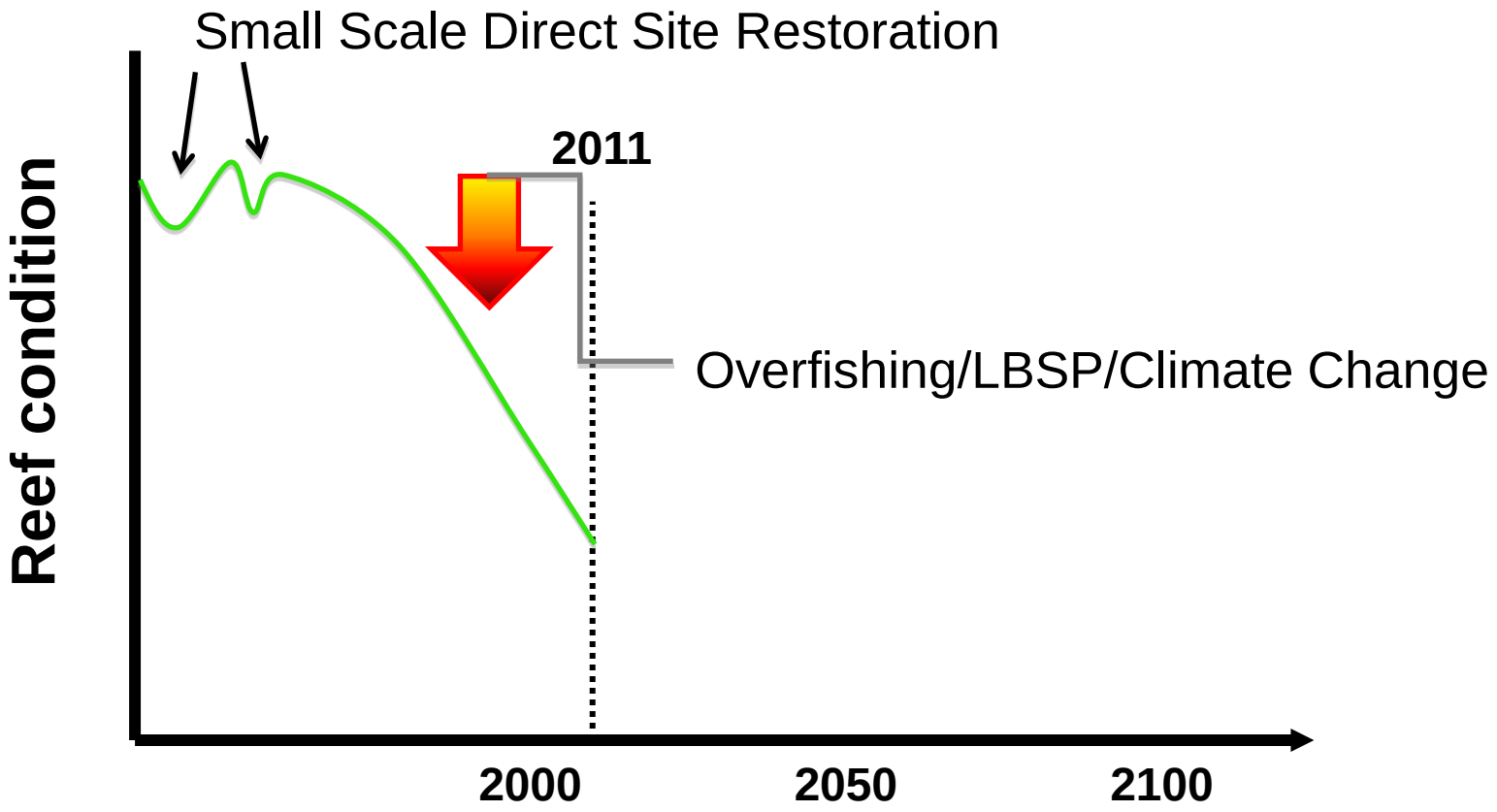
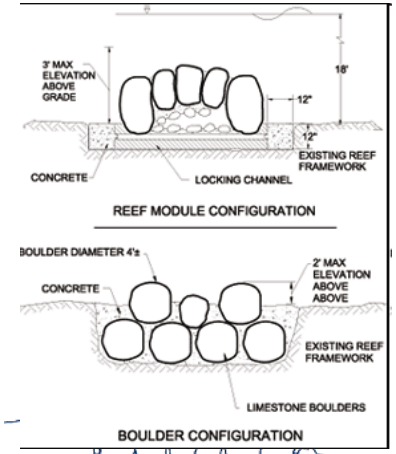
INTEGRATING RESTORATION INTO CORAL REEF MANAGEMENT

