

The interactive effect of nutrients and salinity on corals from distinct thermal environments on the Belize Barrier Reef System



Townsend, JE*¹; Bove, CB²; Baumann, J¹; Davies, SW¹; Castillo, KD¹

¹The University of North Carolina at Chapel Hill, Department of Marine Sciences; Chapel Hill, NC

²The University of North Carolina at Chapel Hill, Curriculum for the Environment and Ecology; Chapel Hill, NC



Objectives

Our goal of this study is to investigate the effects of increased runoff on scleractinian corals. Specifically:

- Examine effect of low salinity and nitrate, both separately and in combination, on coral calcification
- Explore how these factors affect response to and recovery from acute cold-shock events

Background



Figure 1) Collection sites

- 2-3 months of heavy rainfall events
- Nearshore reefs = more frequent runoff
- Nitrate (NO₃⁻) commonly present in runoff from agricultural fertilizer

Results: Growth

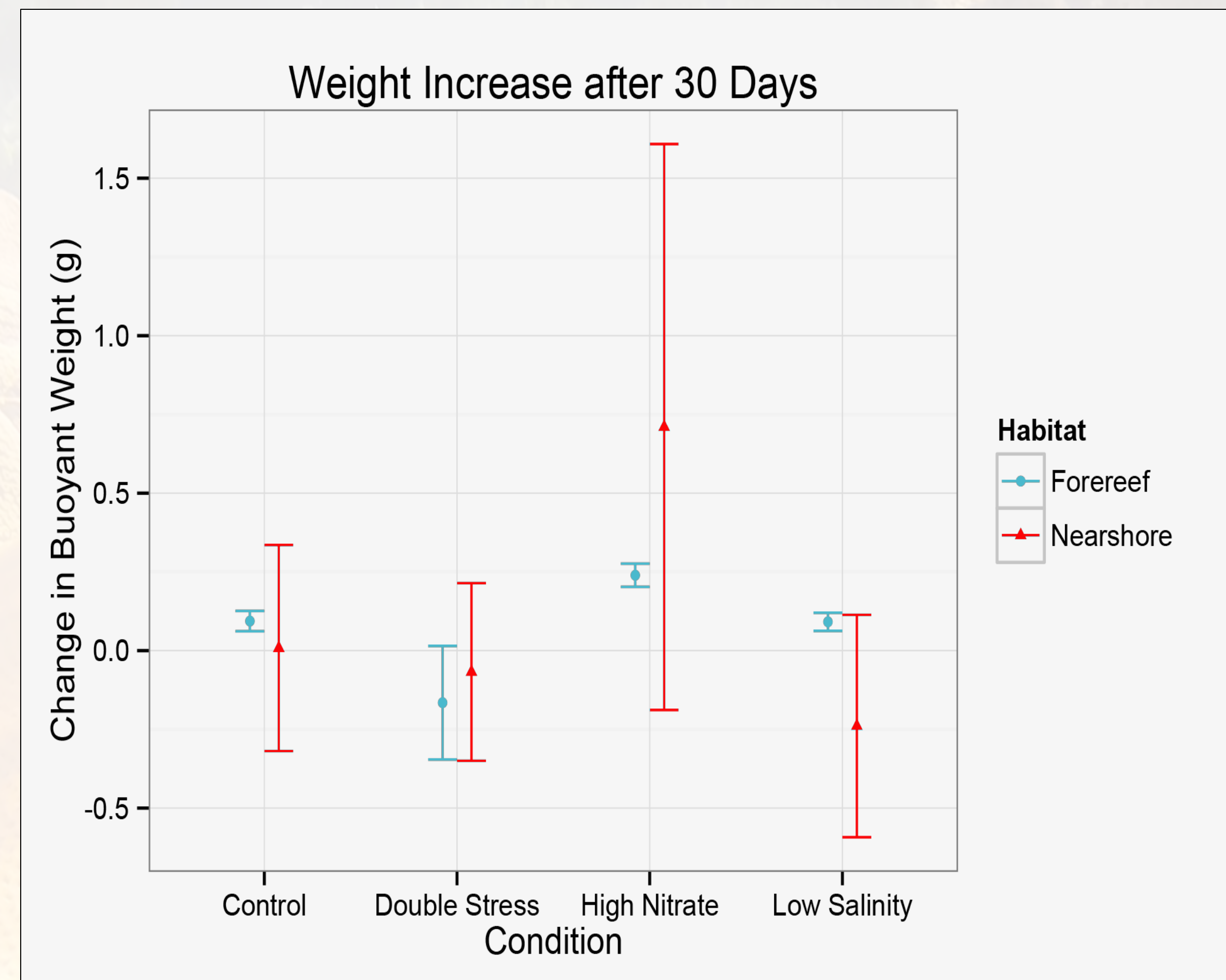


Figure 2) The average net change in buoyant weight of forereef (blue) and nearshore (red) corals nubbins after 30 days of periodic stress doses. Standard error indicated by bars.

