

A school of Chinook salmon swimming in clear water over a rocky riverbed. The fish are silvery with dark spots and are moving in a coordinated pattern. The background shows a rocky riverbed and some green vegetation on the left.

# Spring Chinook Salmon Interactions Indices - Competition

Todd Pearsons

Christopher Johnson

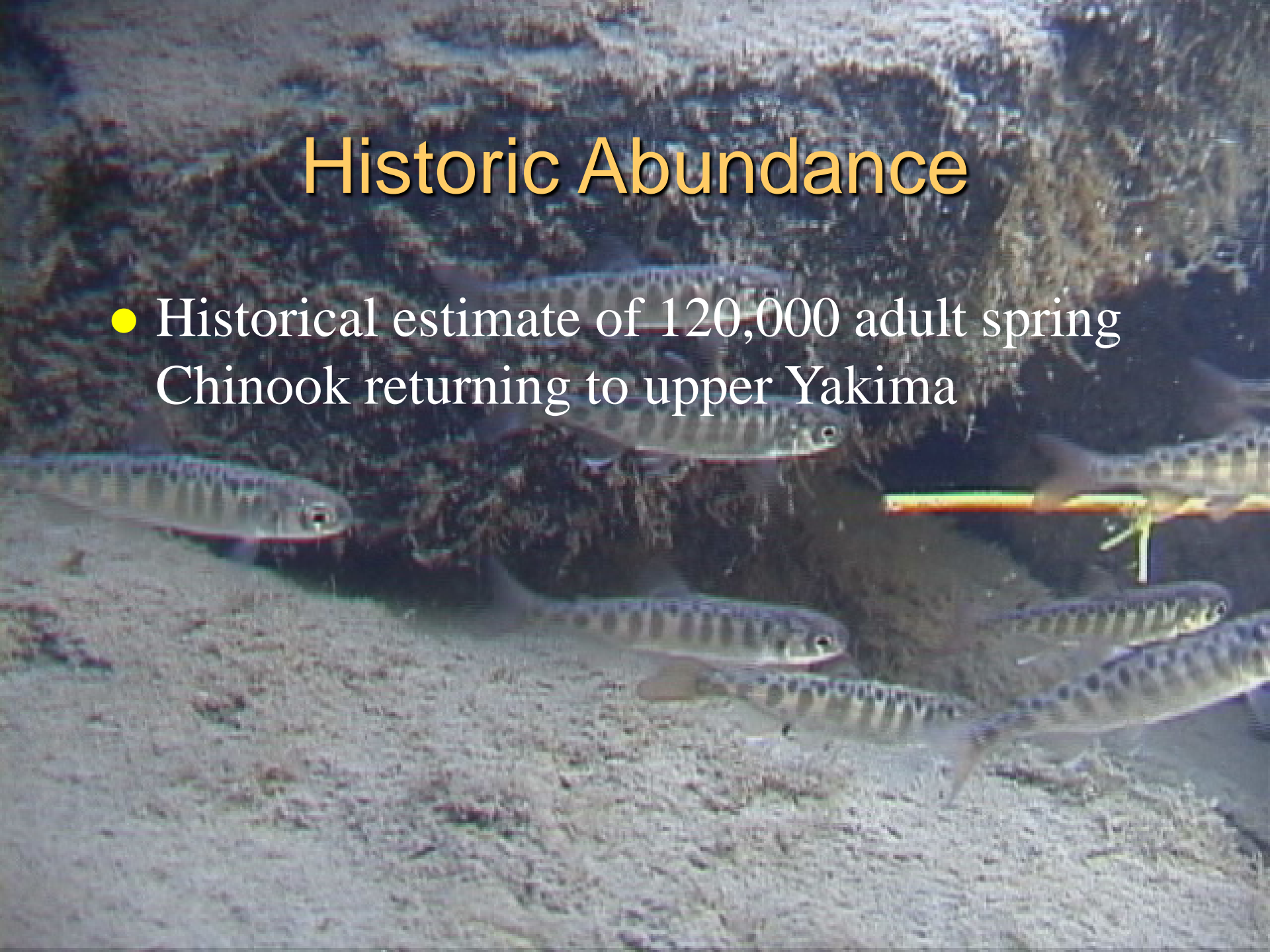
Brenda James

and

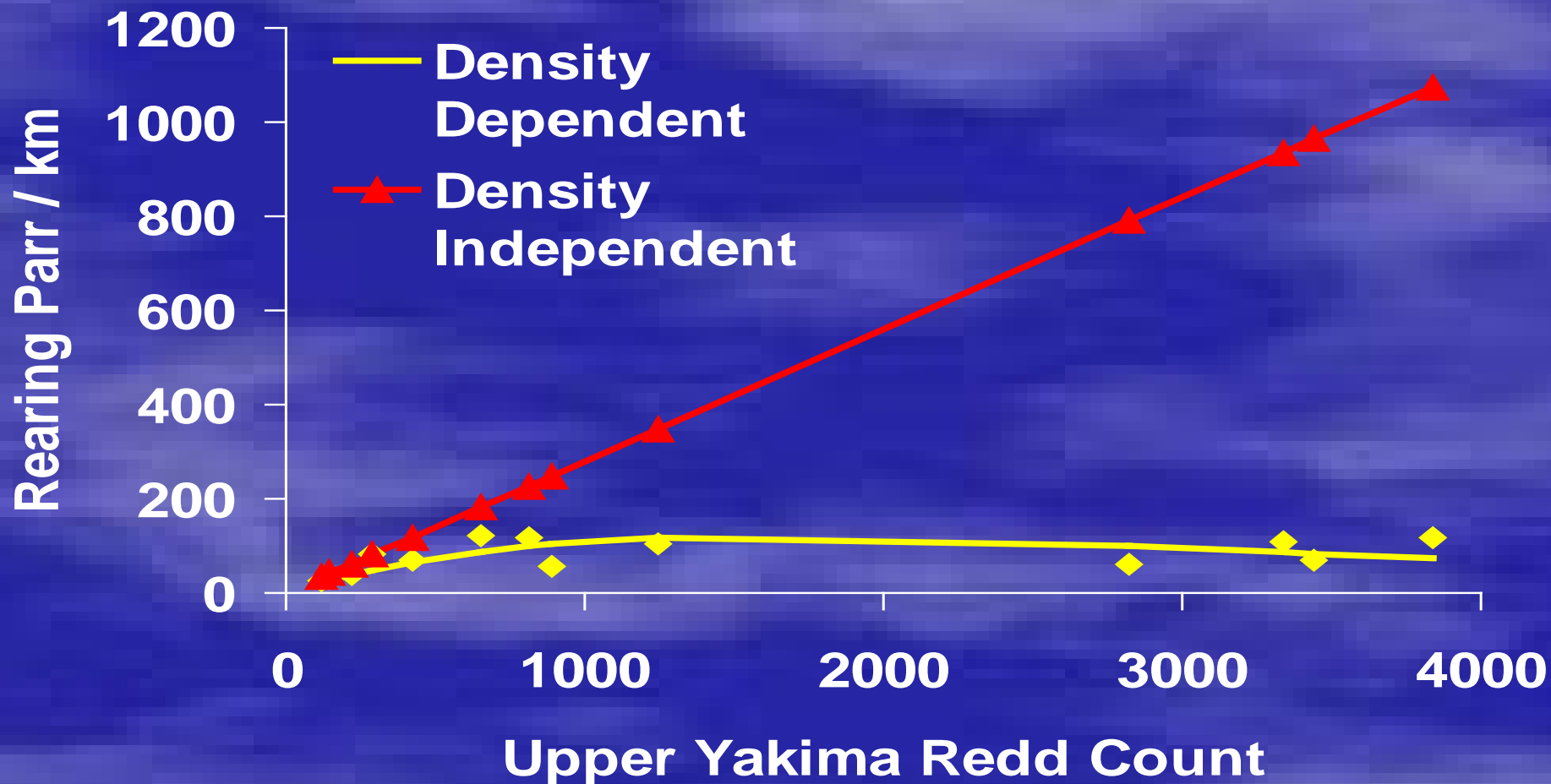
Gabriel Temple