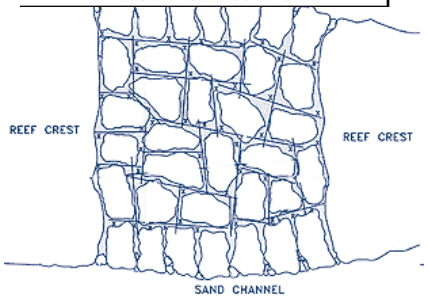
Where we were, where we are and where we are heading…

State of the Reef System



Engineering Solutions: “Build it and they will come approach…”

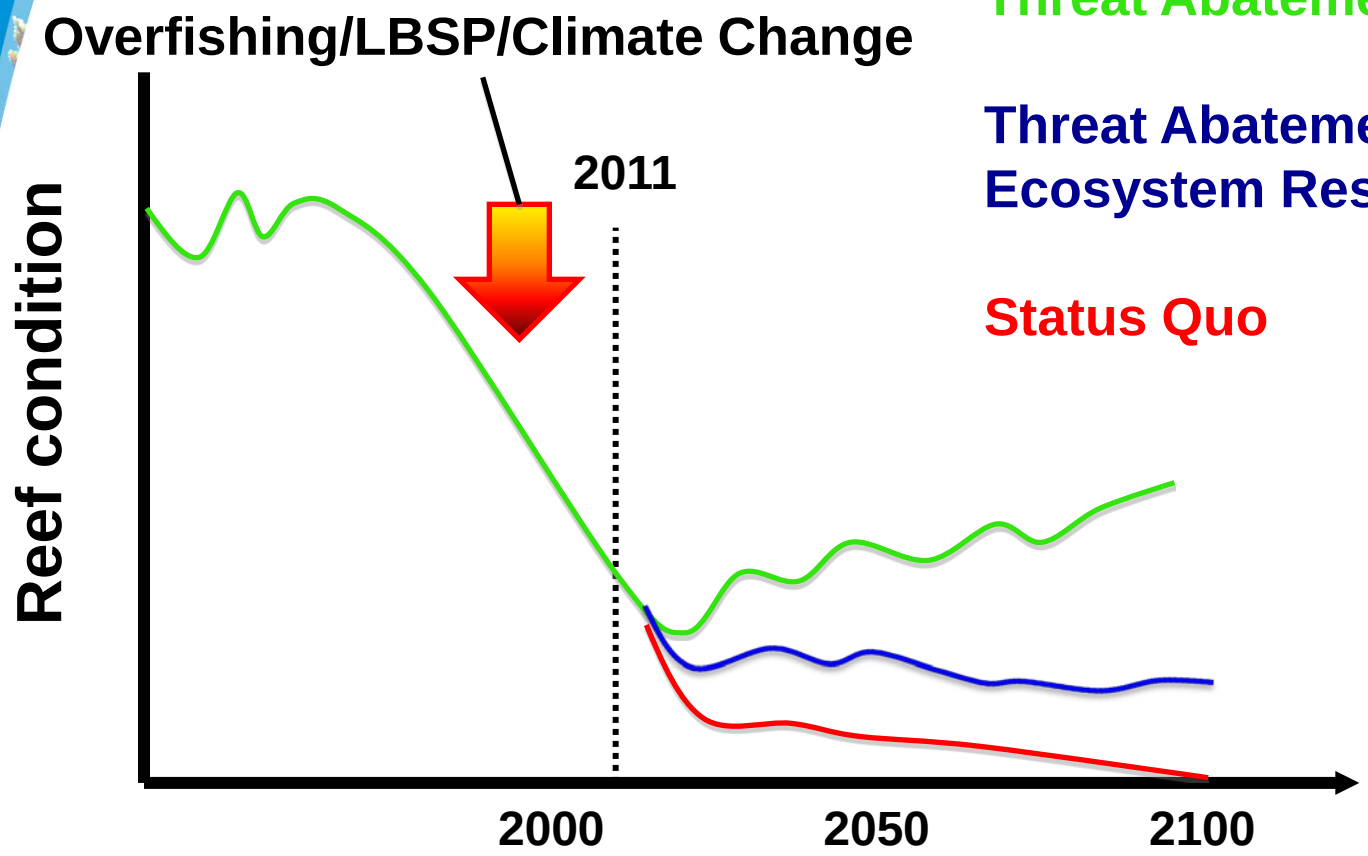




REEFS AT RISK IN THE ATLANTIC/CARIBBEAN

Source: World Resources Institute, *Reefs at Risk Revisited*, 2011.