Results: Bleaching Susceptibility

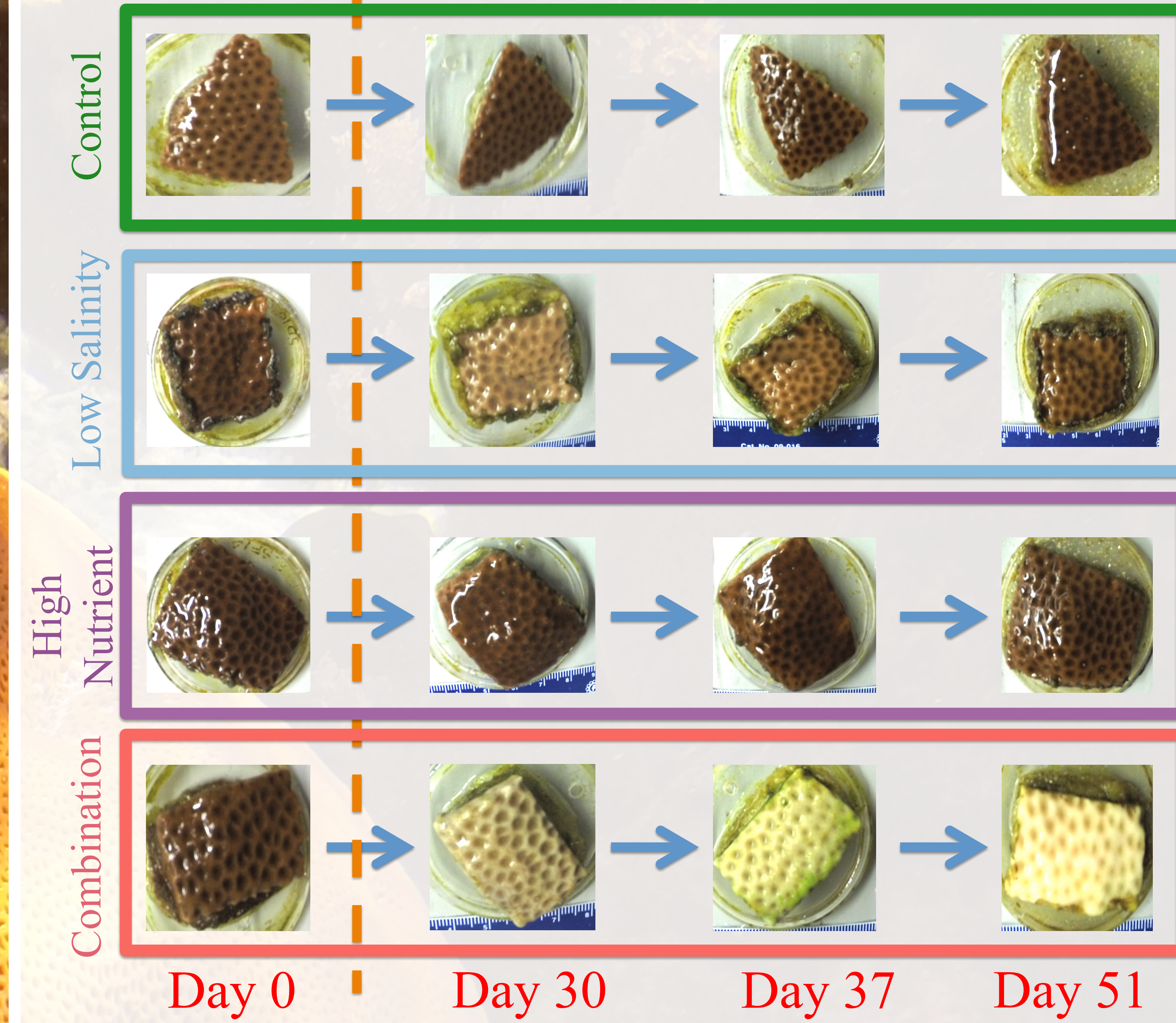
