Impacts of the Spotted Spiny Lobster (*Panulirus guttatus*) on Coral Patch Reef Communities of the Florida Keys

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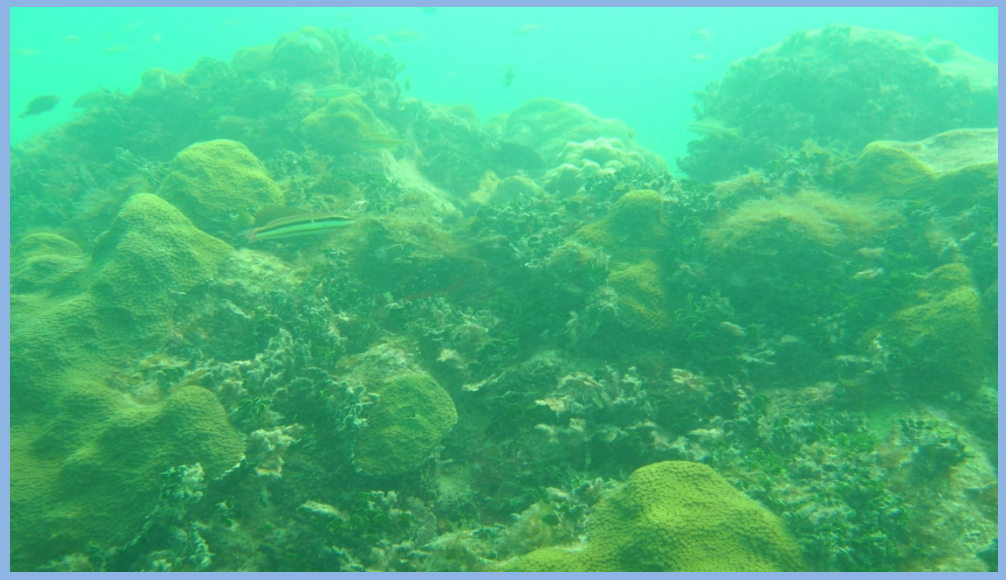
Coral reefs worldwide are in a state of decline

- Eutrophication
- Overfishing
- Bleaching
- Disease
- Global climate change
- Ocean acidification

The mass mortality of *Diadema antillarum* led to a rapid phase shift on Caribbean reefs.

Proximate causes of coral reef decline

- Fewer herbivores
- More algae
- Higher coral mortality
- Less coral successfully recruiting



Predation is important in controlling populations and shaping communities

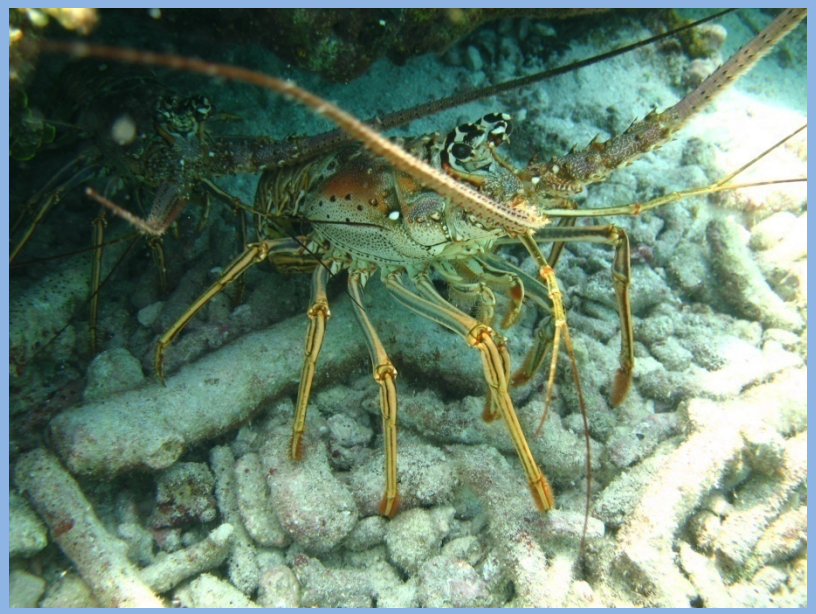
Lobsters are keystone predators in many temperate systems