State of the Reef System



Ecosystem Restoration + Threat Abatement

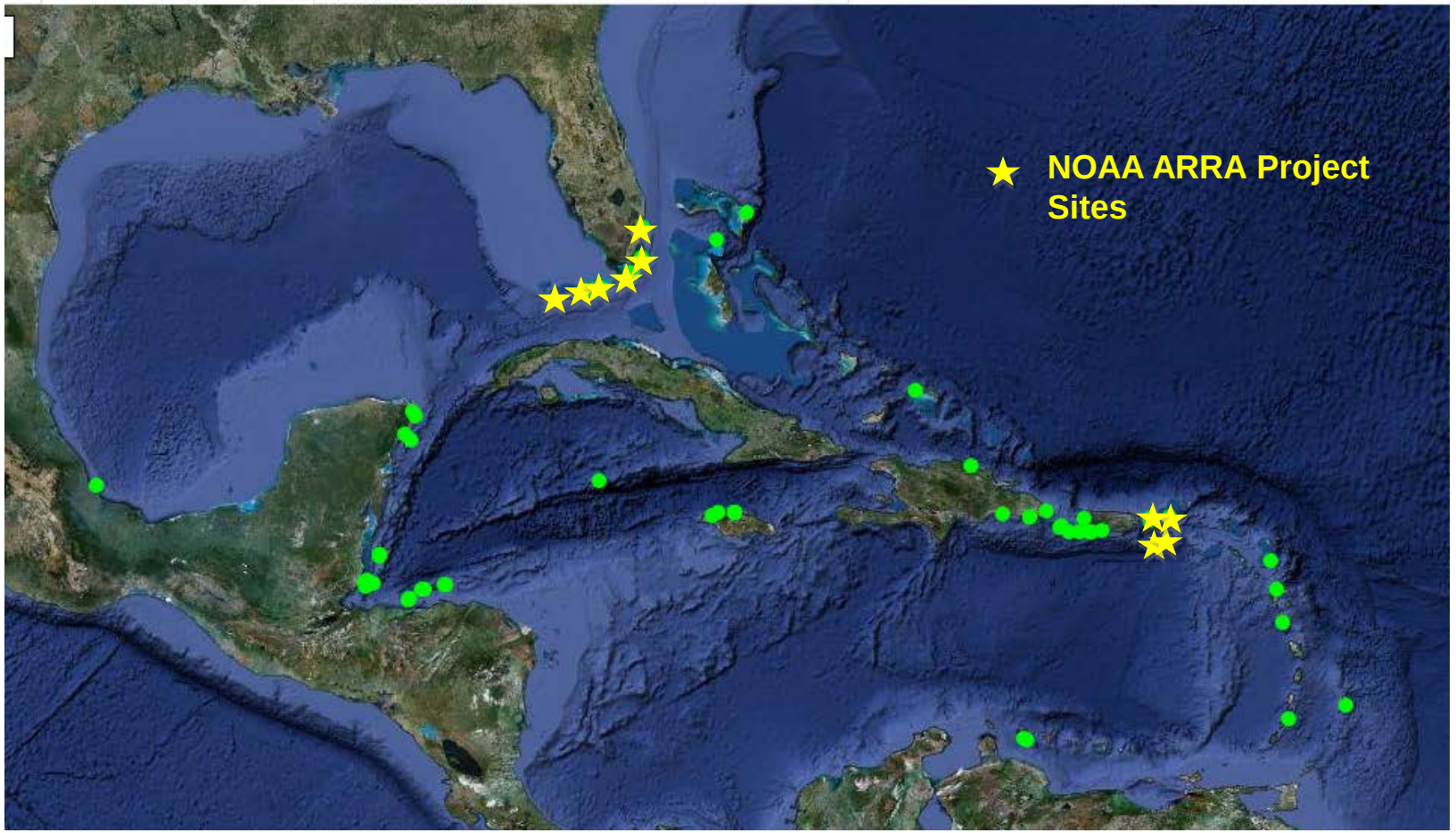
Threat Abatement or Ecosystem Restoration

Status Quo

Ecological Restoration

- Now we have broadened our definition of restoration beyond just restoring physical impacts
- Integrating effective ecological restoration methods
  - Threat Reduction:
    - Broward Anchorage*
    - MPA
    - Watershed Restoration
  - Species & Population Enhancement
    - Corals
    - Diadema
    - Fish
  - Restoration of Associated Habitats
    - Seagrass
    - Mangroves

