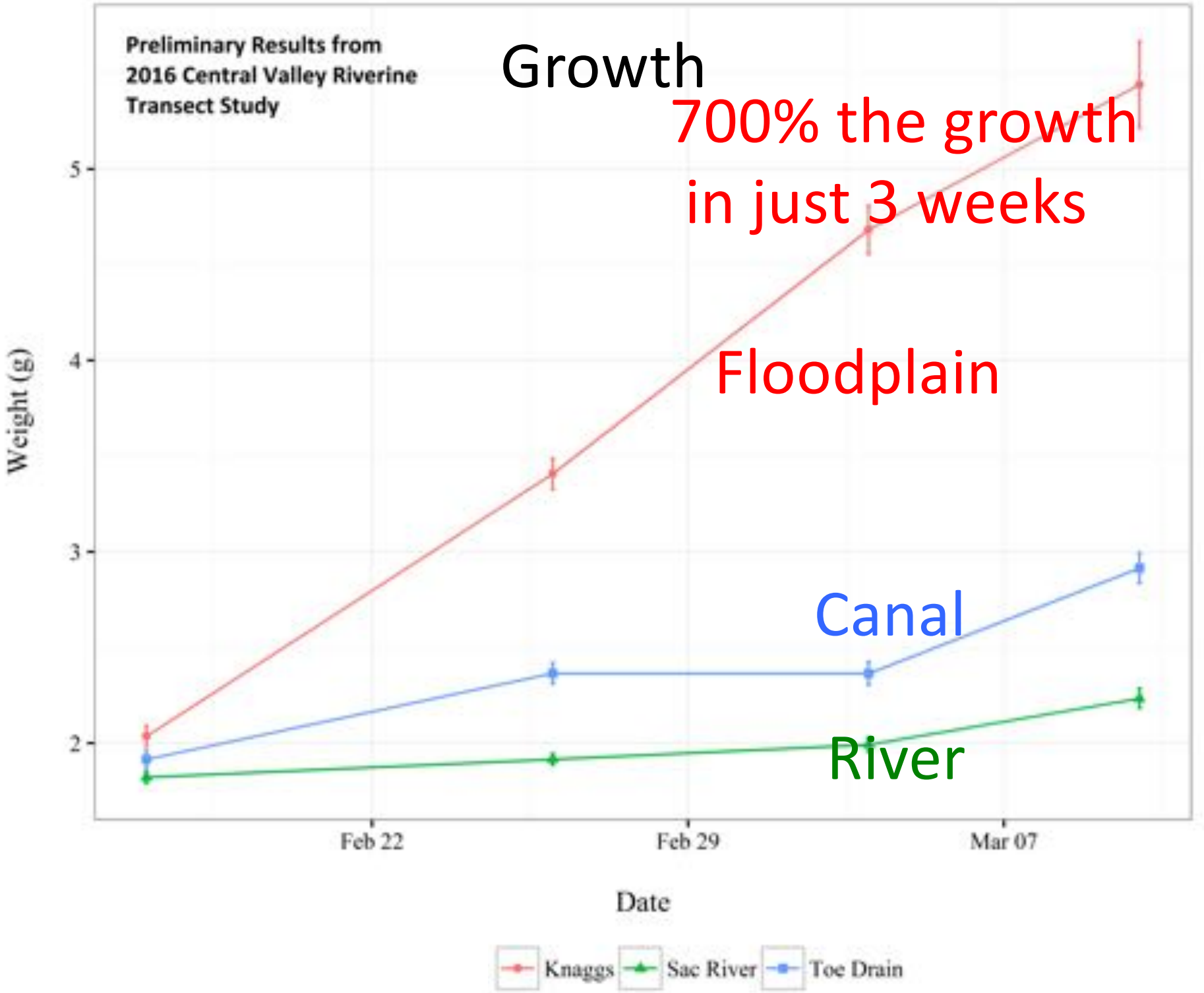

2016 Transect study
Sacramento River
10 PIT tagged fish per pen
Floating Pens



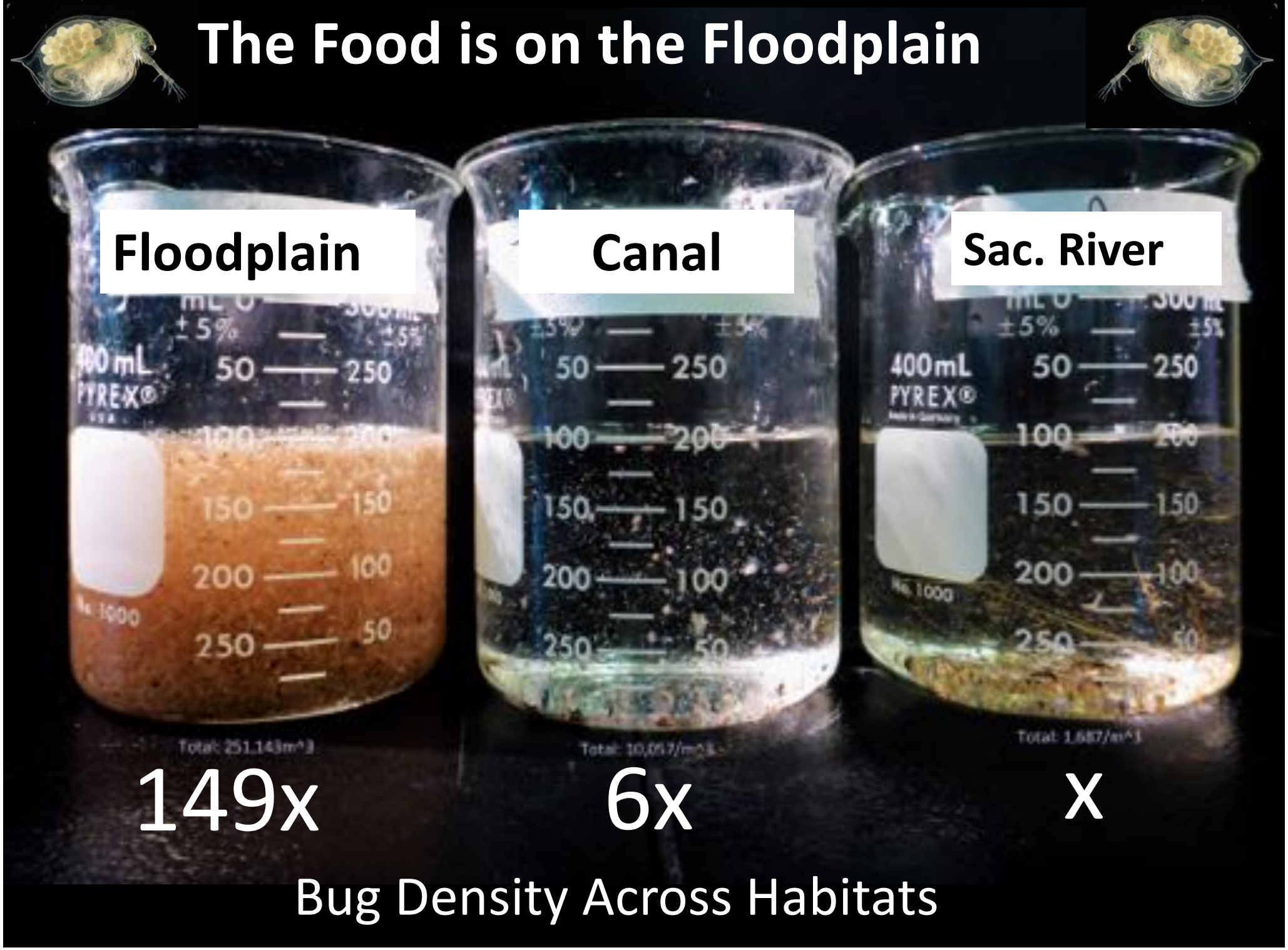

# Tule Canal

# Managed Agricultural Floodplain At Knaggs Ranch on Yolo Bypass


Floodplain
Canal
River
These fish were the same size 3 weeks prior to photo
Photo: J. Katz
3-11-2016

