

Mechanical Removal of Non- Native Fishes to Improve Humpback Chub Recruitment

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Background

- Humpback Chub in Grand Canyon are declining
 - 2,500-3,000 > 150 mm in LCR spawning population
- What is driving the apparent long-term downturn in Humpback Chub recruitment?
 - Interaction with Non-Native Fishes
 - Asian Tapeworm??
 - Little Colorado and Colorado River Hydrology
 - Other Factors?



Goal

• *Increase humpback chub recruitment*

1. Decrease recruitment of rainbow trout

- Water level fluctuations

2. Decrease adult rainbow (and brown) trout abundance in area of highest humpback chub abundance

- Mechanical removal of non natives (salmonids)

This is a long-term experiment (16 years)

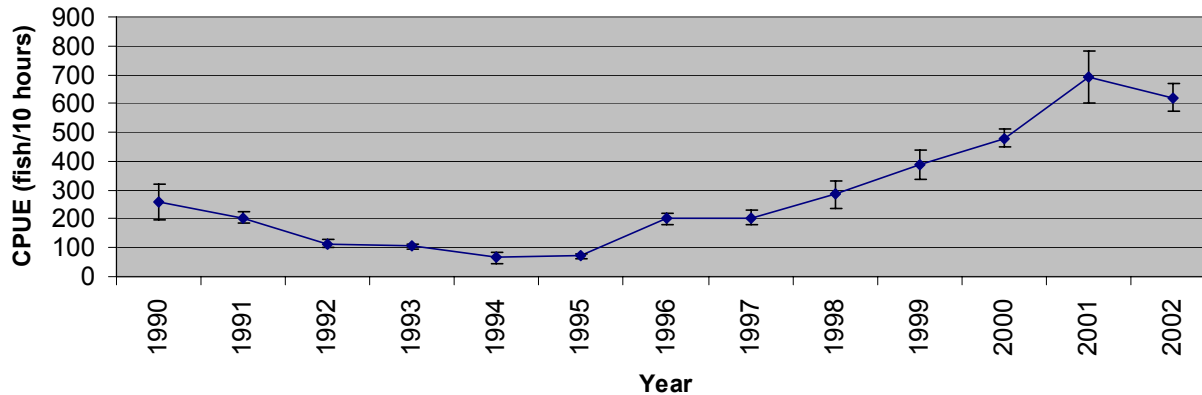
Proposed experimental plan

Year	Trout Removal	Fluctuating Flows
2003	yes	yes
2004	yes	yes
2005	yes	no
2006	yes	no
2007	no	yes
2008	no	yes
2009	no	no
2008	no	no

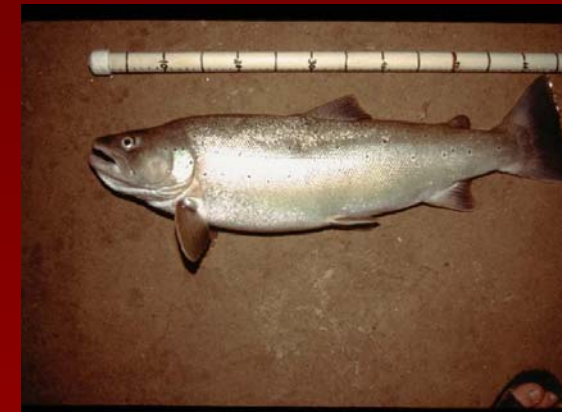
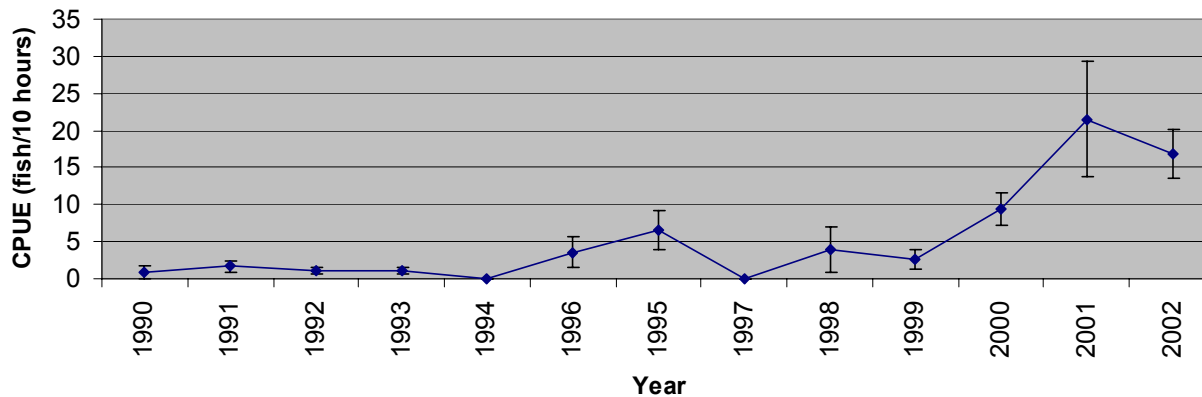
(repeated an additional 8 years)

