

# West Hawai'i Aquarium Project: Fishery Management of Marine Protected Areas



# WHAP Monitoring Program

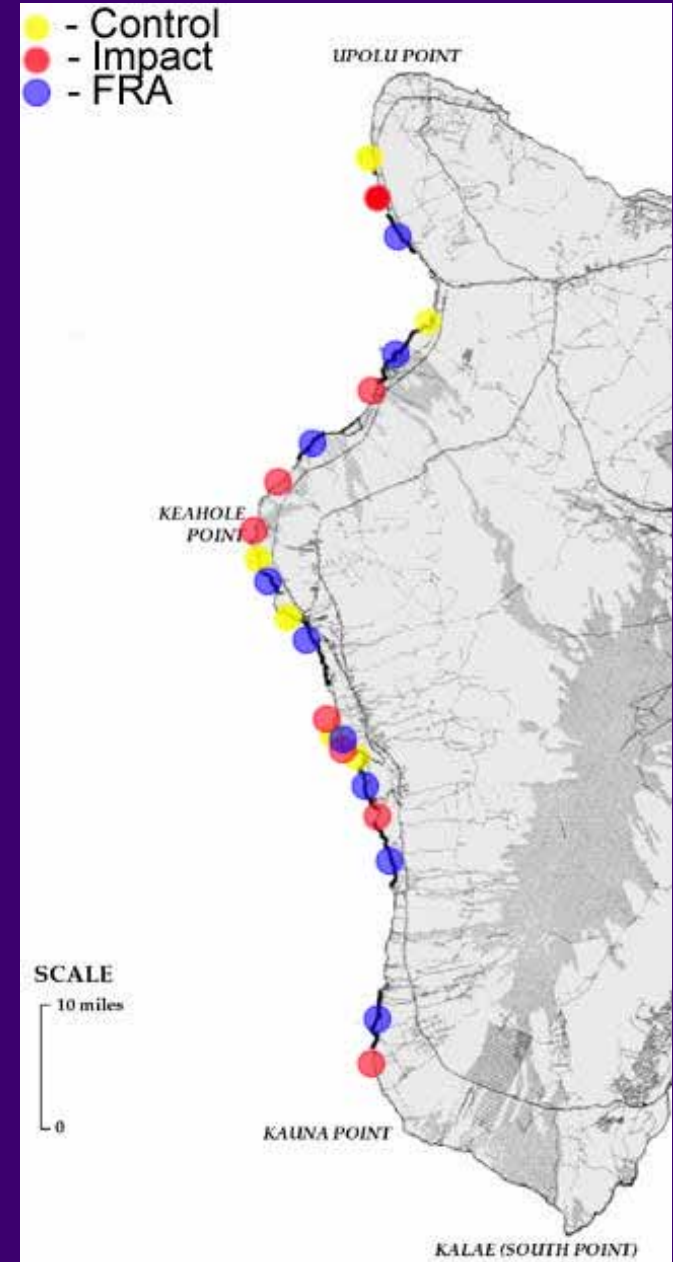
Study sites (23) - established March 1999

- 4 - 25 m transects
- Bimonthly surveys for adult/juvenile fish
- Eleven fish surveys (n= 1012 transects)
  - Six pre-reserve; five post-reserve
  - Data for 10 surveys entered and verified
  - Counted > 177,000 fishes
- Initial benthic habitat survey completed