# Historic Abundance

- Historical estimate of 120,000 adult spring Chinook returning to upper Yakima

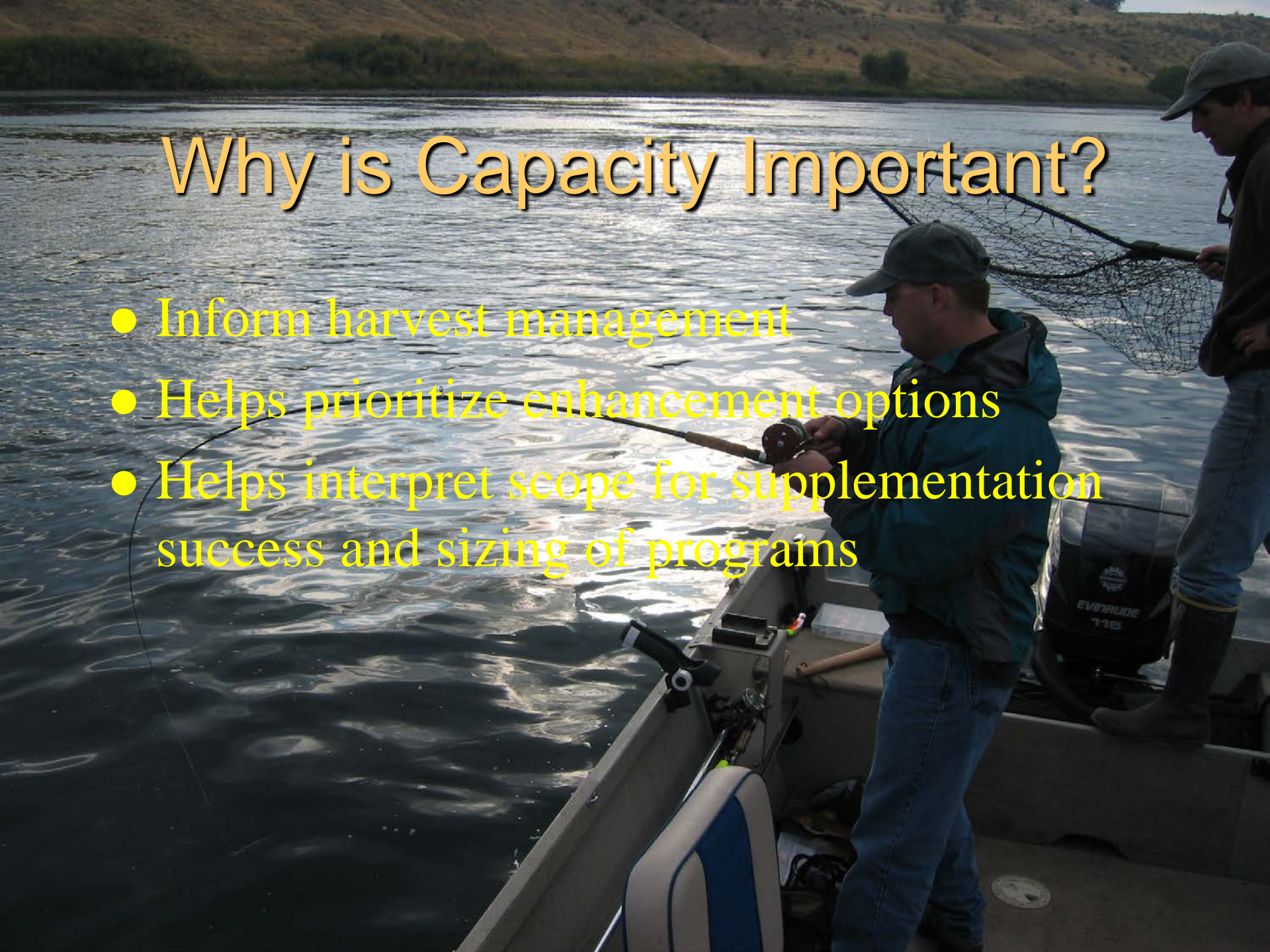


# Importance of Density Dependence

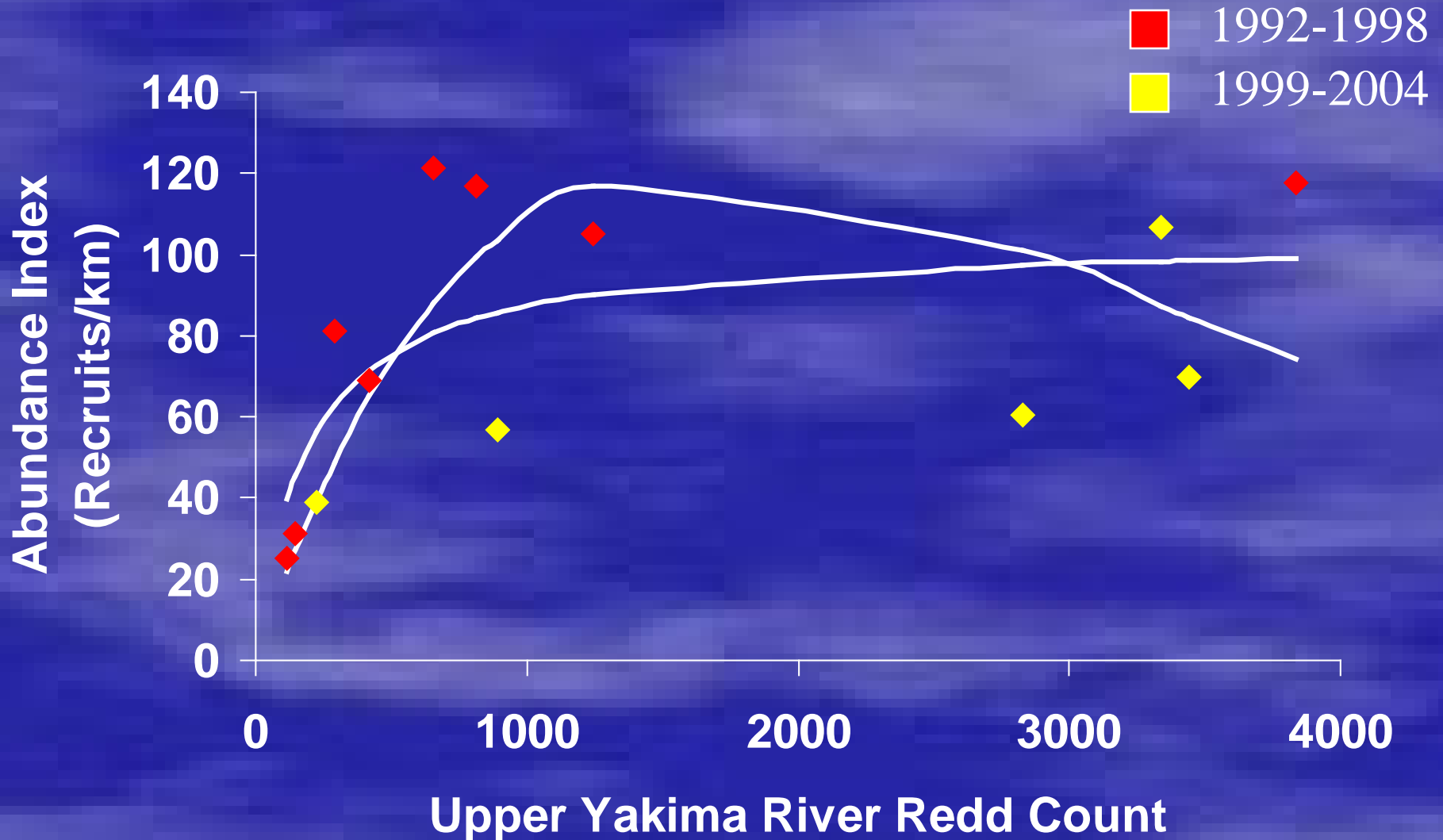


# Why is Capacity Important?

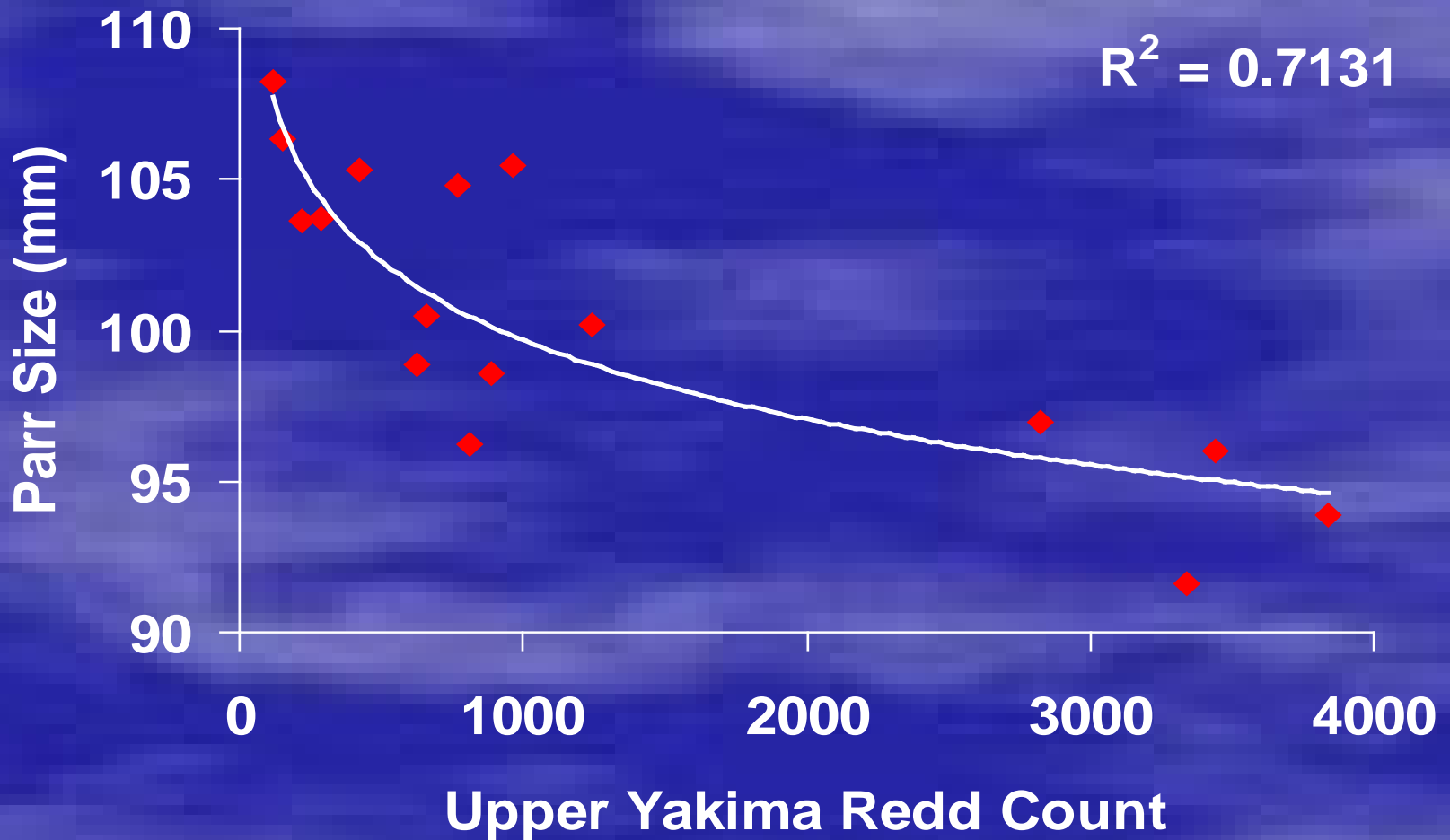
- Inform harvest management
- Helps prioritize enhancement options
- Helps interpret scope for supplementation success and sizing of programs