Caribbean Acropora Restoration Database

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Active Species and Population Enhancement

1) FRAGMENT COLLECTION

5) RECOVERY

2) NURSERY GROW-OUT PHASE

4) REPRODUCTION

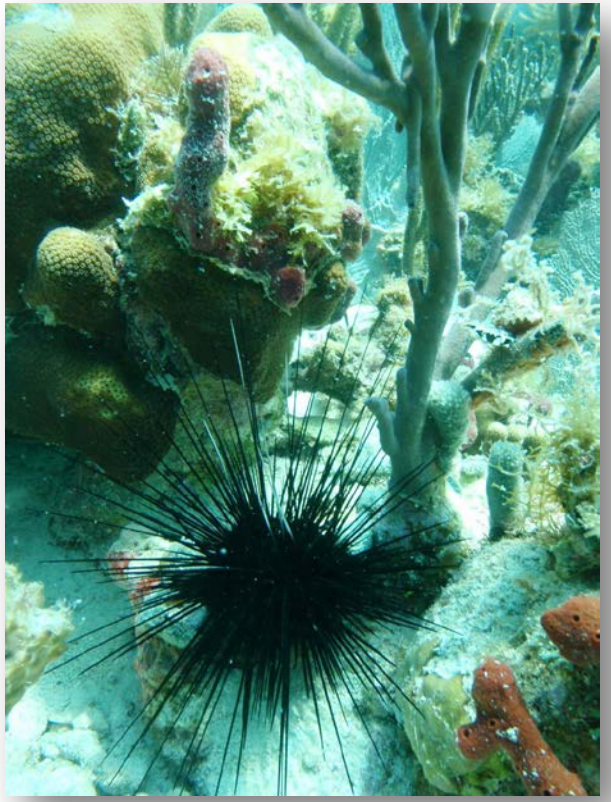
3) RESTORATION / OUTPLANTING

Long-Spined Urchin Restoration Project: Vision

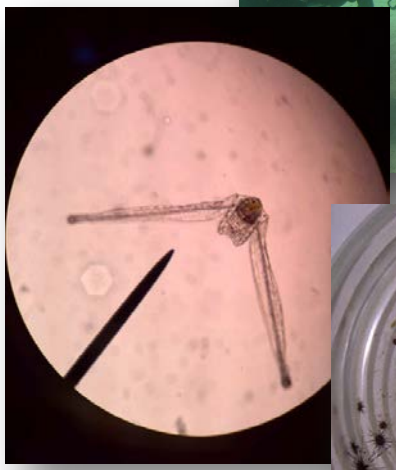
- **Holistic Reef Restoration…actively restore ecologically functional coral reefs via reintroduction of hatchery-raised *Diadema antillarum* and nursery propagated corals**

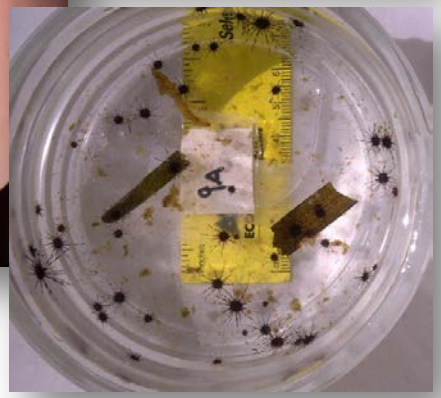
- **Why *D. antillarum*?**

  Keystone herbivore whose decline has been recognized as one of the reasons for the degradation of coral reefs



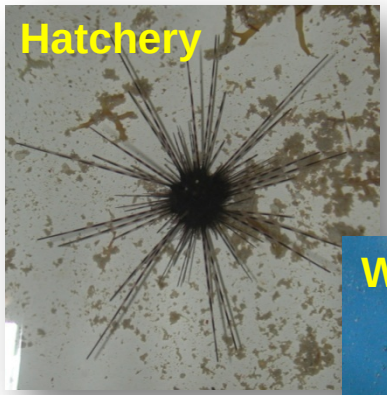
Long-Spined Urchin Restoration Project: Status





Hatchery

- successful spawning on demand
- successful larval culture
- metamorphosis and juvenile grow-out remain a challenge



