Assessing performance of thermally selected northern hard clams (*Mercenaria mercenaria*) during growout

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Cedar Key Clam Industry Workshop

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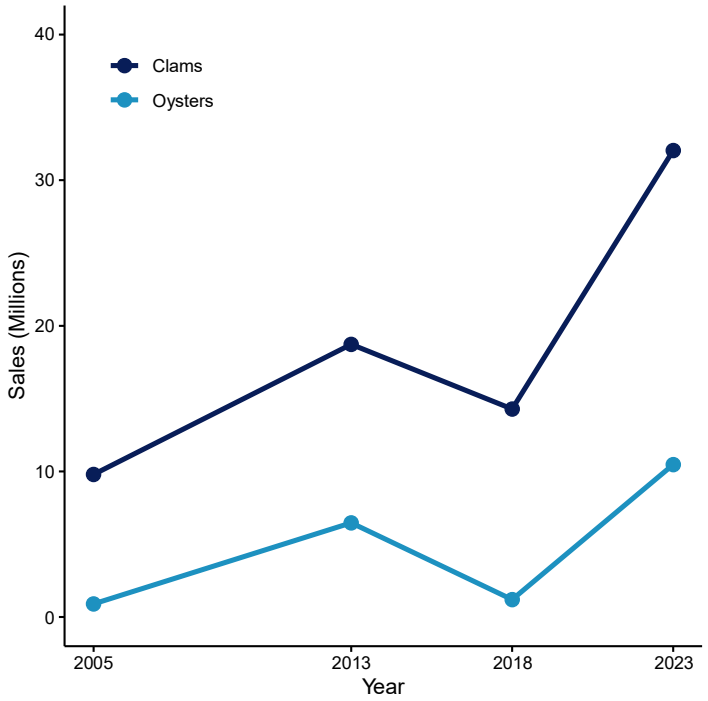
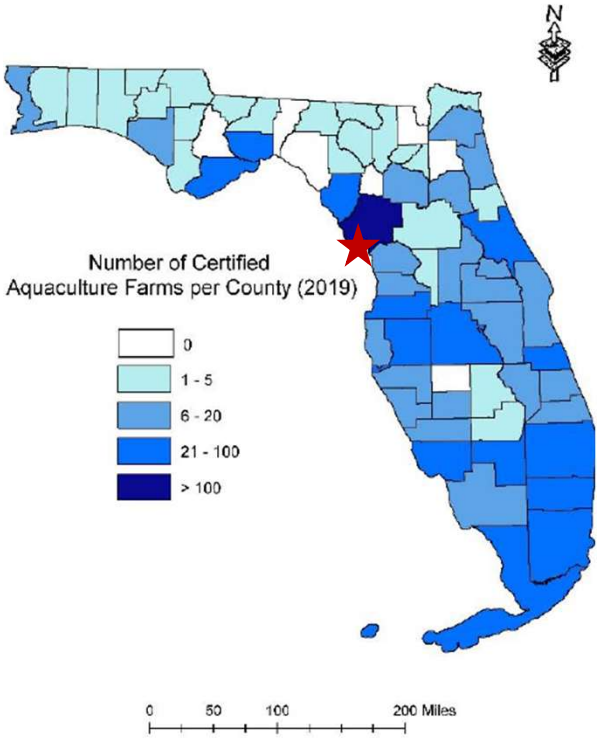
GULF SHELLFISH INSTITUTE

Research for Sustainable Aquaculture & Healthy Ecosystems

Florida Shellfish Aquaculture Industry

- Third in nation for shellfish production[1]