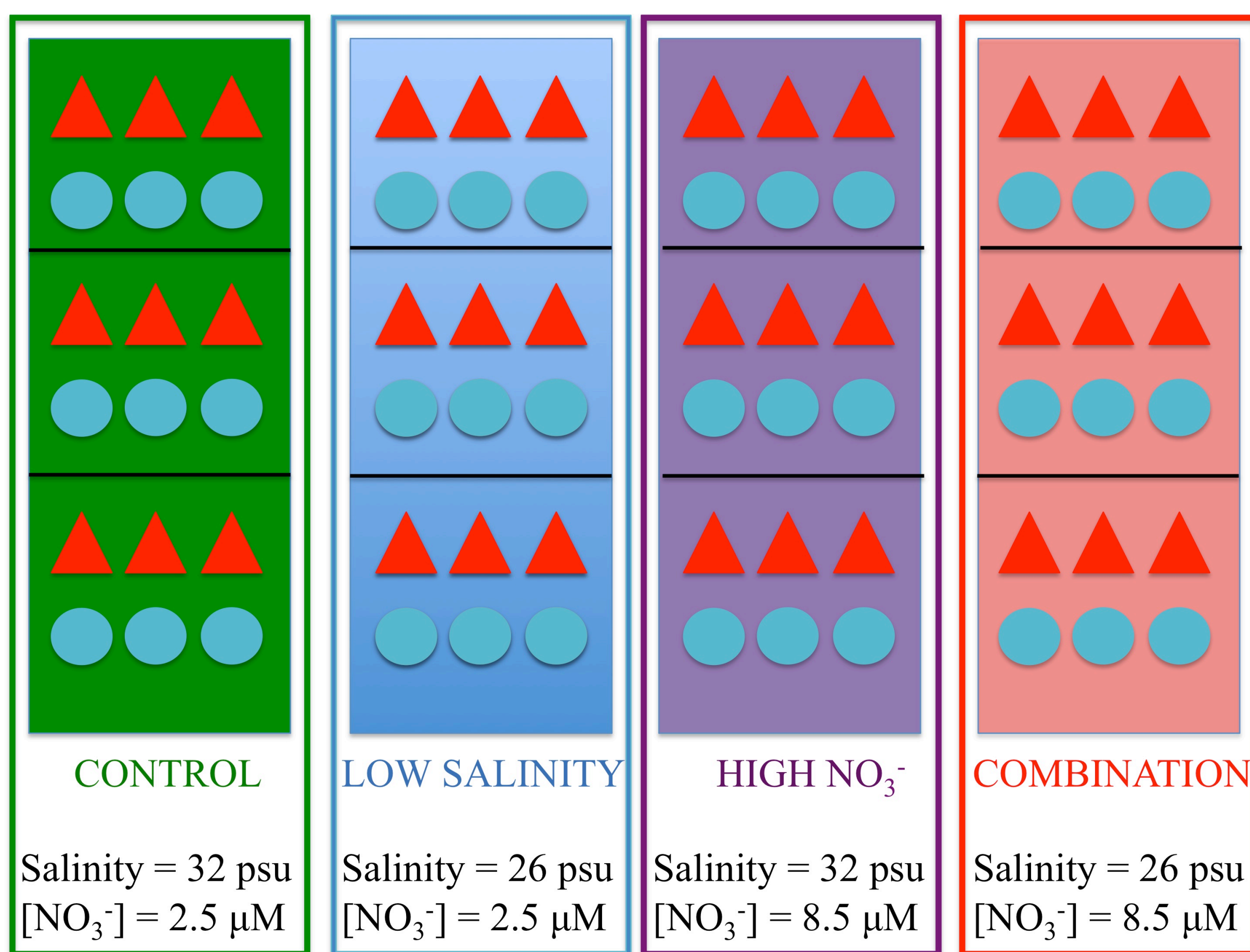


