Precocious salmon on the spawning grounds

Christopher Johnson, Todd Pearsons, Brenda James, and Gabriel Temple

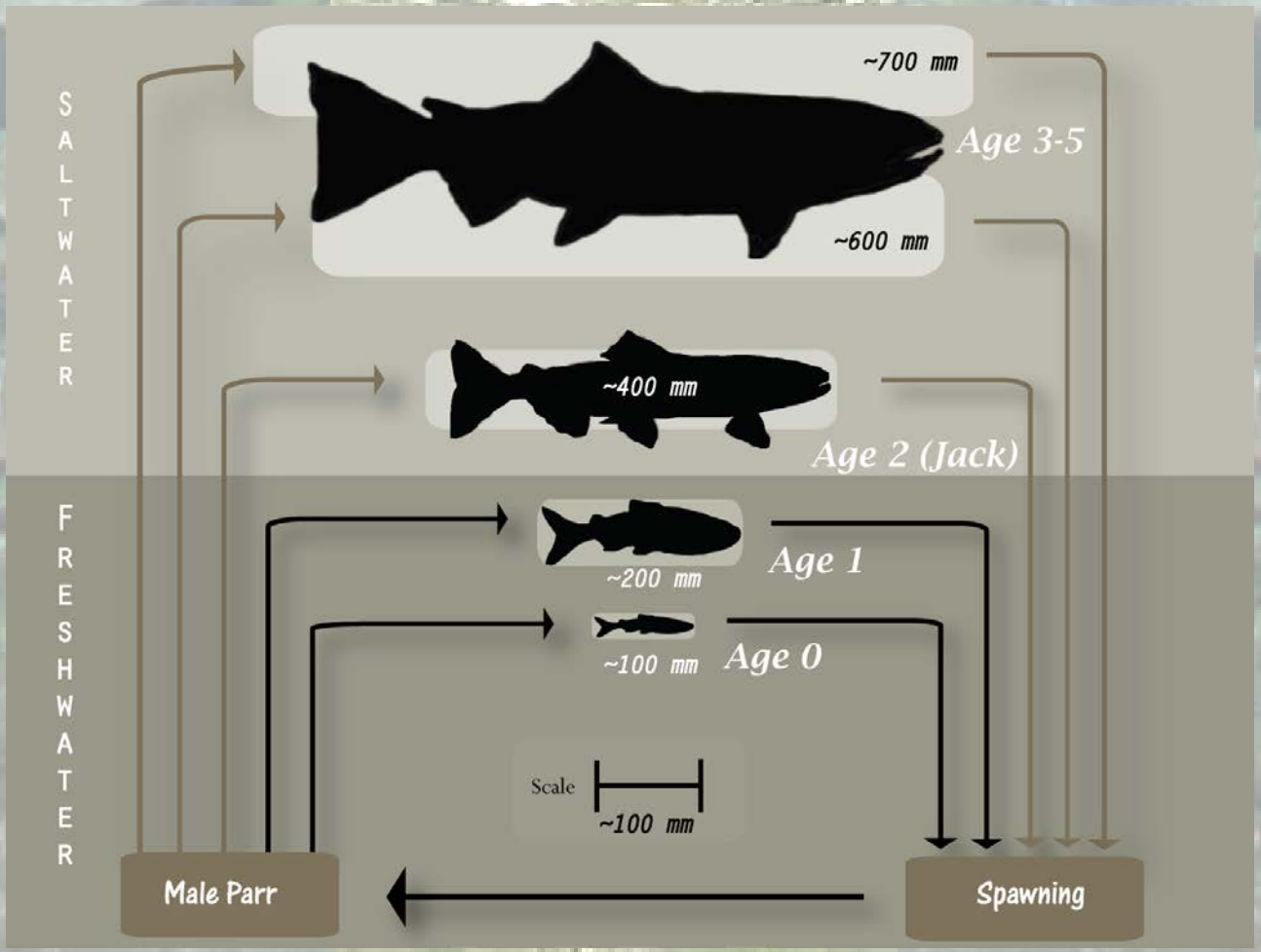
Potential Implications of increased precocialism

- Ecological
  - Predation pressure
  - Increased competition for available resources
- Genetic
  - Propagation of undesirable traits
  - Decrease in genetic variability
- Harvest
  - Decreased sport and commercial harvest
  - Interference with resident sport fisheries

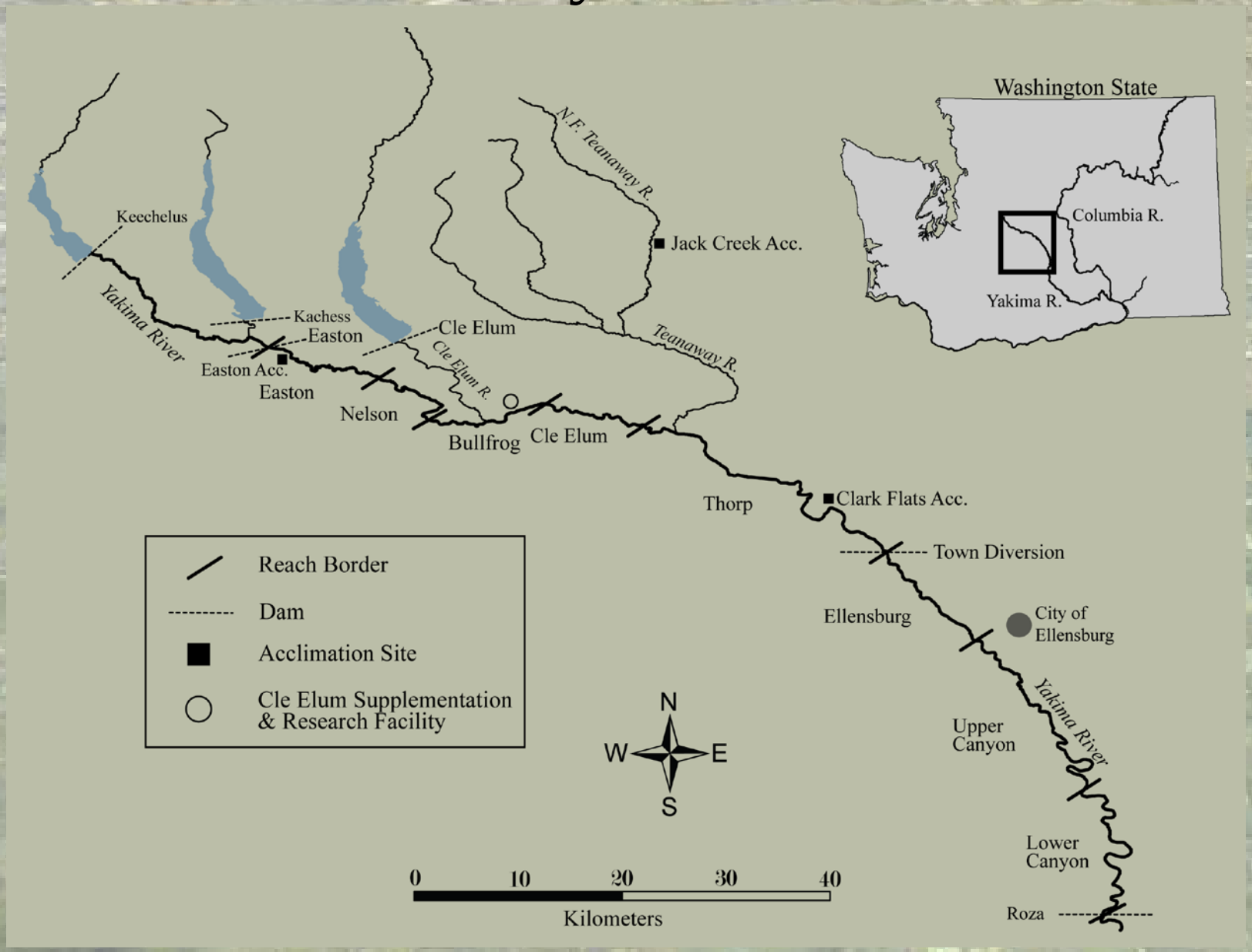
Study Objectives

Determine if the Cle Elum Supplementation and Research Facility alters the abundance, distribution, age/size, or behavior of precociously maturing males in the natural environment.