- Wharton and Mann 1981

- Robles 1987

- Shears and Babcock 2002

There are two abundant species of lobster in the Caribbean



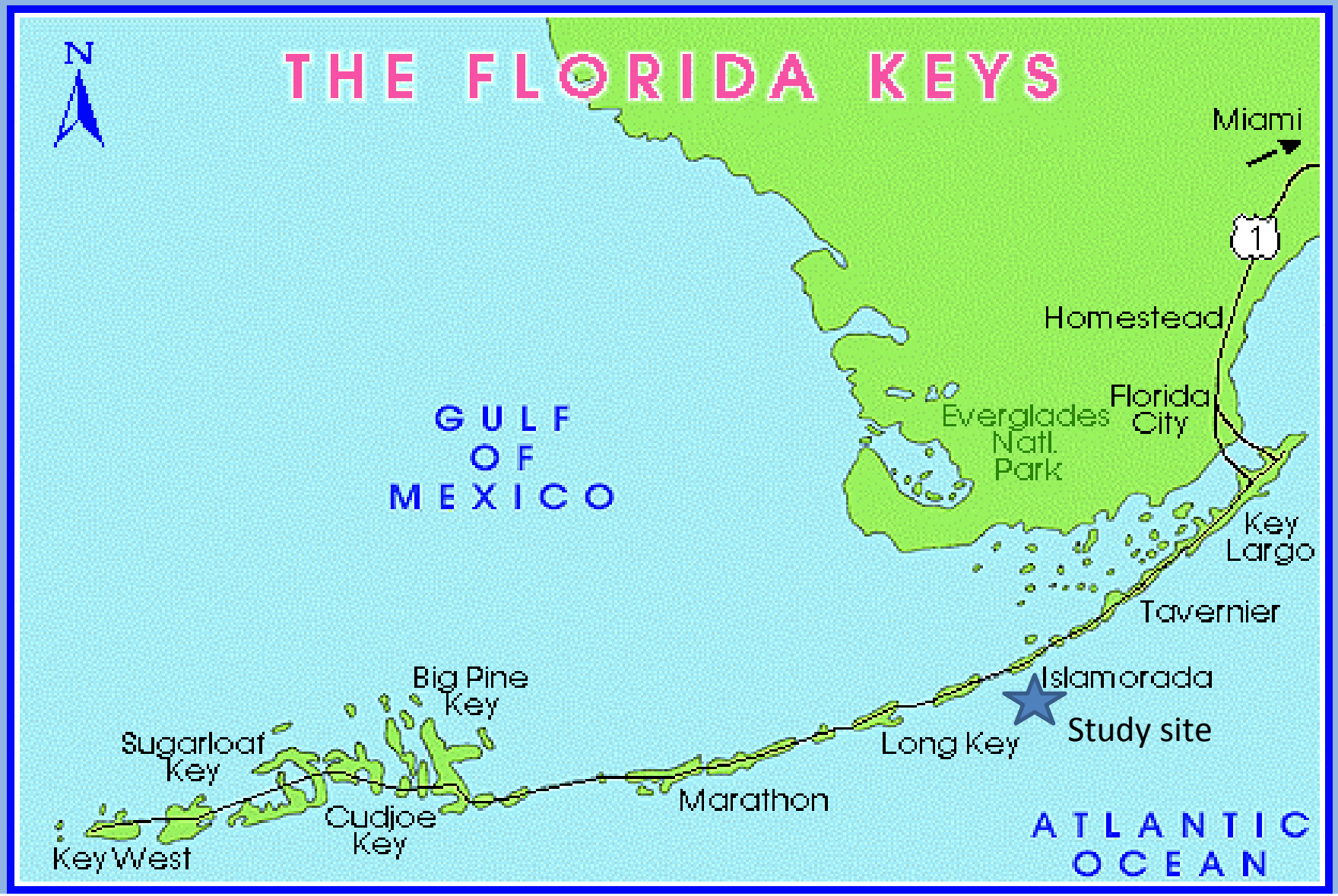
Panulirus argus

Panulirus guttatus

Questions:

- What impact does *P. guttatus* density have on patch reef communities?
- What impact does *P. guttatus* have on *D. antillarum* behavior?
- Are any behaviors exhibited by *D. antillarum* unique to *P. guttatus* cues?