Recent Trends in Salmonid Abundance

**Rainbow Trout Electrofishing Catch Rate
Little Colorado River Reach (RM 56 - 69)**



**Brown Trout Electrofishing Catch Rate
Little Colorado River Reach (RM 56 - 69)**



Decrease recruitment of rainbow trout

Water level fluctuations

January-March

Daily water level fluctuations

5,000-20,000 cfs

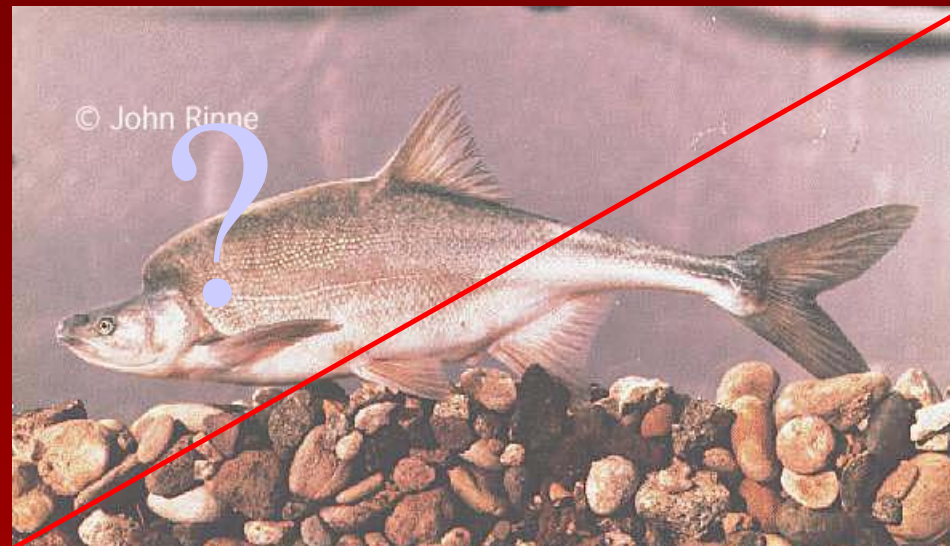
Goal is to increase mortality of eggs and/or juveniles