Spring Chinook
Precocious Male Life-History

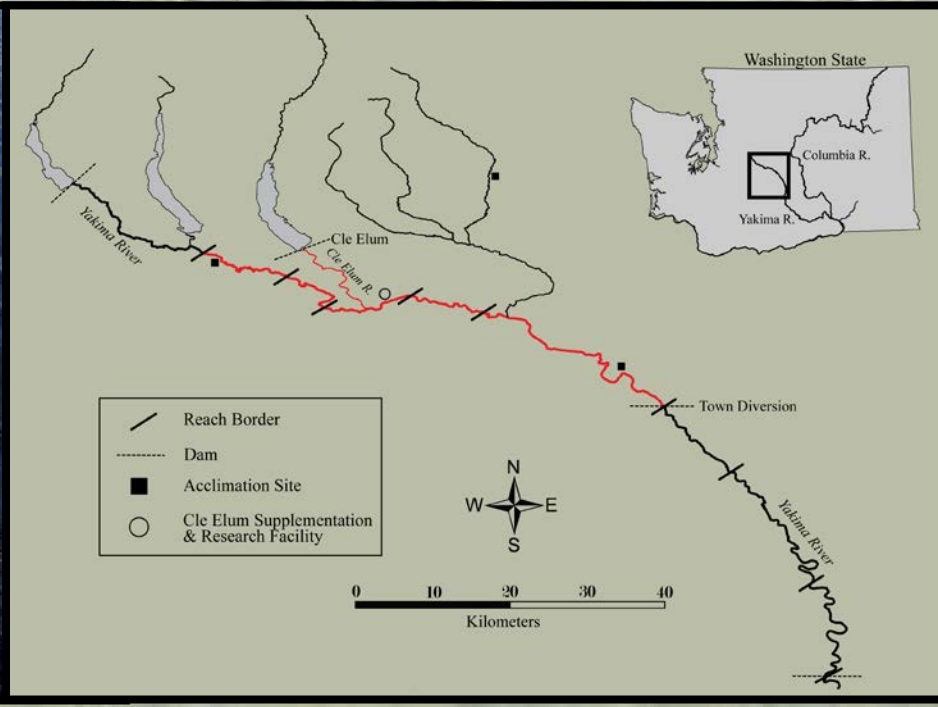


Study Area


Washington State
Columbia R.
Yakima R.
Keechelus
Yakima River
Kachess
Easton
Easton Acc.
Easton
Nelson
Cle Elum
Cle Elum R.
Bullfrog
Cle Elum
N.F. Teanaway R.
Jack Creek Acc.
Teanaway R.
Thorp
Clark Flats Acc.
Town Diversion
Ellensburg
City of Ellensburg
Yakima River
Upper Canyon
Lower Canyon
Roza
Reach Border
Dam
Acclimation Site
Cle Elum Supplementation & Research Facility
N
W
E
S
0
10
20
30
40
Kilometers