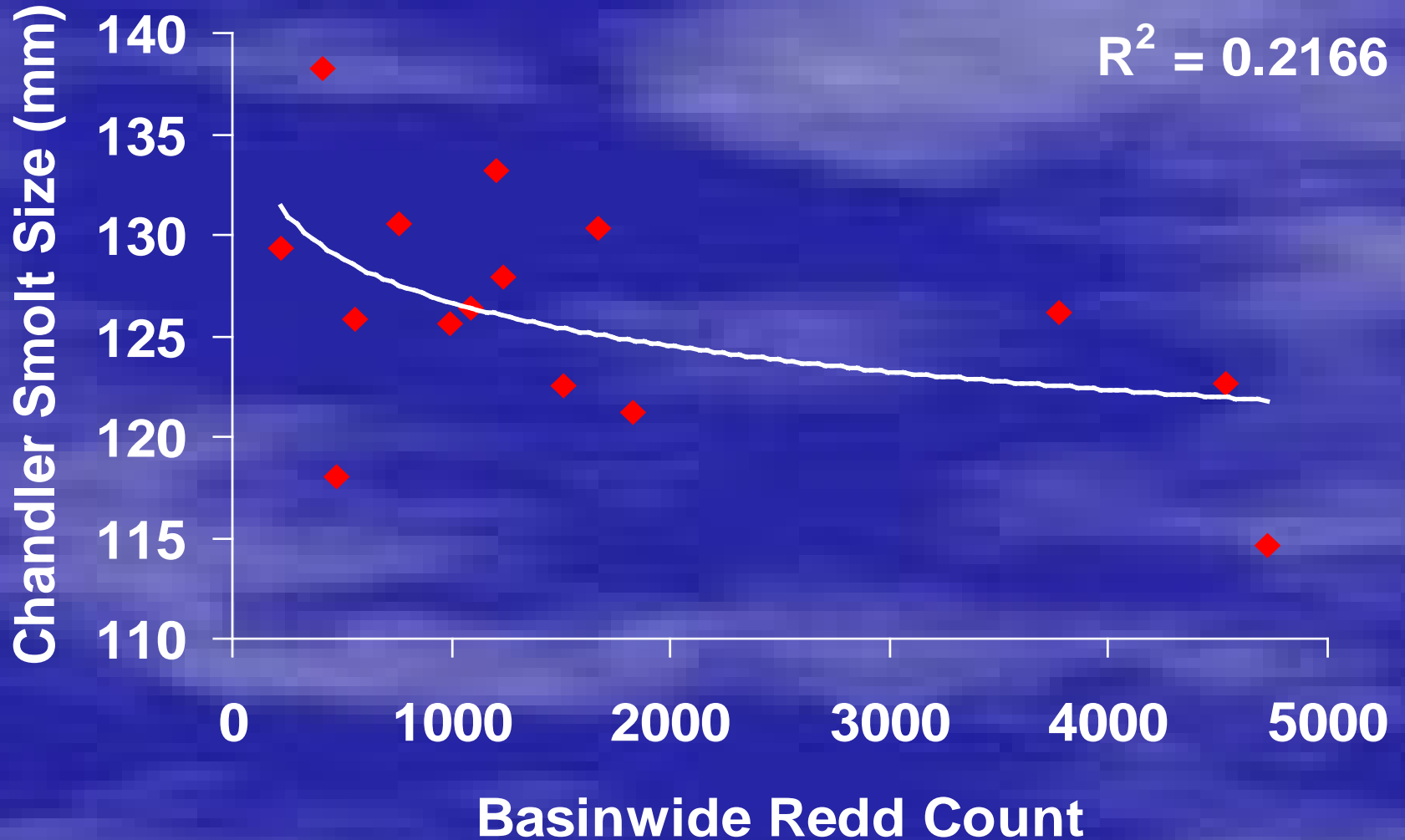
# Beverton/Holt and Ricker



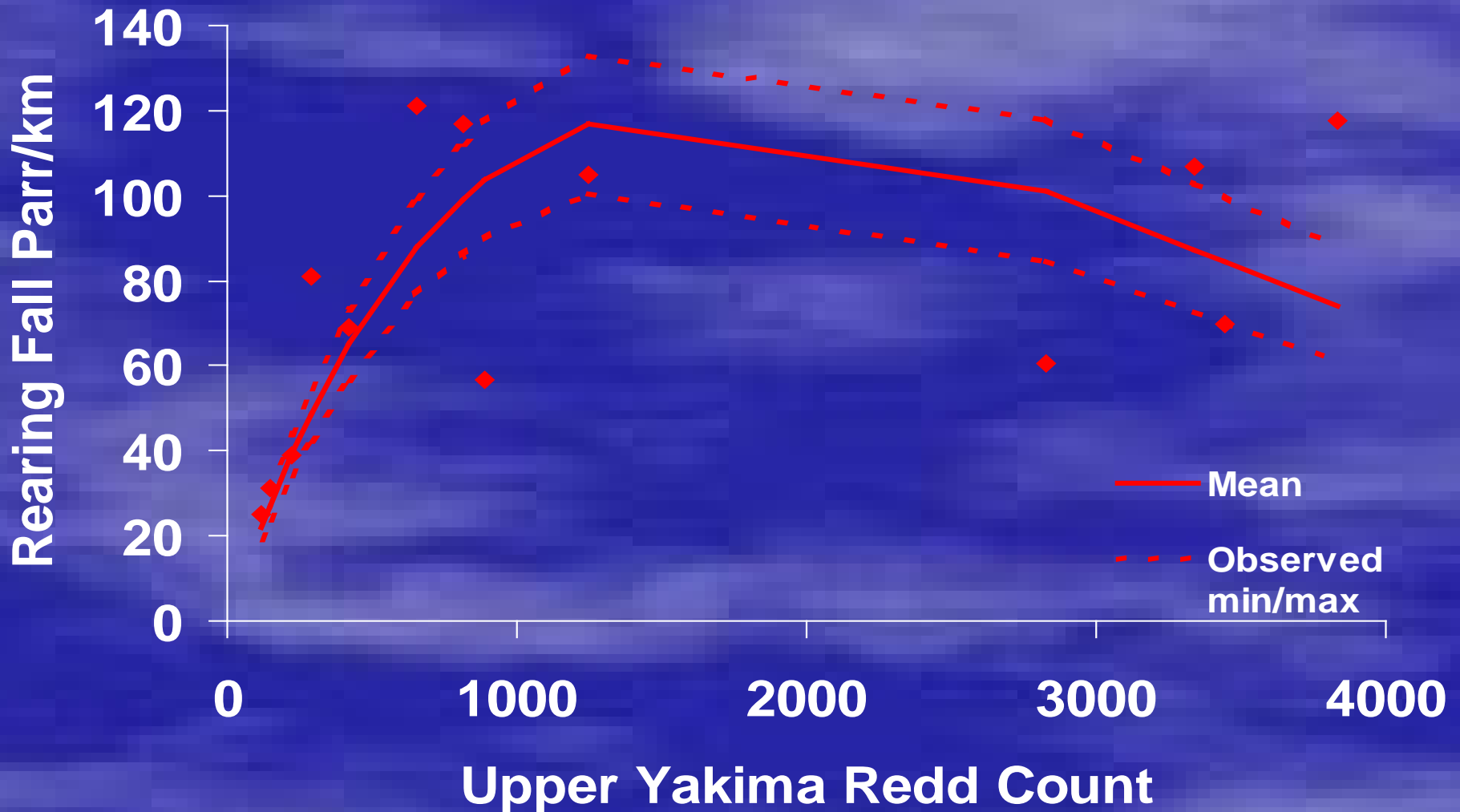
# Parr Size



# Smolt Size



# Variation in Capacity



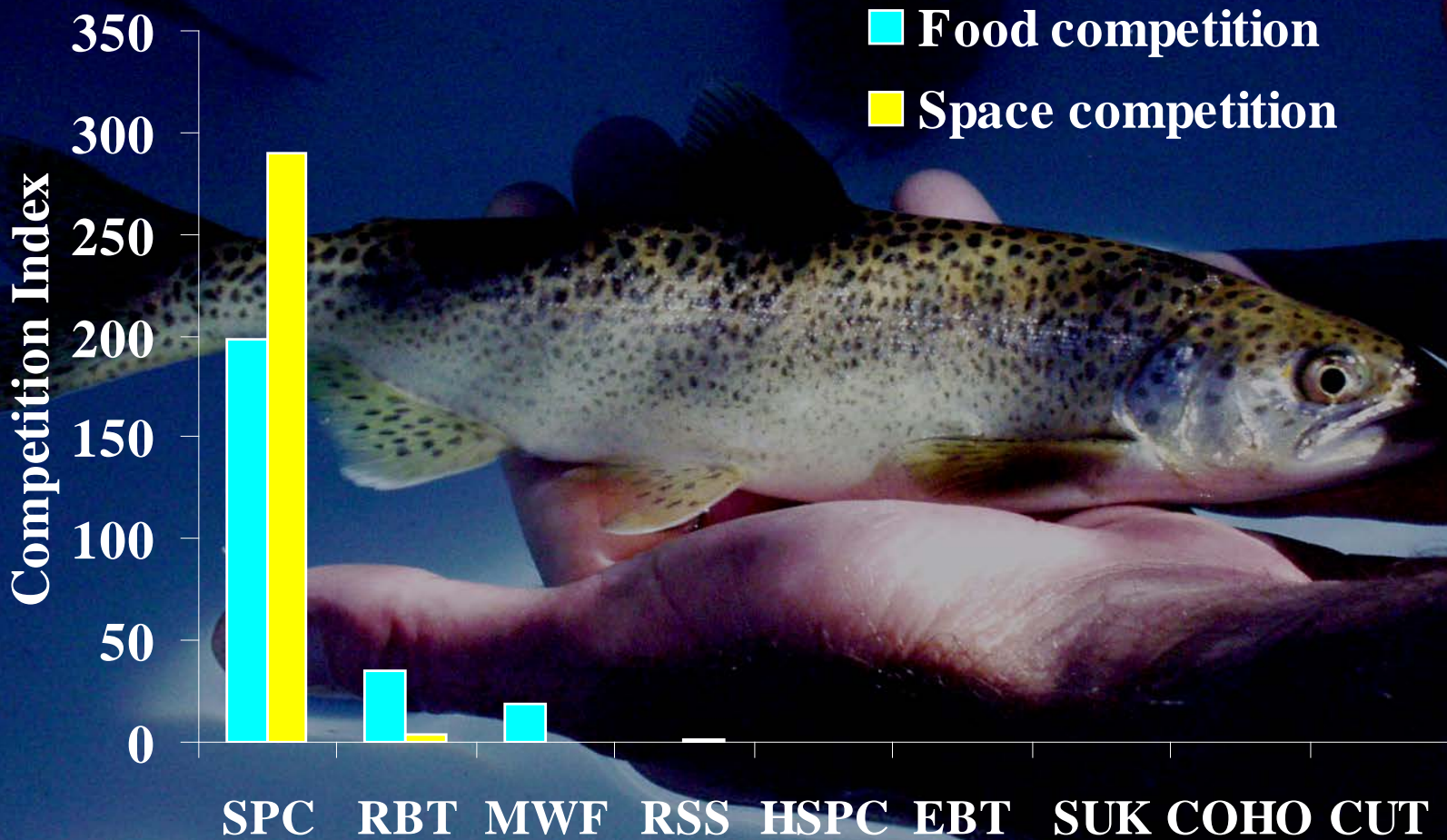


# What Controls Capacity?

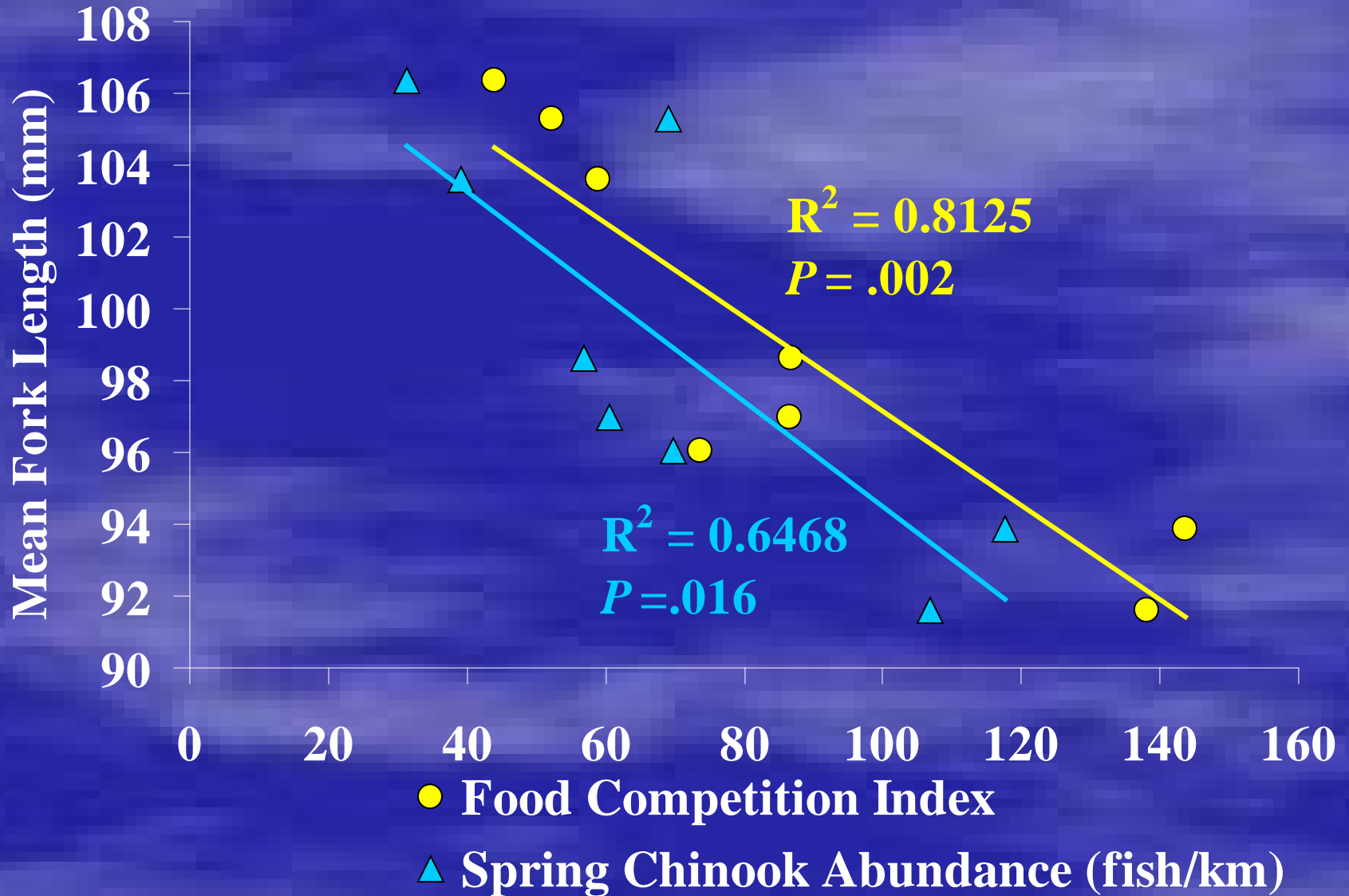
- Identify limiting factors that influence competition
  - Inter- and intra-specific competition
  - Food and space