Goal: evaluate effectiveness of FRAs

- FRA
  - Impact
  - Control
- Observational design block**

**5 complete / 4 incomplete blocks**

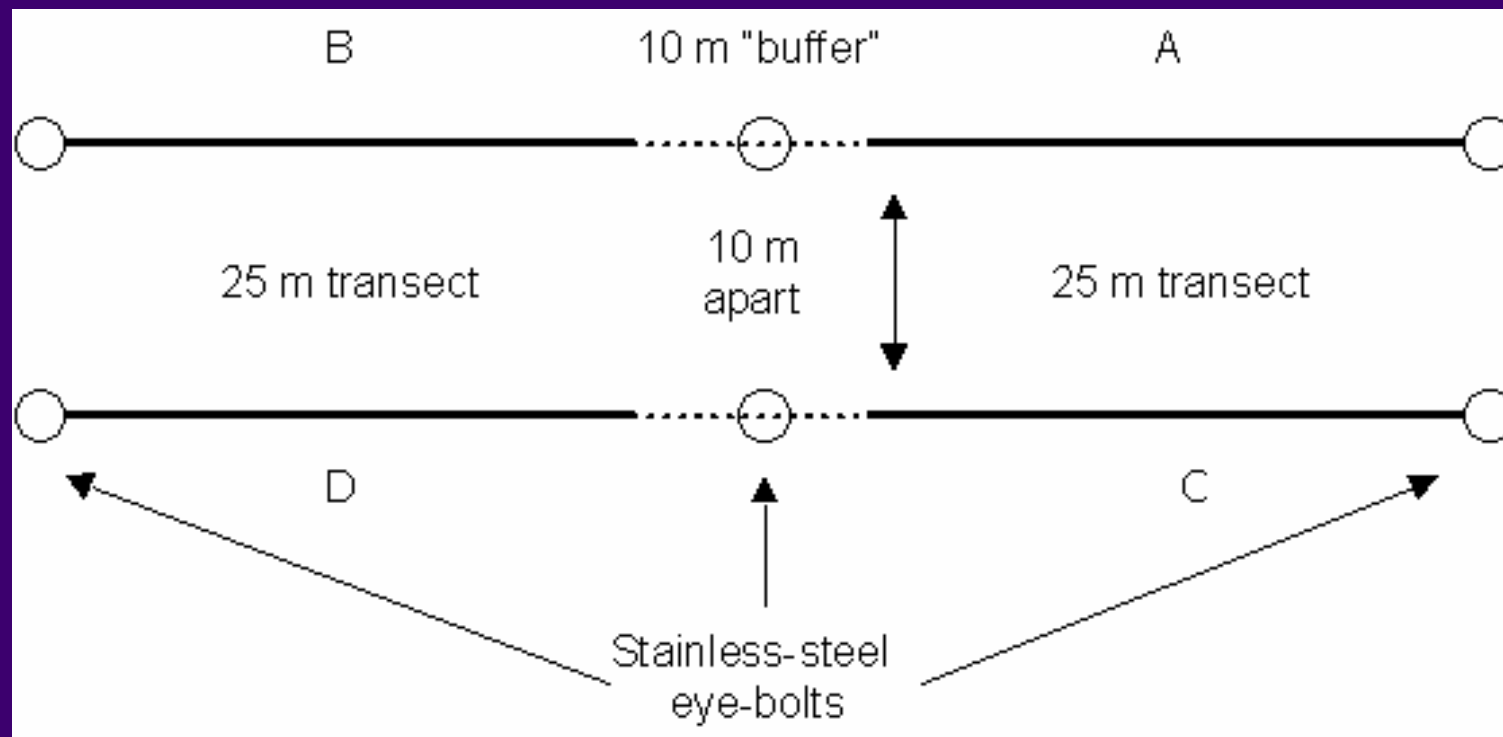


# WHAP Benthic Habitat Archive

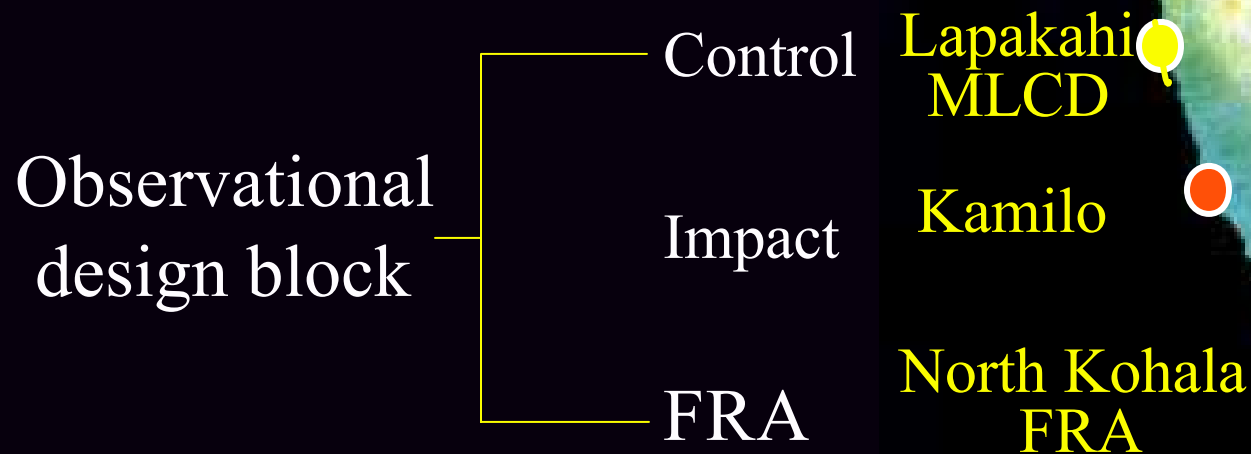


- 23 study sites surveyed in 2000
- 4 - 25m transects at each site (n = 92 transects)
- Contiguous frames grabbed from each video transect
- 3392 frames archived on CD-ROM
- Available for distribution

# WHAP transect design



# WHAP Monitoring Program

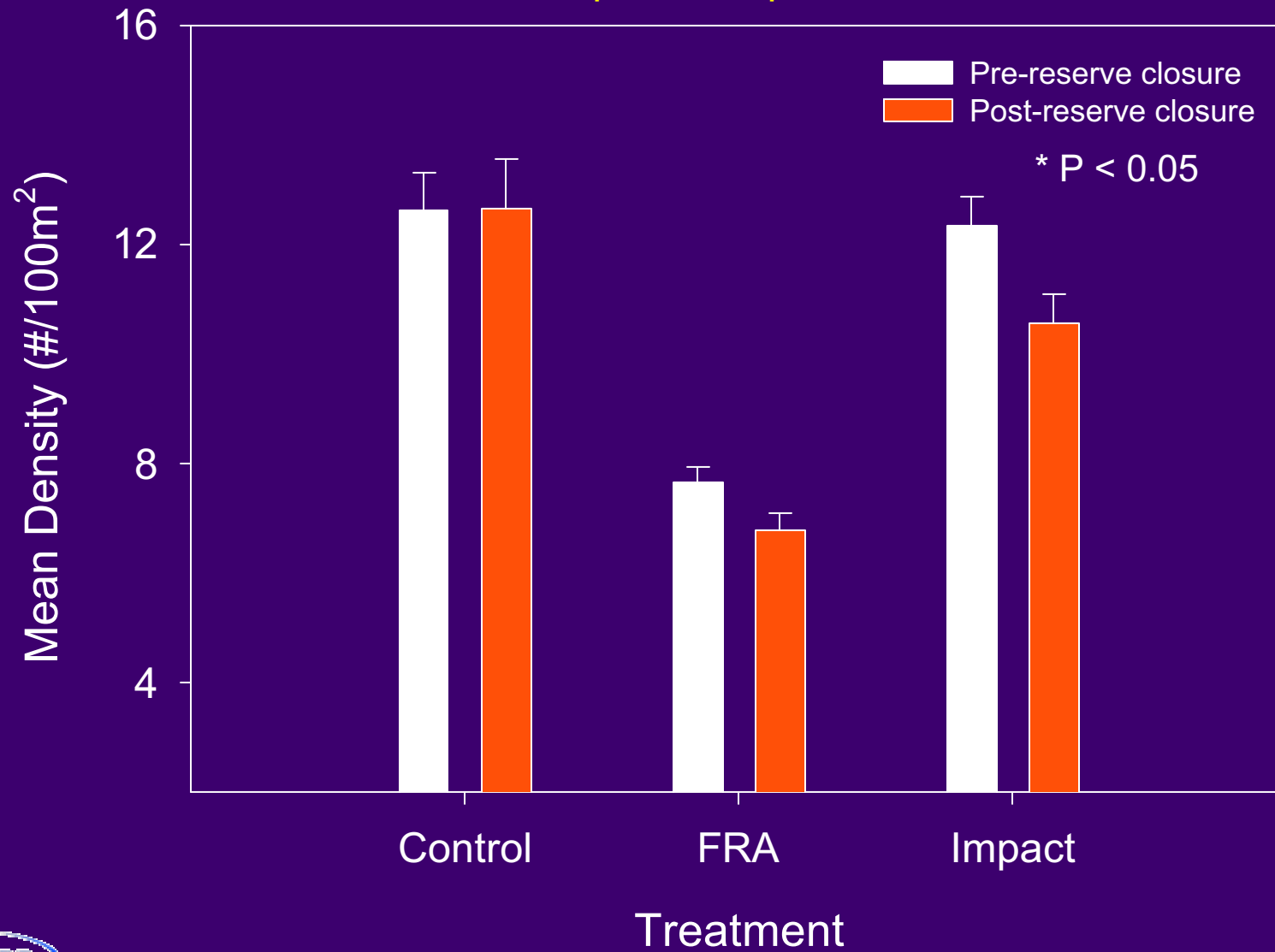


Statistical design (BACI repeated measure):