Manipulative field experiment

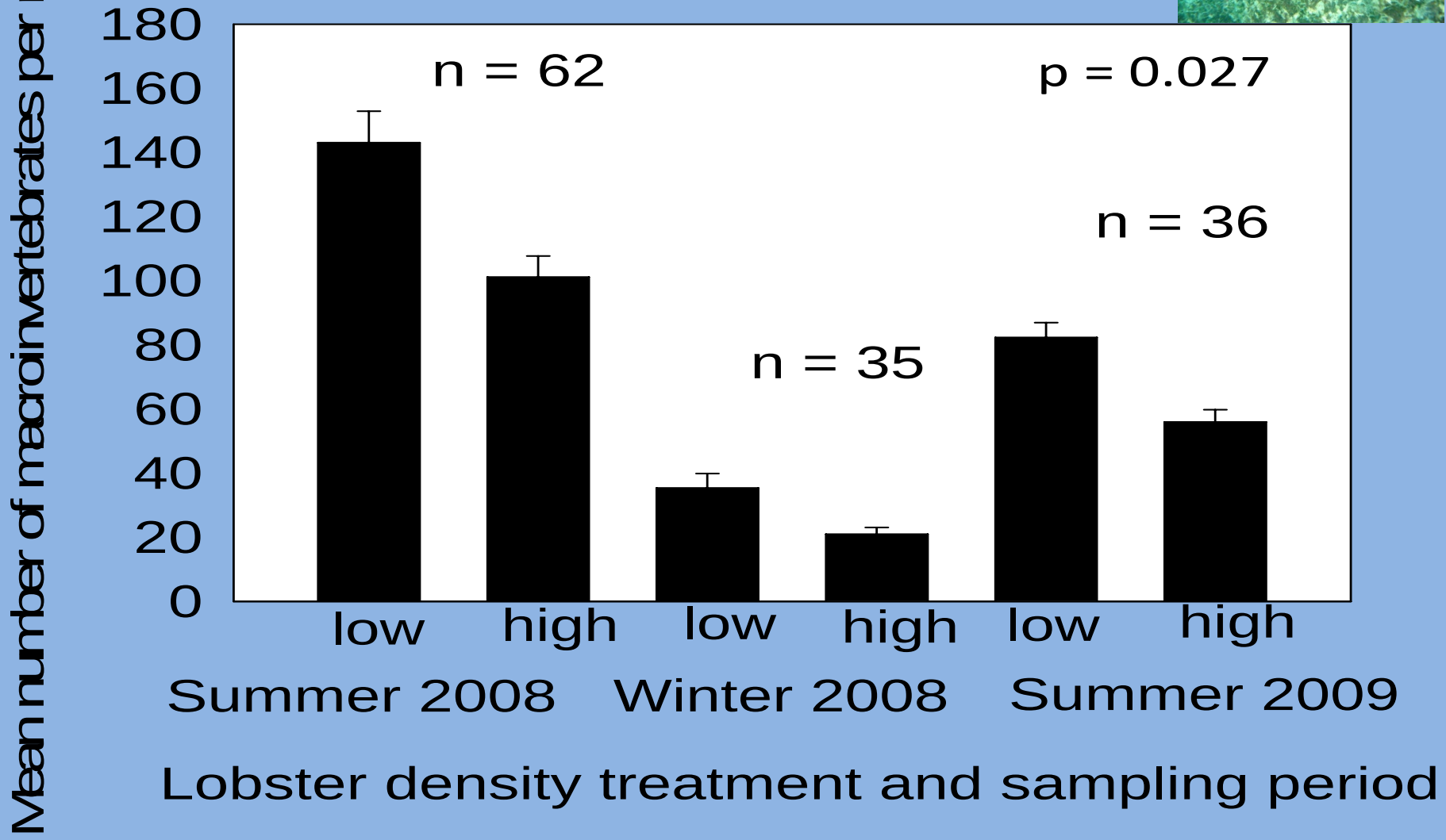


Manipulative field experiment

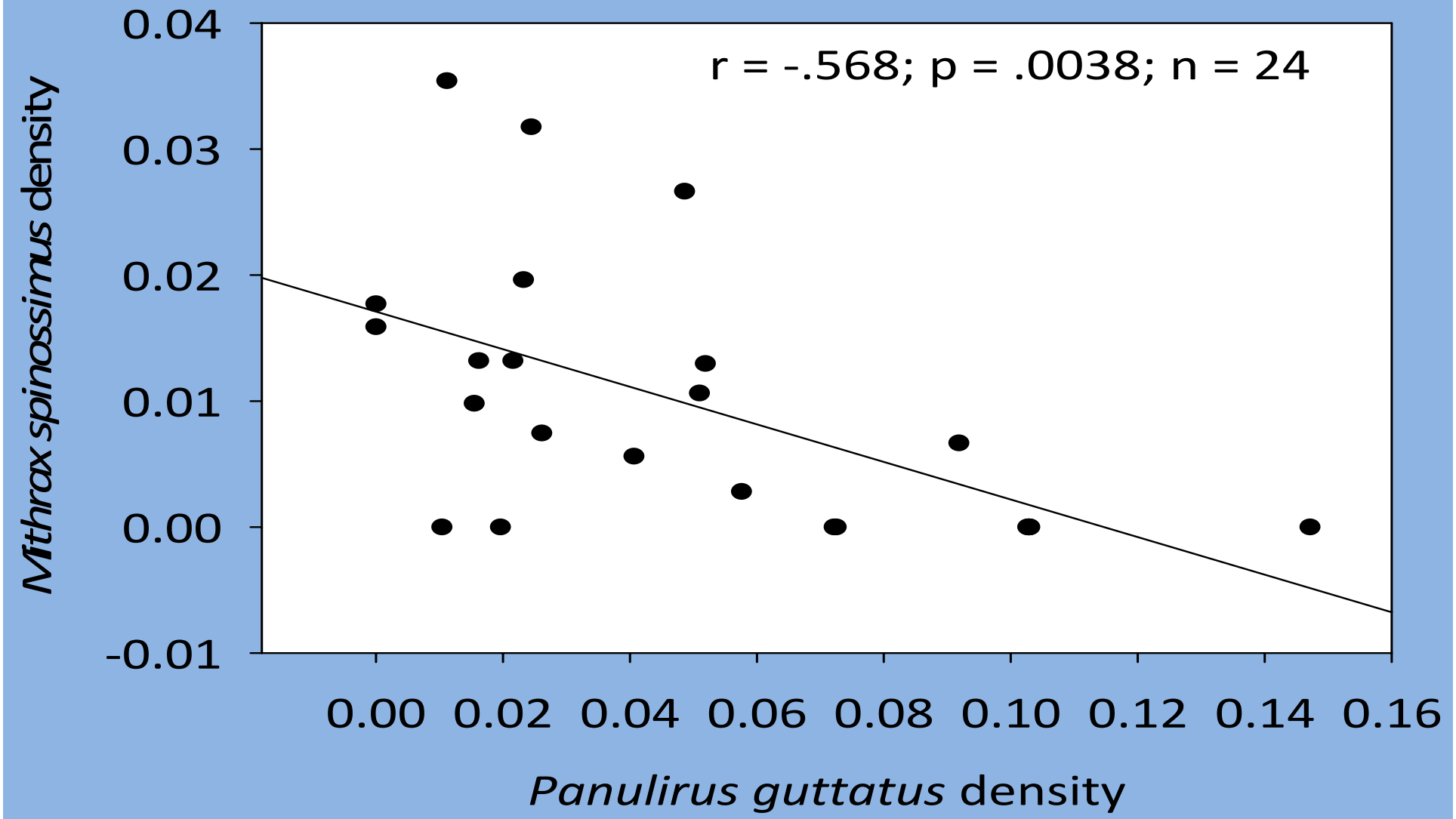
Rubble trays

