

# **Native – Nonnative fish interactions:**

**Case studies from other locations**

**Mechanisms by which introduced fish  
Impact native fishes**

David Ward

USGS

Grand Canyon Monitoring Center

# Yampa River



# Yampa River



# Lake Mohave

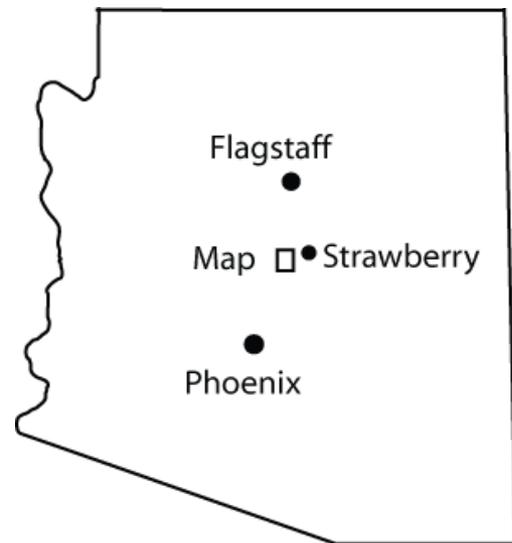
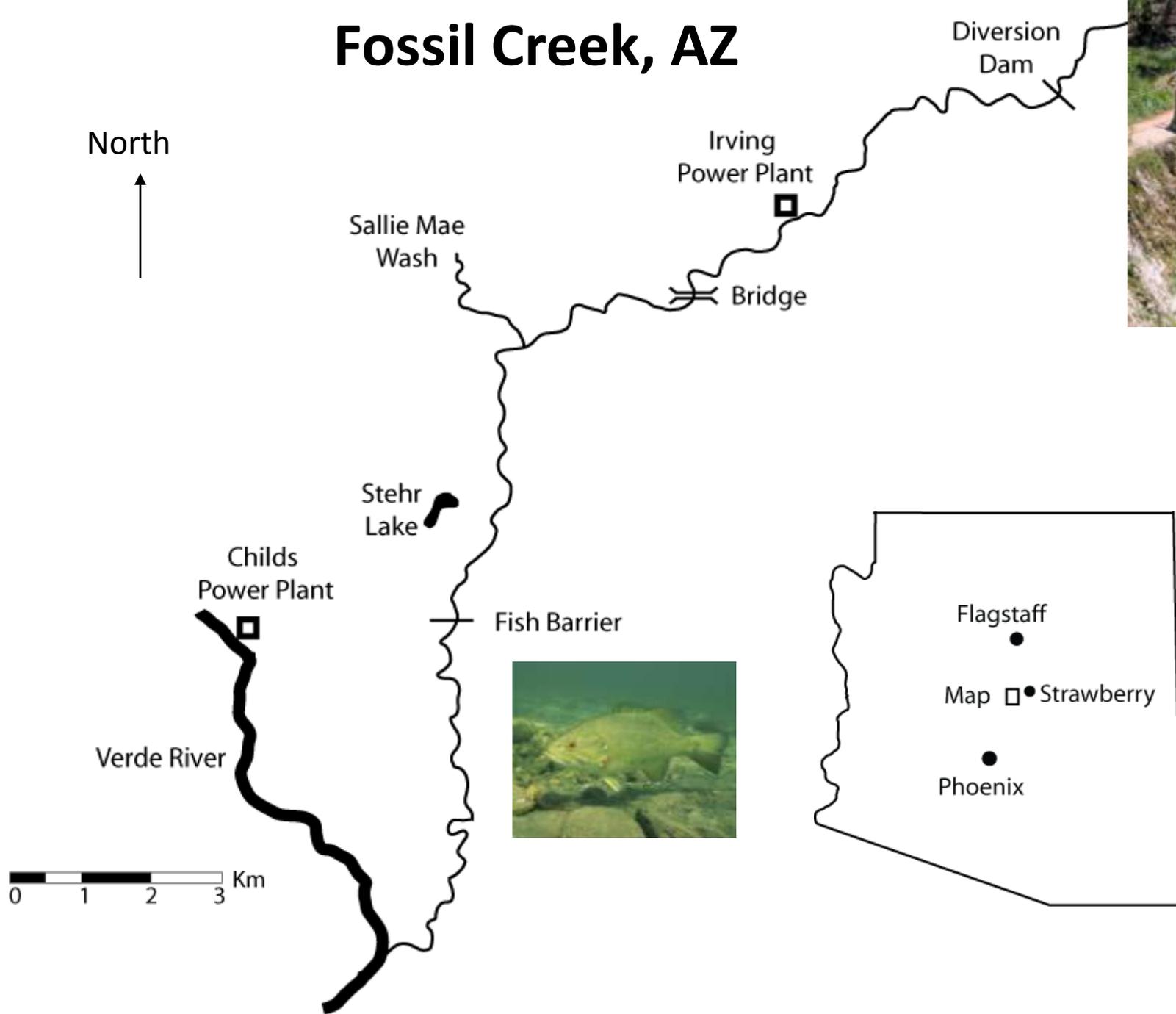