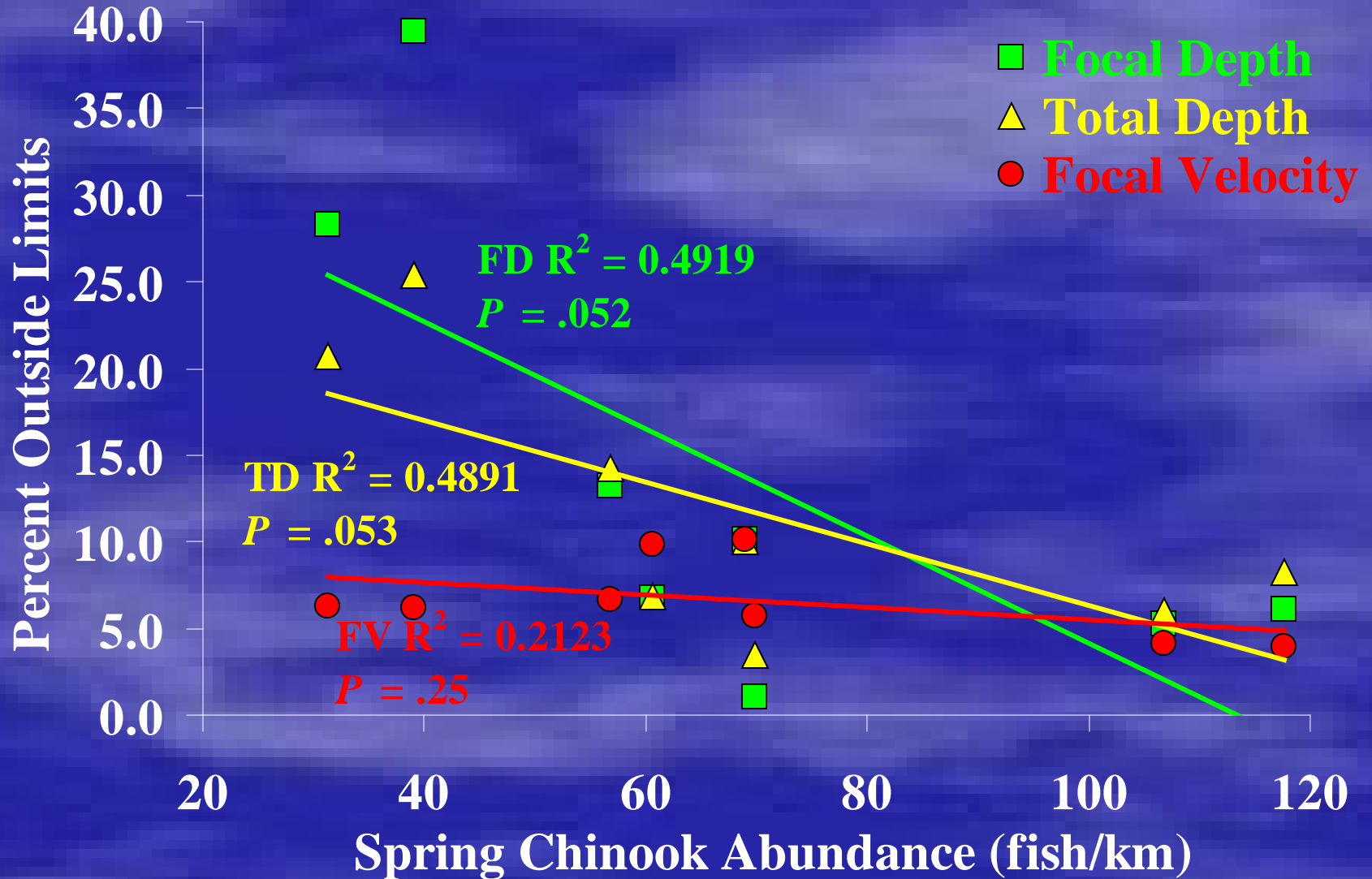
# Competition Ranking 98-05



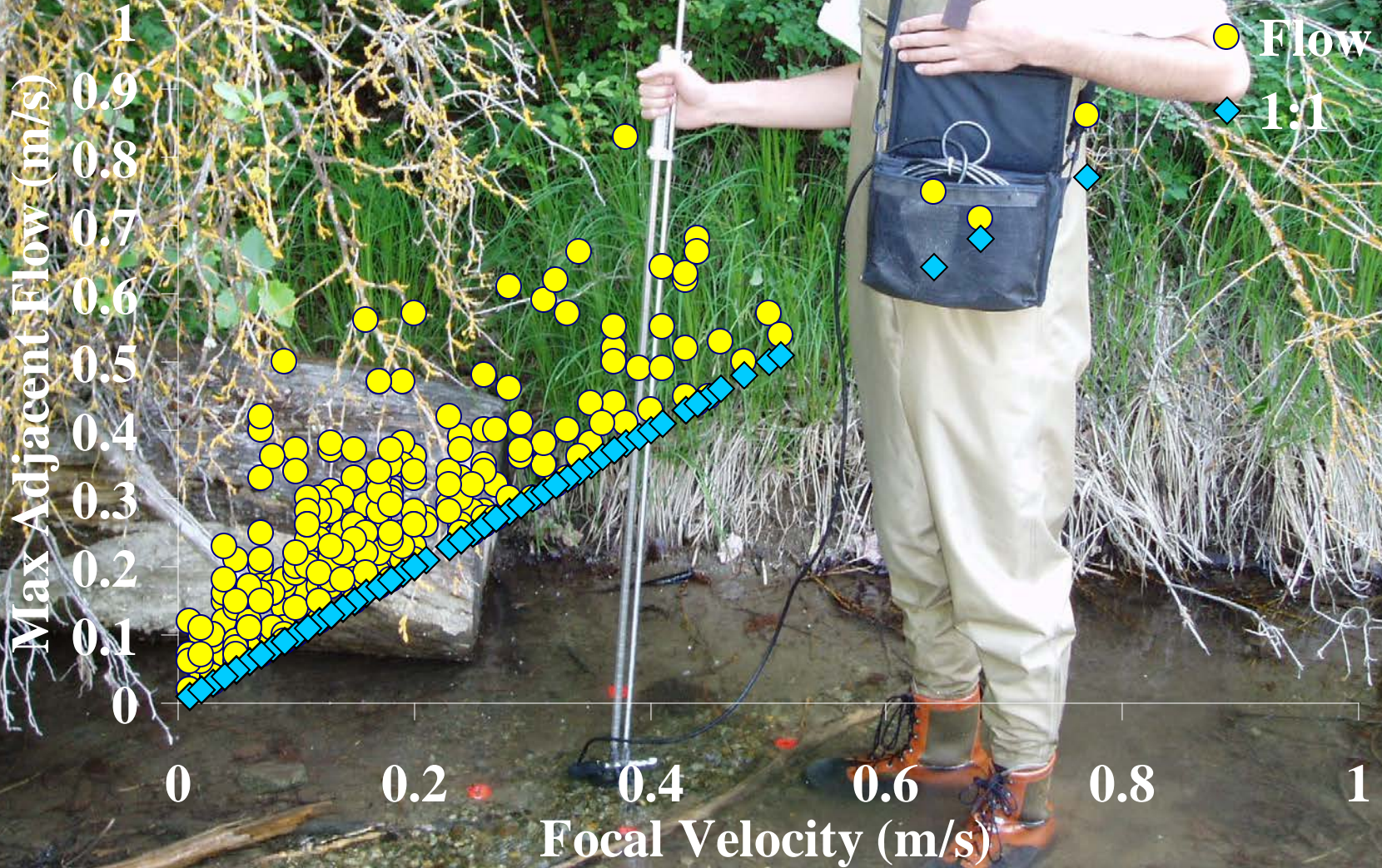
# Intra Food Competition Index



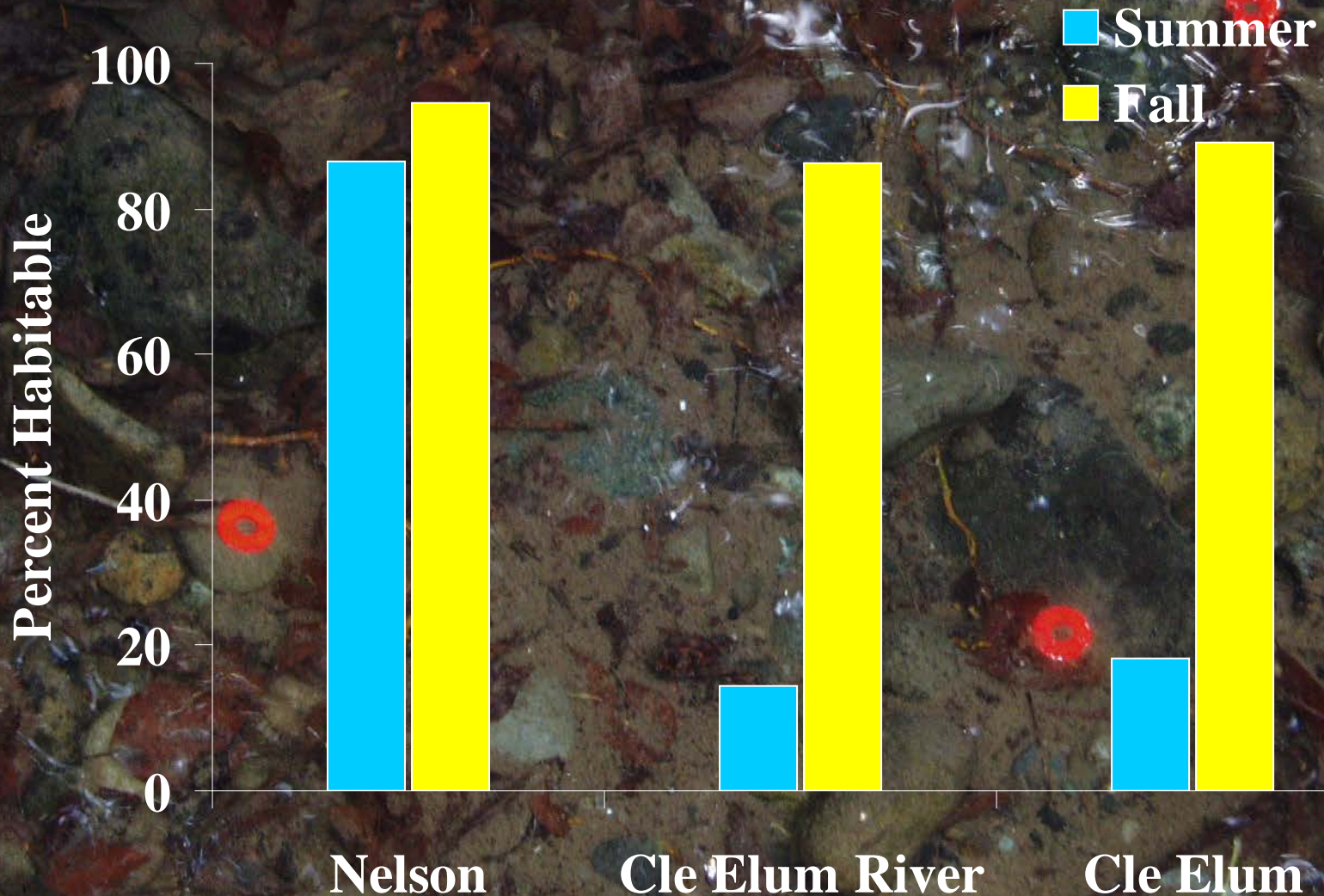
# Microhabitat Index



# Flow Ratio - IFIM



# % Habitable Velocities

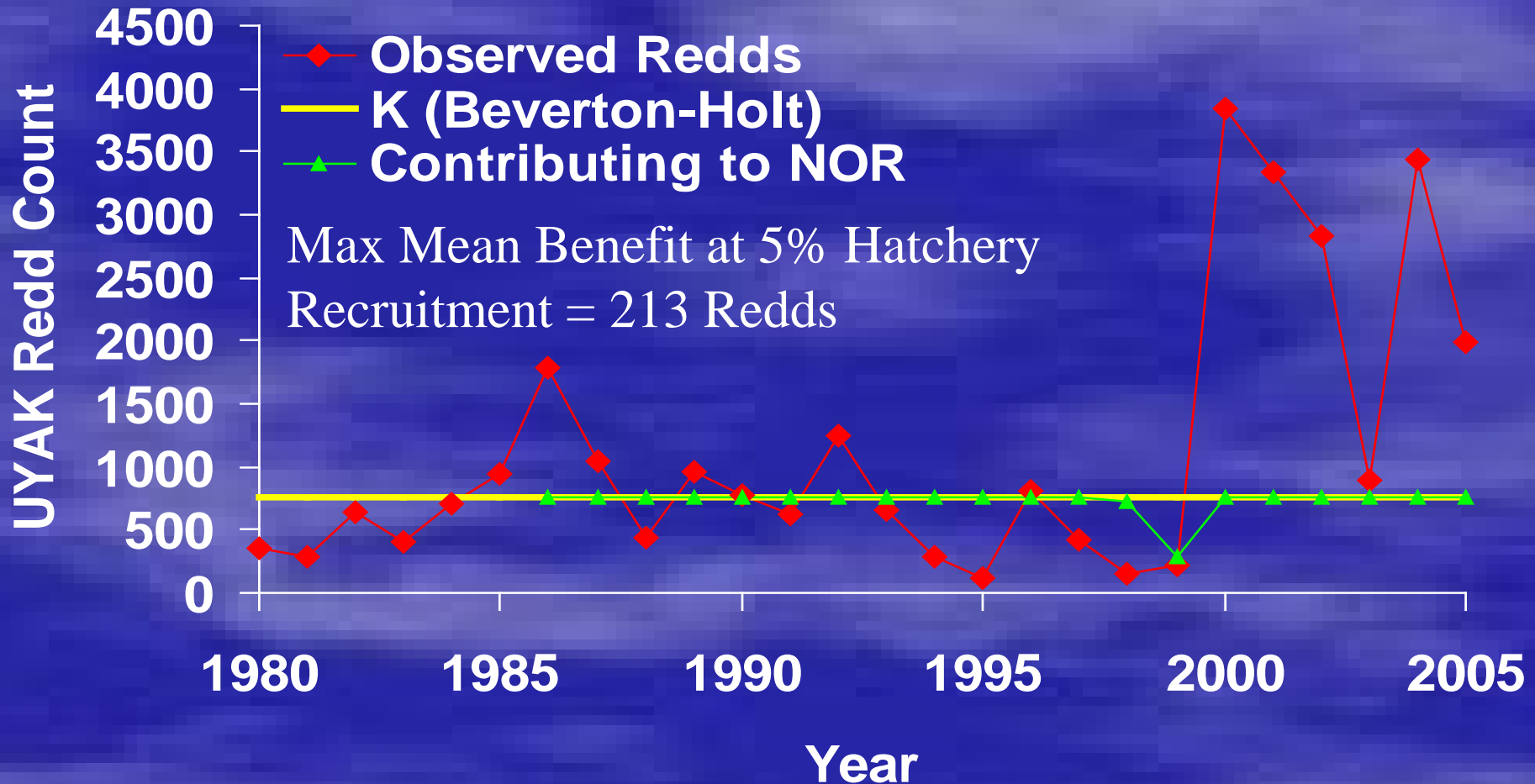


A group of salmon swimming in a river, with a large log in the