Methods

Precociously mature males on the redds



Methods

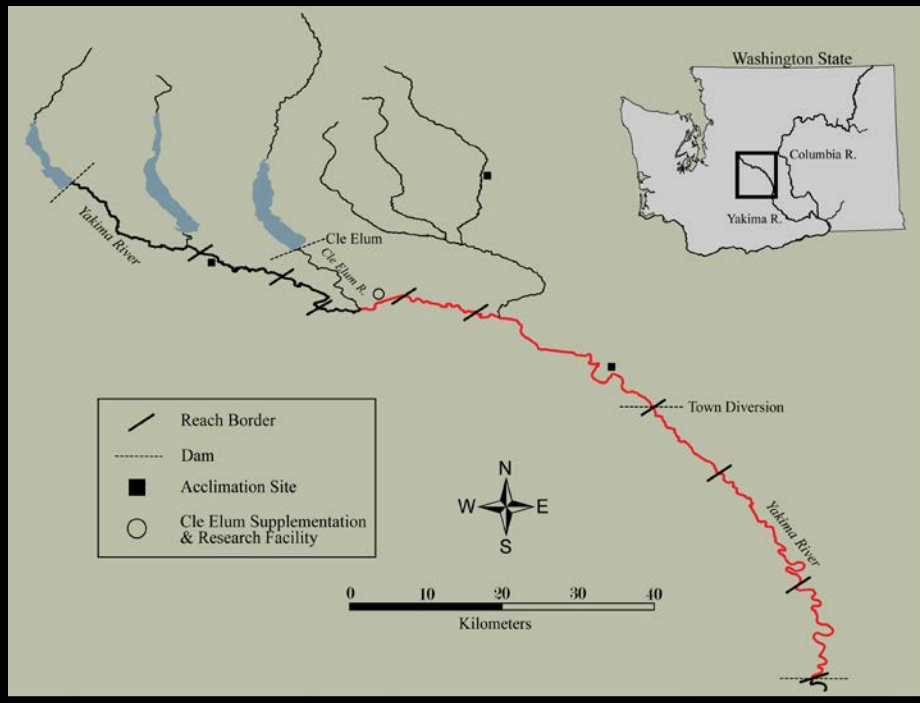
Precociously mature males on the redds

Methods

Precociously mature males on the redds

Methods

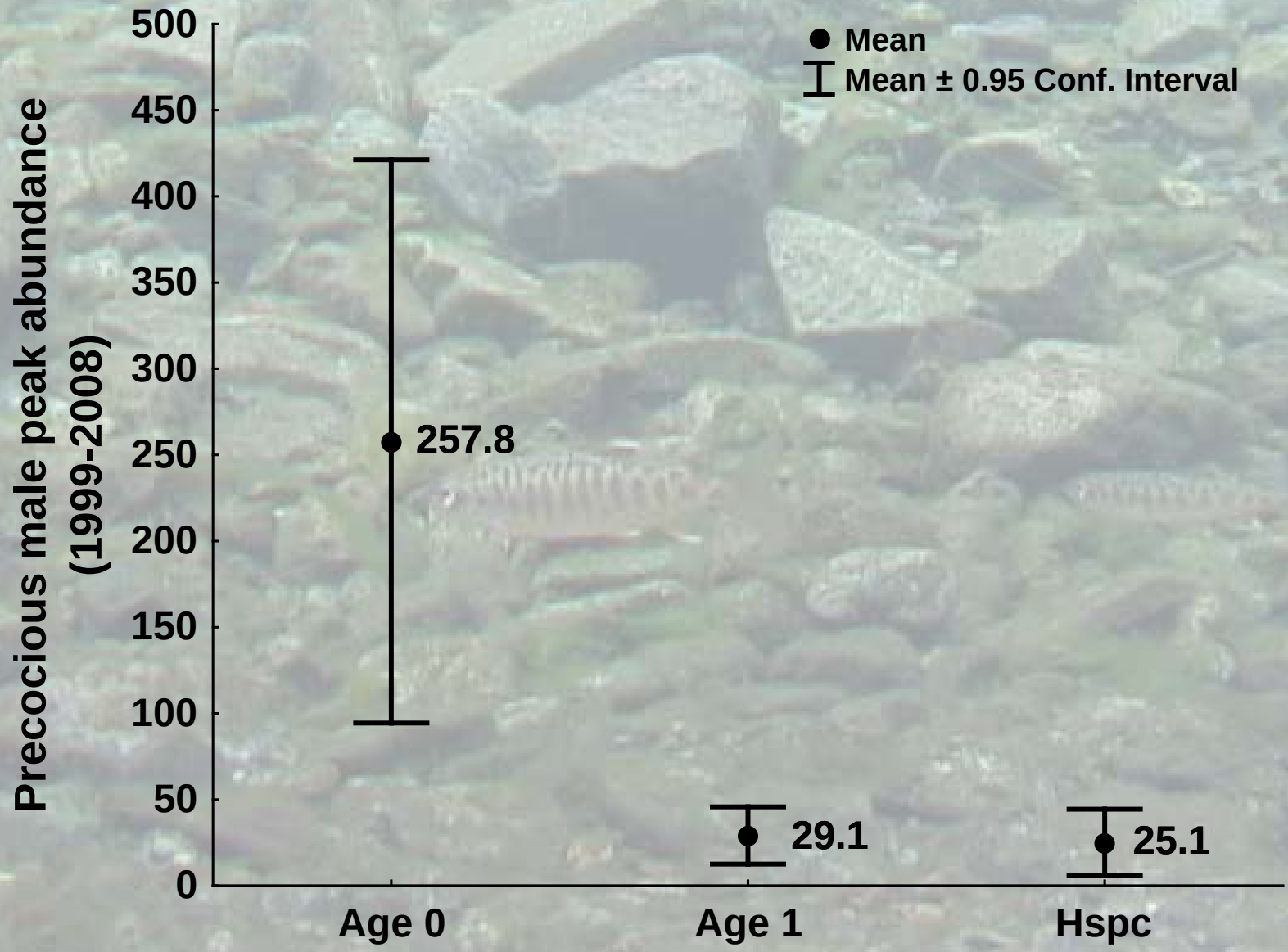
Precociously mature males off the redds (hatchery origin)



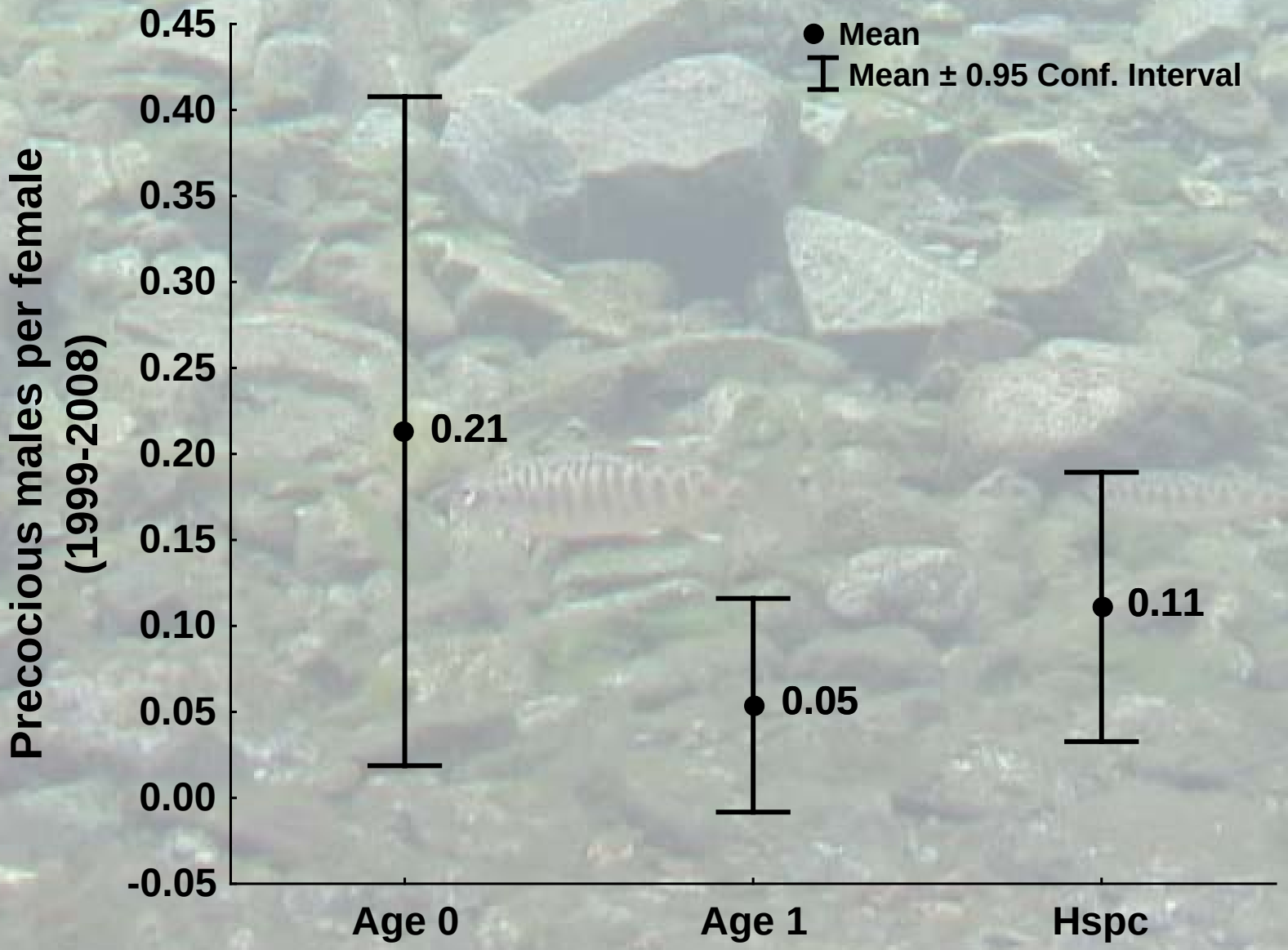
Abundance

- Mean abundance by age and origin on the spawning grounds
- Precocious males per spawning female
- Correlates with precocious male abundance