- Design block contrasts
- Location
- Time

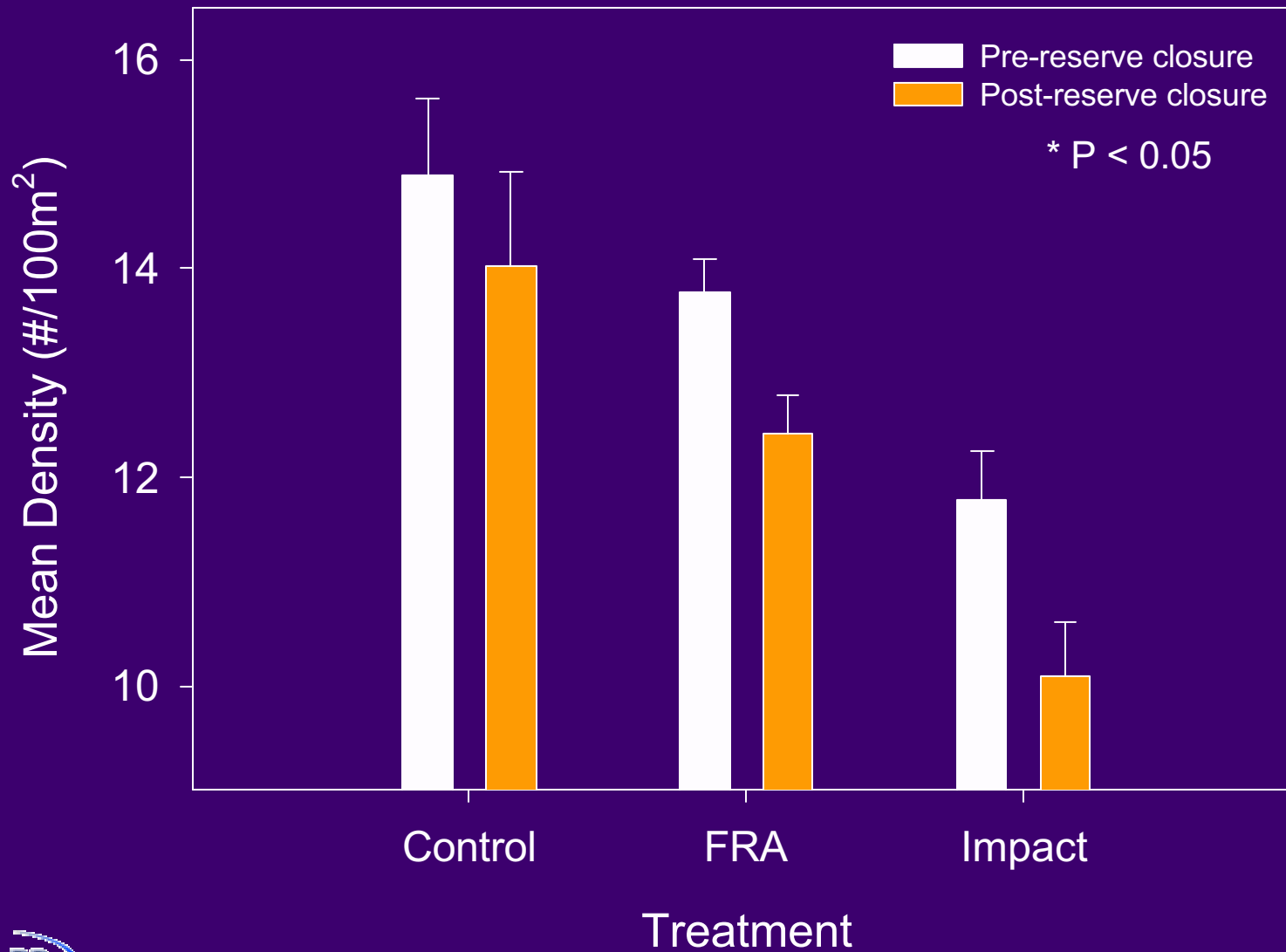
# Control-FRA-Impact Comparisons

## Non-Aquarium Species Pooled



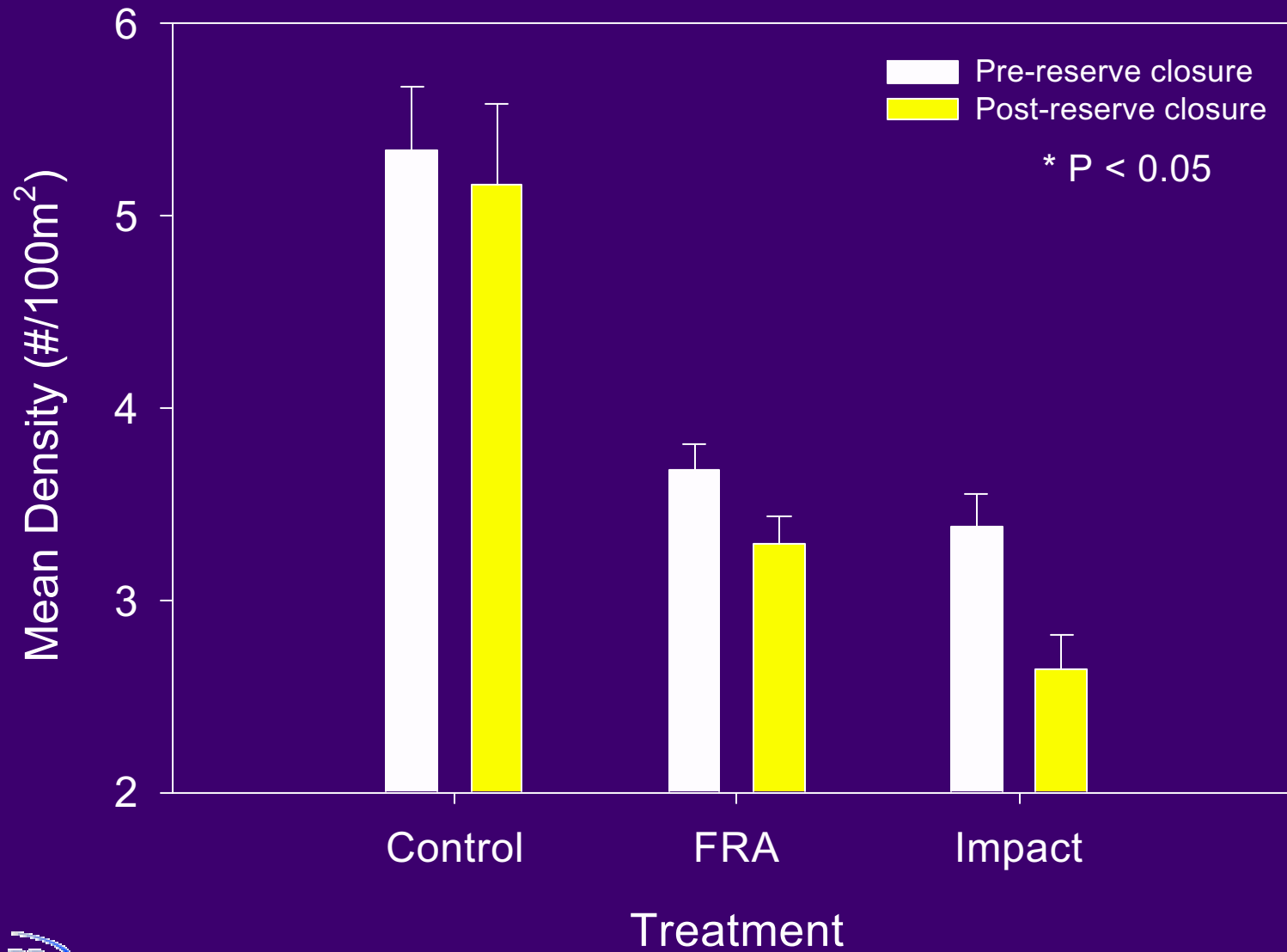
# Control-FRA-Impact Comparisons

## Top 10 Aquarium Species Pooled



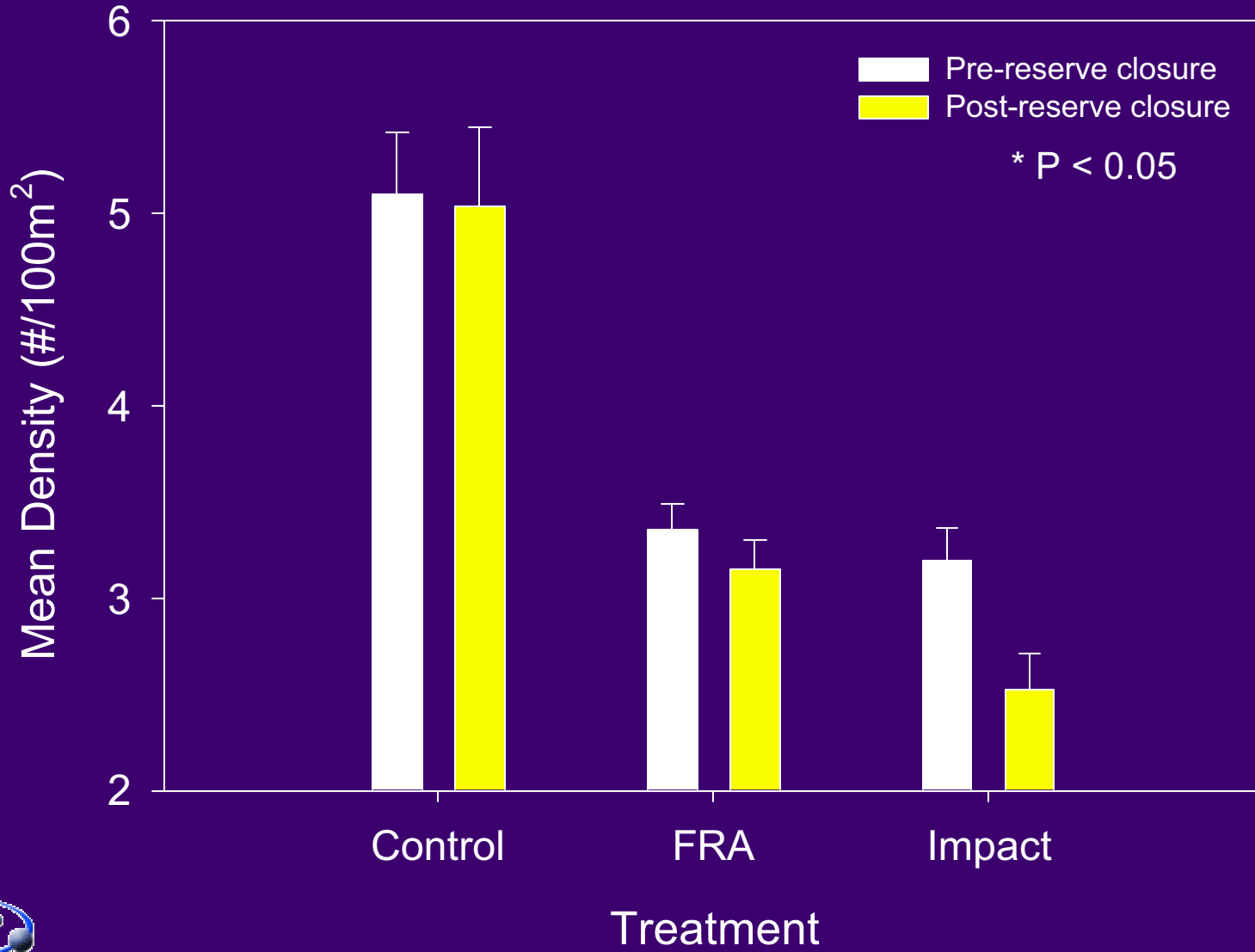