[1]2023 Census of Aquaculture, National Agriculture Statistics Service, USDA

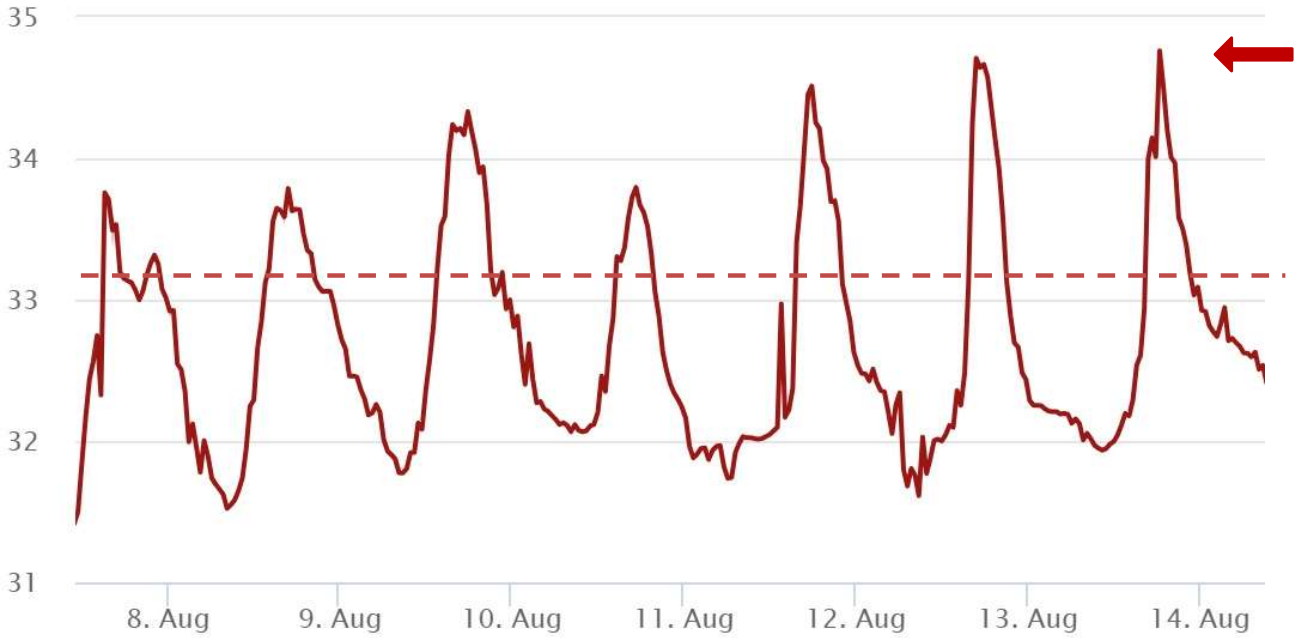
Aquaculture Industry Summary, FDACS

Marine Heatwaves

Marine heatwave = 5+ days sea temp > 90th percentile[1]