foreground. The salmon are in various stages of migration, with some showing dark spots on their sides. The water is clear, and the background shows a rocky riverbank.

# Two of the Goals of the YKFP

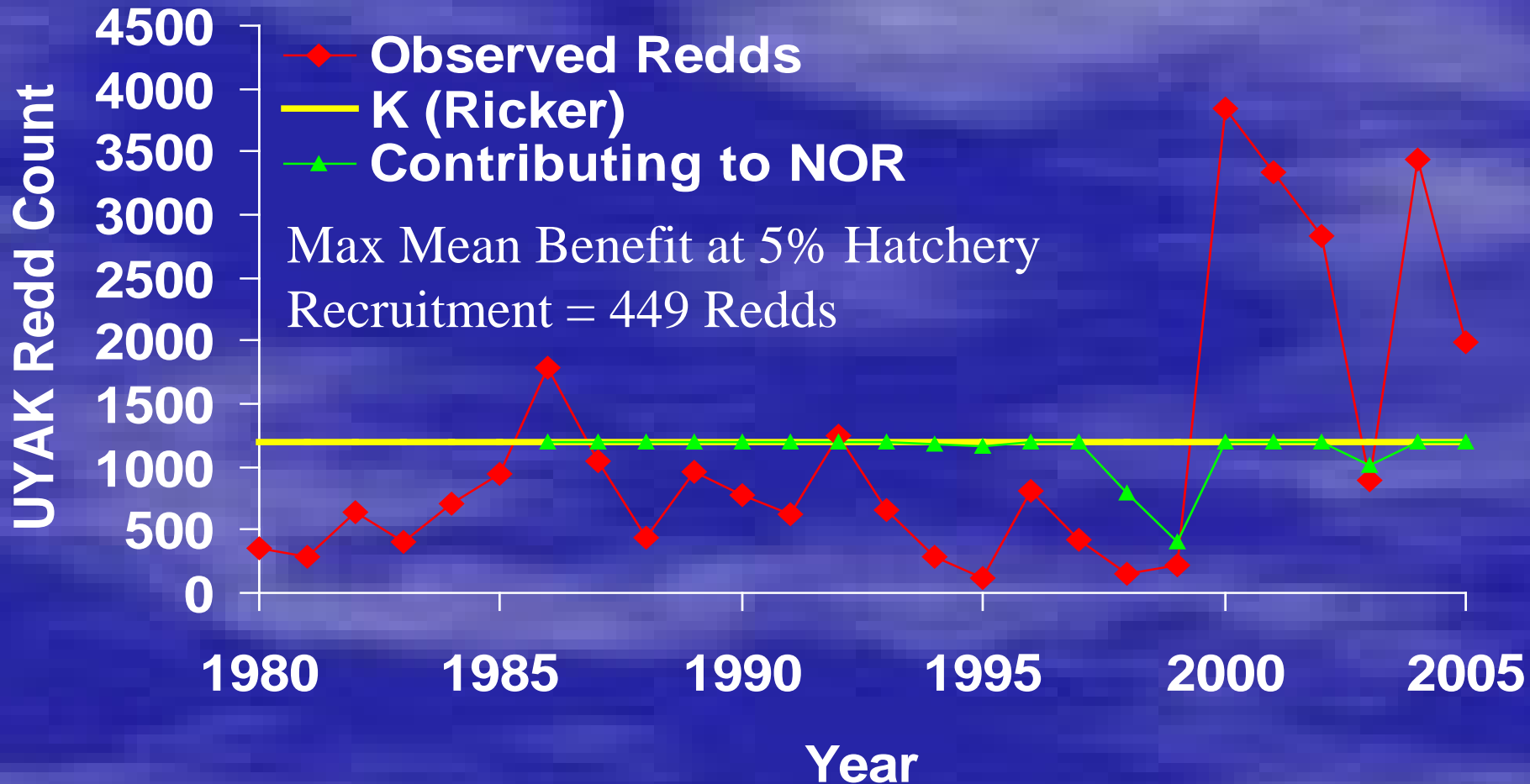
- Increase capacity (habitat enhancement)
- Fill the current and future environment to capacity (supplementation and harvest management)