# Control-FRA-Impact Comparisons

*Zebrasoma flavescens*



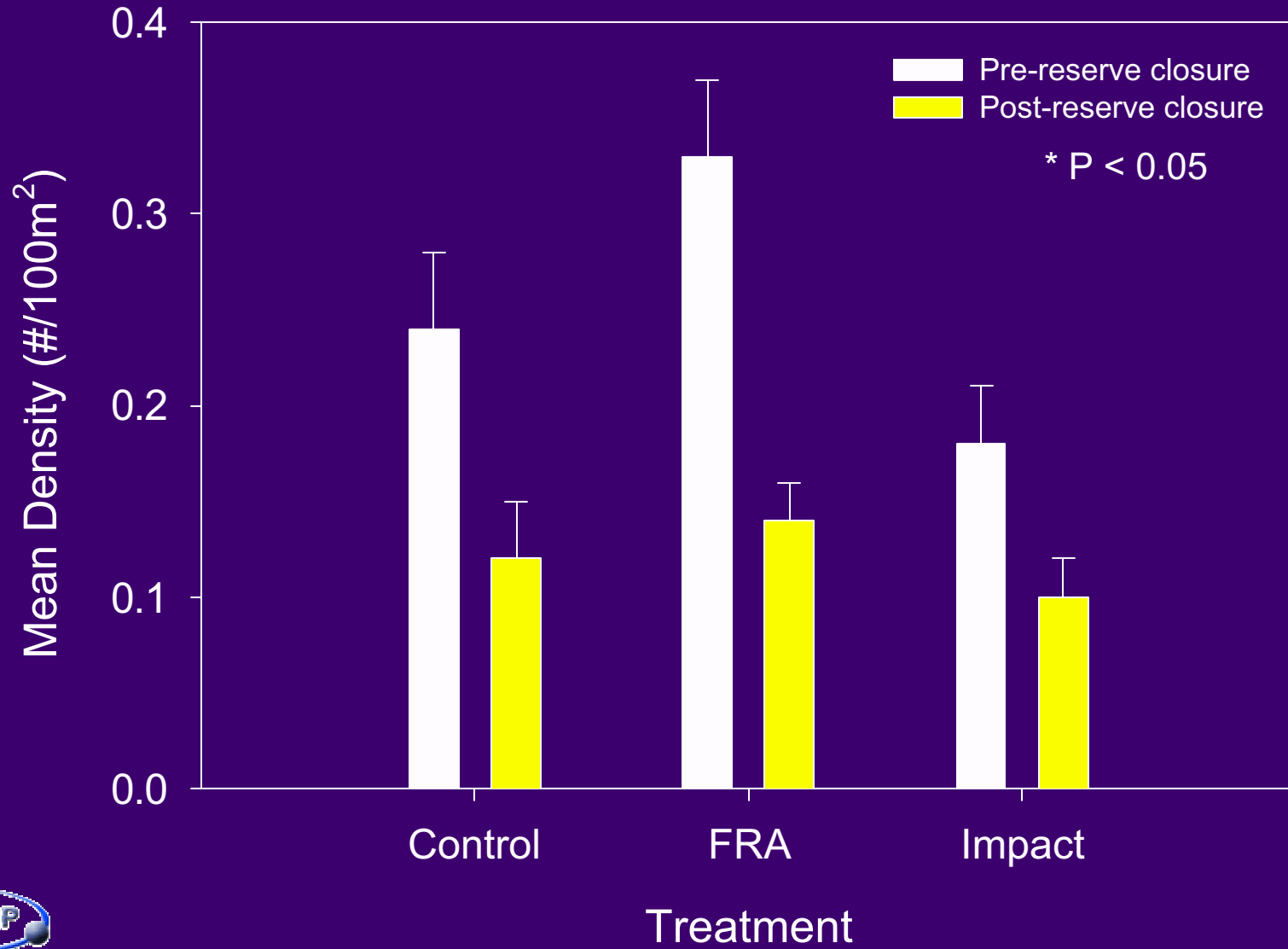
# Control-FRA-Impact Comparisons

(A,I,J) *Zebrasoma flavescens*



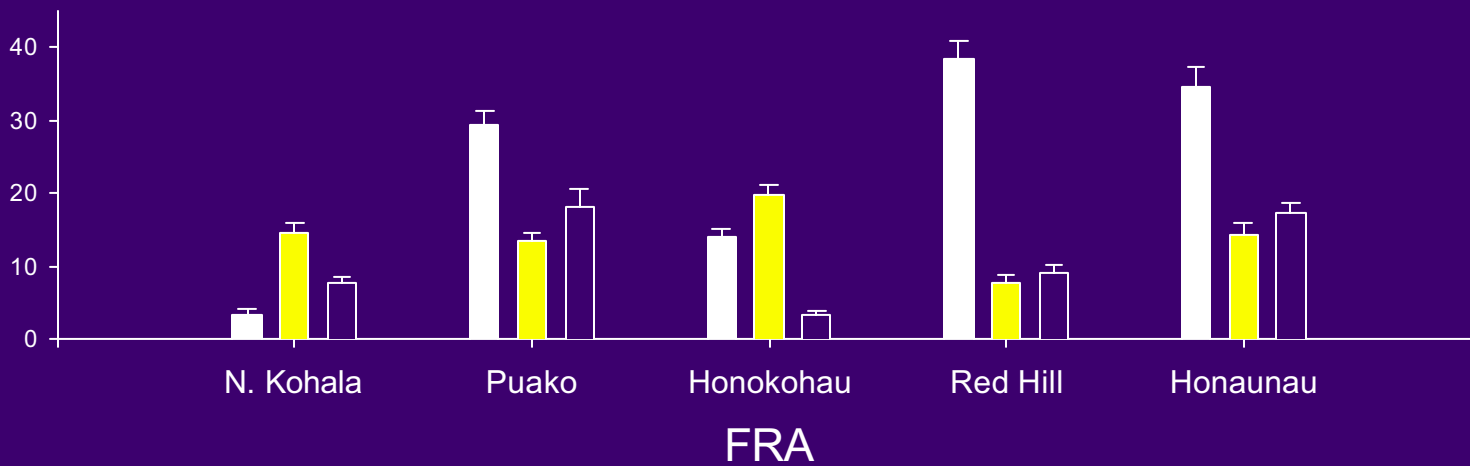
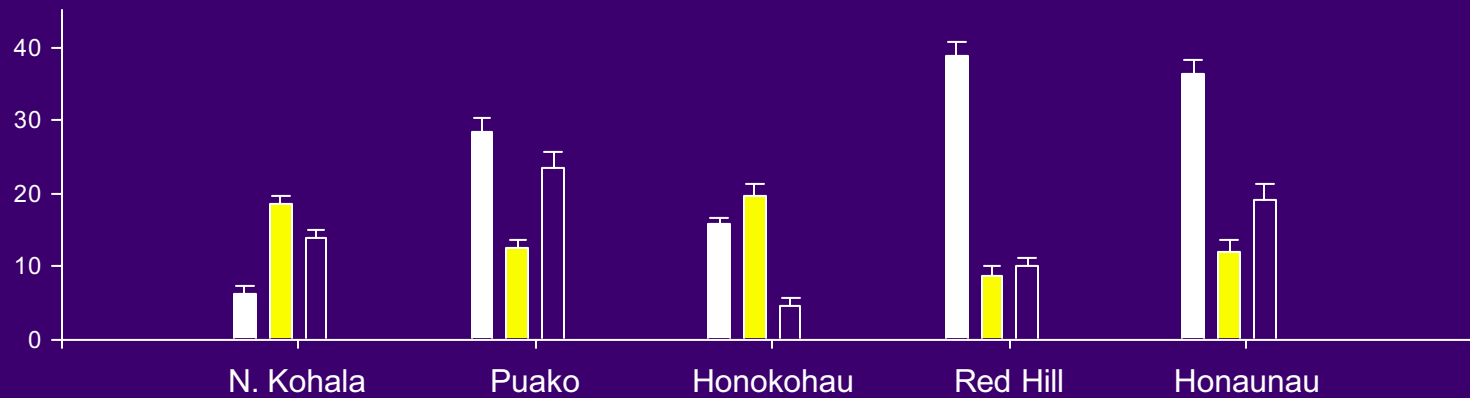
# Control-FRA-Impact Comparisons