Mithrax spinossiumus density

Rubble tray data



Impact of *P. guttatus* on herbivorous crab

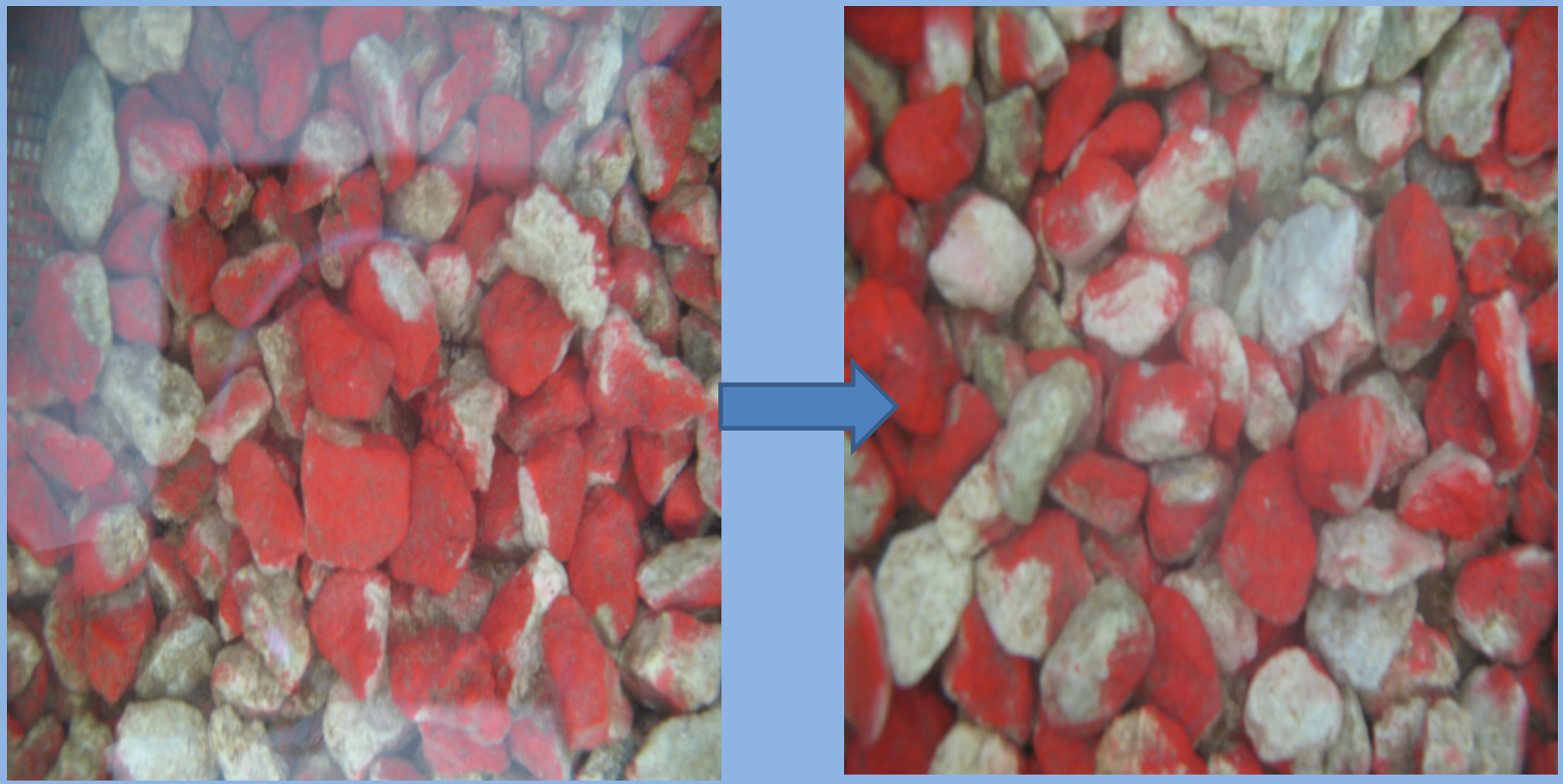


Does P. guttatus impact substrate stability?