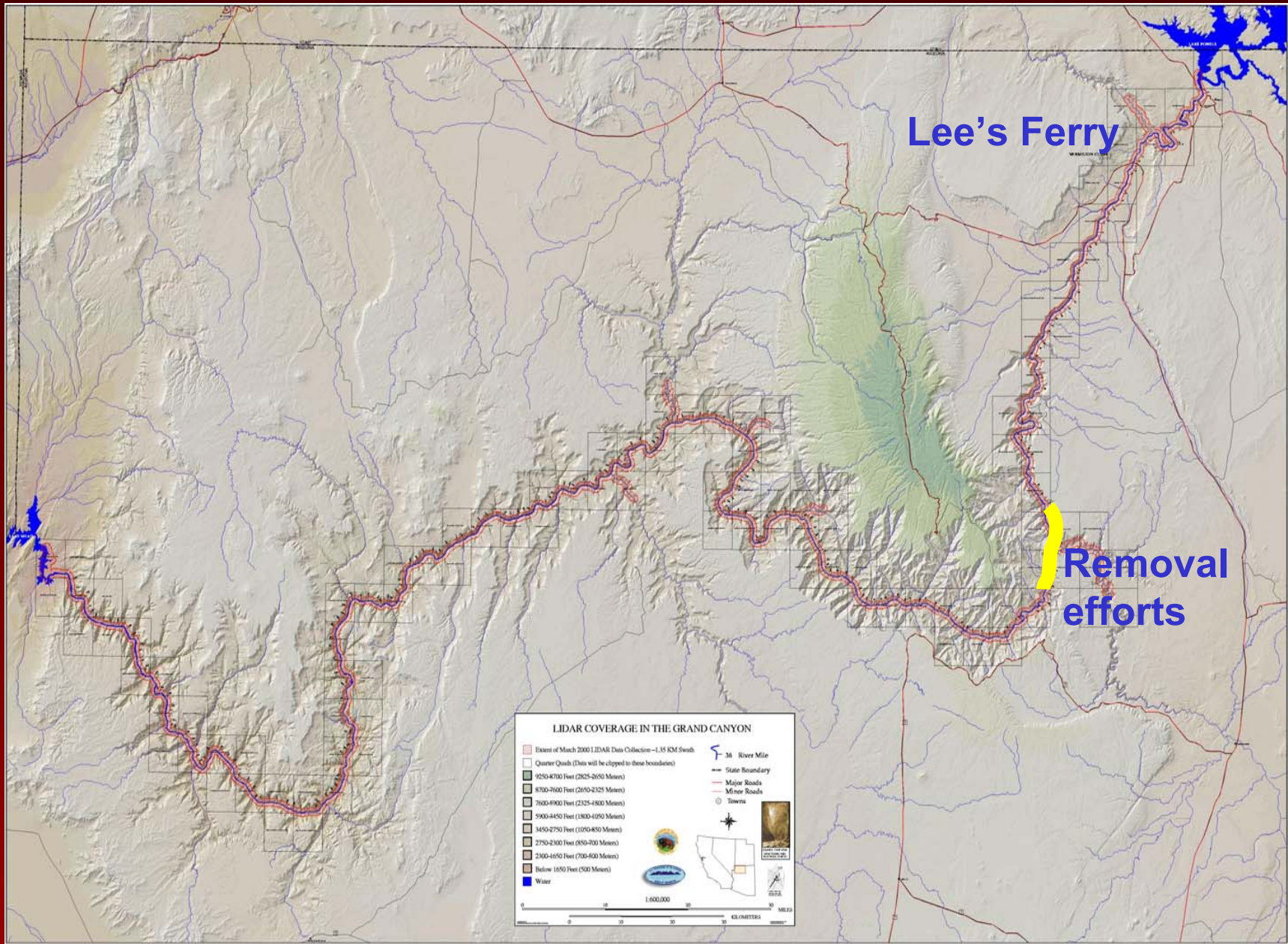
Projects investigating mechanisms begin in Jan.

Mechanical Removal

- Lower the abundance rainbow and brown trout in the Colorado River.

