Testing Coral Transplant Performance:
Aquarius Coral Restoration/Resilience Experiments

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* And a host of collaborators

NOAA CORAL REEF CONSERVATION PROGRAM

Population Restocking?

- Culturing of, especially, *A.cervicornis* is quite tractable via fragmentation
- Much that is not known regarding risks/benefits of different source material
  - Genetic concerns (e.g., outbreeding depression?)
  - Health concerns (transporting 'foreign' microbial associates)
- ARRA project proceeding with 'scaling up' of lowest risk approach
  - Field-based culture
  - Geographically dispersed nurseries limited to local genotypes
- Smithsonian-initiated *Acropora* restoration workshops
  - Collaborating with NMFS/Recovery Team and other experts to address uncertainties and compile 'best practices' for both fragmentation and larval culture

Aquarius Coral Restoration/Resilience Experiments (ACRRE)

- Controlled experiment at Aquarius site to improve scientific basis for transplant or restocking design
- Test the performance/resilience of corals from different sources (over long term disturbance cycle) to inform future permitting and restoration transplant activities
  - *M. faveolata*
  - *A. cervicornis*

Thanks!

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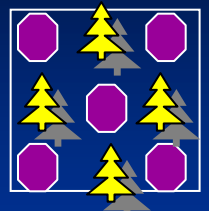
- NURC/UNCW Aquarius Team
- Tony Emtiaz
- Tom Capo
- Amanda Bourque
- I. Berzins/D. Rothan
- D.Lirman/J.Herlan
- I.Baums, C.Woodley, M.Durako, S.Edge

- NOAA-Coral Reef Conservation Program
- Permits: FKNMS, BNP, FWCC, Pennekamp State Park, NMFS/SERO