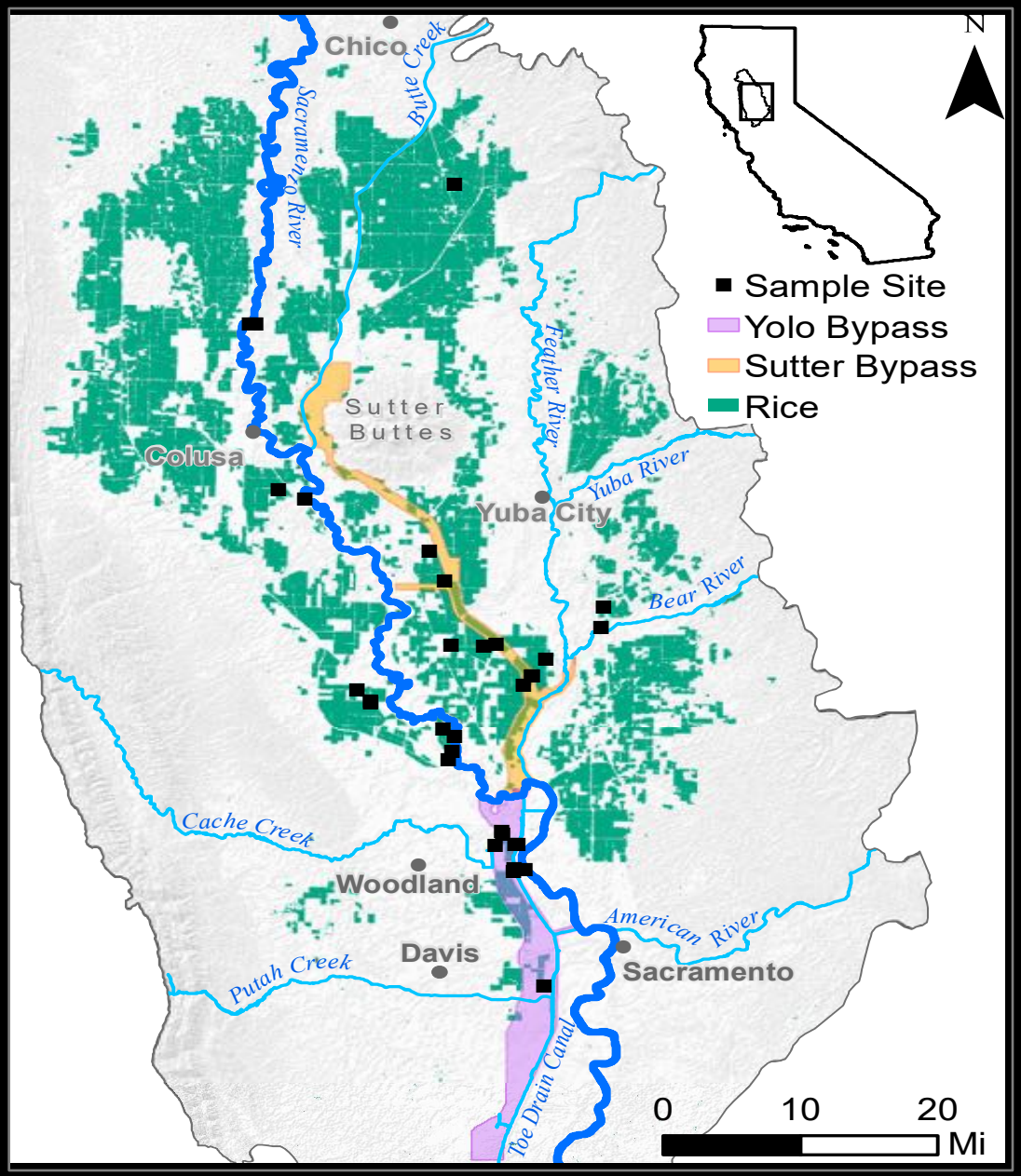

Preliminary Results from
2016 Central Valley Riverine
Transect Study
Growth
700% the growth
in just 3 weeks
Floodplain
Canal
River
Weight (g)
5
4
3
2
Feb 22
Feb 29
Mar 07
Date
Knaggs
Sac River
Toe Drain