Temperature

Gulf Jackson, Cedar Key FL



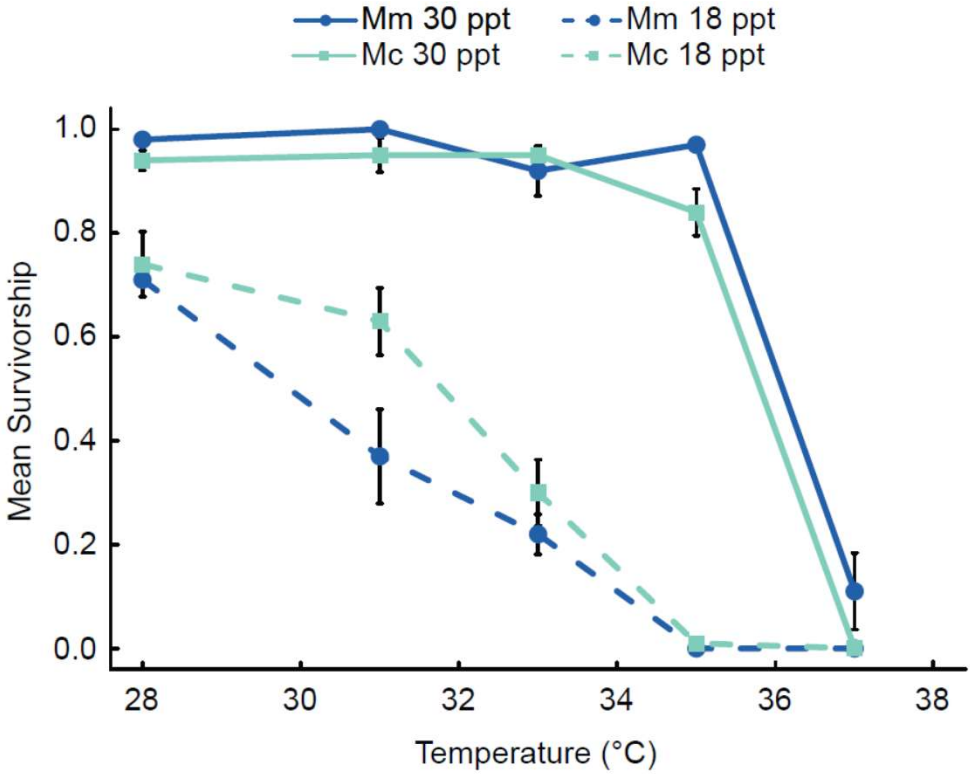
= 90th percentile

August 2023 Insitu Water Quality Data, Gulf Jackson, Cedar Key, FL, UF IFAS

[1]Hobday *et al.* (2016) *Progress in oceanography*

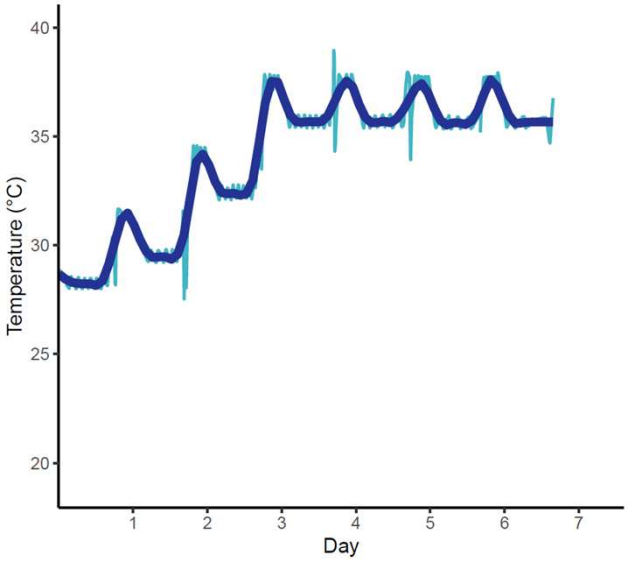
Previous GSI Research

- Lethal limits to acute thermal stress +/- hyposalinity stress



Previous GSI Selective Breeding

- Results → heat-shock broodstock to 37°C



- Hatchery partner spawns survivors

- …& rears from larvae → 4mm

Hypothesis:

Will F1 heat-selected seed outperform conventional stocks?

Timeline

- Outplant 4mm heat-selected seed
  - Gulf Jackson (GJ) & Dog Island (DI) – June
  - Tampa Bay (TB) – July
  - Stock @ 10,000/ nursery bag
  - Unselected seed alongside selected seed

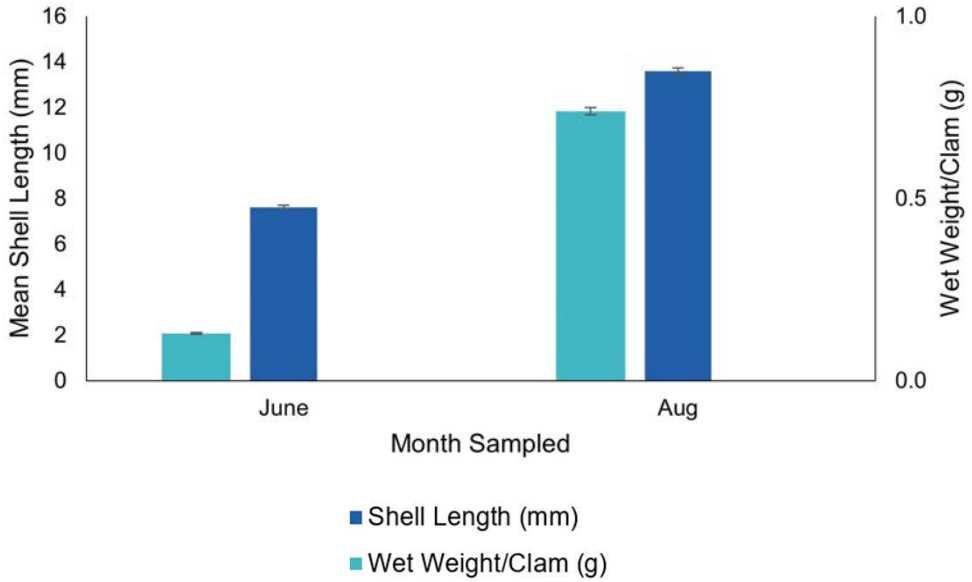
- Monitor & restock growout bags
  - 2 mo. post-plant – August
  - GJ & DI @ ~1,100/ 10 mm bag
  - TB @ ~10,000/ 5 mm bag