Figure 3) Examples of response and recovery from a cold-shock stress event (orange dashed line) from each treatment: Control, Low Salinity, High Nutrient, Combination.

Experimental Design

▲ = Nearshore corals ● = Forereef corals



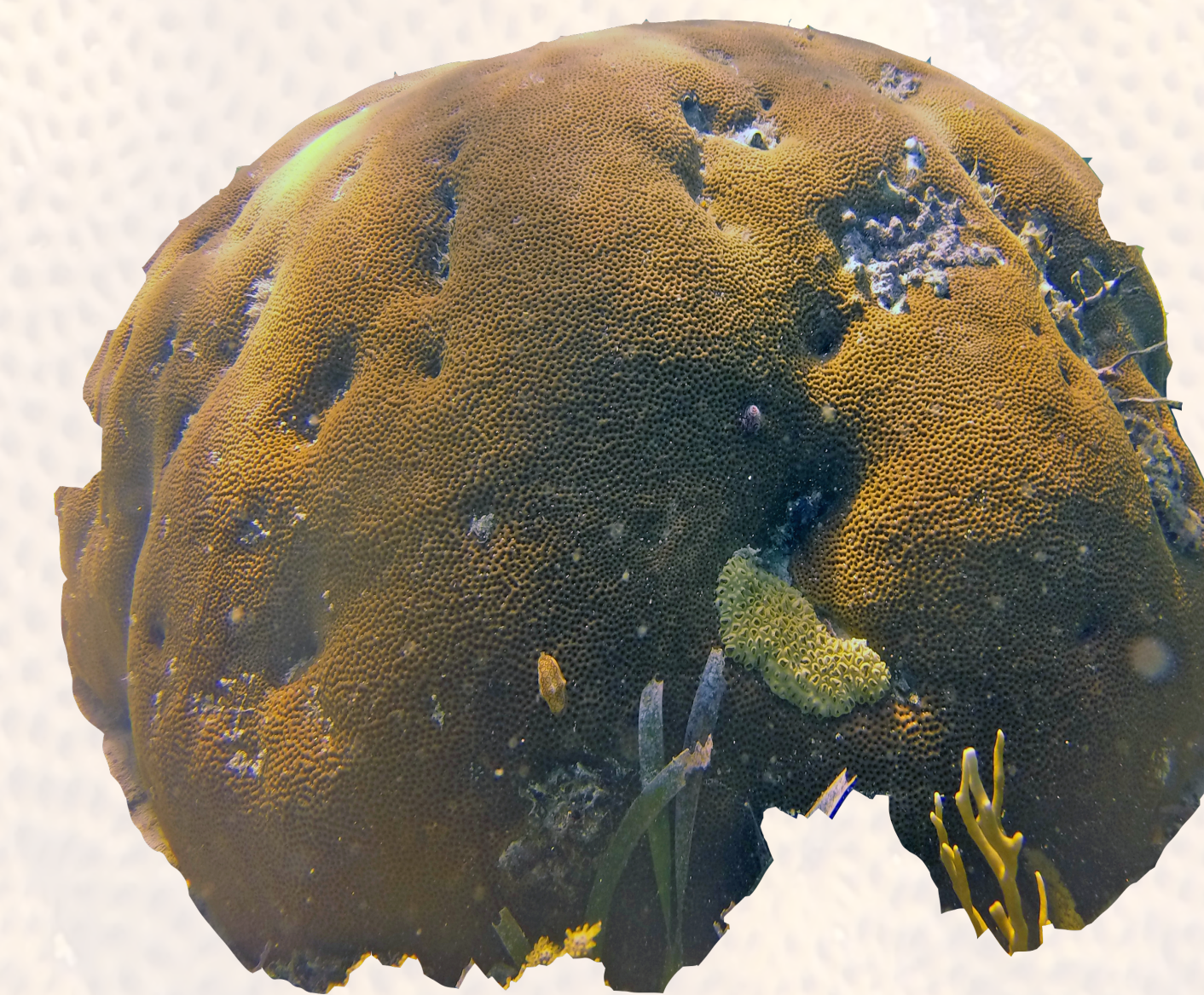
- *Siderastrea siderea* collected from frequent stress (nearshore) and infrequent stress (forereef) environments
- Expose corals to weekly “runoff events” for 30 days
- Measure change in growth (buoyant weight)
- Introduce cold shock event after runoff events and track bleaching 0, 7, and 21 days after cold stress

Conclusions: How do corals react to weekly runoff for 30 days?

Growth:

- Nitrate: No effect
- Low Salinity: No effect
- Combination: No effect

Habitat: Response more variable in nearshore



Stress Response:

- Nitrate: No effect
- Low Salinity: Bleaching
- Combination: Bleaching/mortality

Habitat: Does not affect response

What does this mean for reefs and runoff?

- Over the short term, reef growth will not be affected by nutrient and salinity runoff
- As nutrient and salinity stressors increase from increasing runoff intensity, reefs will be increasing susceptible to bleaching



Figure 4) An example of runoff effluent off the coast of Belize

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Further Research

- 90 day study (time of 1 complete rainy season)
- Increasing the level/rate of nitrate and salinity stress events
- Introducing additional nutrients (PO₄⁻, DOM, etc.)

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