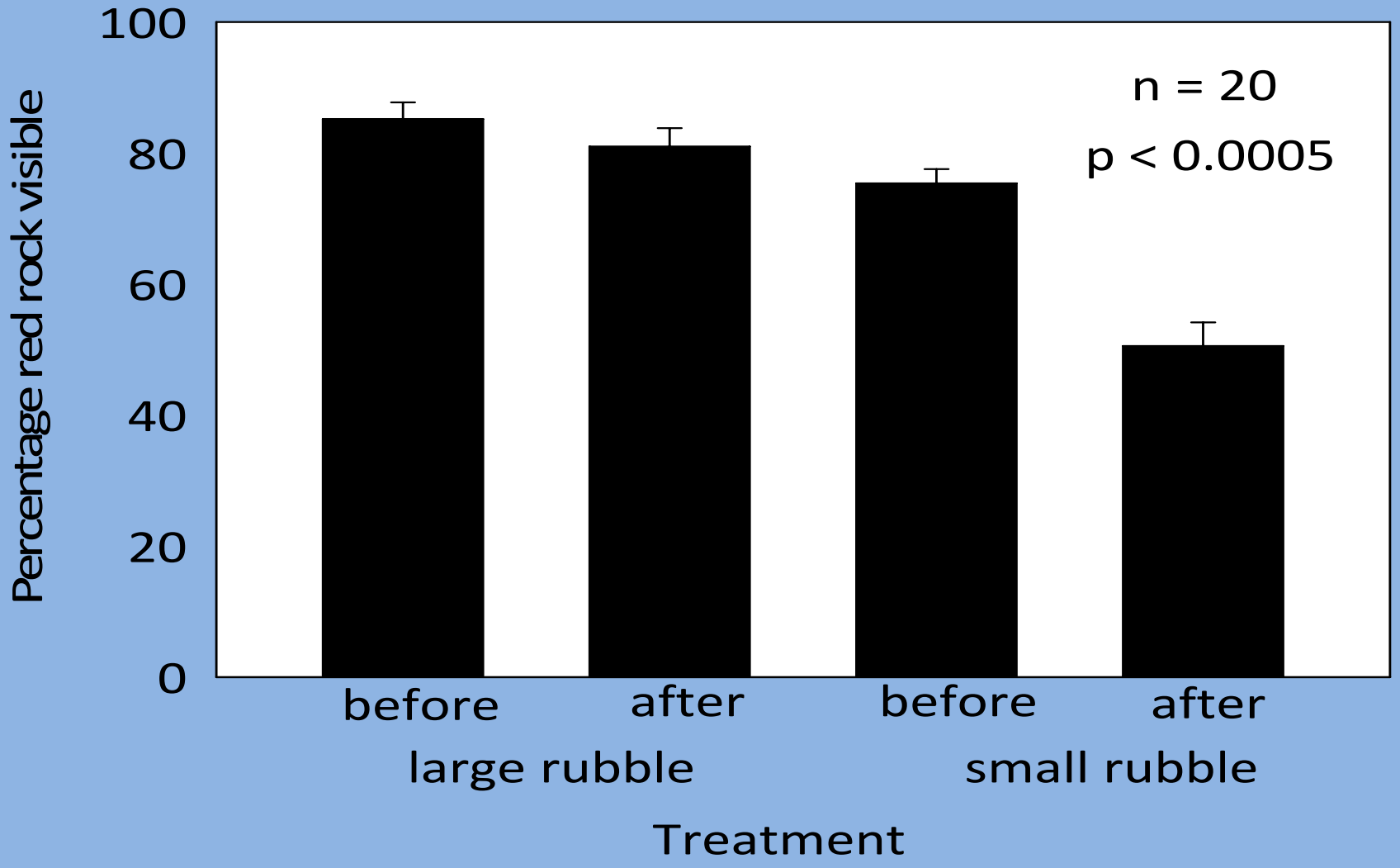
- Trays with large and small rubble

- Piece of bait shrimp under rubble

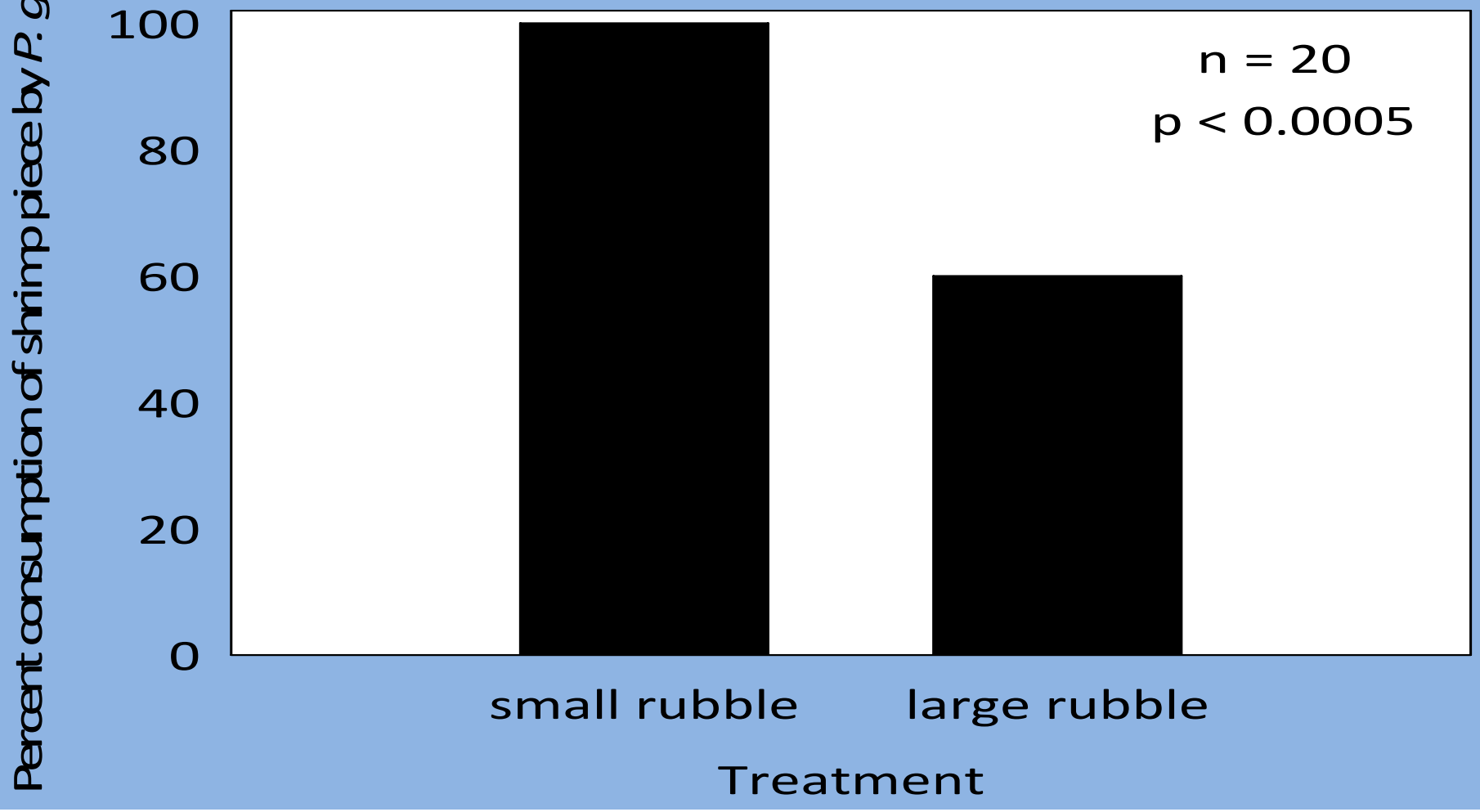