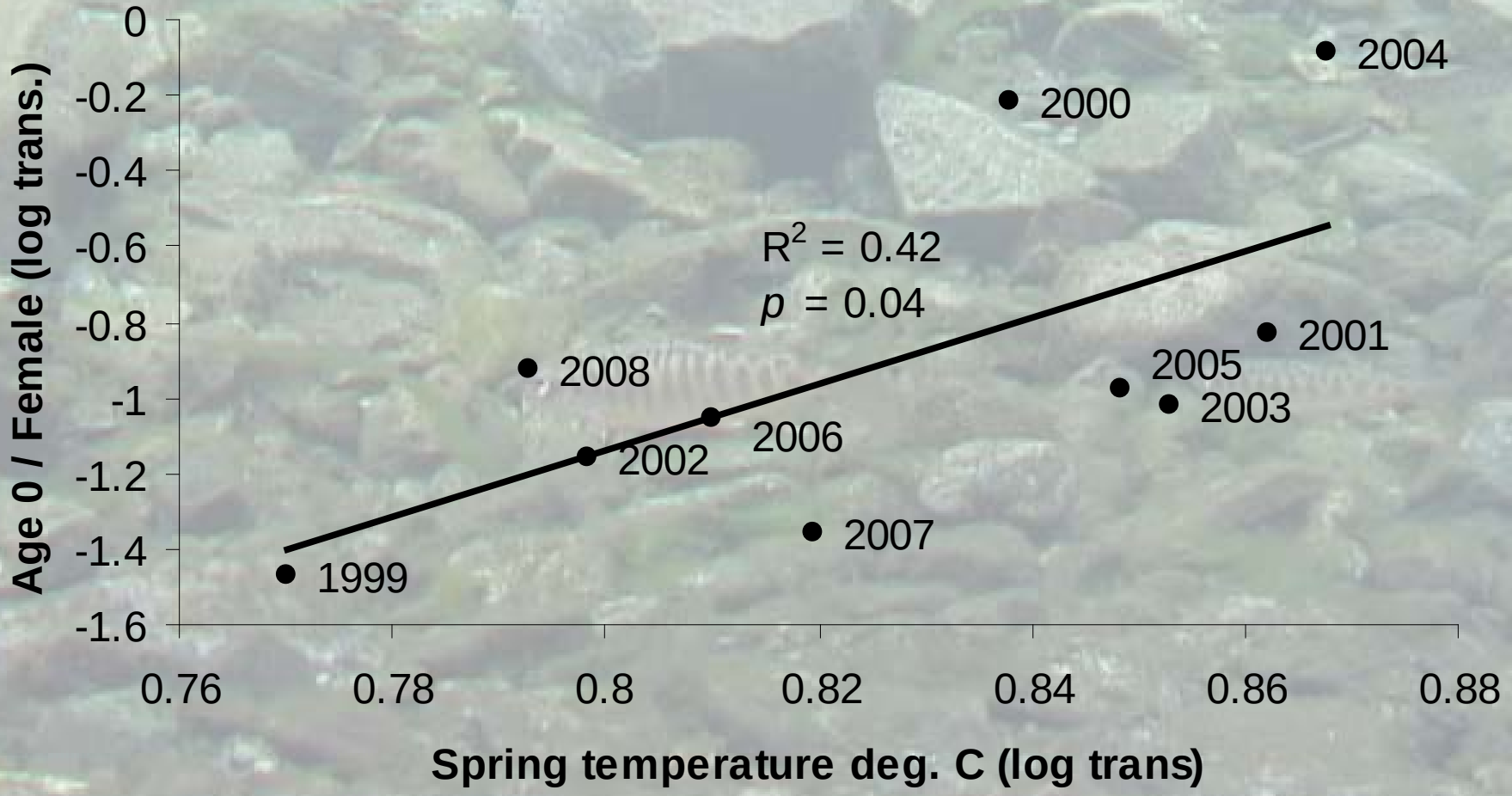
Abundance on the spawning grounds



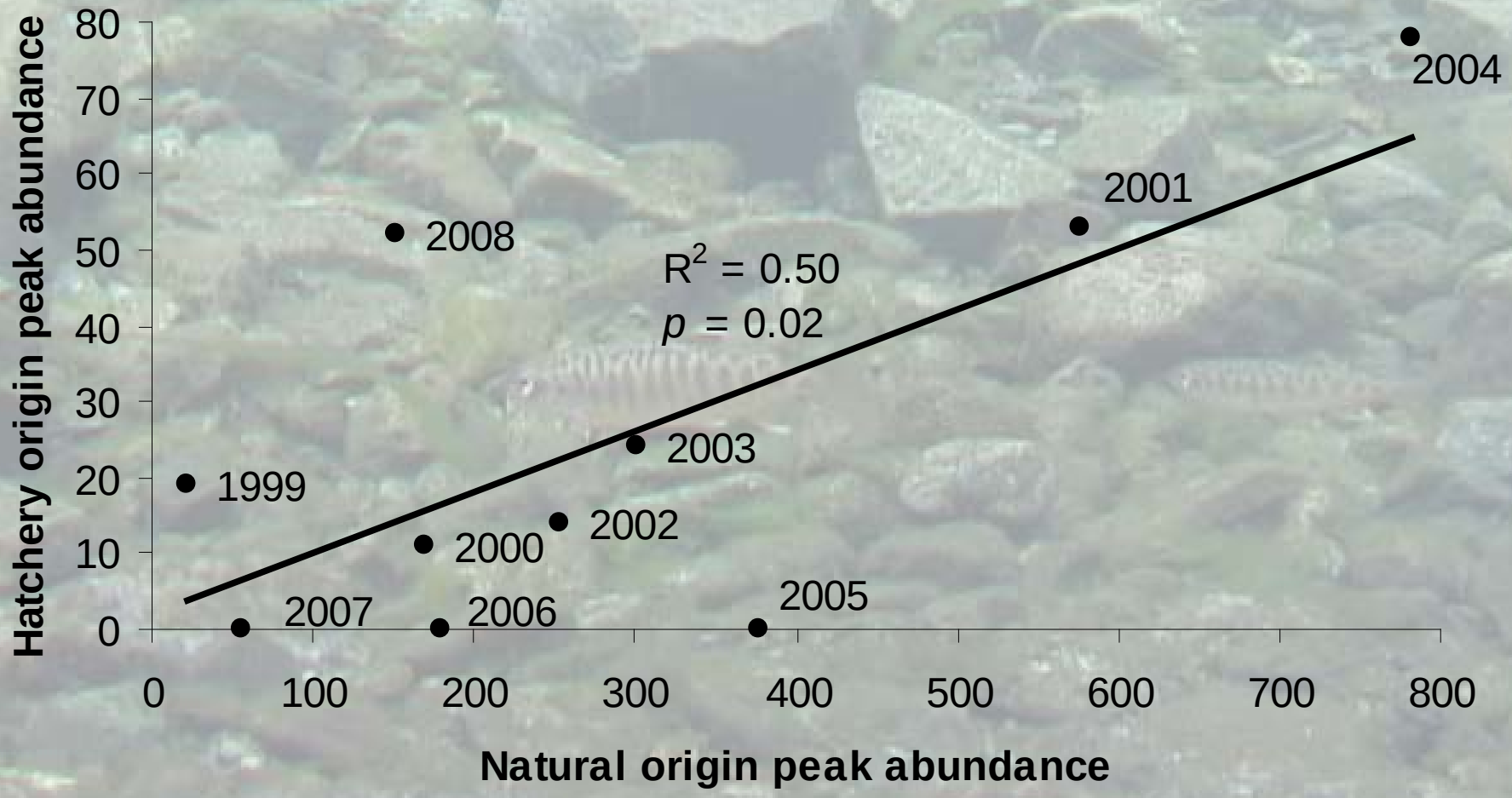
PM per female



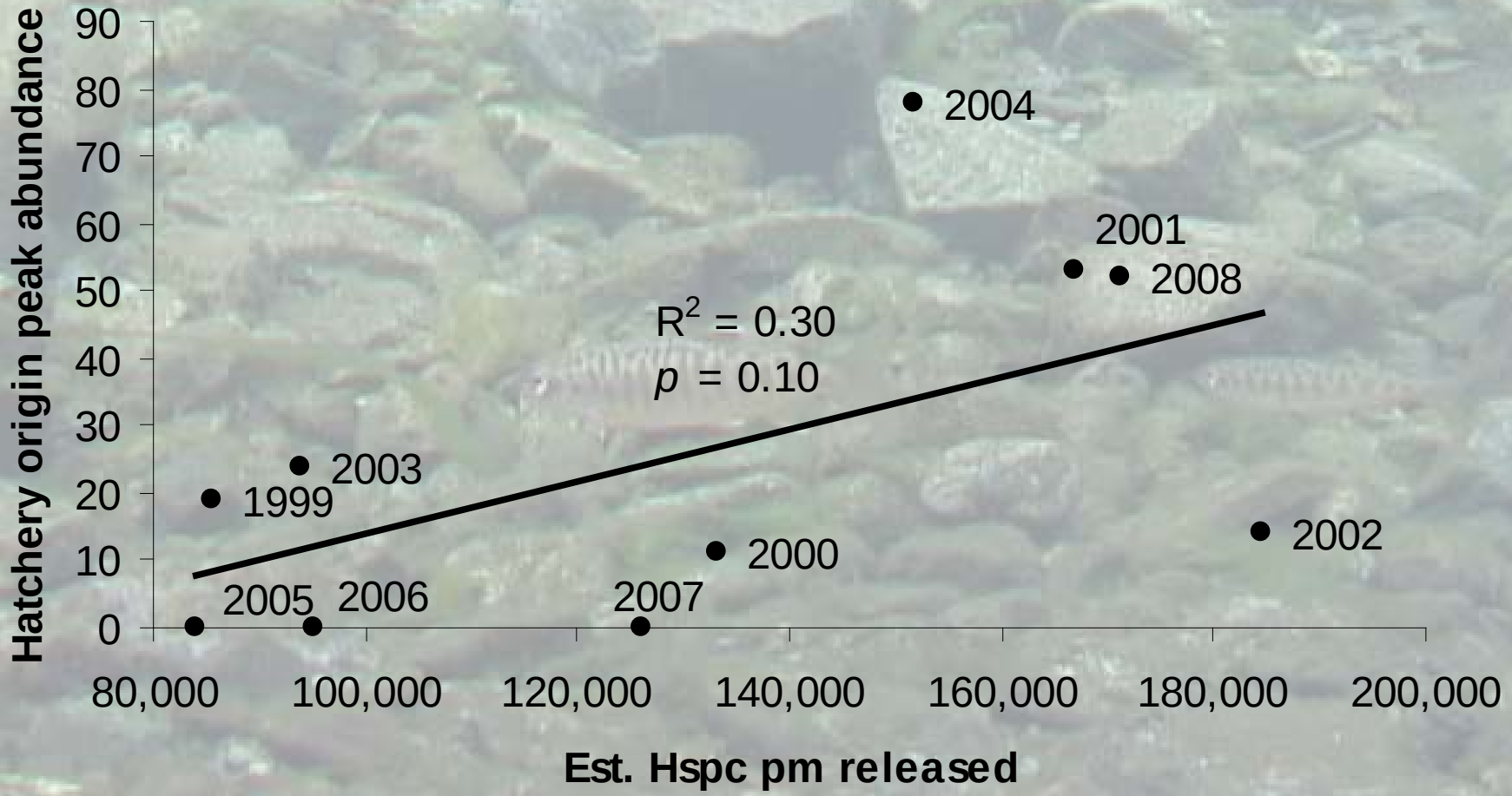