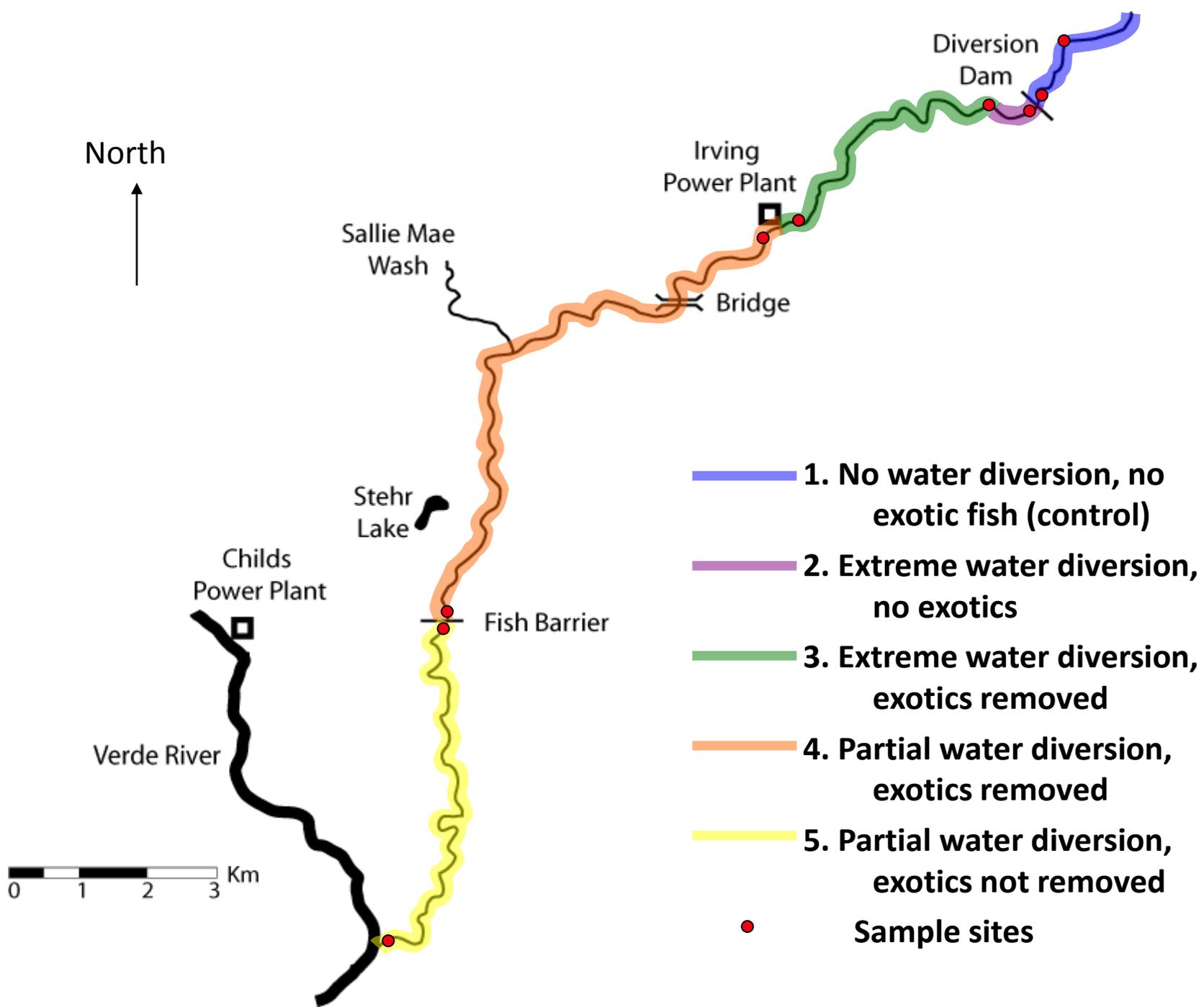
# Fossil Creek Native Fish Restoration Project