Before and after



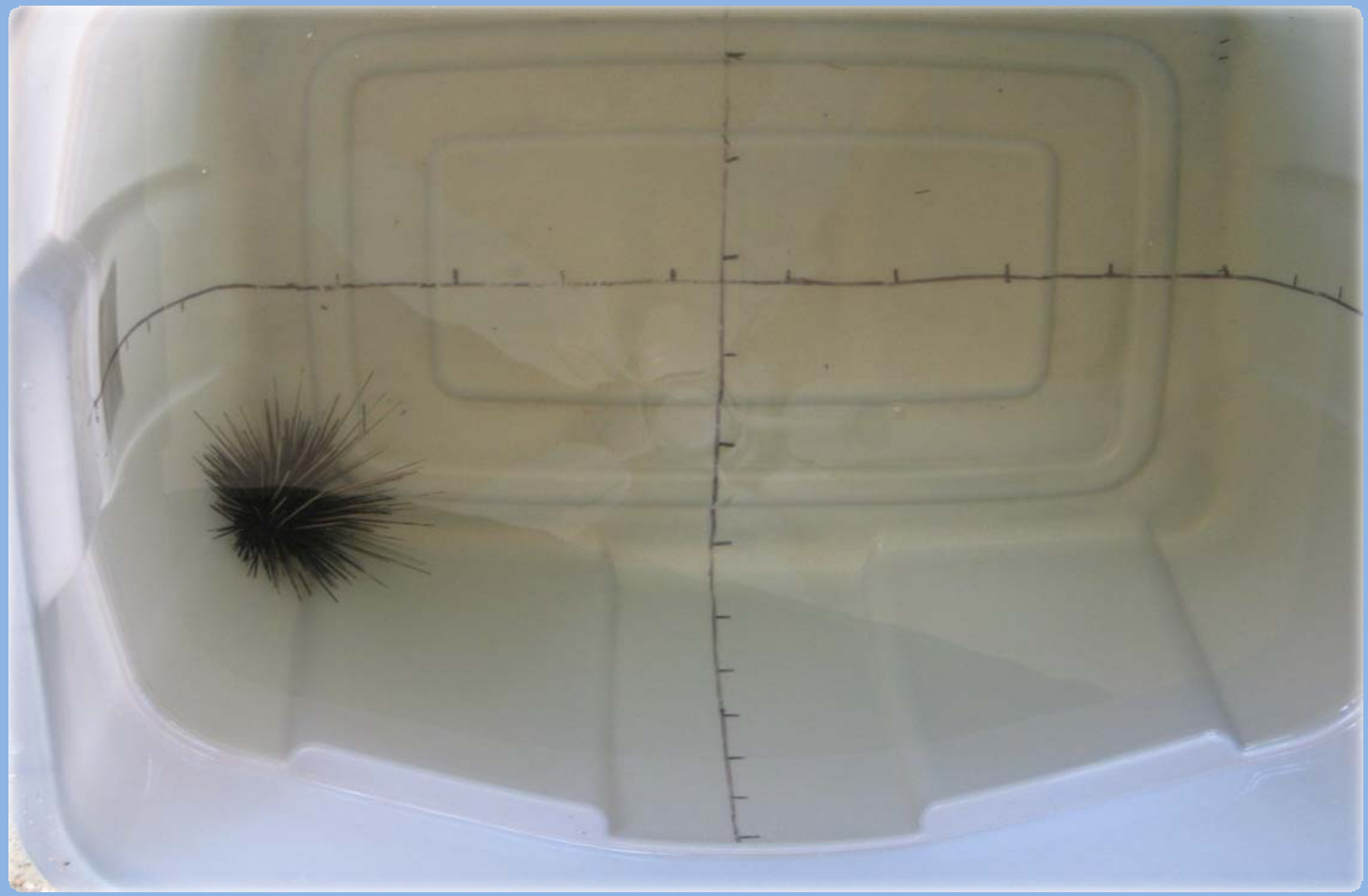
Percentage of red rock visible before and after *P. guttatus* foraging