P51-P55
Y51-Y54



I

Mixed
N=5

M.fav Expt (n=4)
KW cache
KL seawall
aquarium

Mix-III

W-II

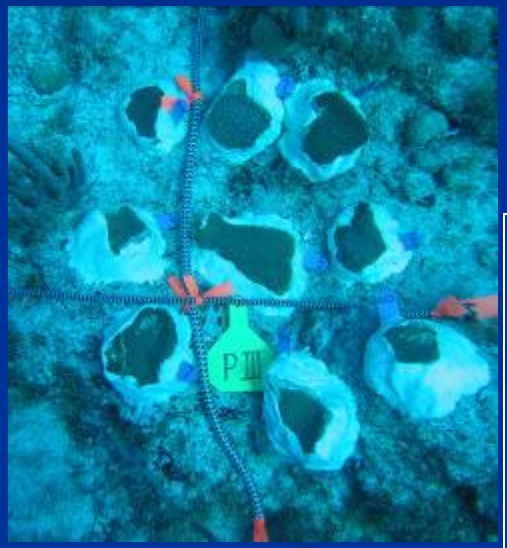
W10-W18

O-II

O60-O68

P-III

P1-P9



A.cerv Expt (n=3)
wild KL
wild BNP
field nursery
aquarium

W60-W68

W-II

G-II

G10-G18

Mix-II