Spring temperature



Hatchery vs. natural origin abundance

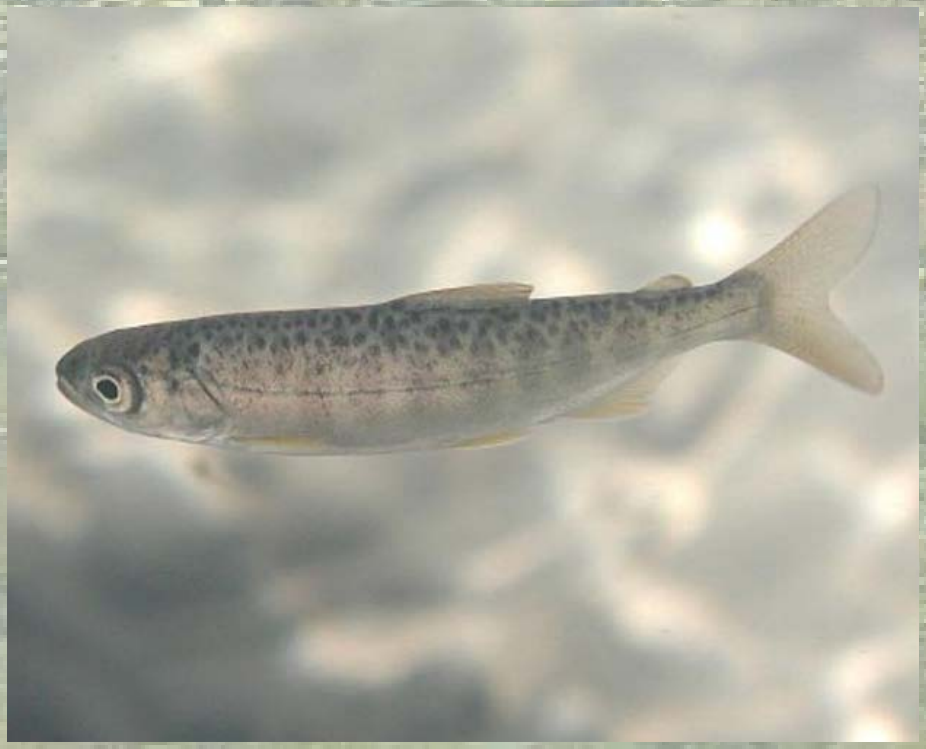


Release numbers vs. fall abundance

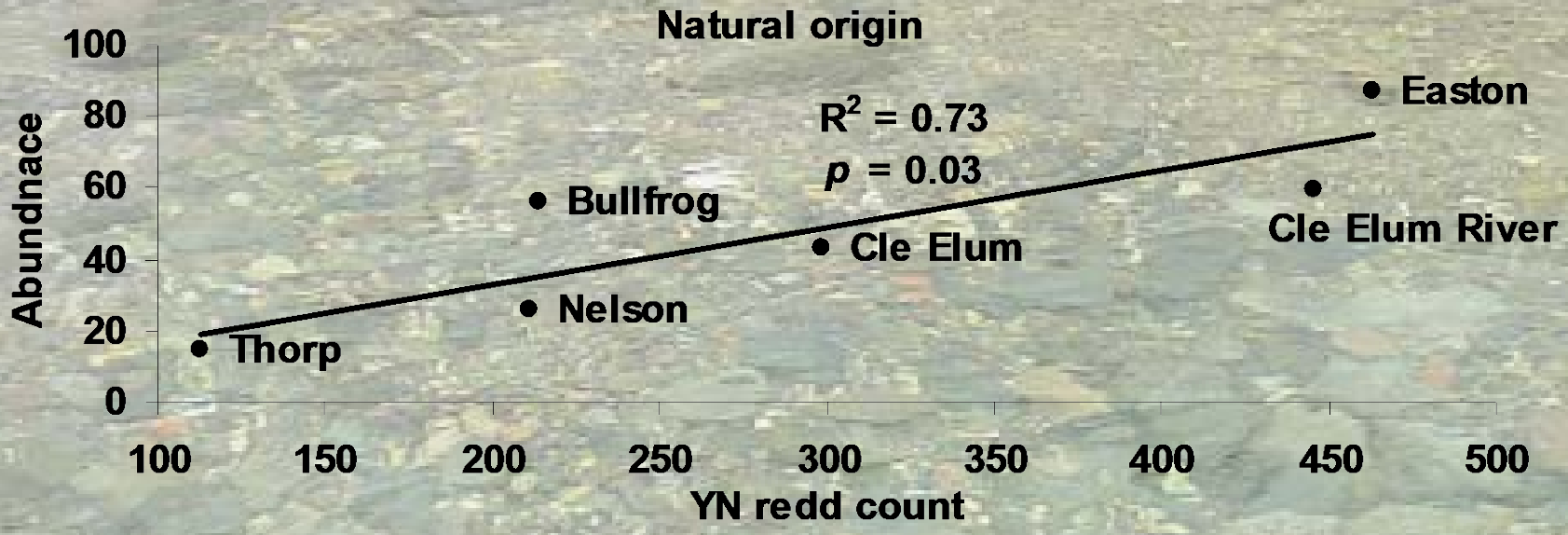