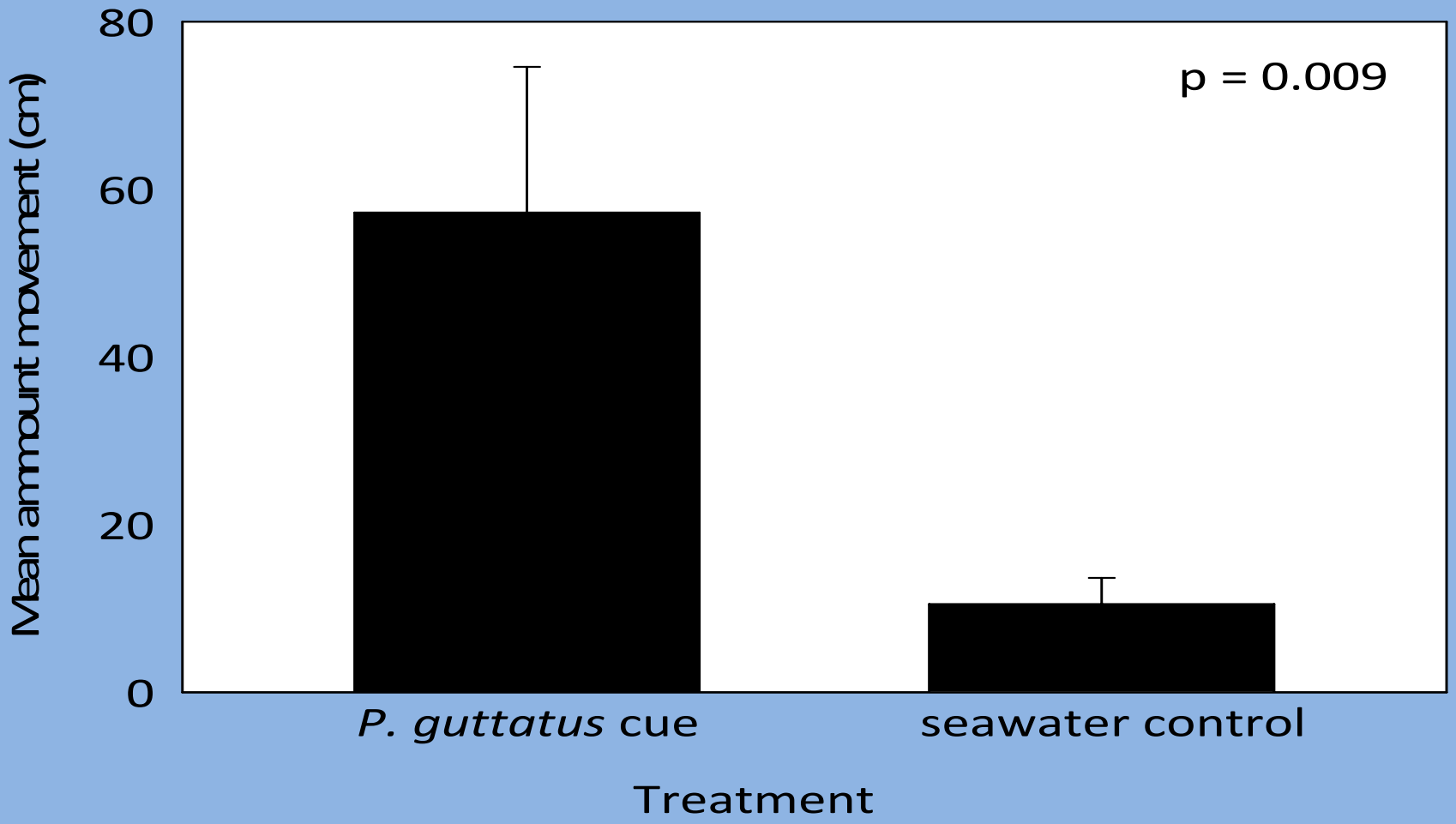
Shrimp consumption in large and small rubble