Mechanical removal of rainbow and brown trout in the Little Colorado River reach of the Colorado River (RM 56-66)



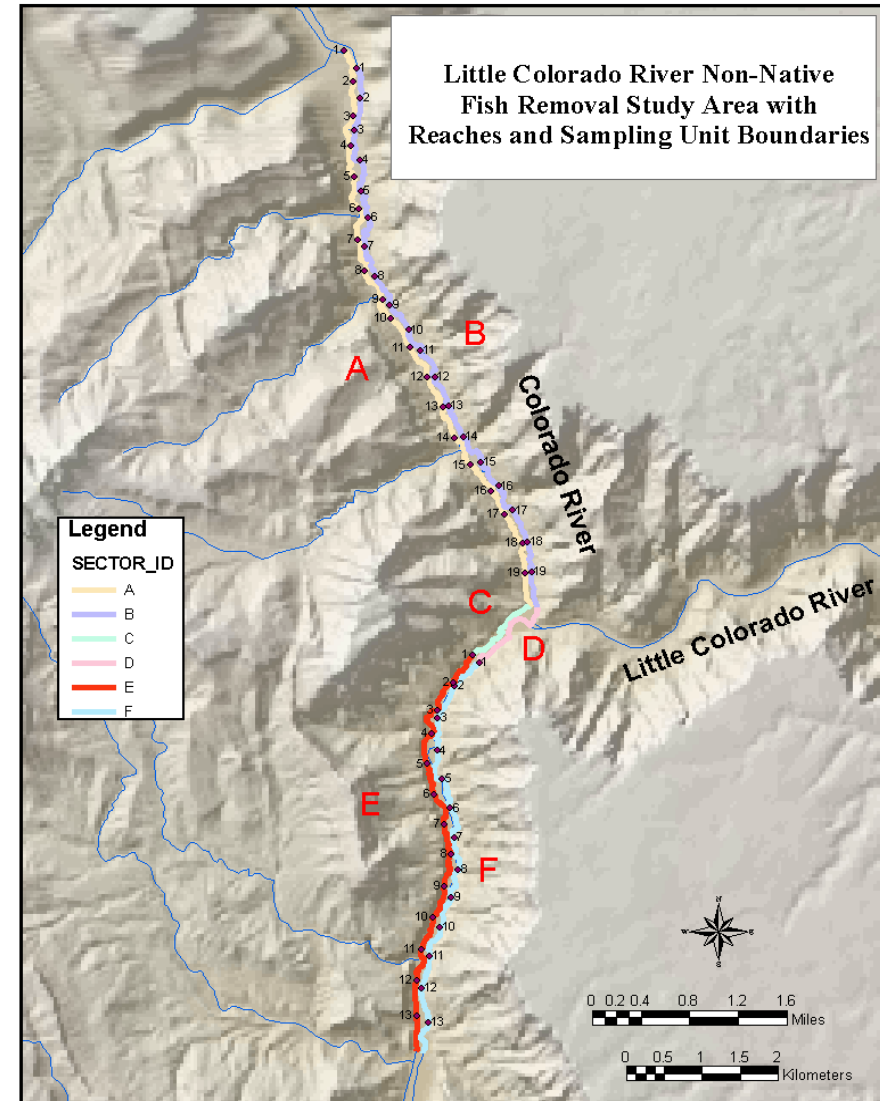


Mechanical Removal

- Electrofishing and euthanize all non-natives (rainbow and brown trout) in the Little Colorado River reach of the Colorado River (RM 56-66).

- 6 trips/year during 2003-2004

- Jan. Feb., Mar.
- Jul., Aug., Sep.