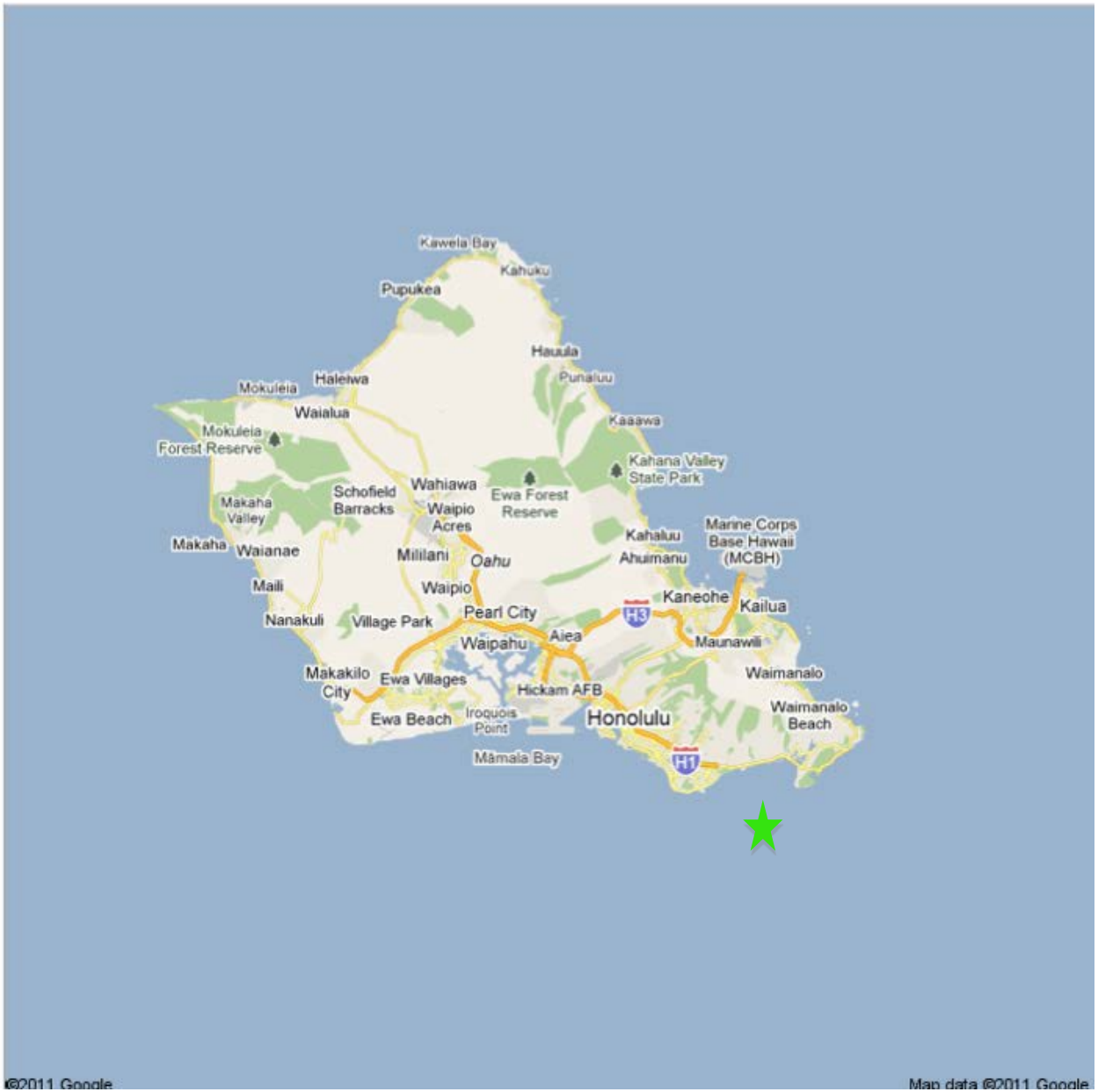
Laboratory Studies

- Comparing behavioral and ecological characteristics of hatchery-raised and wild juveniles
  - morphological differences
  - differences in sheltering behavior

Long-Spined Urchin Restoration Project: Plans

- **Mitigate hatchery-raised morphological and behavioral differences**
- **Experimental releases of *D. antillarum* to determine best release size, season, density**
- **Are urchins shelter limited?**
  - **Test artificial urchin shelters as a recruitment device**

Reef Flat Restoration: Invasive Algae Removal




October 2009


May 2010


July 2010


October 2010


January 2011


May 2011

Where to go from here with the help of the USCRTF:

- State of Coral Reefs necessitate active restoration to enable Coral Reefs to recovery in conjunction with threat abatement.
- Active Restoration:
  - Utilization of this tool for compensatory mitigation
  - Population Recovery
  - Programmatic Support for Continued Coral Restoration Projects