Recruit *Zebrasoma flavescens*



## FRA comparisons *Zebrasoma flavescens*

Control  
 FRA  
 Impact

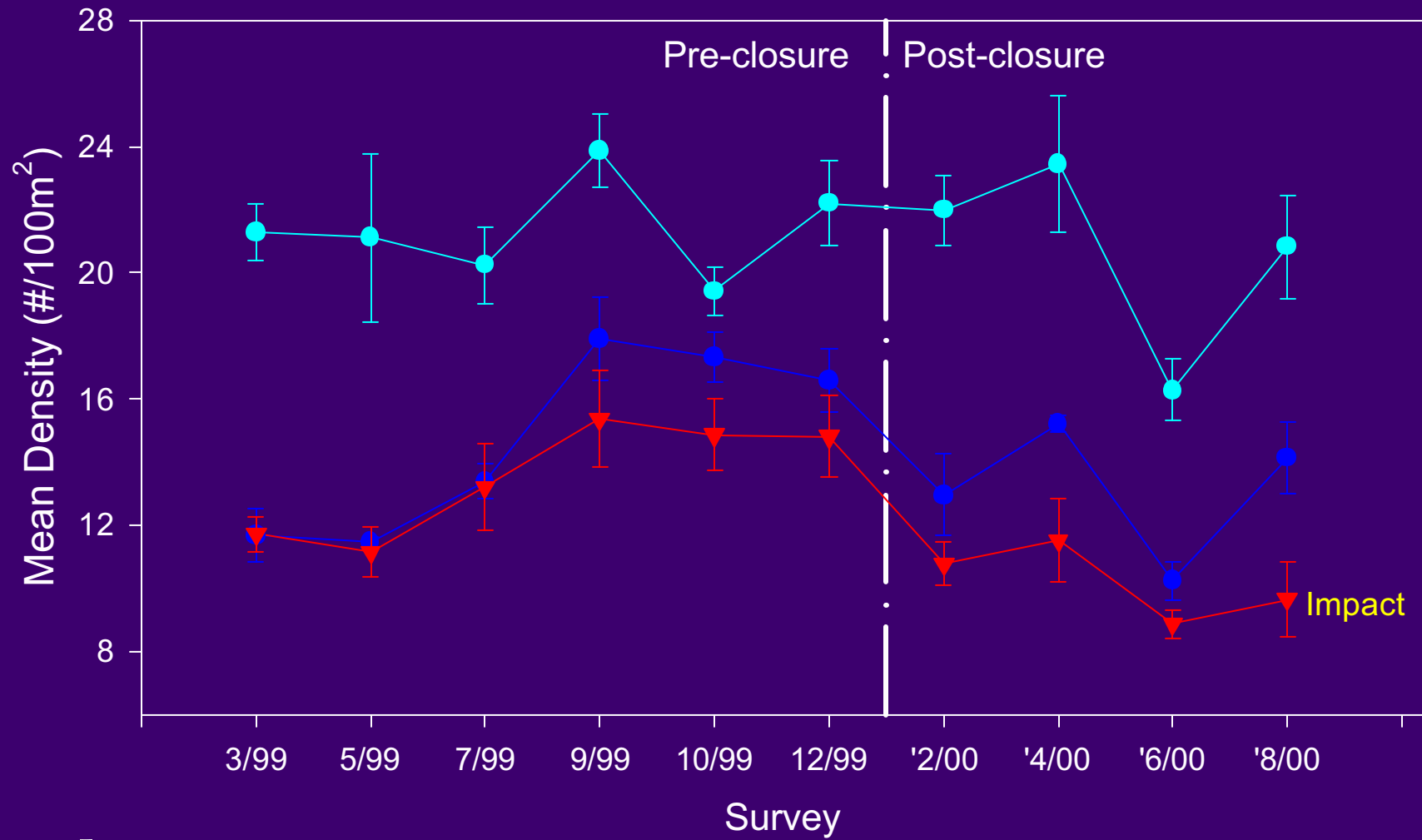


FRA

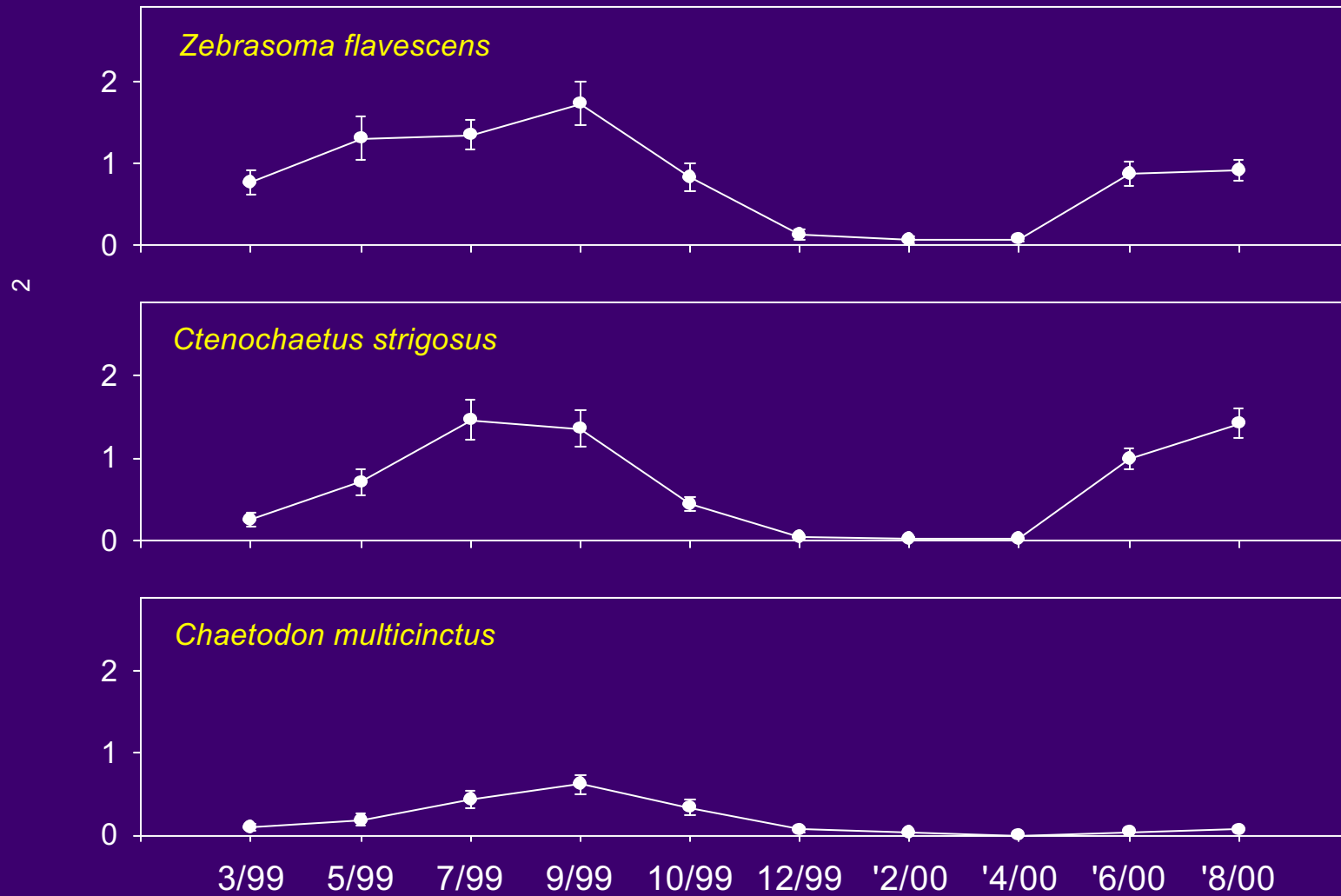