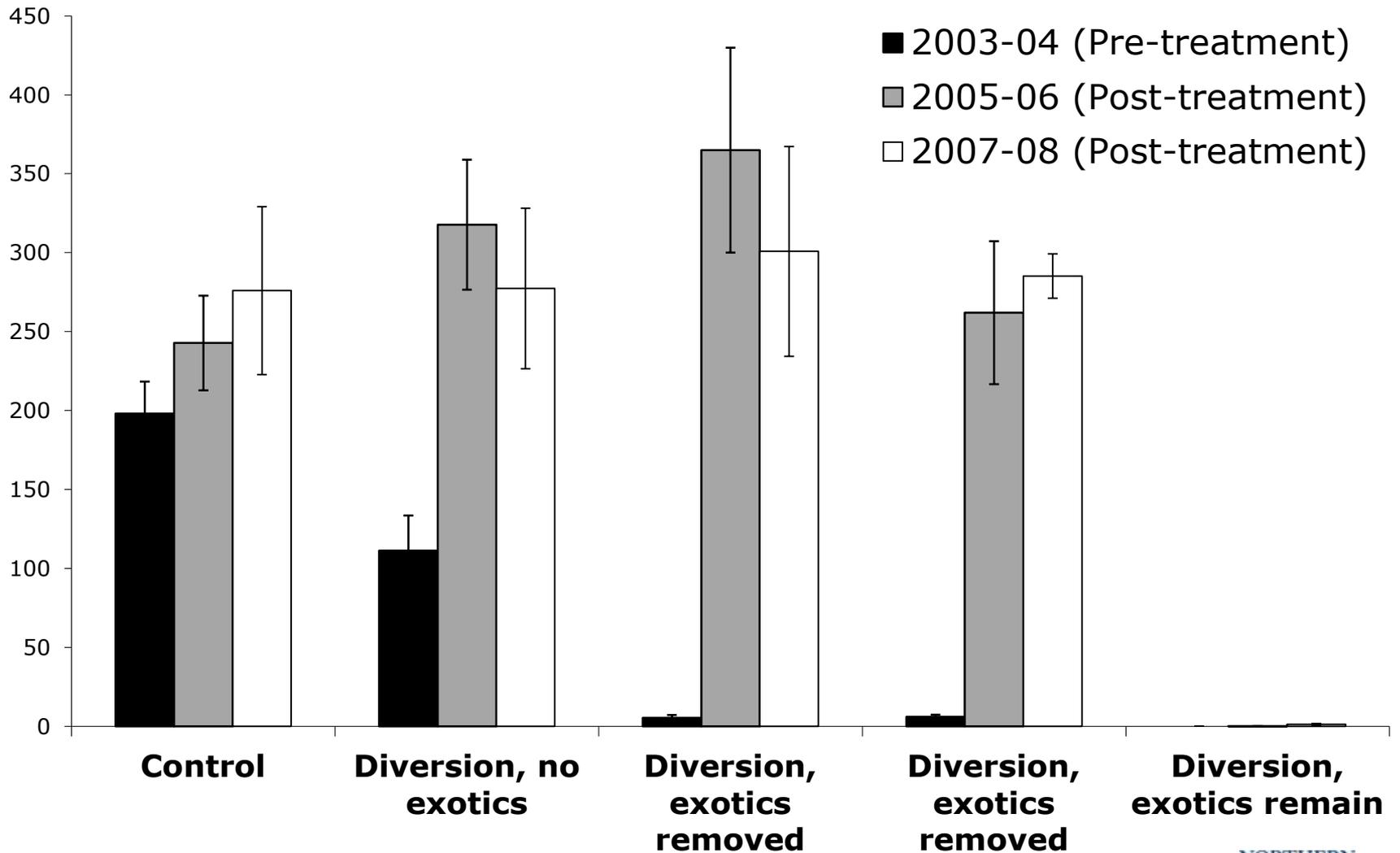
# Fossil Creek, AZ

North





**Native Fish/100m**



**Nonnative removal creates a greater response than flow restoration alone**



NORTHERN ARIZONA UNIVERSITY



# **Immiscibility of Native and Non-native Fishes, 2005**

PAUL C. MARSH AND CAROL A. PACEY, *Fisheries*

## **Conflicts between Native Fish and Nonnative Sport Fish Management in the Southwestern United States, 2005**

Robert W. Clarkson a , Paul C. Marsh , Sally E. Stefferud & Jerome A. Stefferud, *Fisheries*

## **Predatory Fish Removal and Native Fish Recovery in the Colorado River Mainstem, 2005**

Gordon A. Mueller, *Fisheries*



# What is different about the situation with humpback chub in Grand Canyon?



Temperature ? Turbidity ?

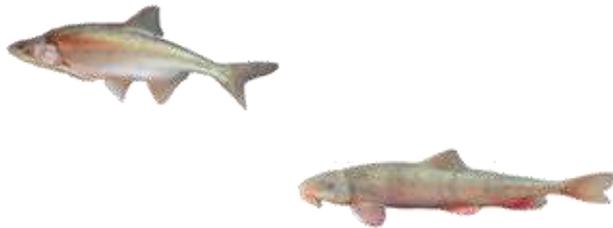
# What are the Mechanisms by which introduced fish Impact native fishes?



- **Competition**
- **Predation**

# Fundamental Question?

- Why don't predators cause the extinction of prey in all cases?