# Redds Contributing to NORs, Benefits of Supplementation

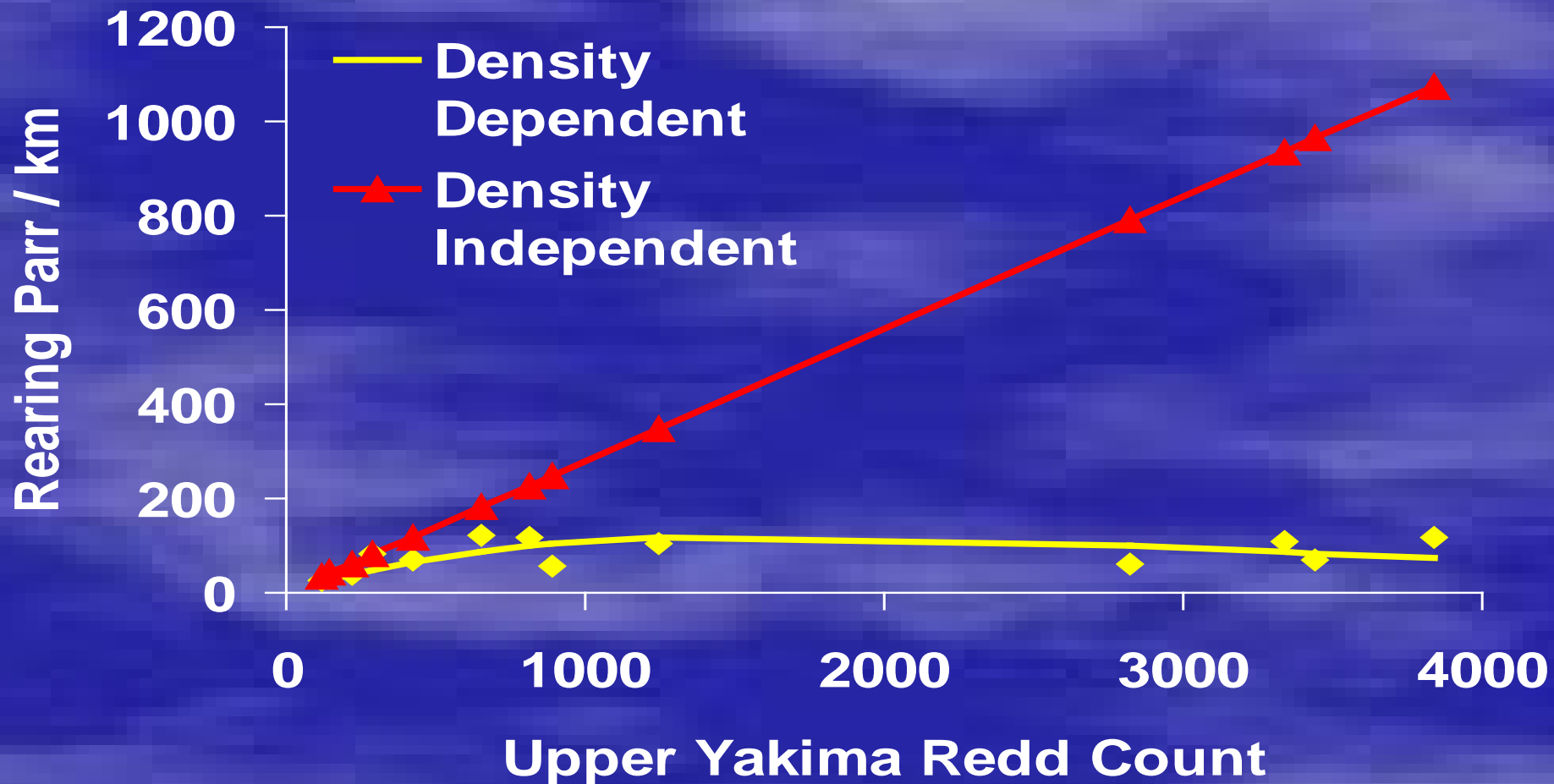




# Redds Contributing to NORs, Benefits of Supplementation



# Capacity Should Be Increased to Get More NOR Benefits



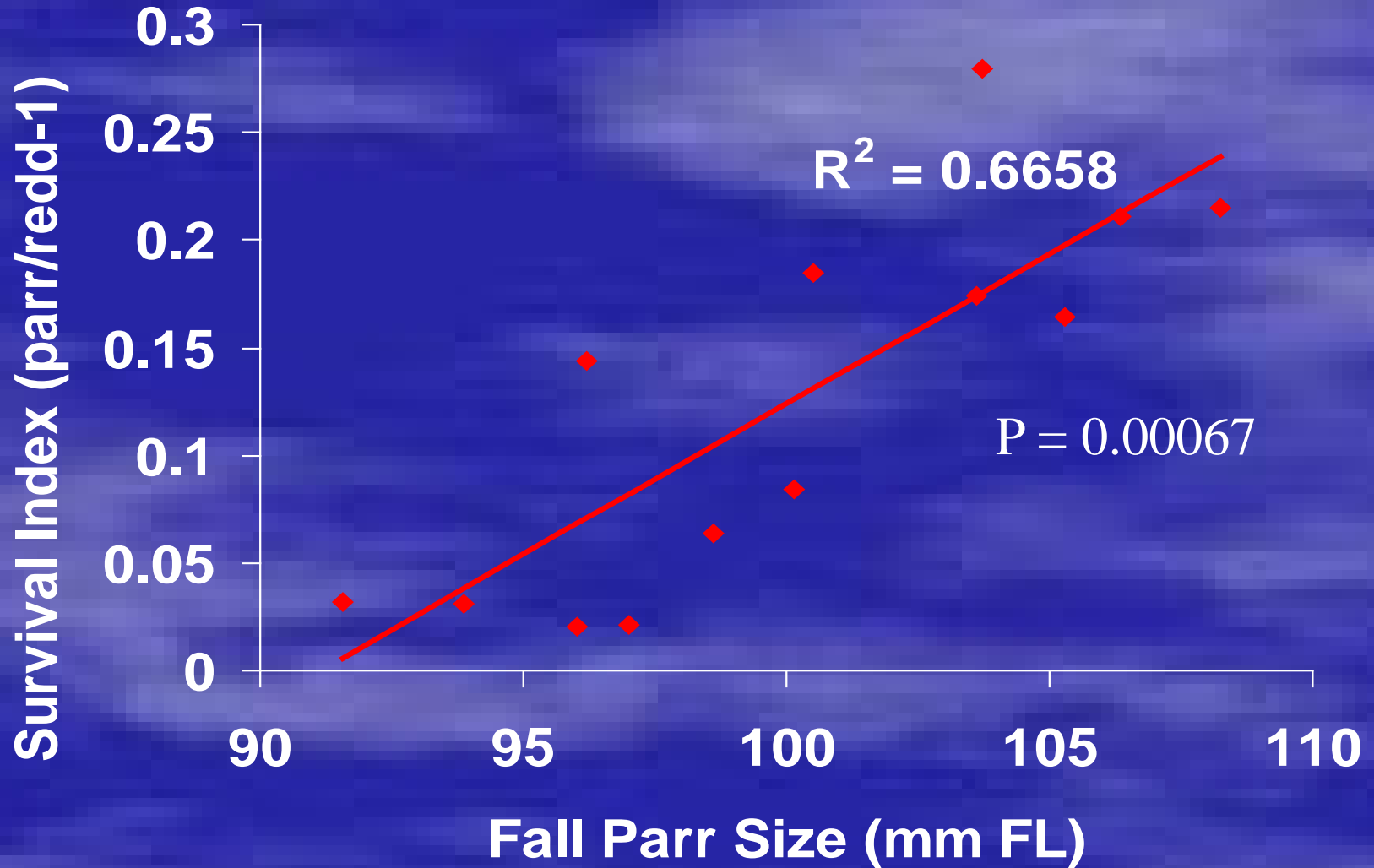
A person wearing a green cap and an olive-green jacket is wading in a stream. They are holding a long measuring tape, likely for a field measurement. The water is dark and rippling, and there are some white sticks or branches in the foreground.