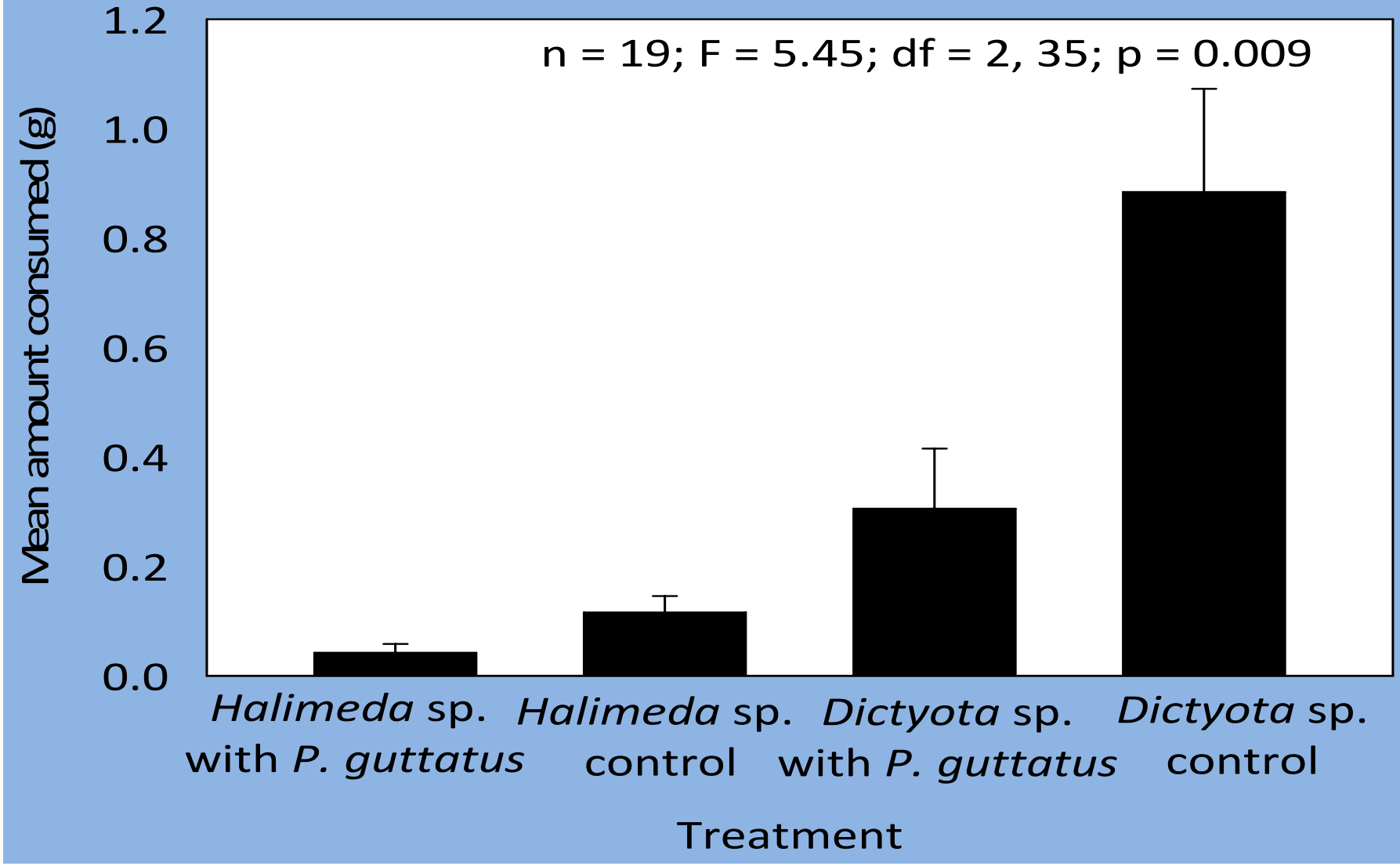
P. guttatus impact on *Diadema*



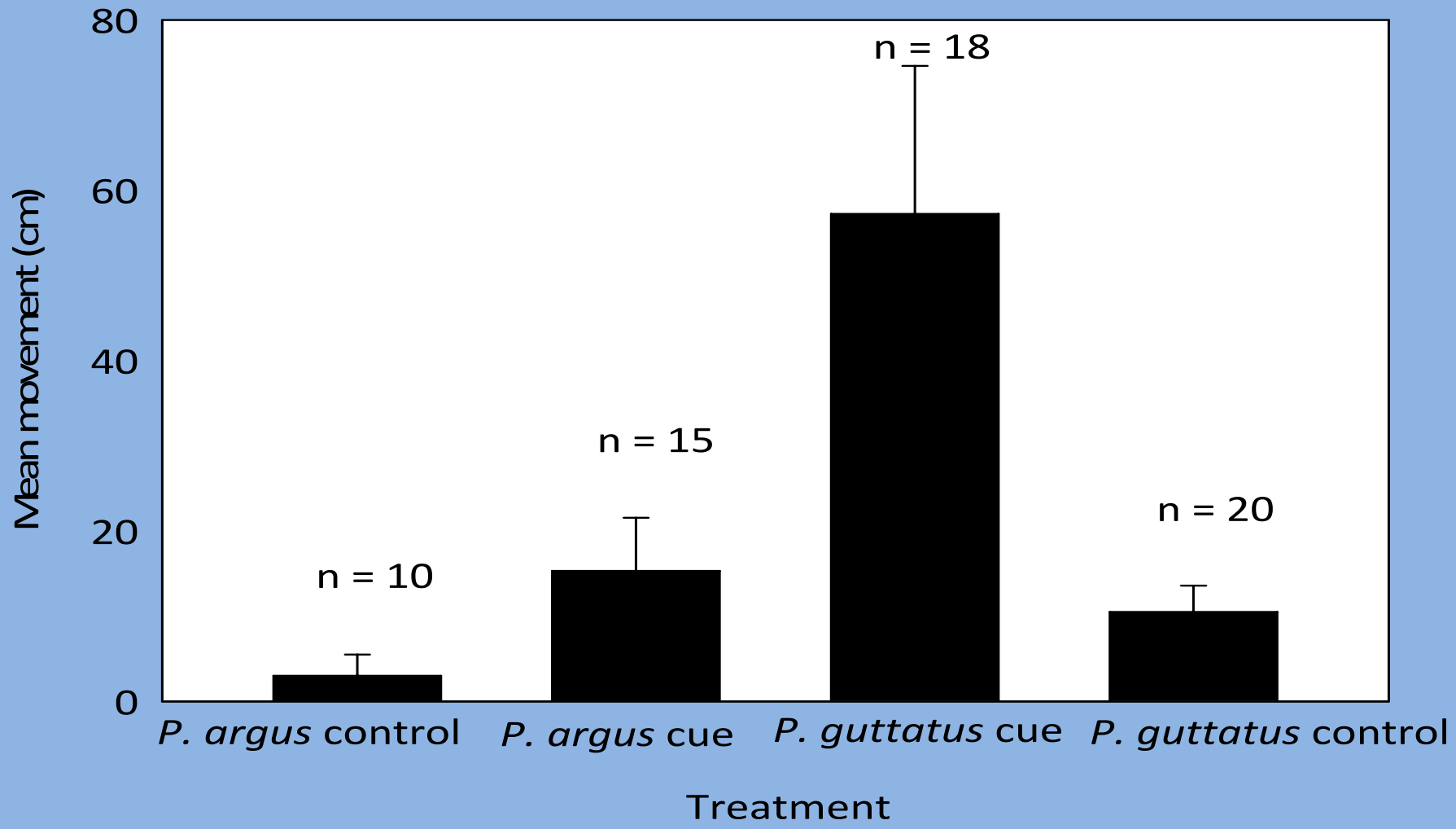
Diadema movement in response to *P. guttatus* chemical cues



Diadema feeding in response to *P. guttatus* cue



Diadema movement in response to *P. argus*



Conclusions

- *P. guttatus* is an important consumer on patch reef communities
- *P. guttatus* causes *D. antillarum* to exhibit a flight response and decrease algal consumption

Applications to management

- MPAs-more lobster predators could naturally control lobster abundance and behavior
- Need to carefully plan sites to transplant *Diadema*
- Need sufficiently large *Diadema*
- Beware of “sleeping functional groups”

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