- How do any prey persist?



# Answer

In Co-evolved predator prey relationships the prey species have:

**Morphology and Behavior** *-(Including the use of specific habitat features)* **That render some individuals less vulnerable to predation**

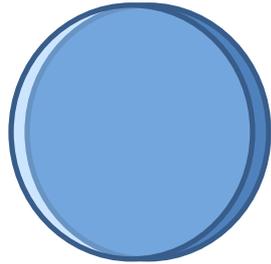
Portz and Tyus 2004, Fish Humps in Colorado River Fishes, *Environmental Biology of Fishes*

Gorman and Stone 1999 – Ontogenesis of Humpback Chub, *American Midland Naturalist*

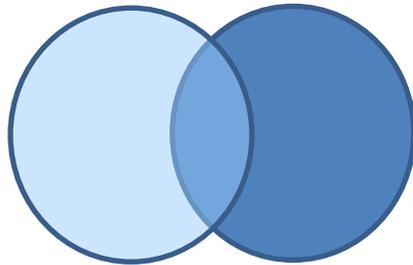
# Possible outcomes for a prey species when a novel predator is introduced

Prey geographic range = 

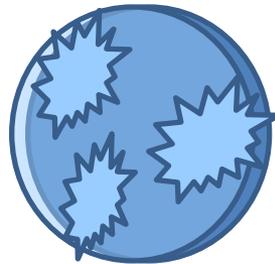
Predator geographic range = 



Complete overlap = extinction of prey



Incomplete overlap = Restricted range of prey



Complete overlap but coexistence because Prey have behaviors/morphologies that make them relatively invulnerable to predation in some areas

# Managers and Scientists

Often A Difference of Views