O+G+Y32-35
W82-85

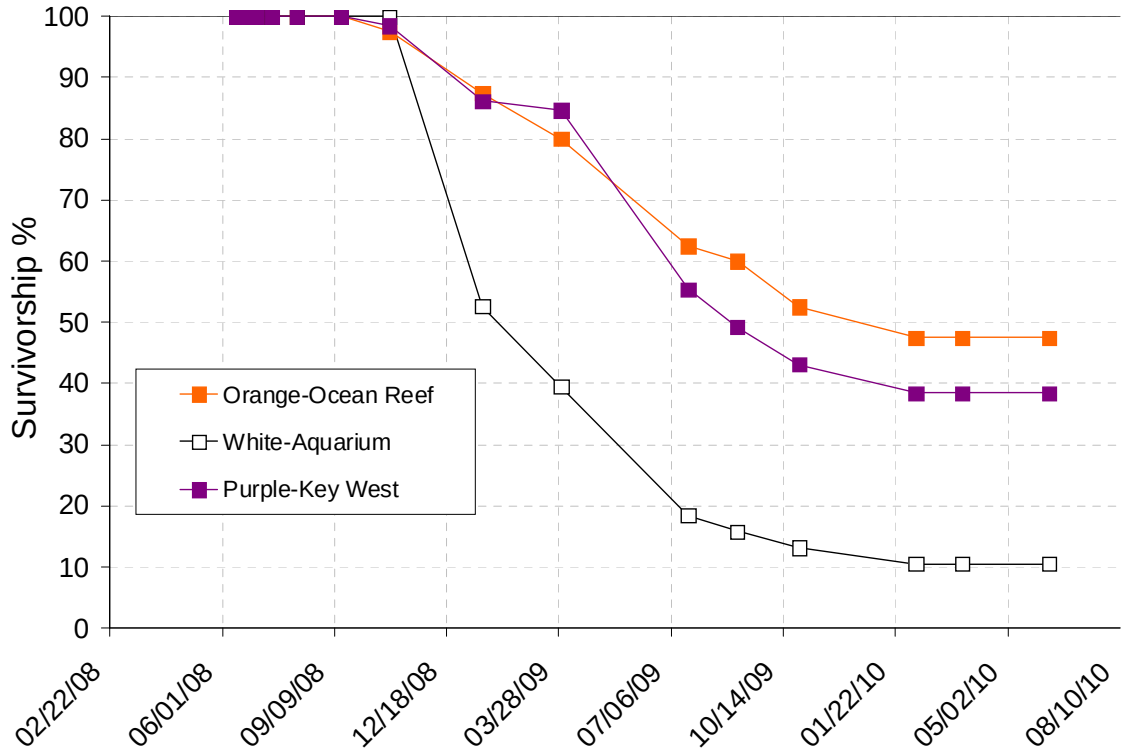
Y10-Y18

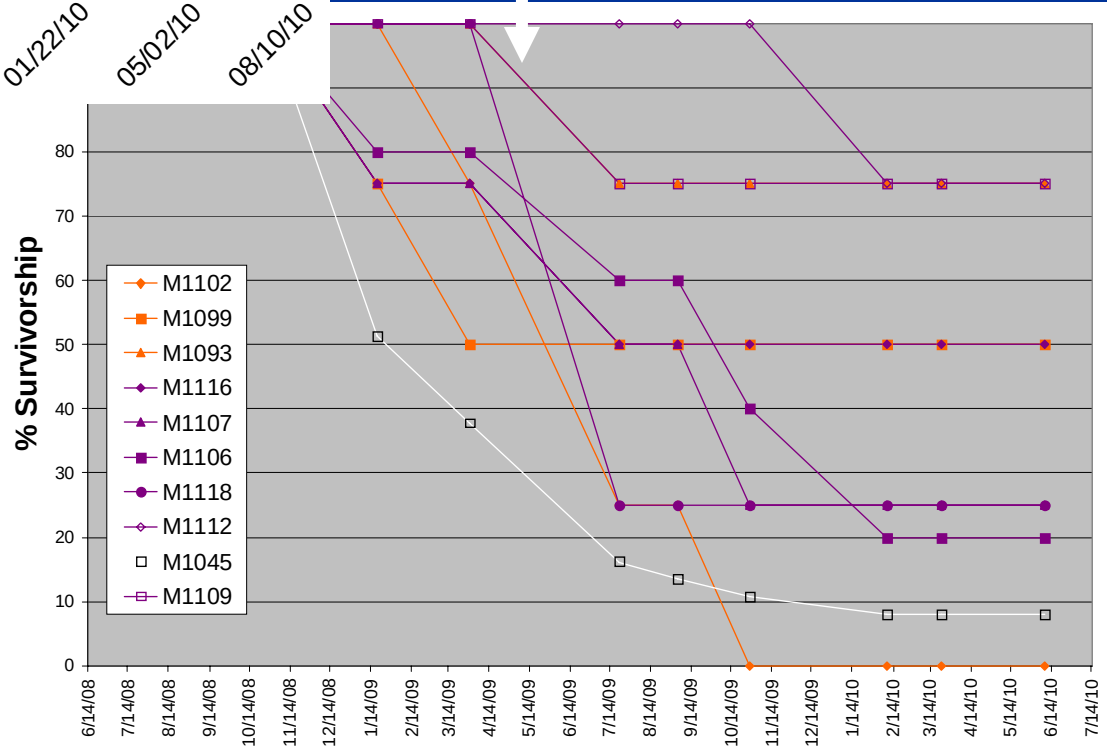
Y-II

O-II

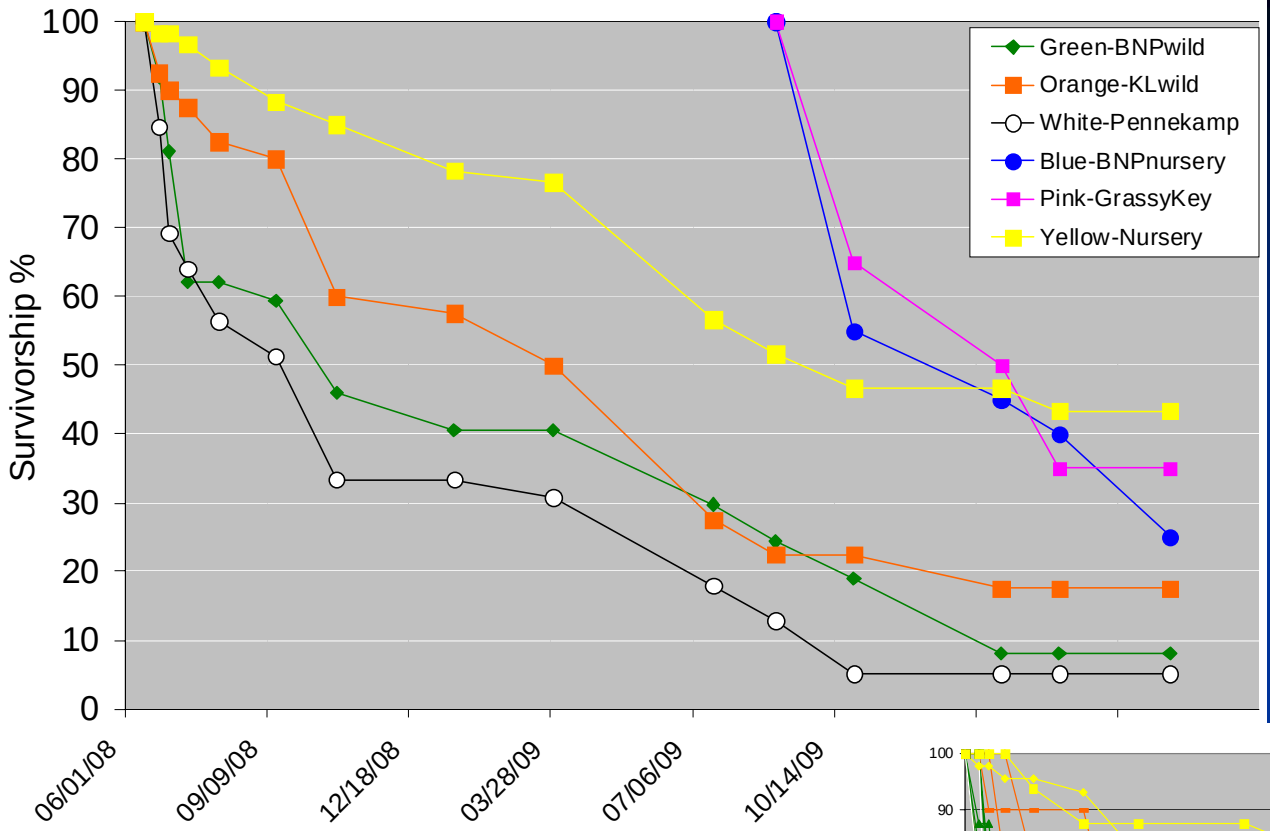
- 2008
  - Aquarius
  - Conch Shallow
- 2009
  - 2 more Ac sources
    - Aquarius
    - Molasses Deep