# Acknowledgments

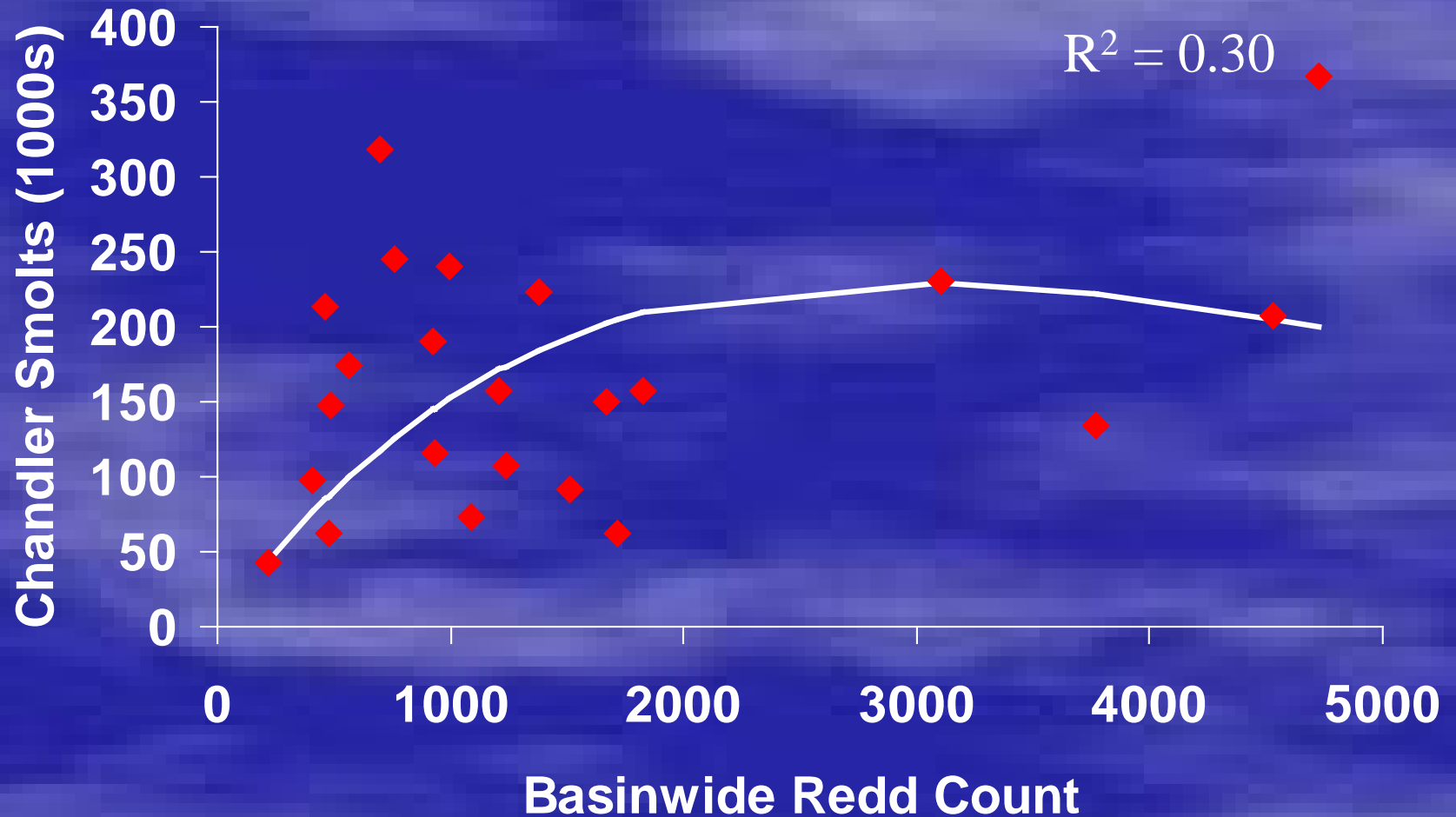
- BPA – Patty Smith, David Byrnes
- WDFW – Timothy Webster, Anthony Fritts, Natalia Pitts, Charity Davidson
- YN – Mark Johnston, Bill Bosch, and Chandler/Redd crews
- Cascade Aquatics – Paul James and field staff

