What’s so special about pine rocklands?

• Globally endangered ecosystem
• Habitat for several species listed or under review for listing
What makes a pine rockland?

- Limestone substrate
- South Florida slash pine (*Pinus elliottii* var. *densa*) canopy
- Diverse, tropical understory
  - Palms
  - Hardwood shrubs
  - Herb layer
Limestone
South Florida slash pine
Palms
Hardwood shrubs
Herbs
Fire

• Pine rockland requires periodic fire
• Succession to hardwood hammock in absence of fire
• Pine litter dominant fuel component
Where are pine rocklands?

• Lower Florida Keys (<1000 ha total)
  – Big Pine
  – No Name
  – Cudjoe
  – Little Pine
  – Sugarloaf

• Miami Rock Ridge (<1000 ha outside ENP, 8000 ha in ENP)

• Grand total <10,000 ha
Where are pine rocklands?

• Similar forests in the Bahamas
  – *Pinus caribaea* var. *bahamensis*
Lower Keys pine rocklands

• Major upland ecosystem on larger keys
  – No “upslope” ecosystem
• Lower productivity than mainland version
• Habitat for protected species
  – Key deer
  – Plants
  – Butterflies
Candidate plant species
Butterflies and Croton

Photo David L. Lysinger
Threats to pine rocklands

- Development
- Improper fire regime
- Exotic species
- Sea level rise
SLR impacts on pine rockland

• Taylor Alexander (1976)
  – Pine stumps in mangroves on Key Largo

• Ross, O’Brien, and Sternberg (1994)
  – Shrinking pineland on Sugarloaf Key
  – <15 cm SLR resulted in loss of 35% of pineland
    46 ha in 1935
    30 ha in 1991
Hurricane Wilma

- October 2005
- Storm surge 1.8-2.4 m
Ross, O’Brien, Ford, Zhang, and Morkill (2009)

- Sugarloaf Key north of road
- Sugarloaf Key south of road
- Big Pine Key
Management interventions

• Identify core areas of “best” pine rocklands
Management interventions

- Maintain/enhance core areas
  - Prescribed fire
  - Eliminate hydrologic barriers/conveyances
  - Translocation of rare species from marginal habitat
Where to go?

- Florida mainland
  - Pine rocklands are also low elevation although less prone to storm surge
  - There exist no suitable limestone outcroppings at higher elevations in Florida
- As an ecosystem, seems unlikely to persist in US
  - Ex situ collections of individual species
- Bahamas have vast amount of pine rocklands of very similar structure and substrate
Bahamas “pineyards”

• Four islands
  – Andros >100,000 ha
  – Abaco >50,000 ha
  – Grand Bahama >20,000 ha
  – New Providence > 2000 ha
Summary

- Keys pine rockland is a rare ecosystem
- It appears doomed by SLR
- Component species can be rescued
- Pine rockland ecosystem should survive in the Bahamas