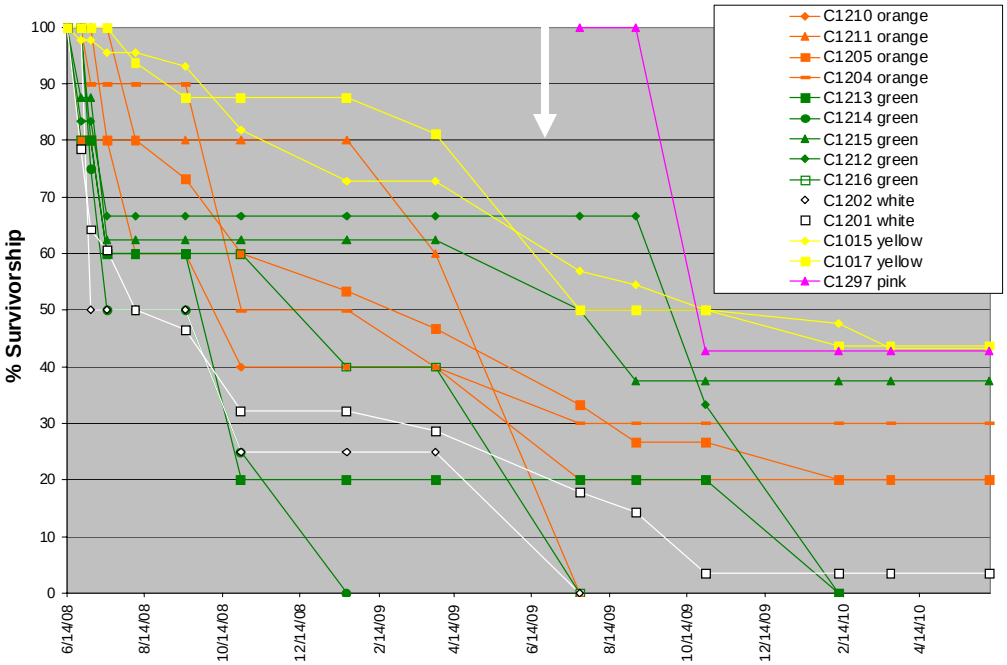
Aquarius site: *M.faveolata*



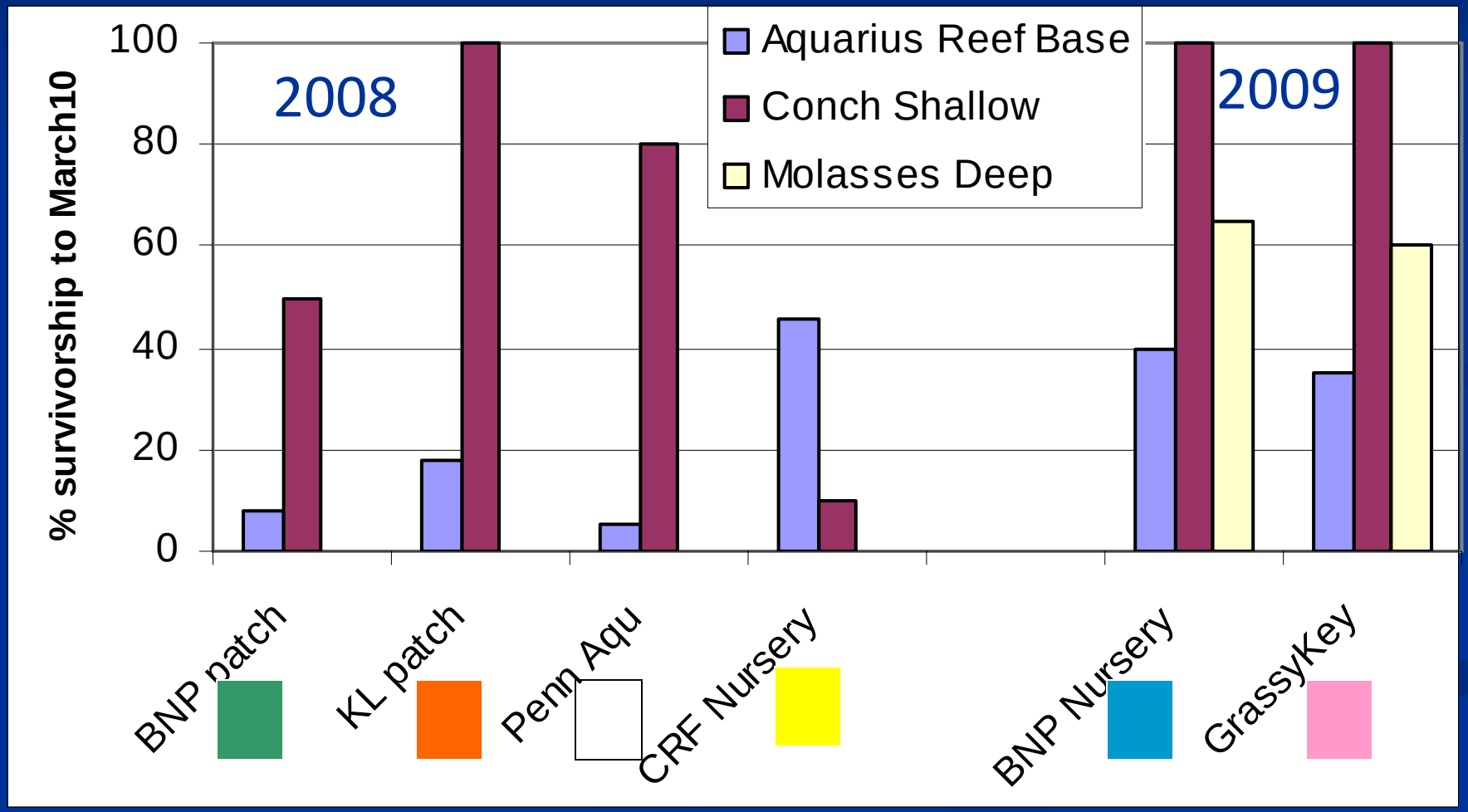


Aquarius Site: *A.cervicornis*



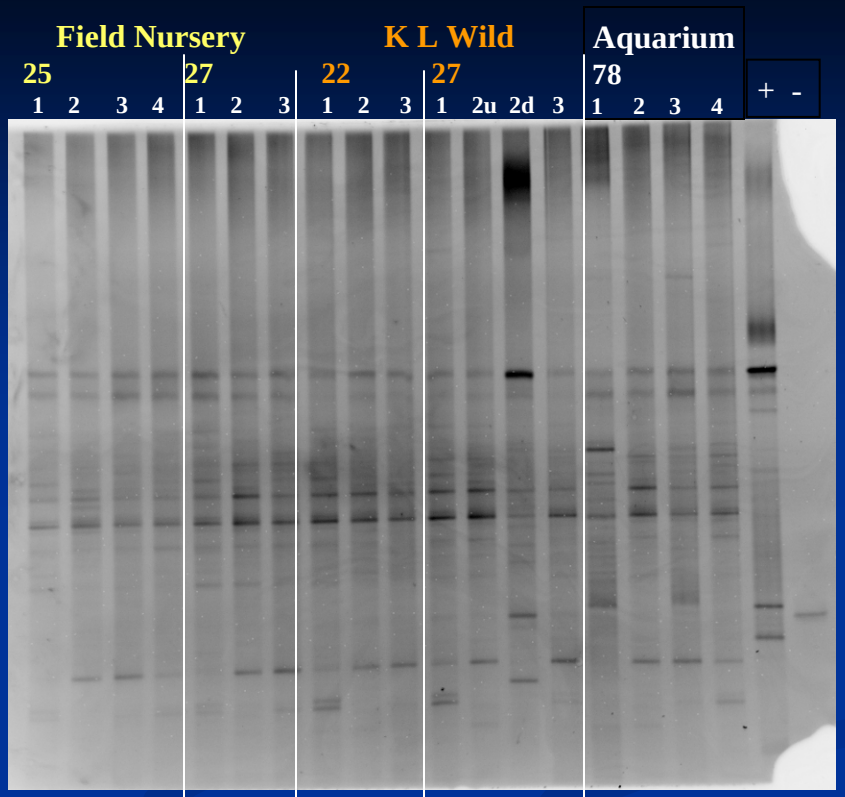


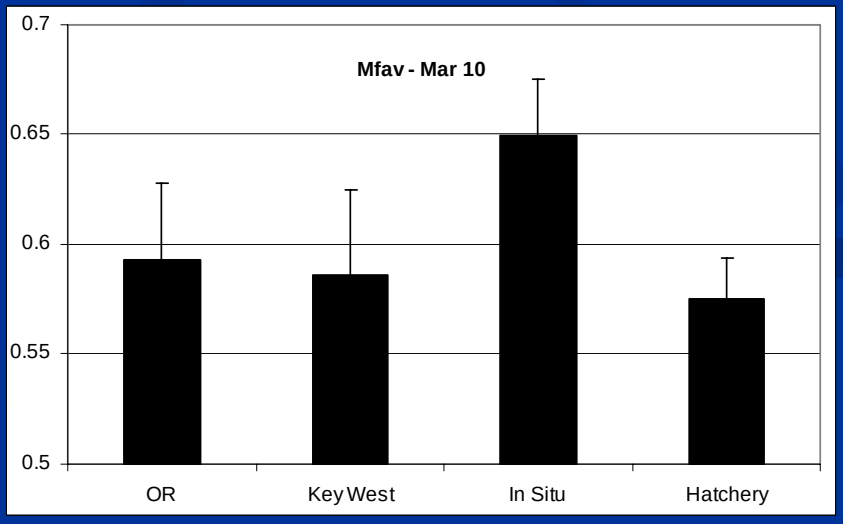
A.cervicornis

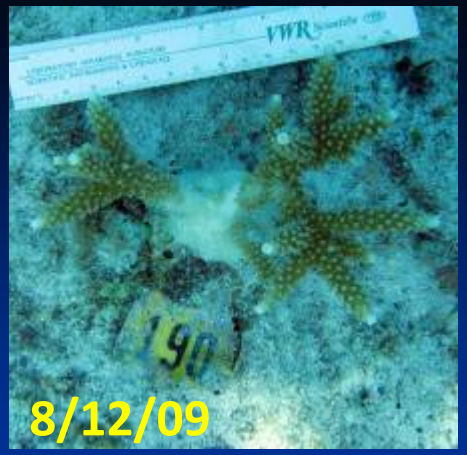