- Monitor & restock TB seed
  - 4 mo. post-plant – December; @ ~5,000/ 12 mm bag

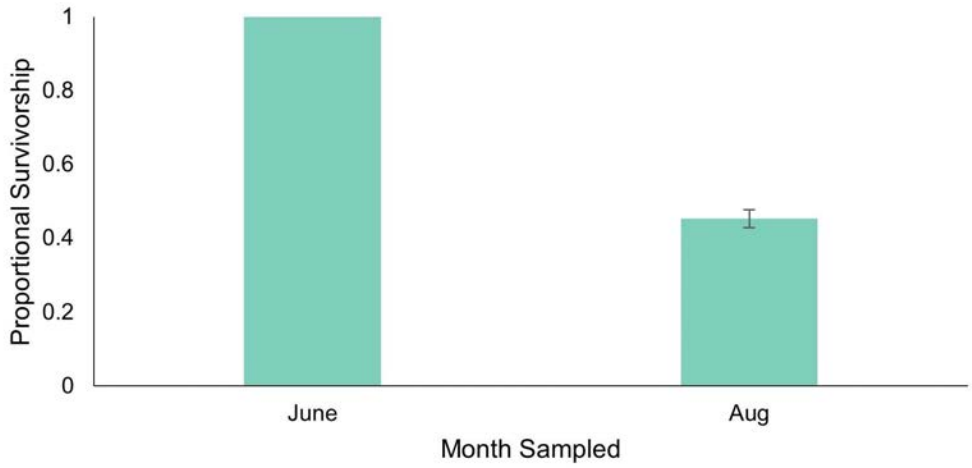
Methods

- Outplant nursery bags
  - Subsample 50 seed/6 bags/site & measure:
    - Shell length (mm)
    - Whole wet weigh
  - Deploy HOBO loggers @ GJ & DI
- Stock growout bags
  - Count survival/bag
  - Subsample same 6 bags/site & measure
  - Recover DI HOBO logger
- Restock TB growout bags
  - Subsample all bags & measure
    - Analyze condition index