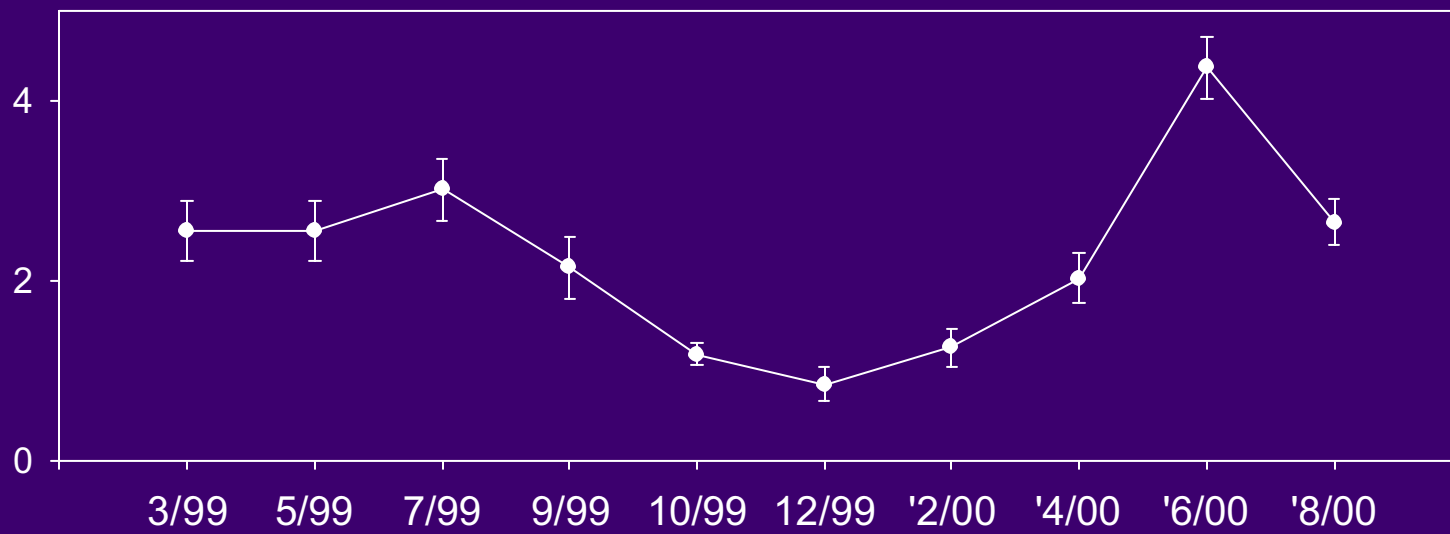
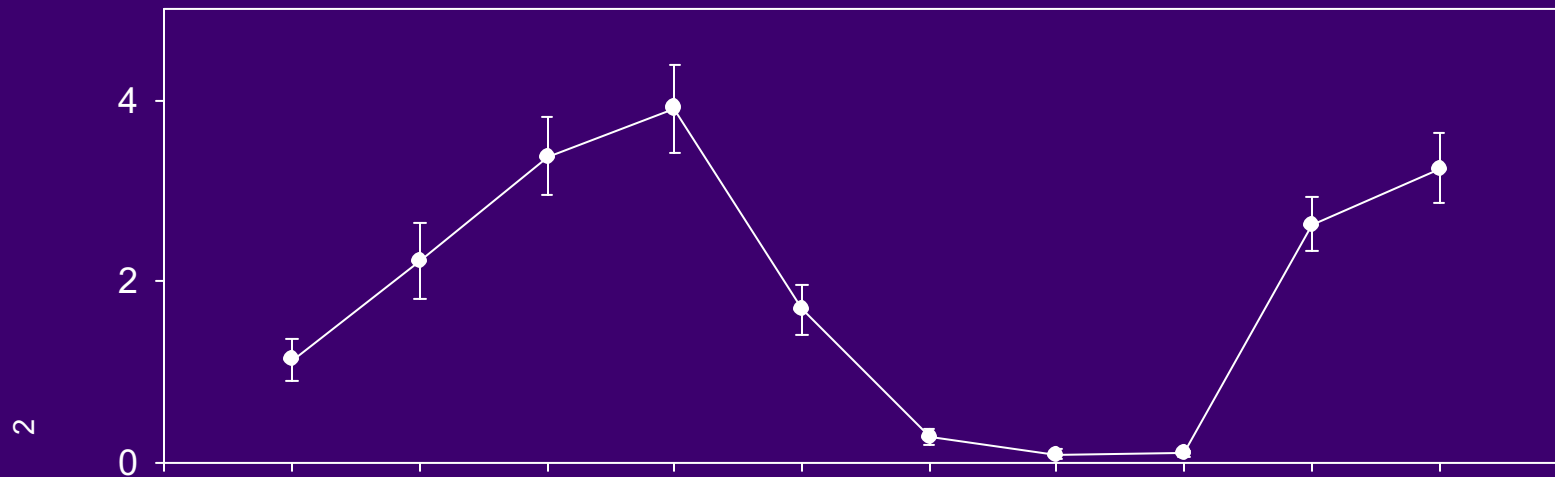
\* -  $P < 0.05$  One-way ANOVA among treatments  
 \*\* -  $P < 0.01$