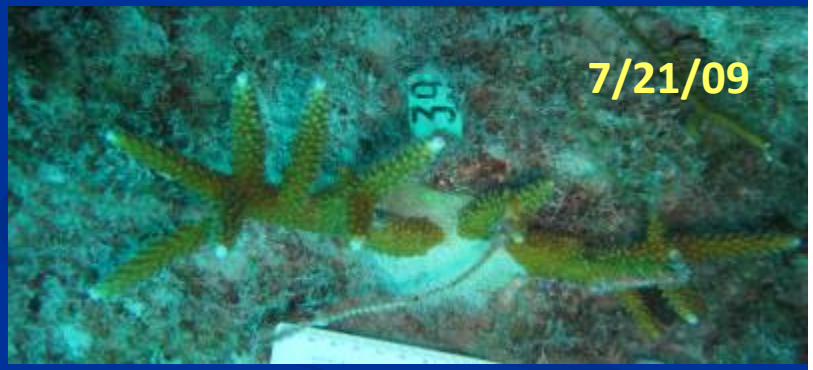
Summary

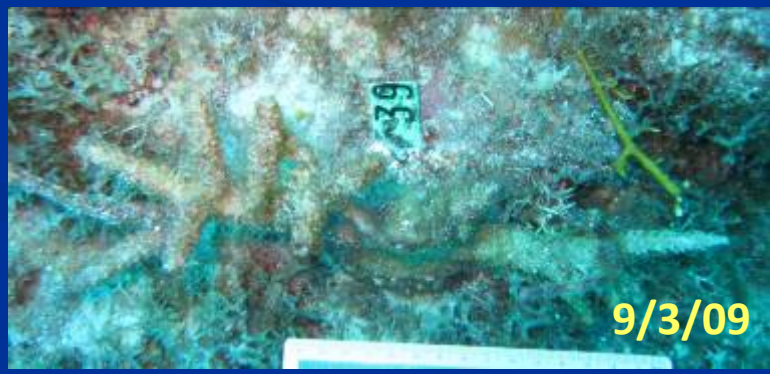
- No evidence that co-transplant with 'foreign' corals reduces survivorship;
- Initial surface microbial differences in *A.cerv* appear to converge on scale of days
- Photosynthetic efficiency of *Mfav* transplants remains below that of in situ colonies for years.





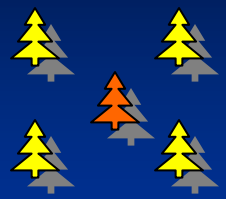




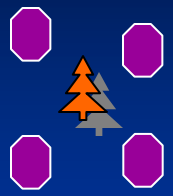


Corallivores and Disease

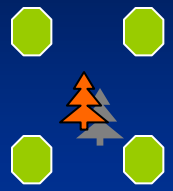
Transplant Design and Corallivore Dynamics