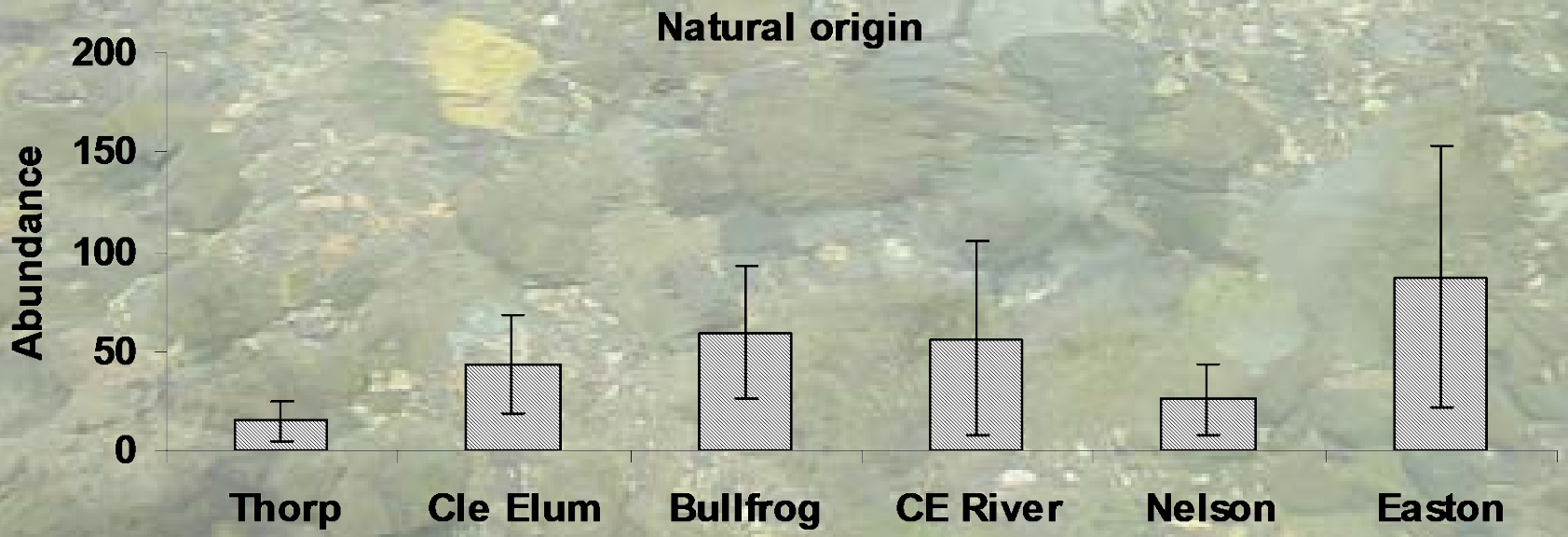
Distribution

- Natural and hatchery origin precocious male distribution on redds
- Hatchery origin precocious male distribution away from redds