# The Food is on the Floodplain



# Fish Food on Floodplain Farm Fields

# Operation F.A.T.F.I.S.H.

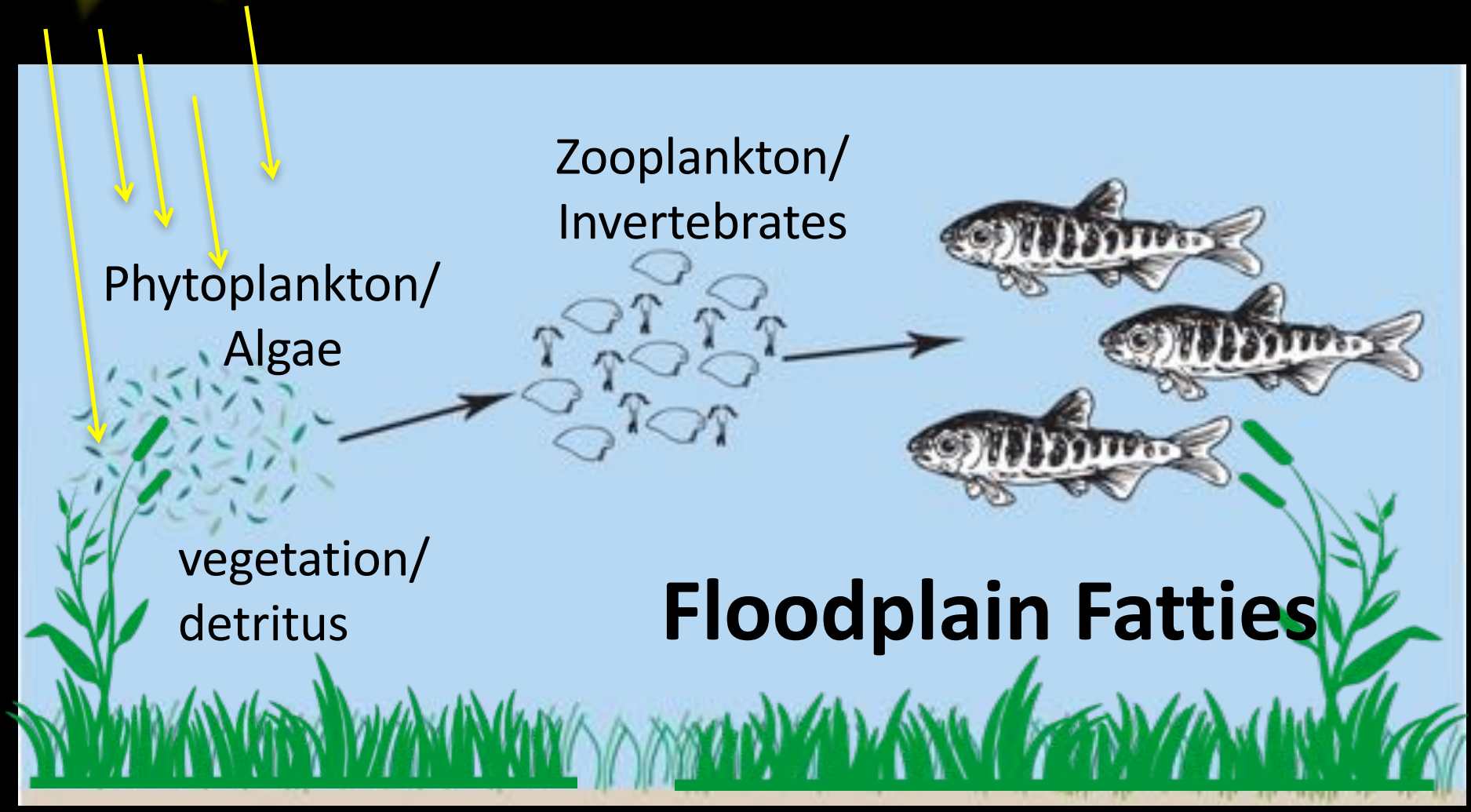



## Cultivating Ecological Solutions On Agricultural Lands

# Floodplains are the

# River’s solar panels

# Mimicking Hydrologic Process To Restore Ecological Function



$$E=mc^2$$

# Loss of Seasonally Inundated Floodplain

Pre-development → Today

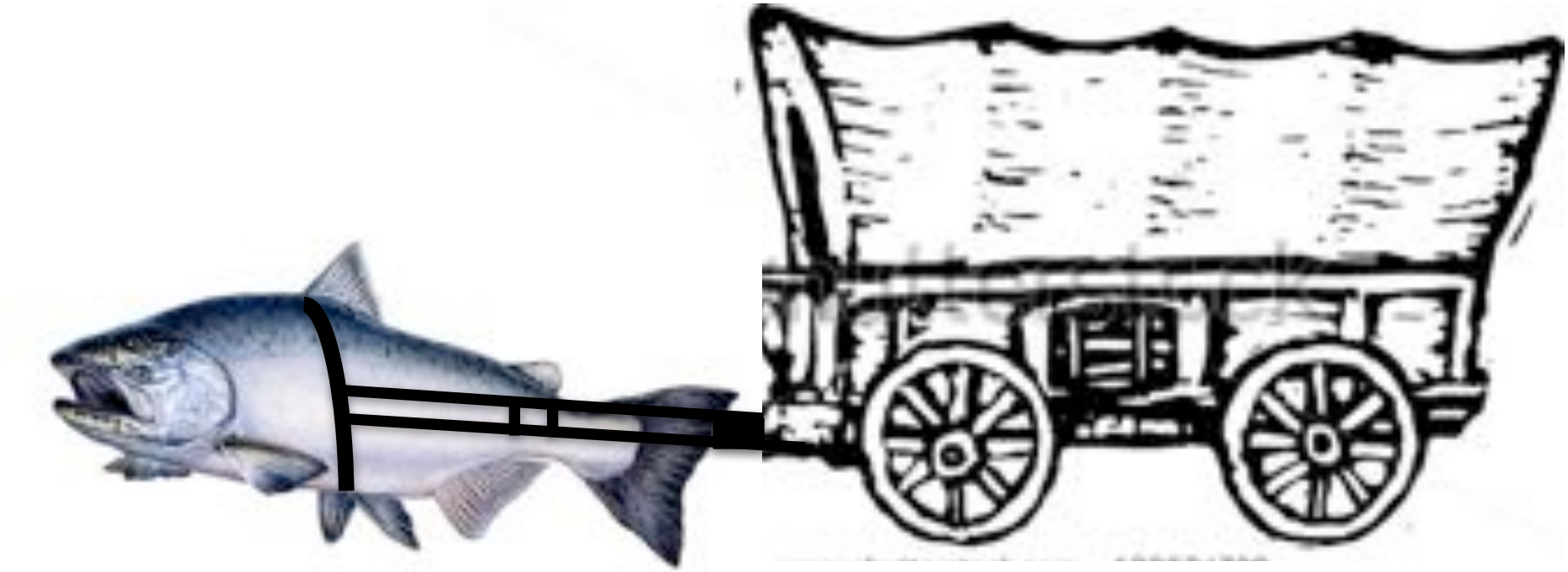
## Ecosystem Running Out of Power!

# Residence Time = Puddle Power

## Spread it–Slow it–Sink it–Grow it

# Fish Gotta Eat Too!

# Central Valley Salmon Habitat Partnership



‘bout time we circled the fish wagons

# We all eat sunlight!





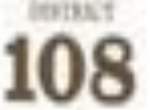













Knaggs Ranch

Davis Ranches

Next Generation Foods

# Process-Based Reconciliation

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

# Questions?

Carson Jeffres

# *Zooplankton ecology and trophic resources for rearing native fish on an agricultural floodplain in the Yolo Bypass California, USA*