Conspecific

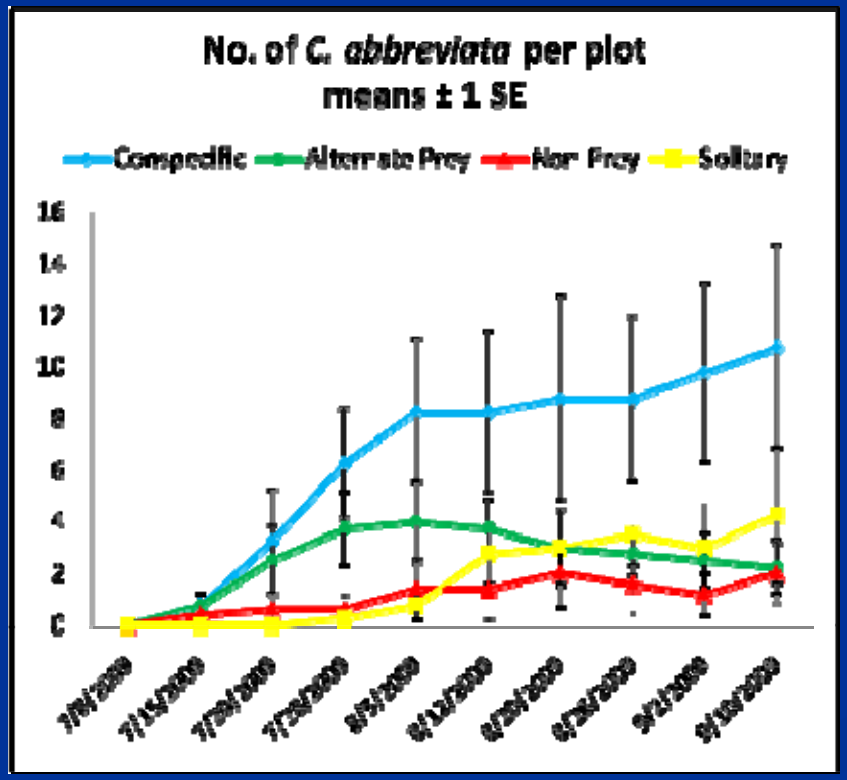


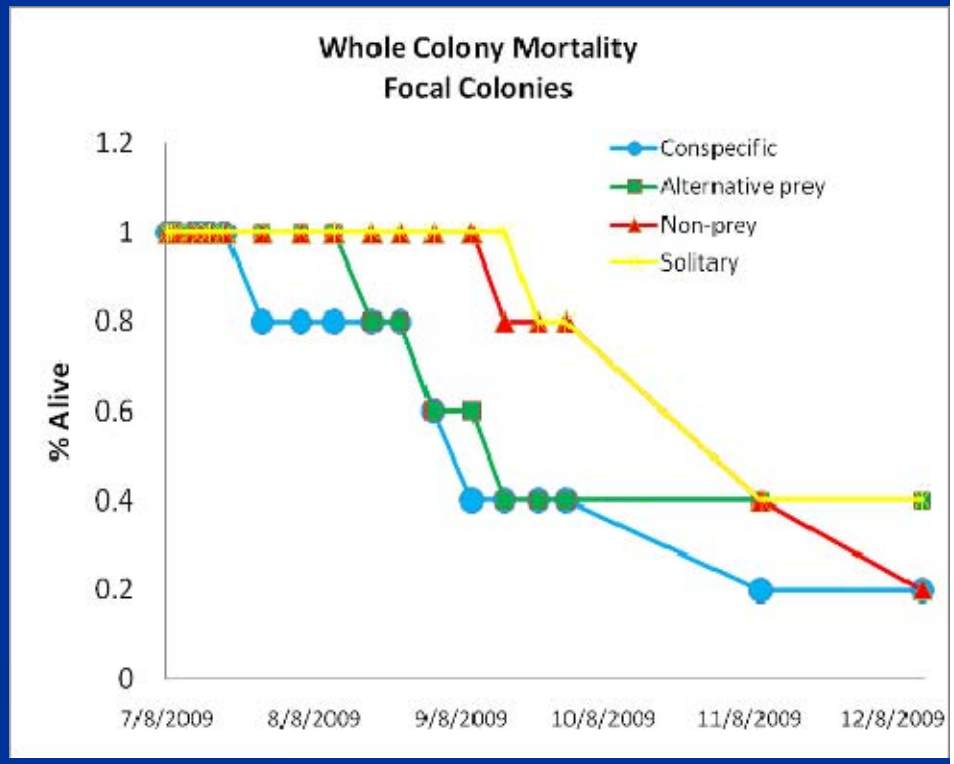
Alternate Prey



Non-prey

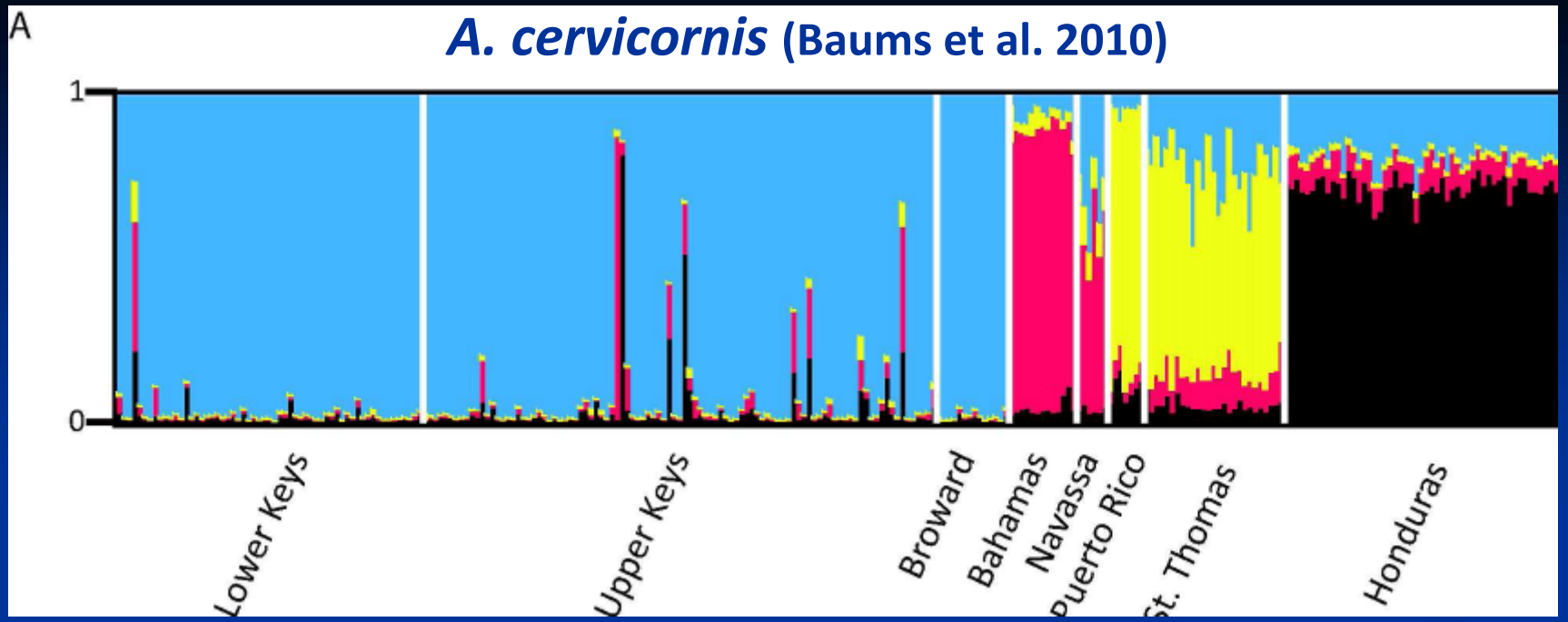
Solitary



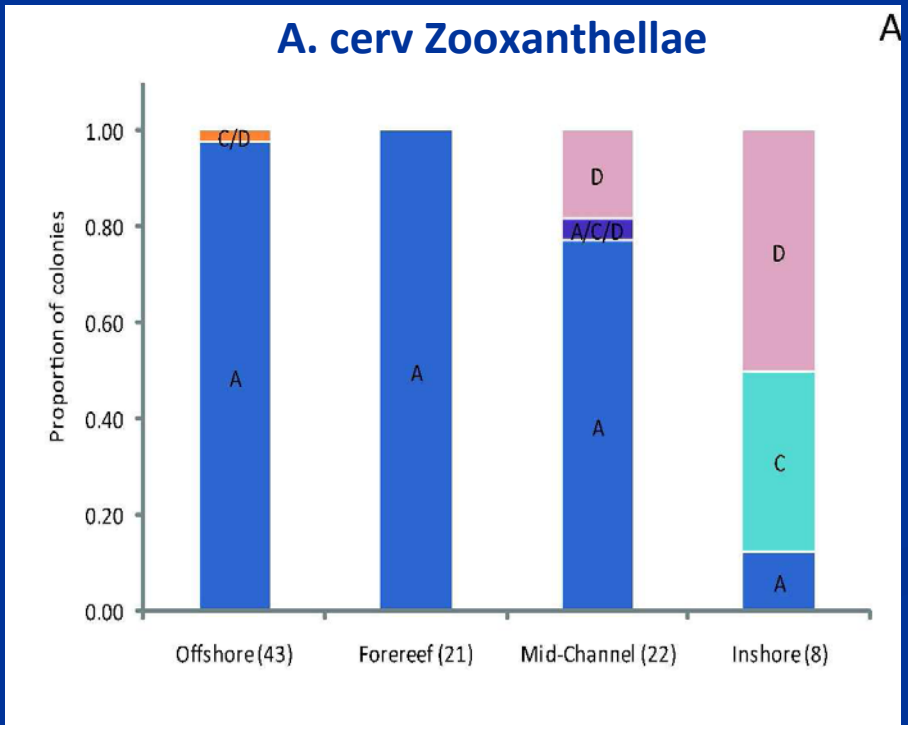


Johnston et al.(in prep)

A. cervicornis (Baums et al. 2010)



A. cerv Zooxanthellae



- Coral genetics does not indicate potential for outbreeding depression within Florida
- Habitat-specific zoox types may affect performance

Coral Restocking: Where, Whether, and How

- Genetic results suggest that transplanting throughout Florida poses **little genetic risk** (*A.cervicornis*, *A.palmata*, and *M.faveolata*)
- Overall, survivorship of different sourced transplants is highly **site dependent**
- Snail **predation** and **disease** syndromes remain **primary threats** to transplant survivorship
  - Predation impact in high snail densities may be ameliorated by lower density of transplants (< 1 m^{-2})
  - Predator control and some means to control disease impacts remain crucial needs for proactive recovery