End

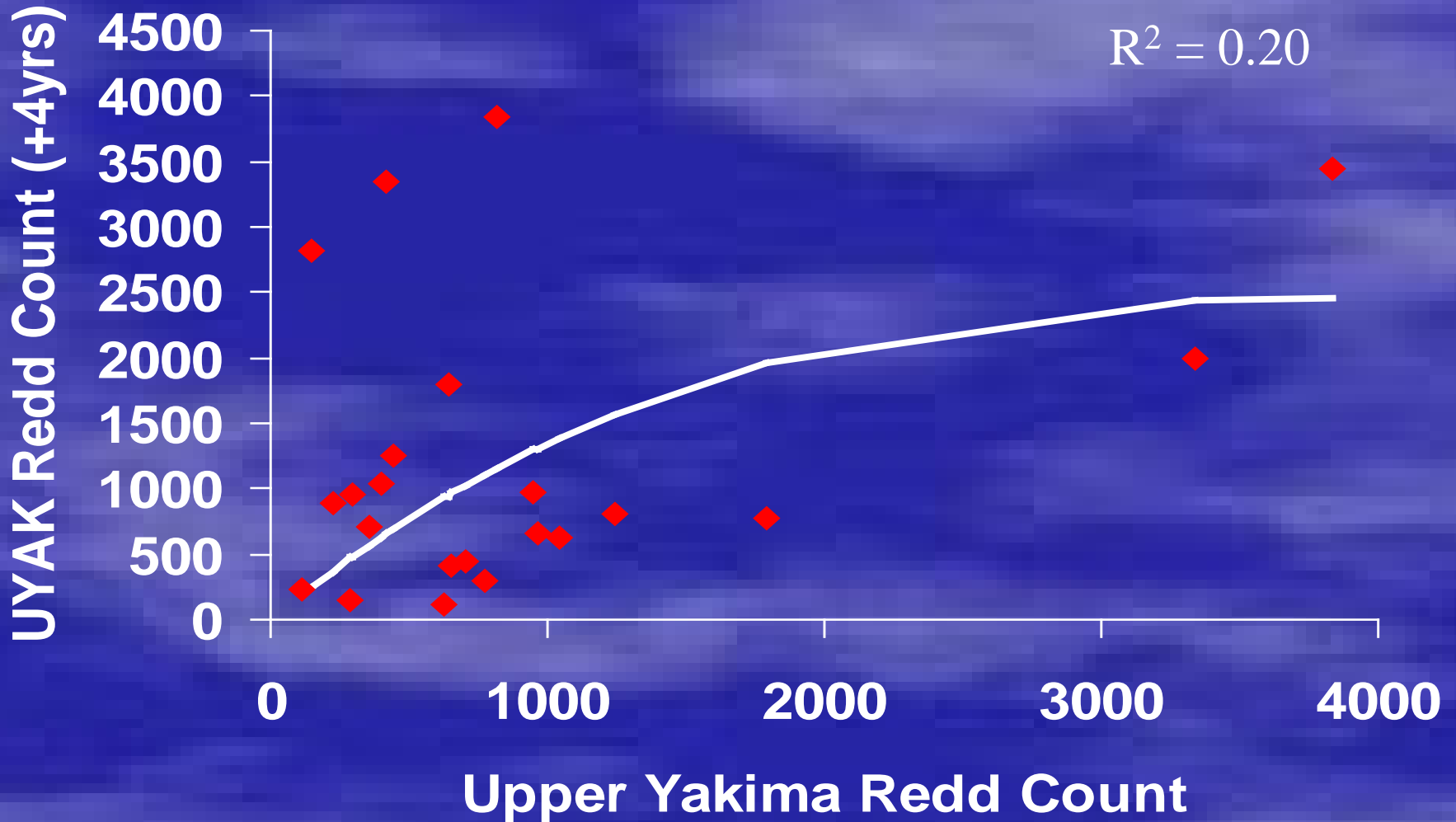
# Parr size vs survival index



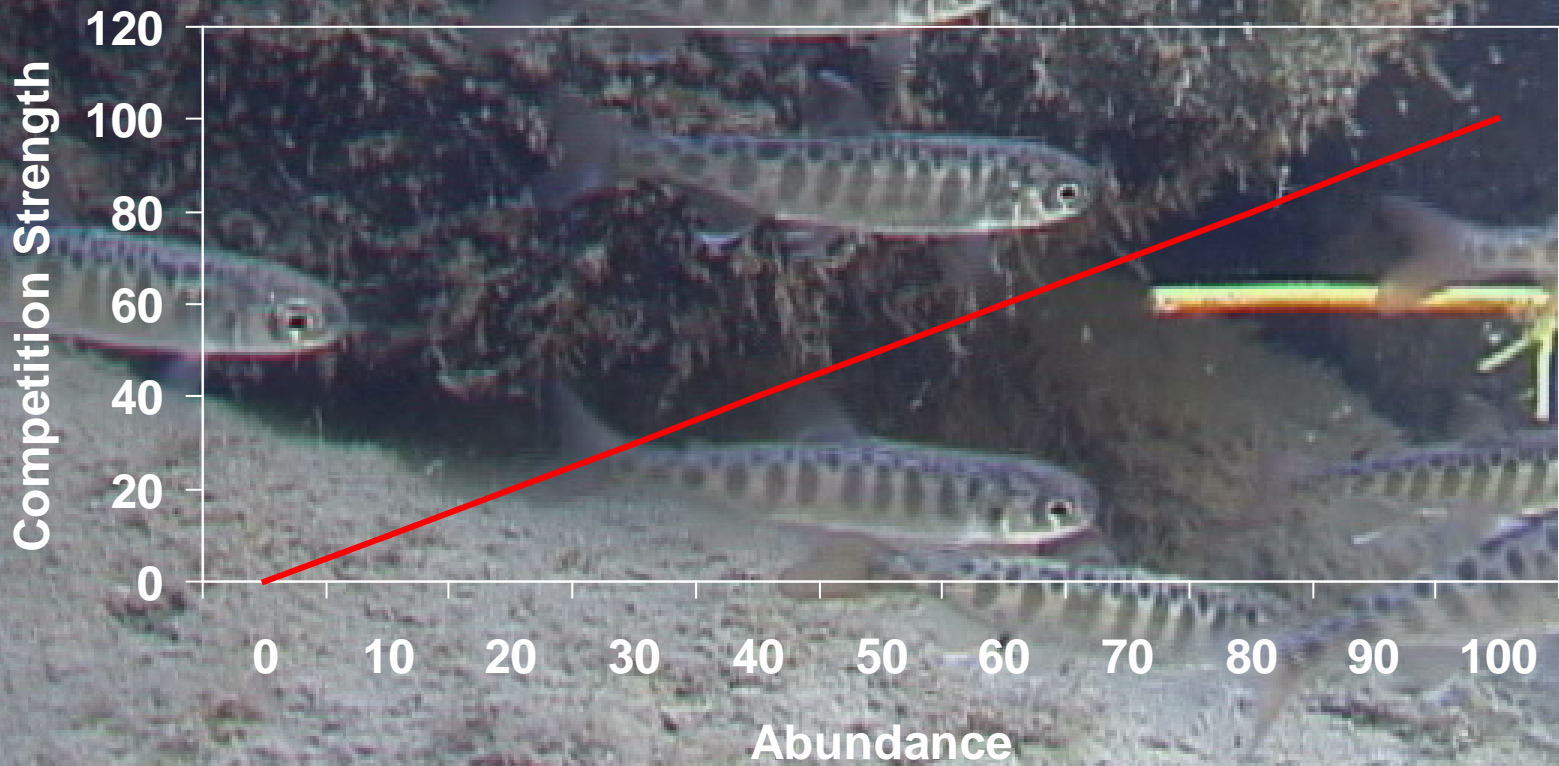
# Yakima Basin Redds x Smolts



# Redd to Redd

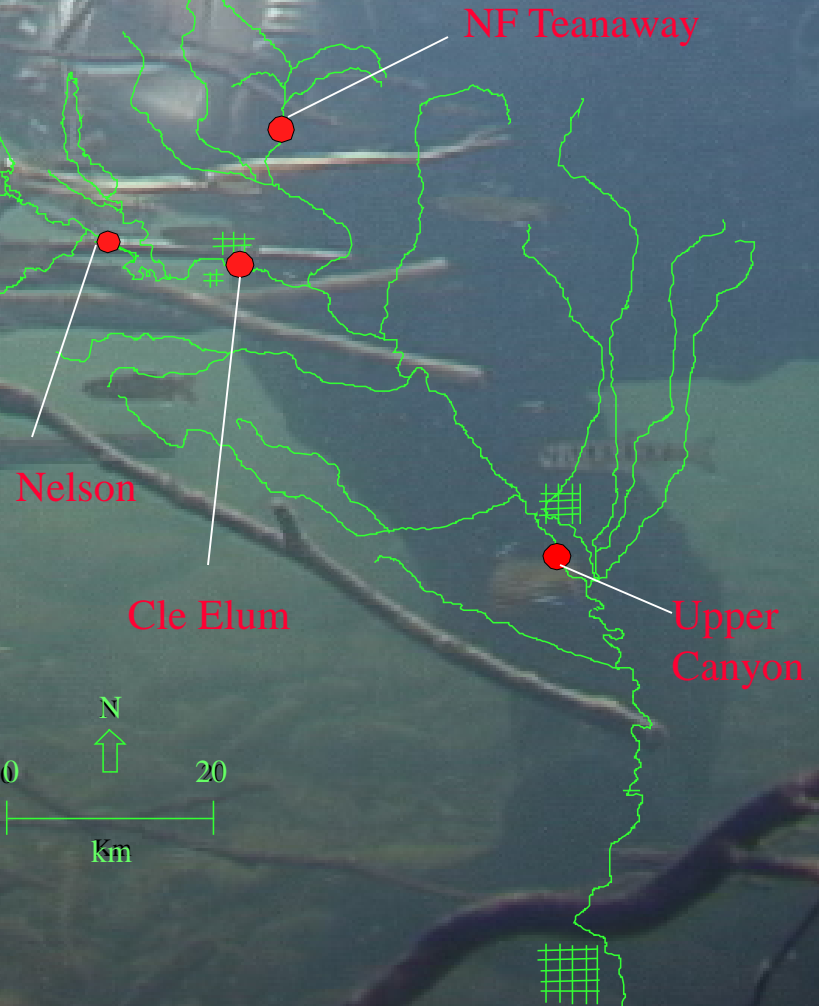
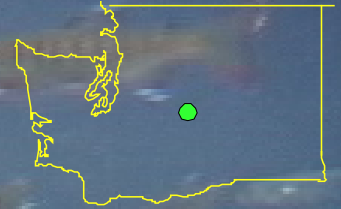


# Density Dependence

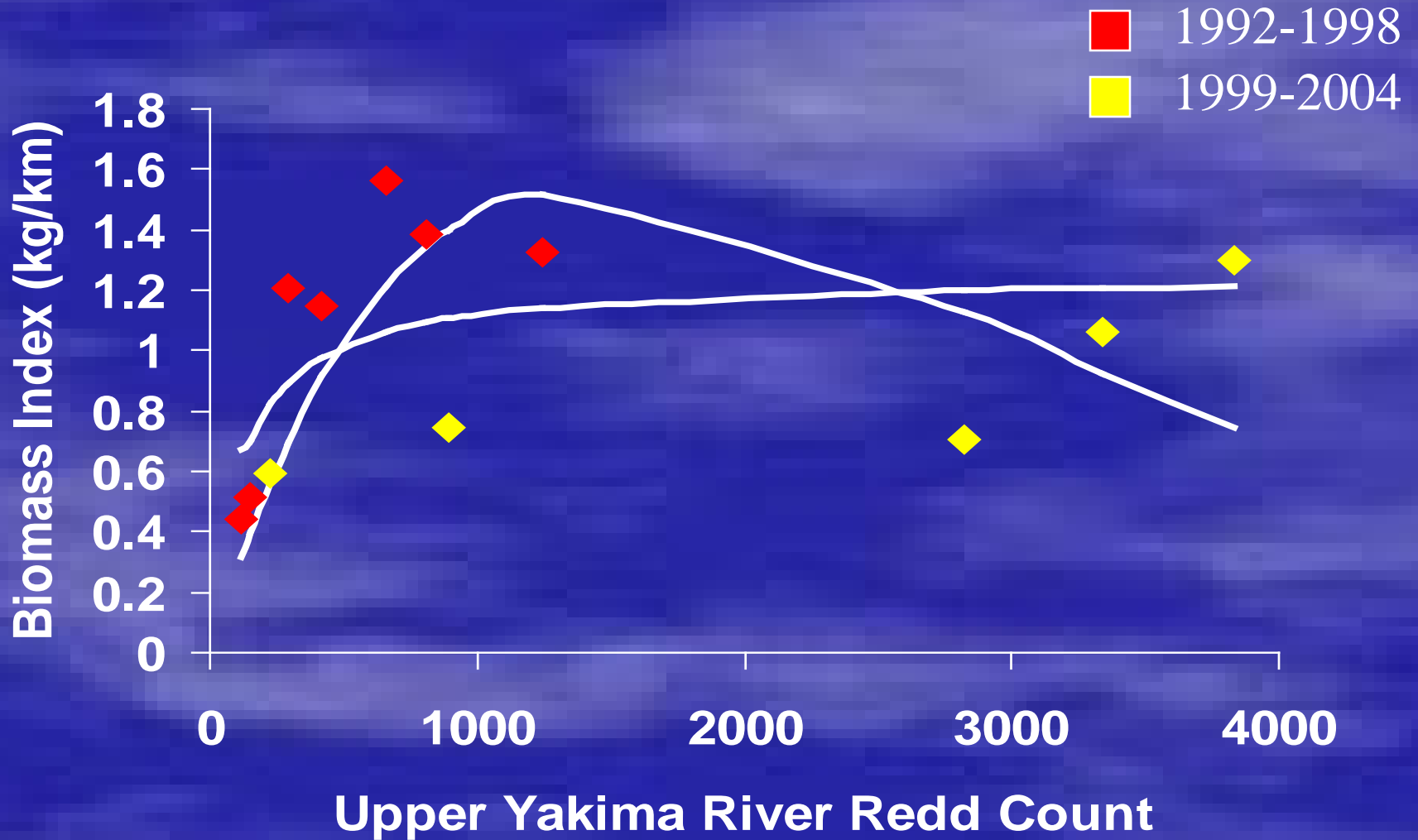




# Study Area and Methods

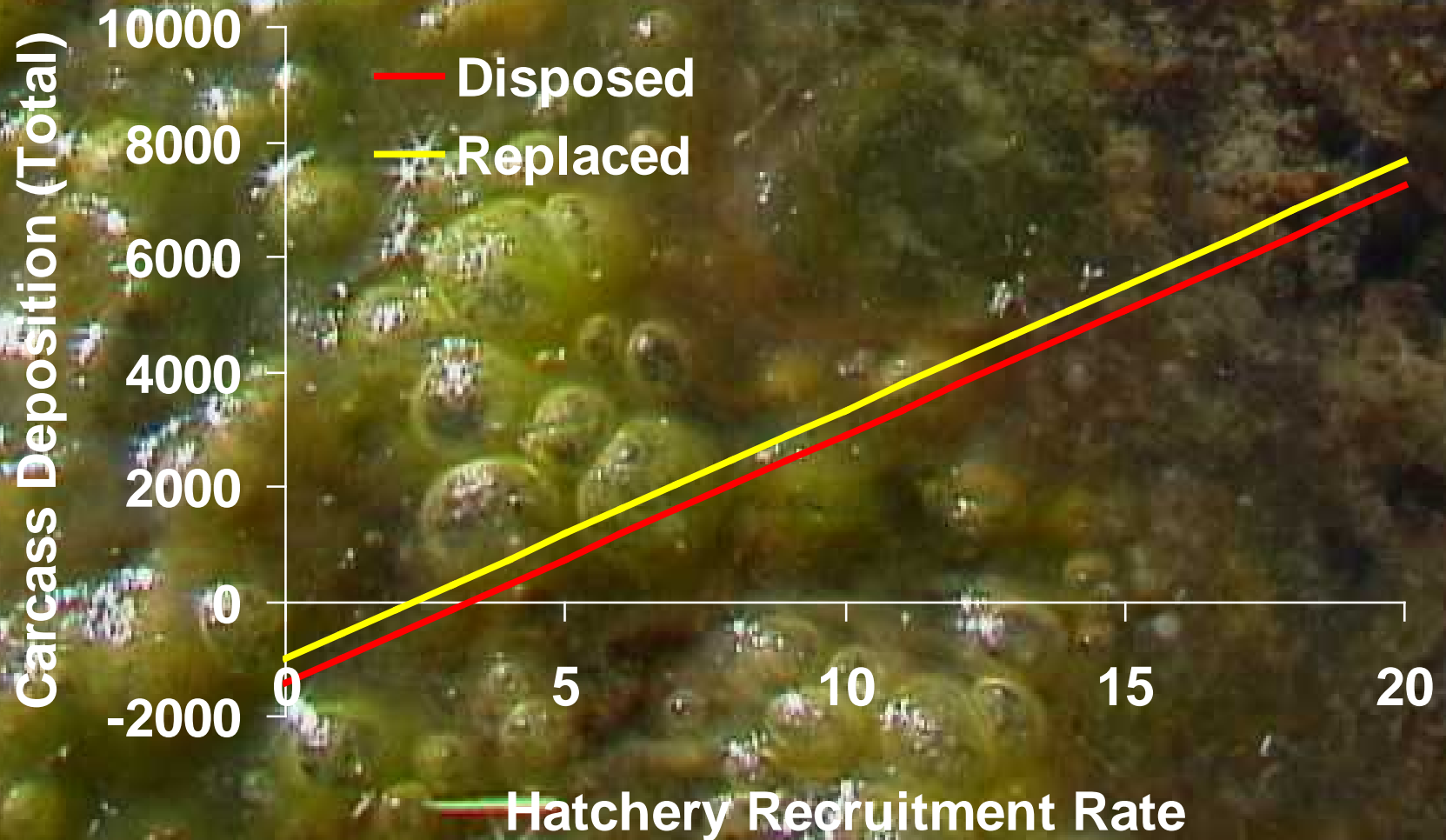


# SPC Biomass Index



# Nutrient Benefits

## Broodstock=500



# Harvest Benefits