## *Zebrasoma flavescens*

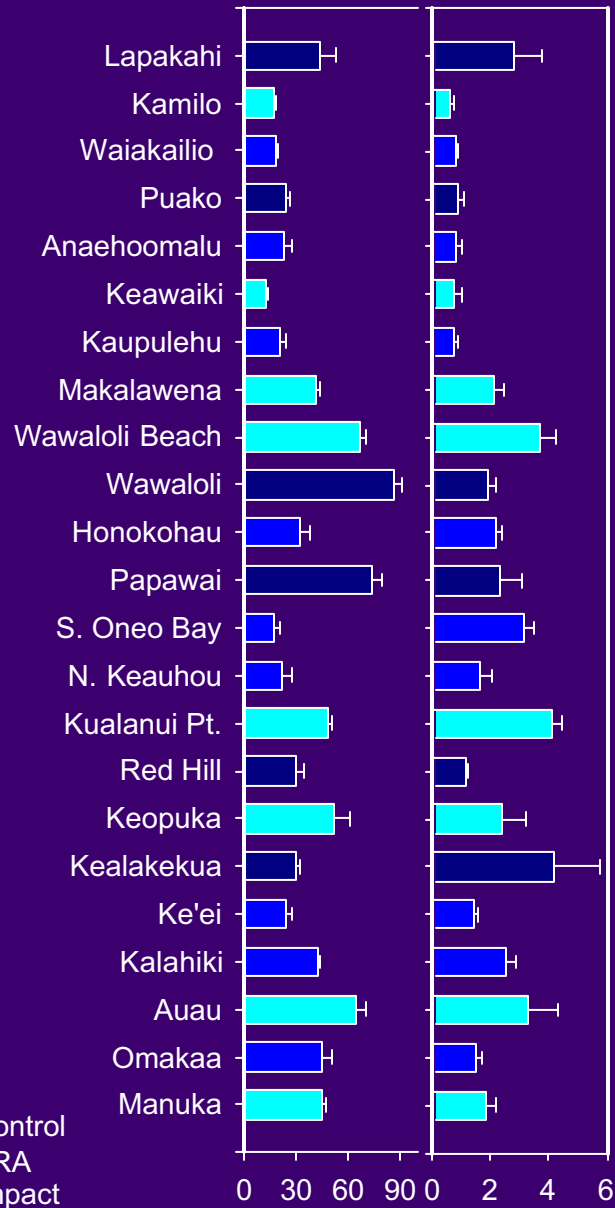


## Density of Recruits

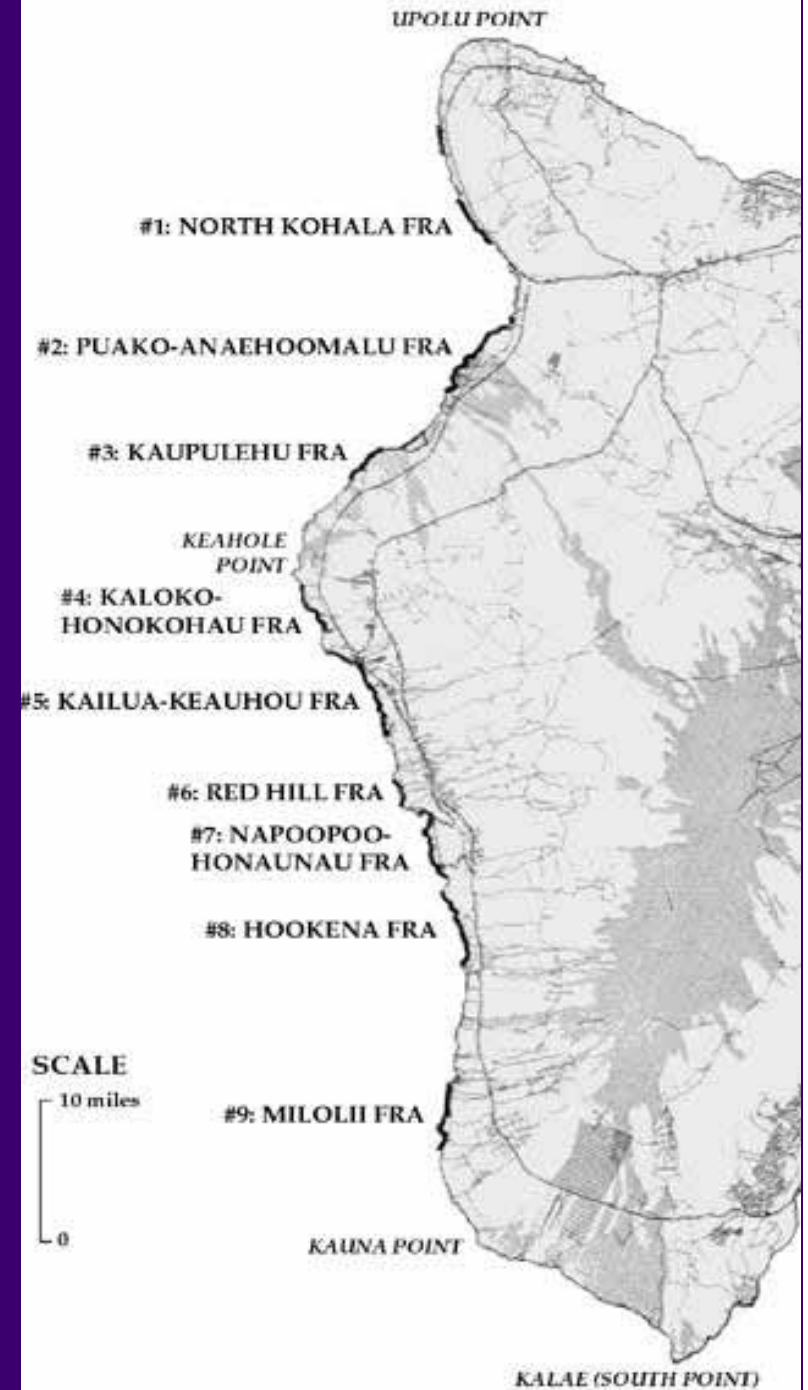




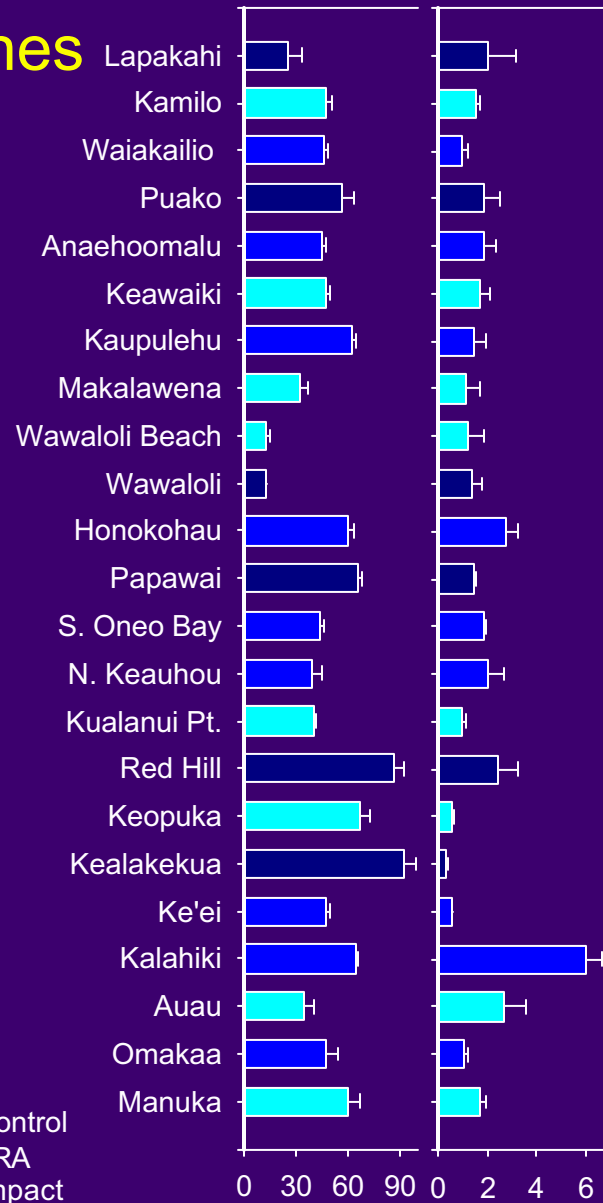