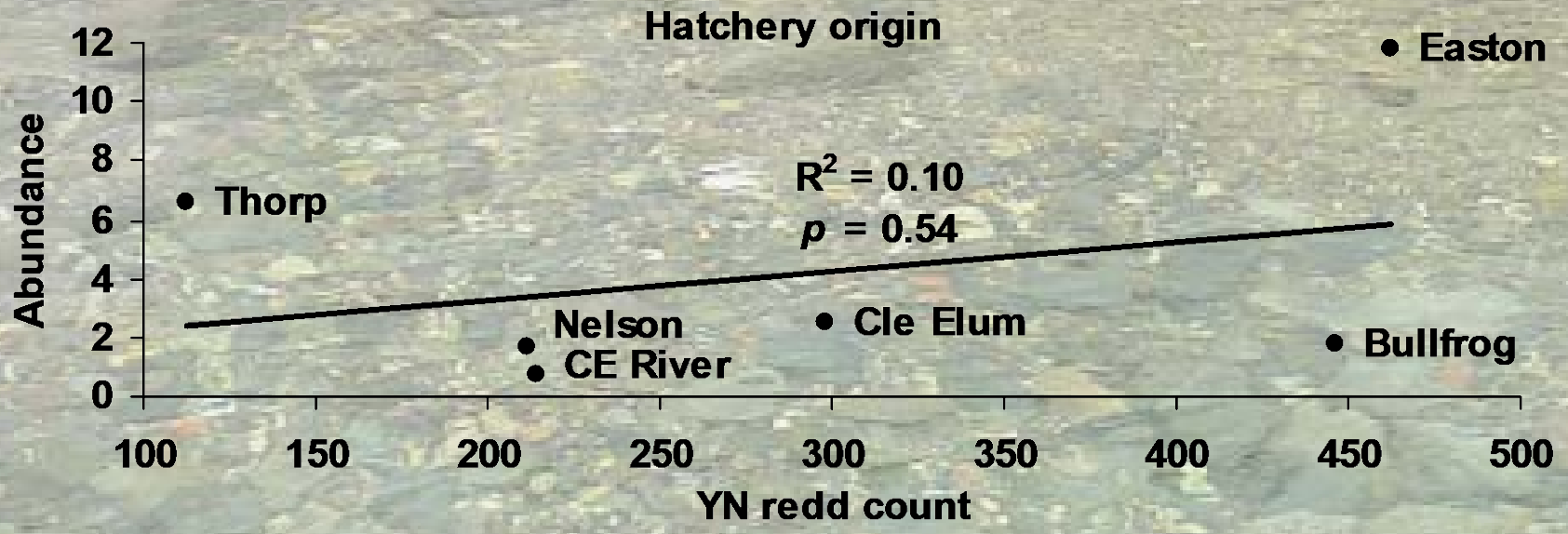


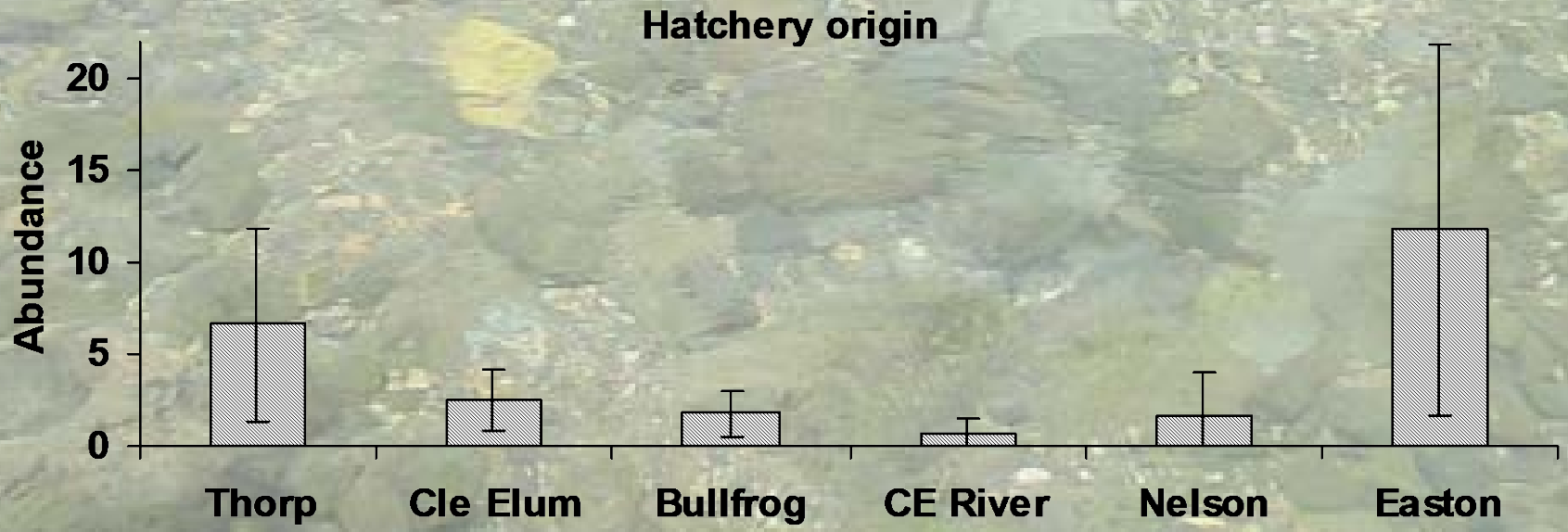
Natural origin PM distribution



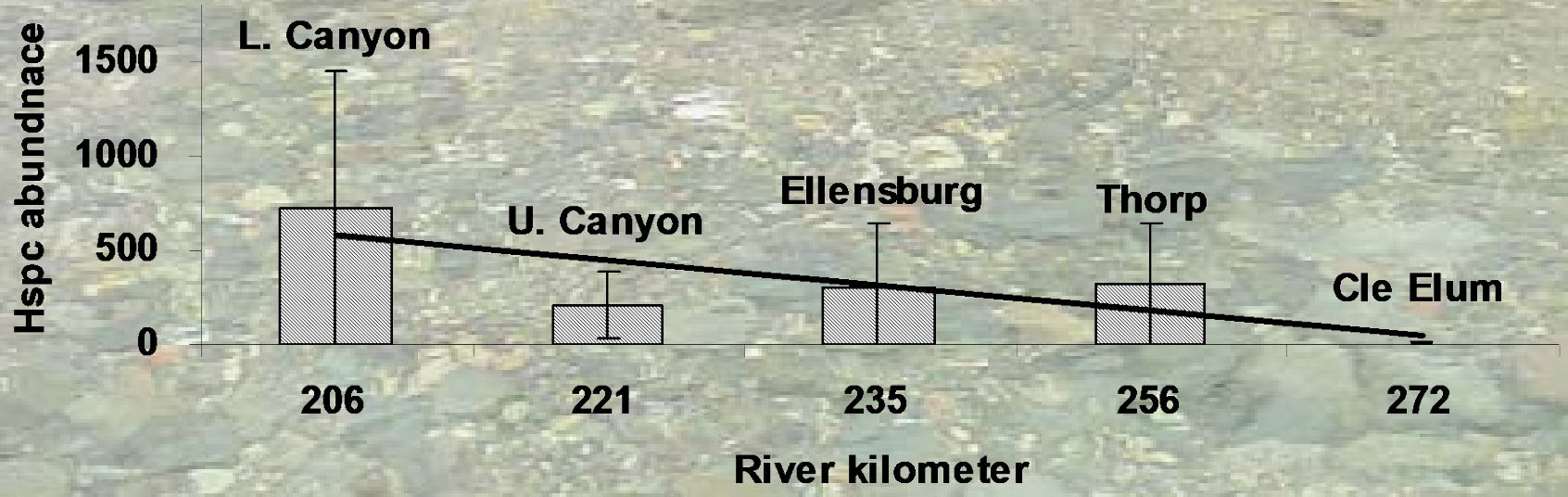


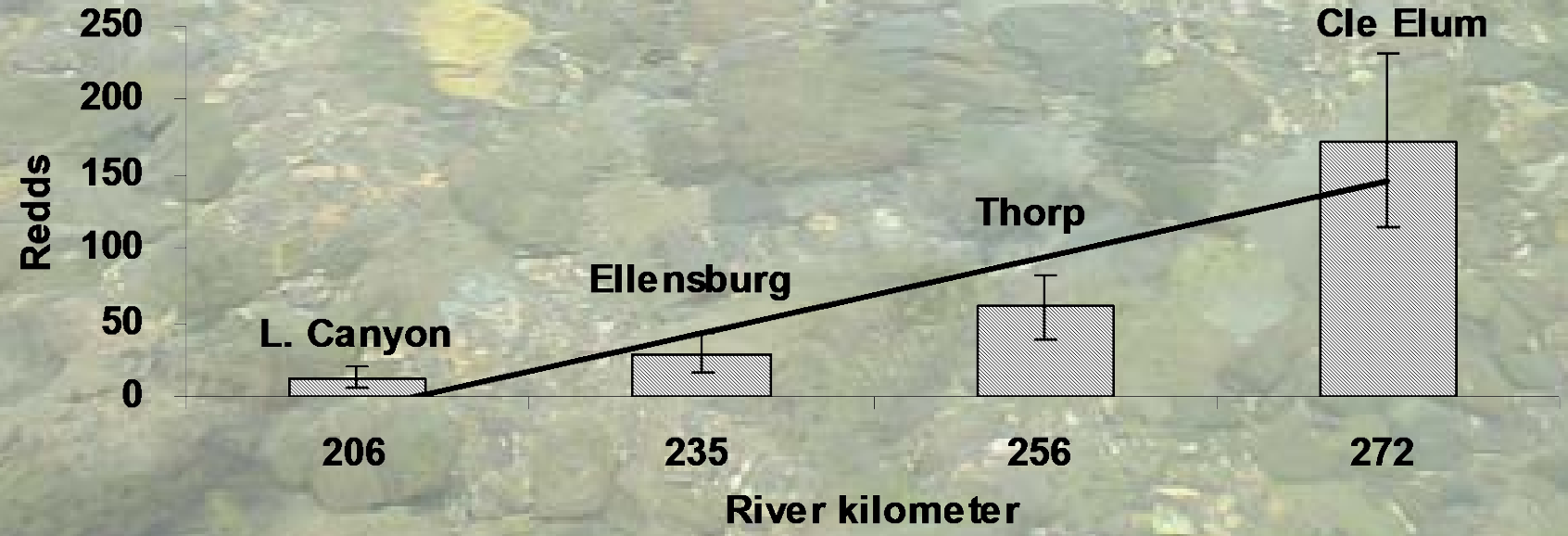
Hatchery origin PM distribution





Hatchery origin PM distribution away from the redds

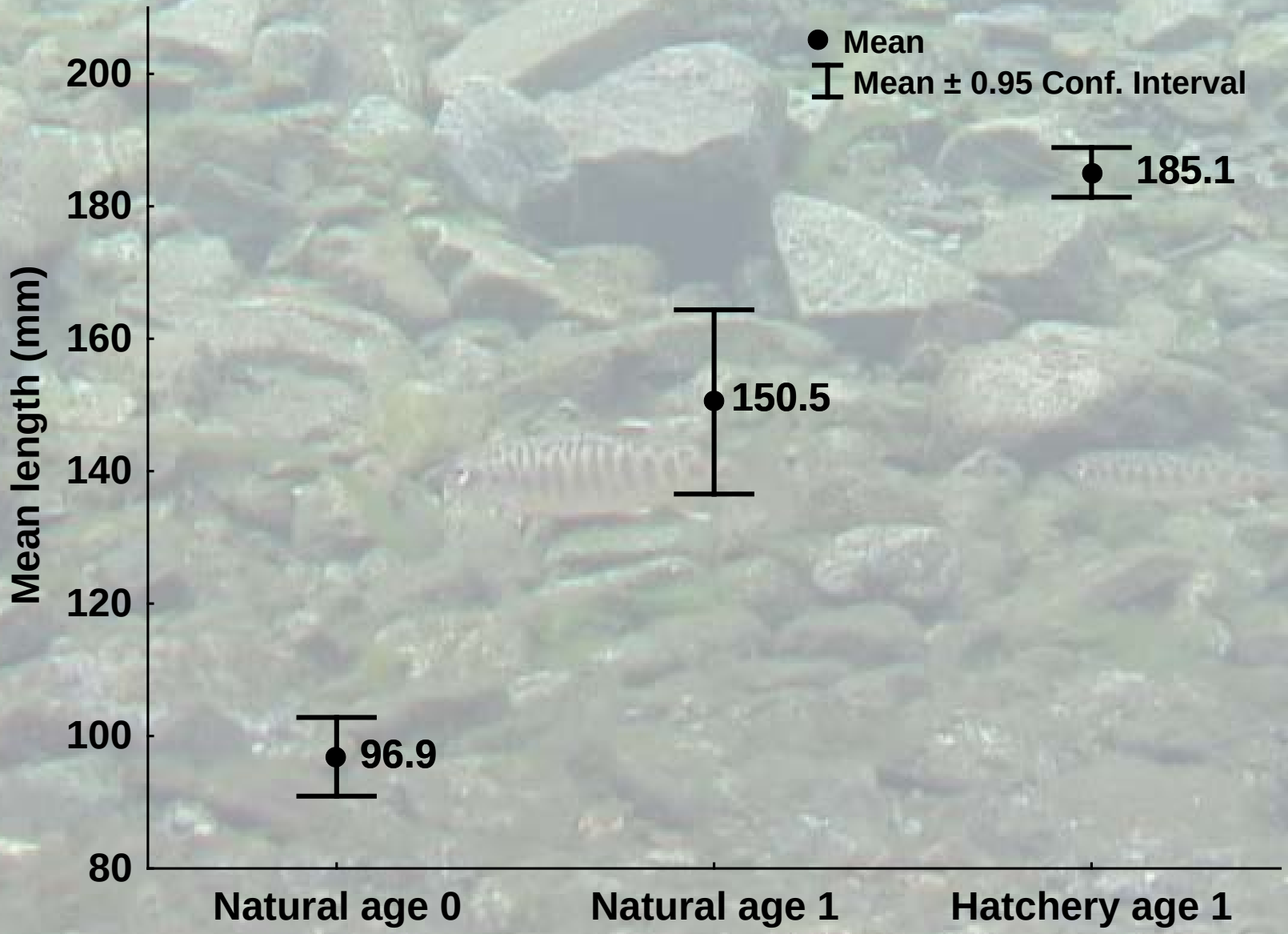




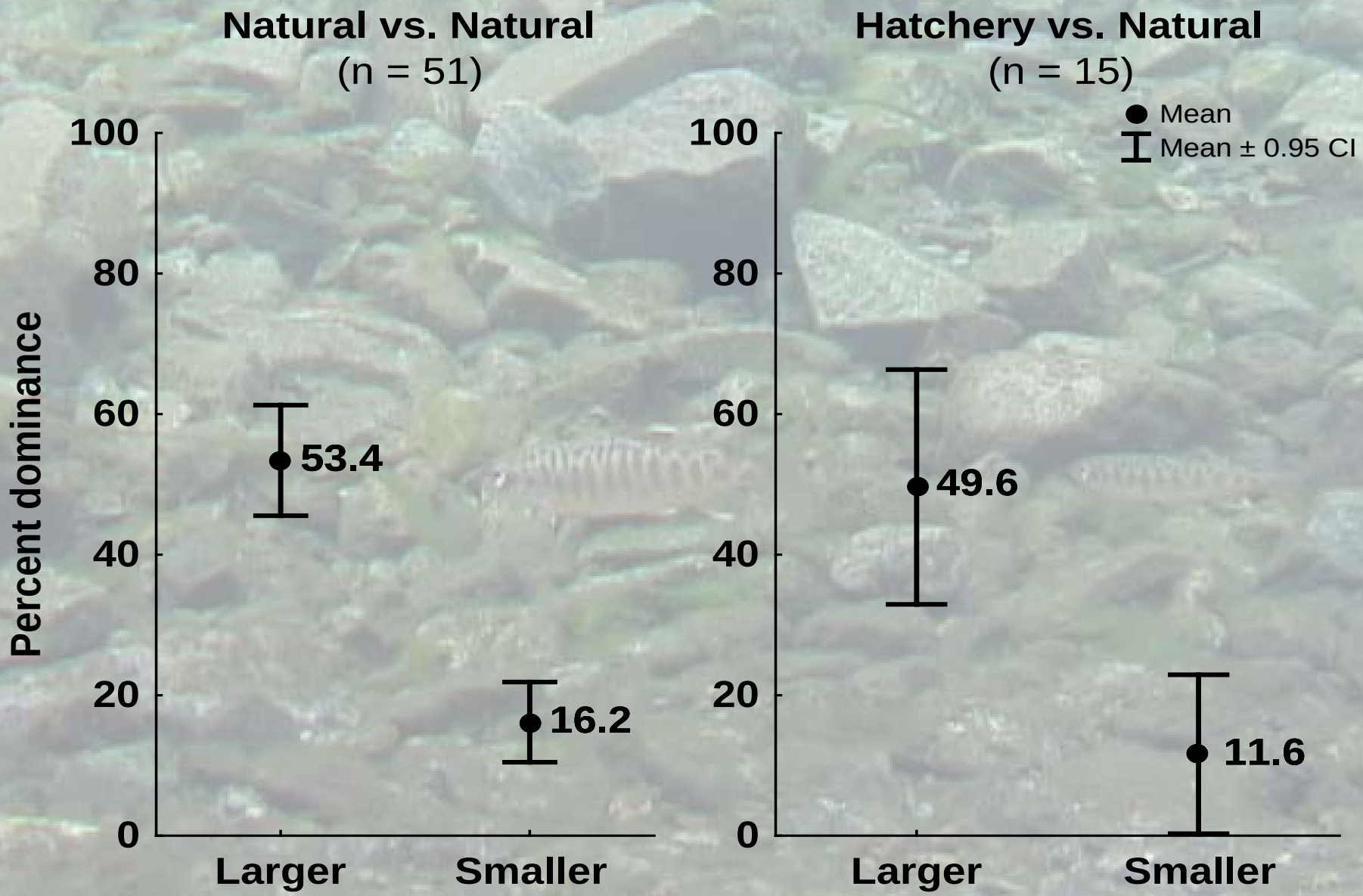
Age, Size and Behavior

- Size differences between age class and origin
- Indicators of sized based dominance

Size at the time of spawning



Interactions on the redds



Summary

- Natural origin precociously mature males are more abundant on the spawning grounds
- Environmental conditions and hatchery release numbers both appear to regulate hatchery origin abundance in some years
- Hatchery origin precocious males are predominantly in areas of low spawning density
- Hatchery precocious males are larger and appear to dominate interactions with natural production precocious males

More information:

Pearsons, T.N., C.L. Johnson, B.B. James, G. M.Temple. 2009. Abundance and distribution of hatchery and natural origin precociously mature male spring Chinook salmon in the Yakima River. North American Journal of Fisheries Management 29(3):778-790.

BPA website: http://www.efw.bpa.gov

Acknowledgements

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