Gulf Jackson Results

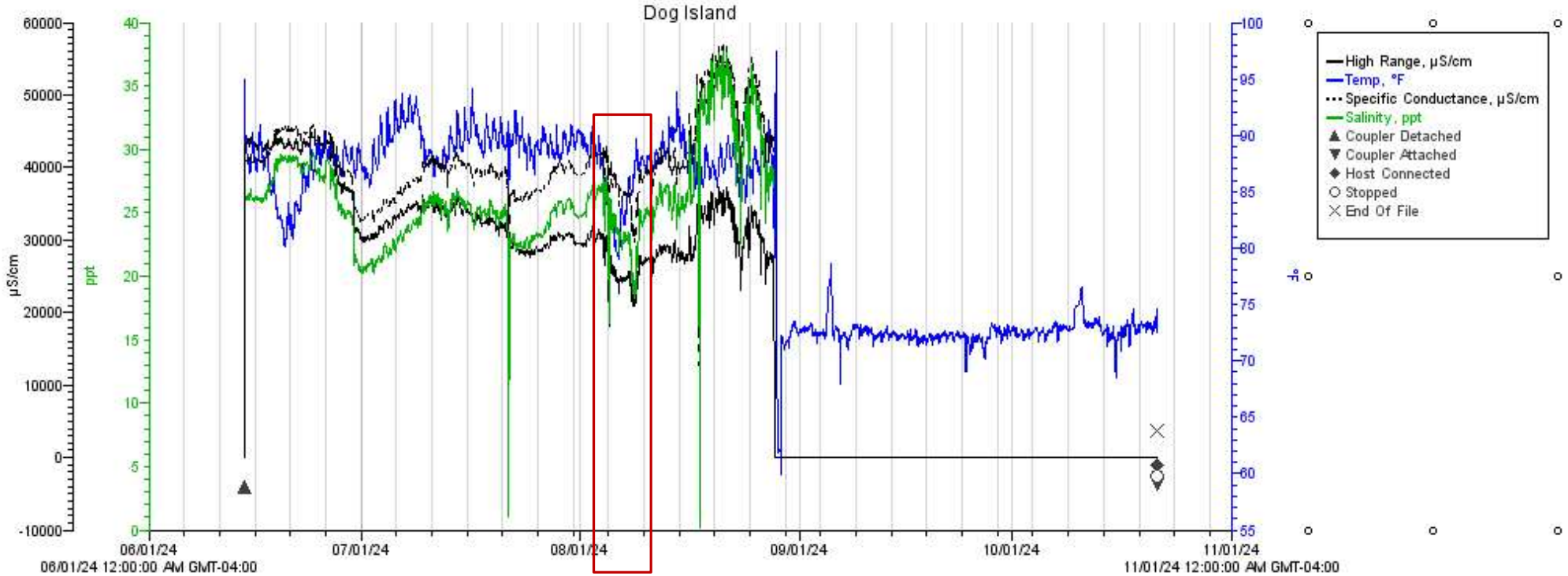


Time p ≤ 0.001



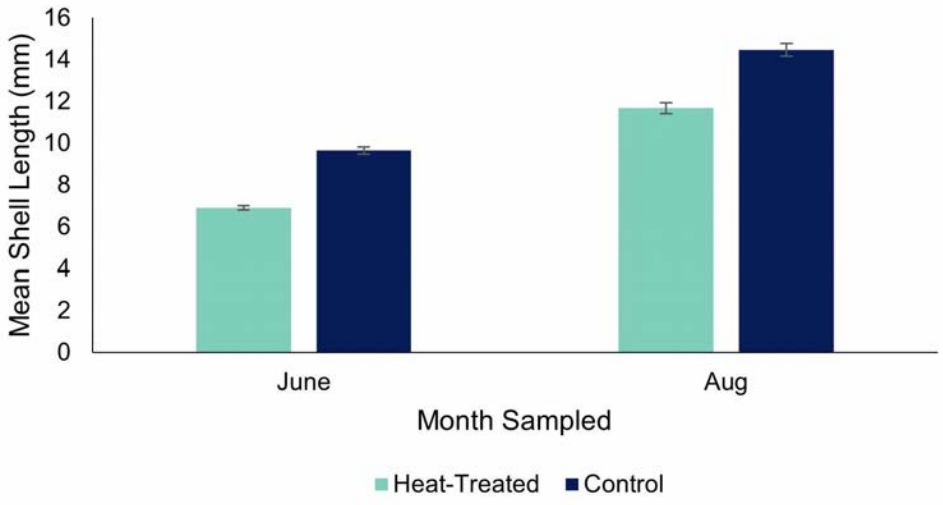
Time p ≤ 0.001

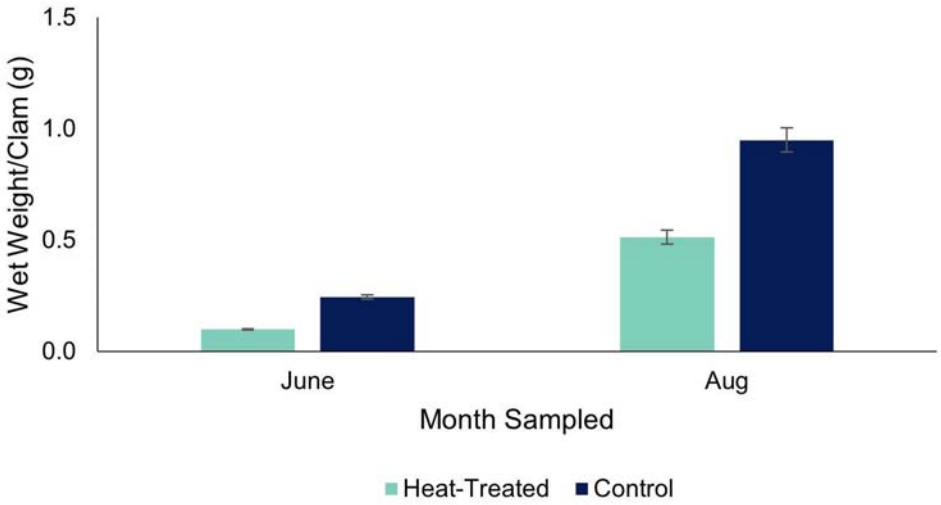
Dog Island Results – Water Quality



Tropical Storm Debby