**Nicholas J. Corline, Ted Sommer, Carson A. Jeffres & Jacob Katz**

**Wetlands Ecology and Management**

ISSN 0923-4861

Wetlands Ecol Manage
DOI 10.1007/s11273-017-9534-2

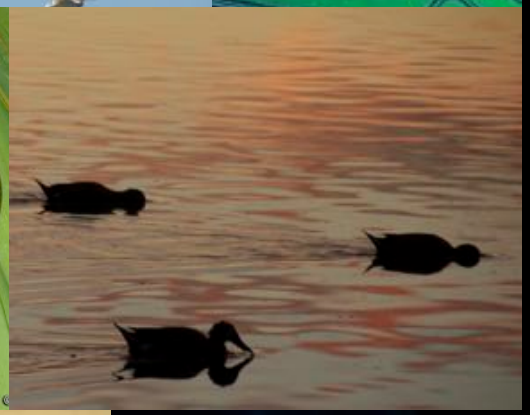
Floodplain

Sac River

300,000%


M.Wier




# Managing floodplains for multiple uses:

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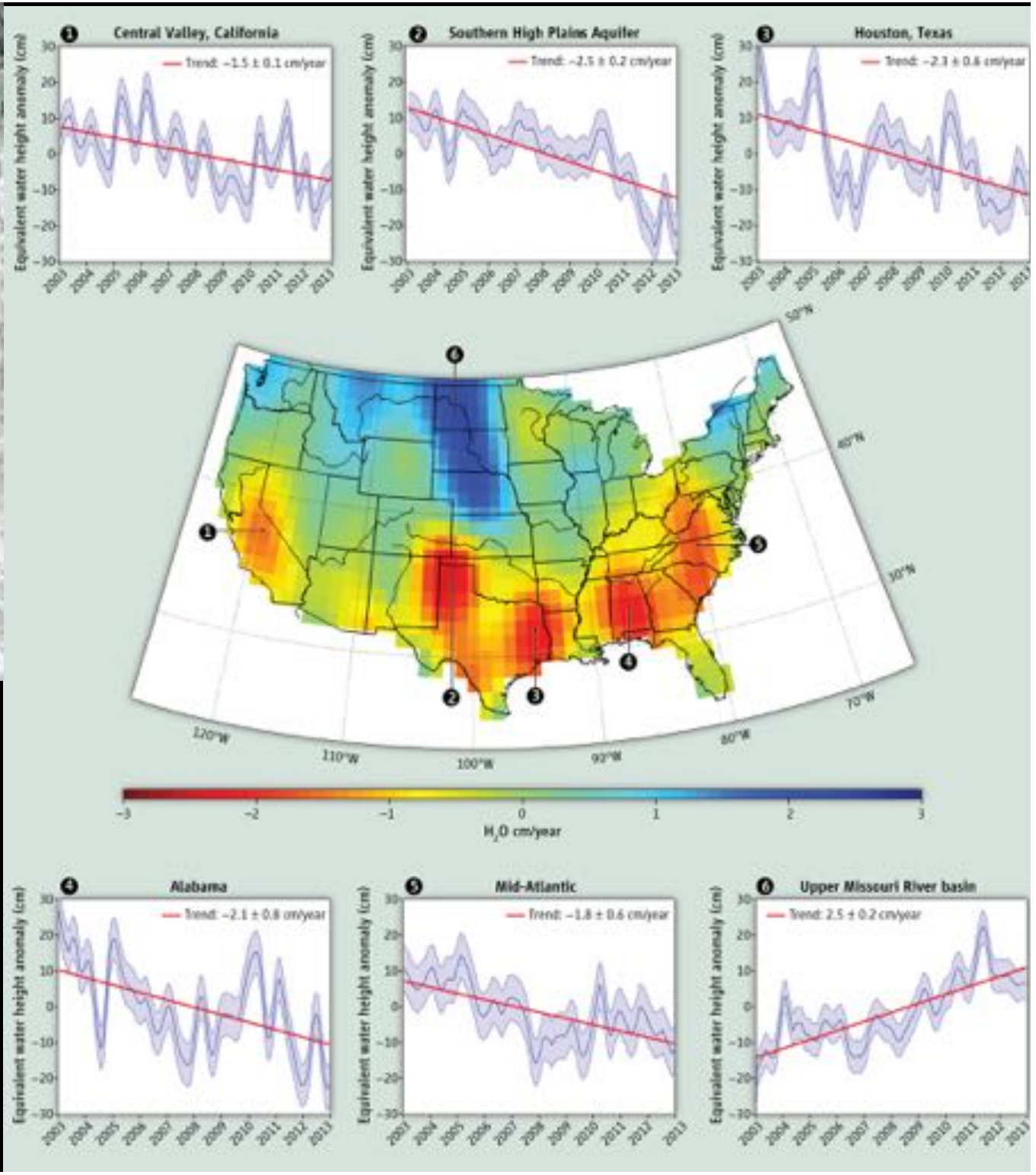
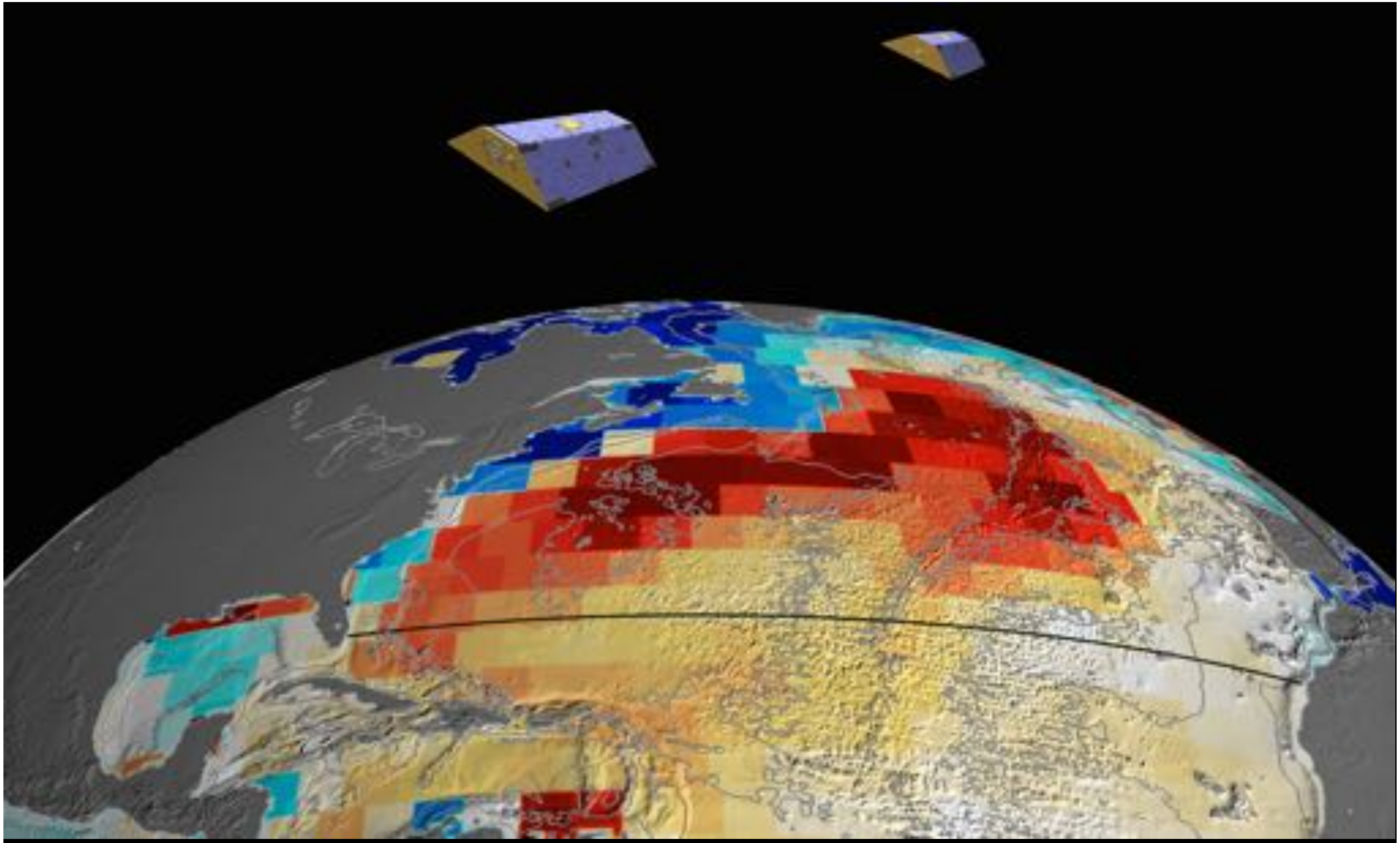
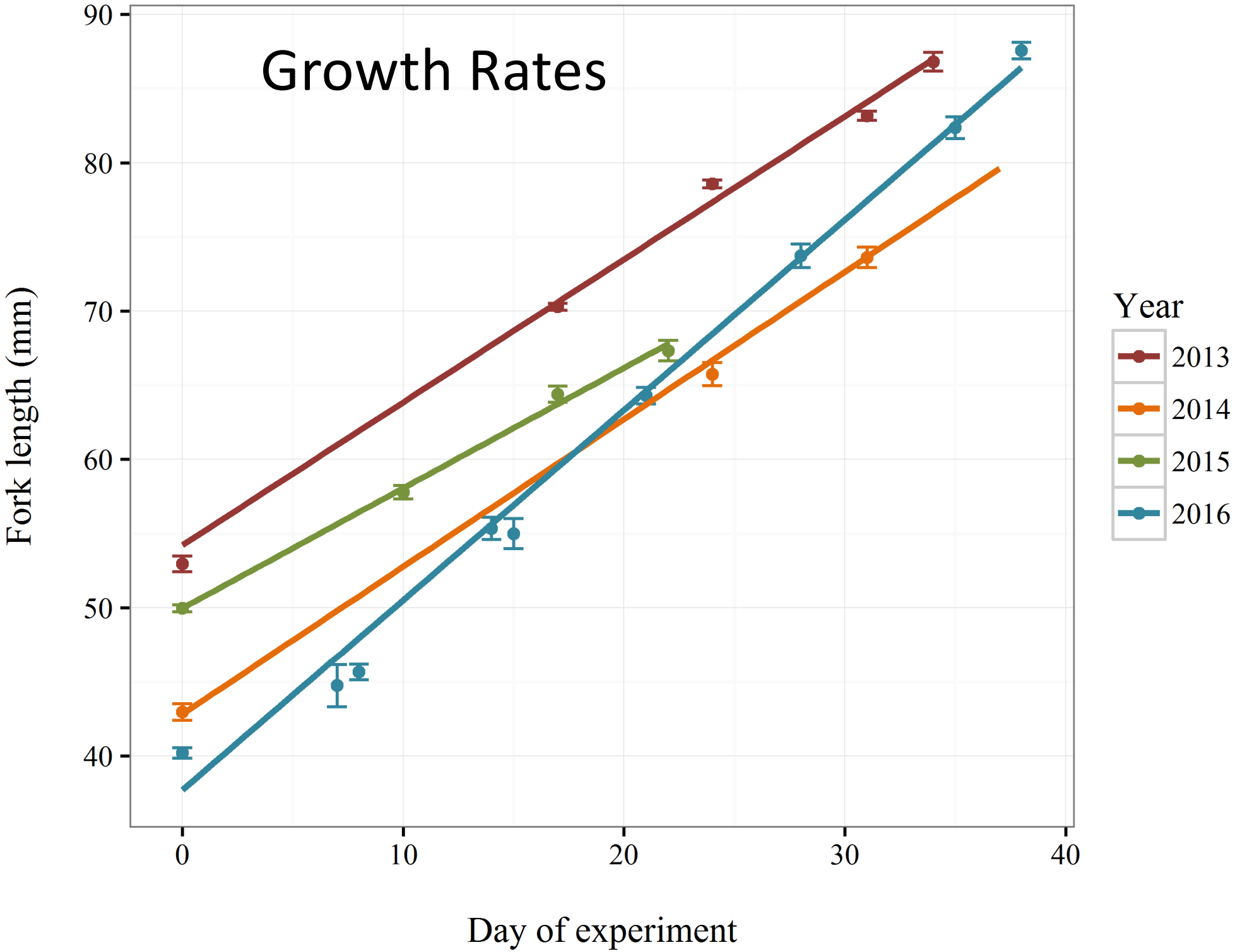
# Ground-water Mining





# Water in the Balance


Fish – Water – People


Growth Rates
Fork length (mm)
90
80
70
60
50
40
0
10
20
30
40
Day of experiment
Year
2013
2014
2015
2016

| Year | Fork length | Weight |
|---|---|---|
| 2013 | 0.96 mm/day | 0.19 g/day |
| 2014 | 0.99 mm/day | 0.14 g/day |
| 2015 | 0.81 mm/day | 0.12 g/day |
| 2016 | 1.28 mm/day | 0.21 g/day |