# Non-aquarium fishes



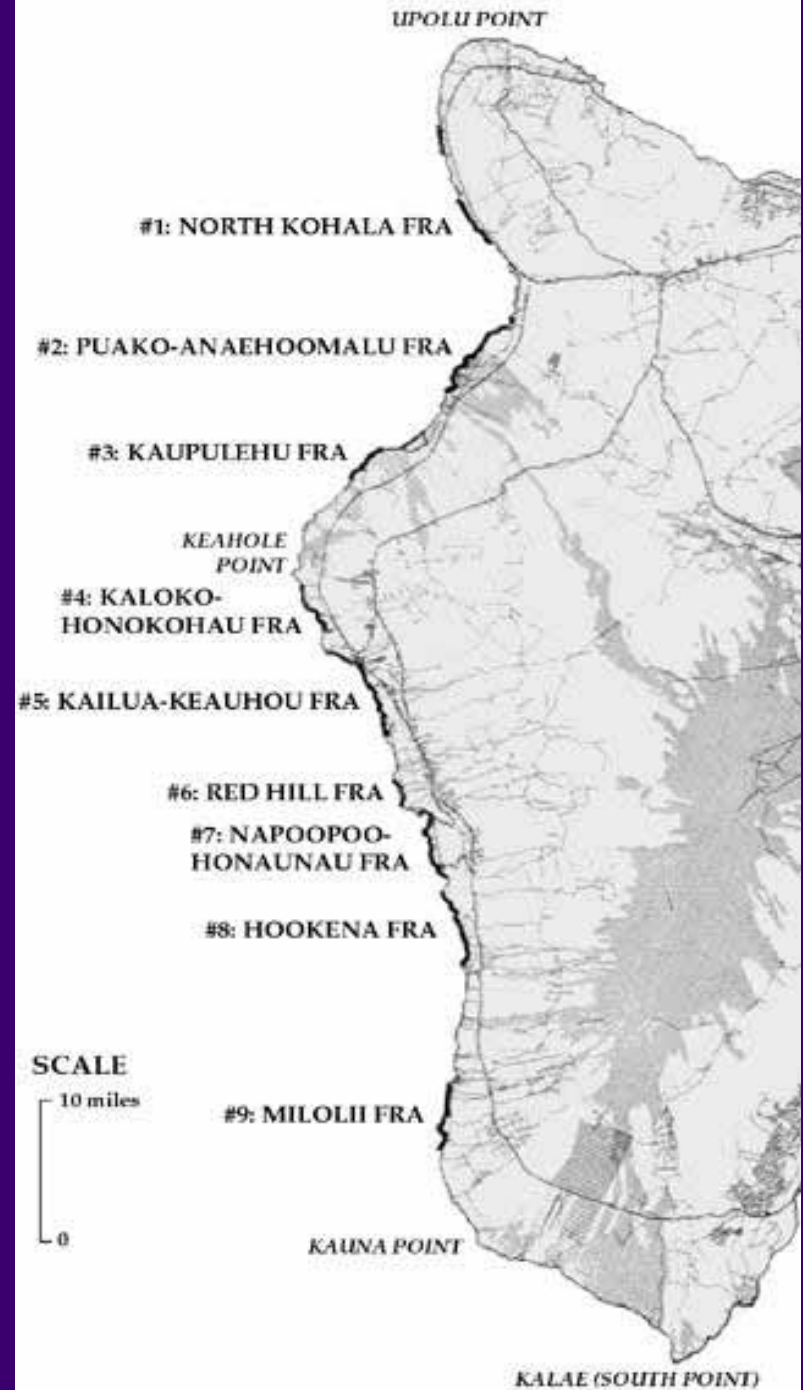
Control  
FRA  
Impact



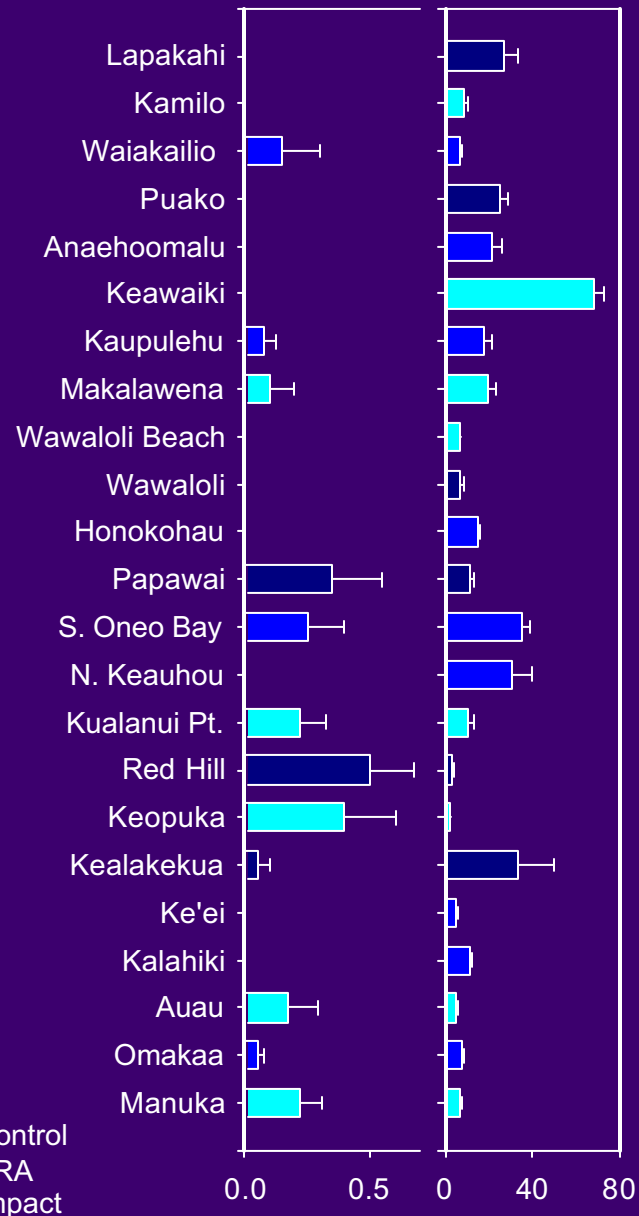
# Top ten aquarium fishes



Control  
FRA  
Impact



# Ta'ape & Urchins



Control  
FRA  
Impact