Dog Island Results – Length & Weight





Treatment $p \leq 0.001$
Time $p \leq 0.001$

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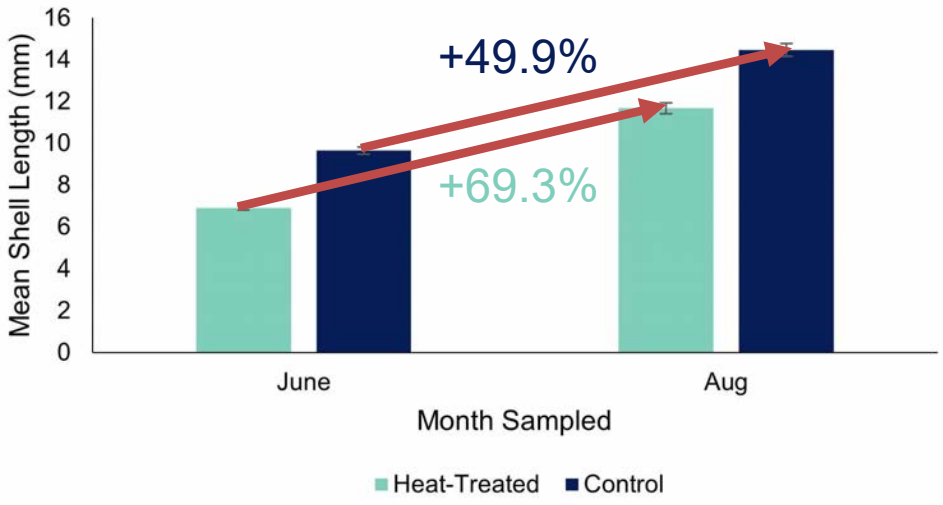
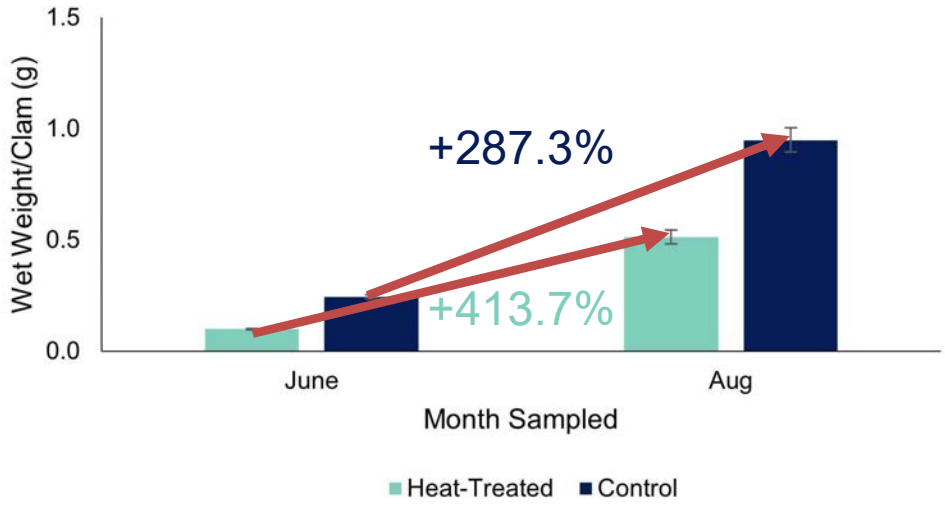
Dog Island Results – Length & Weight