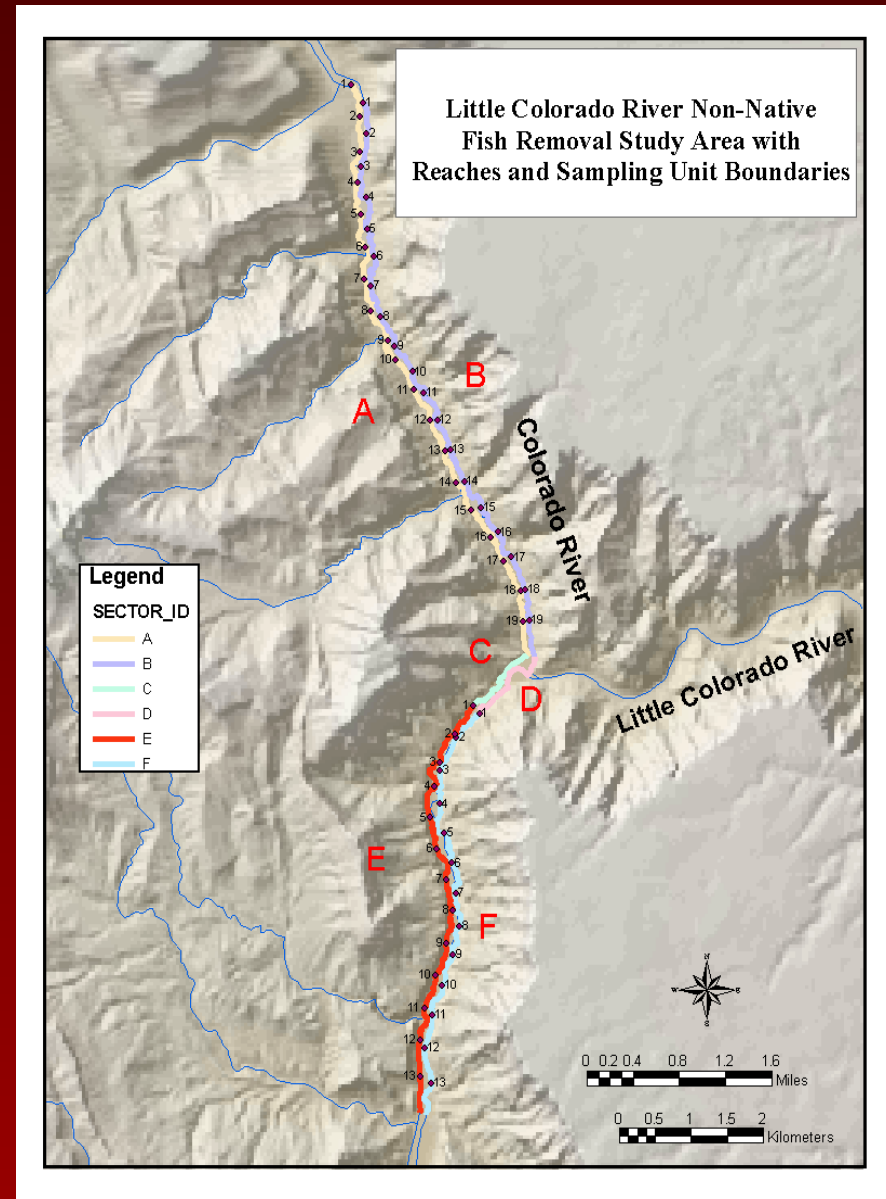


Mechanical Removal

Mechanical Removal Objectives:

- Can we reduce the abundance of non natives in a 10 mile reach of river (abundance estimates)?
- Evaluate piscivory as a function of: predator species and size, prey size, prey abundance, predator abundance.

Over time, evaluate relationship between rainbow and brown trout abundance and humpback chub recruitment and survival.



Mechanical Removal Methods

**Electrofish 64 stations in LCR reach 5 times each during each trip.
estimate abundance as a depletion estimate
euthanize every non native**

**Extract stomachs from all non natives
determine incidence of predation on natives**

**Conduct drift samples to estimate drifting food base
use to estimate prey selection by non natives**

**Electrofish control reach ~ 10 m upstream from experiment
determine if differences in experimental reach is actually
from removal efforts.**

Related projects

Evaluate rates of stranding of rainbow trout in Lee's Ferry

Bill Davis, Ecoplan

Benthic and drift food base at Lee's Ferry

Joe Shannon-NAU

Mapping spawning redds and identify when mortality occurs for rainbow trout

Josh Korman, Ecometrics