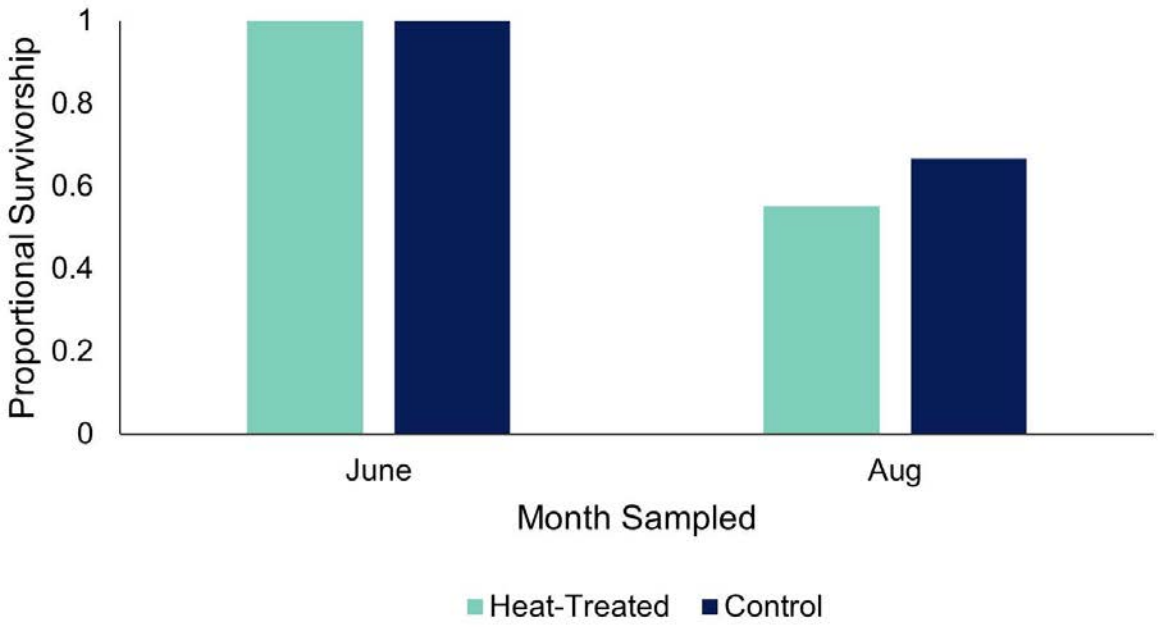


Treatment $p \leq 0.001$
Time $p \leq 0.001$

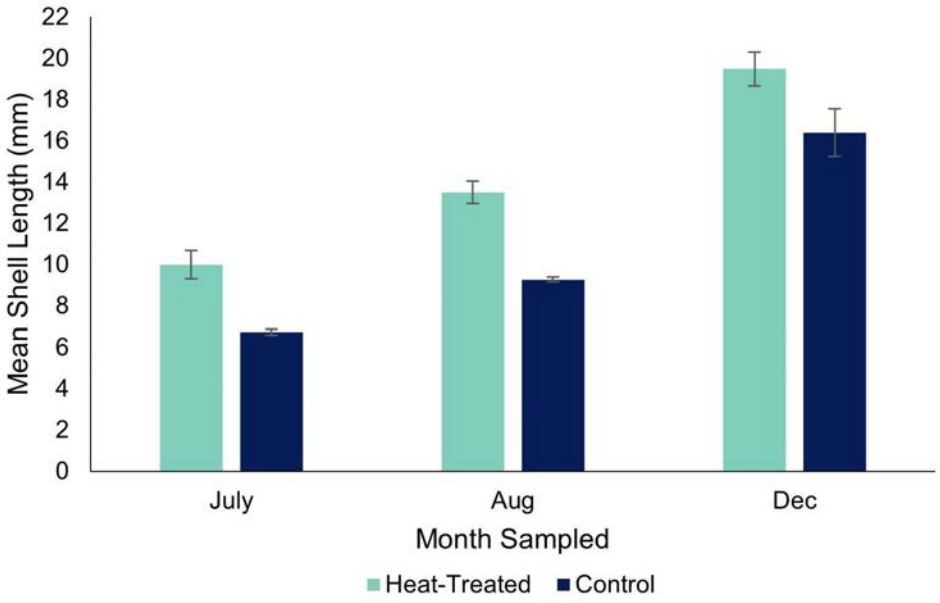


Treatment $p \leq 0.001$
Time $p \leq 0.001$

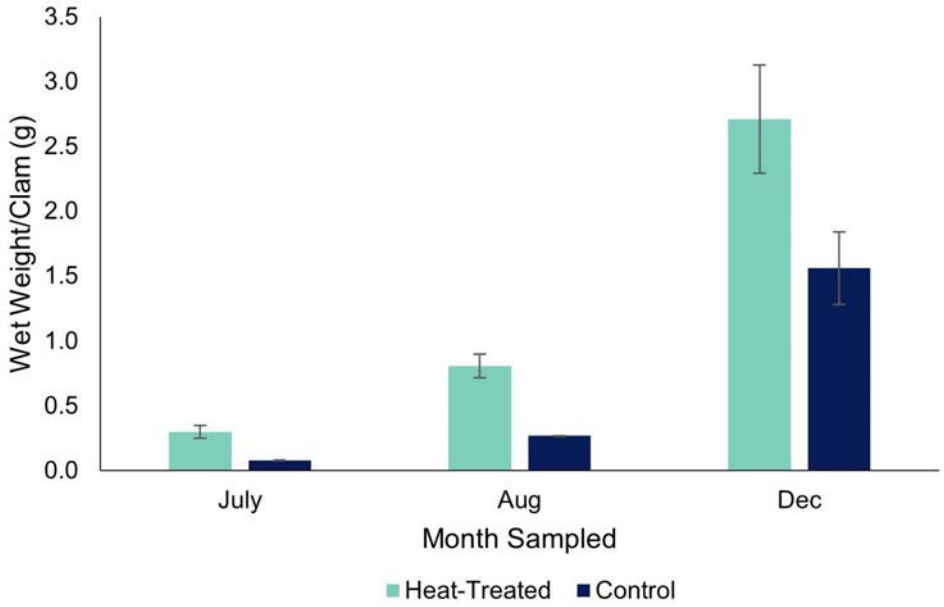
Dog Island Results – Survival



Tampa Bay Results – Length & Weight

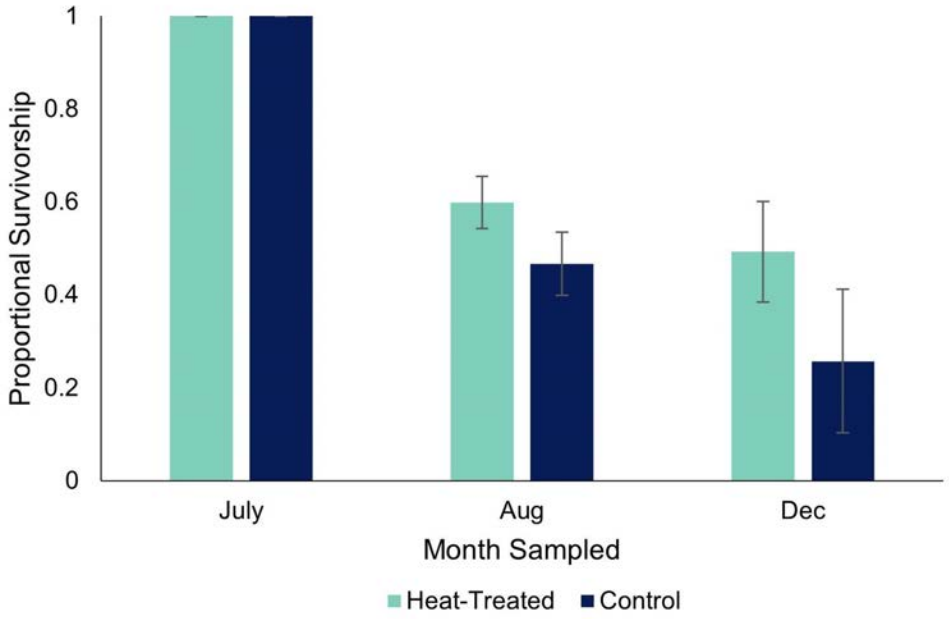


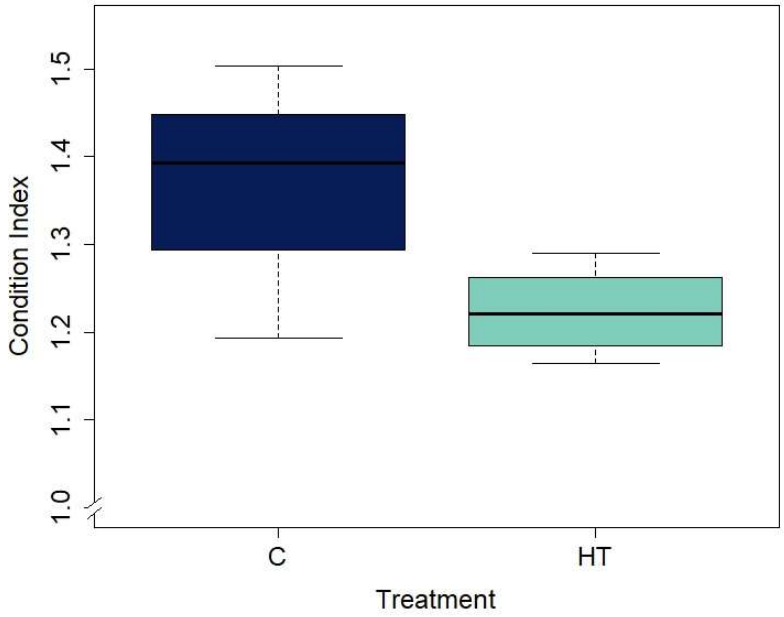
Treatment p ≤ 0.001
Time p ≤ 0.001



Treatment p ≤ 0.001
July : August p ≤ 0.01
August : December p ≤ 0.05

Tampa Bay Results – Survival & CI





Time $p \leq 0.001$

Future Directions

- DI clams intact post-hurricane!
- Largest DI & TB F1 → heat shock → heat-resistant F2

  & heat + hyposalinity shock → heat/hyposalinity-resistant F1
- Improve industry resilience to heatwaves & freshwater intrusion

Acknowledgements

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  Heath Davis
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  Dr. Leslie Sturmer

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