The Changing Role of Fire in Coastal Wildlife Management

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Consequences of Rising Sea Level

- Inundation
- Property loss
- Infrastructure damage
- Saltwater intrusion
 - Ecological



Episodic Salinization

- Drought
- Storms
- Altered hydrology (ditches)
- Wildfire suppression

Future events more frequent and severe?





Hurricane Irene - NOAA



Forest to Marsh Transition

- Mature tree mortality
- Inhibited regeneration
- Shrubs and herbaceous species favored



Salinization + Fire

Facilitates transition from forest to marsh

- Overstory removal
- Regeneration limited
- Maintain open water



Conservation of Coastal Birds

Forest

- More extensive
- Vulnerable to forest decline •
- Few species of concern

Marsh

- Resilient to sea level rise?
- Depends on marsh migration
- Many species of concern





Our Objectives

- 1) Identify drivers of vegetation change
- 2) Investigate bird responses
 - Marsh bird use of migrated marsh
 - Document forest bird response to veg change
 - Scale up changes in forest bird communities
- 3) Identify where to facilitate marsh migration

The effects of salinization on rural coastal communities



College of Natural Resources









THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Documenting Vegetation Change

Replicated 2004 study (Poulter 2005)

- 98, 12-m circular plots
- 5 sites varying in salt exposure
- 21 plots per site
- 7 each in forest, transition, marsh
- Tree DBH, height, live/dead
- % Groundcover by species



Marsh Bird Habitat Use

- 10-min point counts
 - With playback
 - -90 locations
 - Shore to "forest"
 - Gradient of salinity
- Black Rail
 - Nocturnal surveys
 - Passive audio recorders
 - Subset of 40 points
 - Sunset to sunrise



Marsh Migration from Fire

Compare vegetation change at 2 forest sites

- Similar saltwater exposure
- Similar plant composition
- Different fire history

Swanquarter NWR

No Fire



Long Shoal River (ARNWR)

• 2 Wildfires (2011 and 2016)



2004-2016 Swanquarter NWR

No fire between 2004 and 2016

- Reduction of smaller diameter trees (limited Pine regen)
- Shrub proliferation
- Patchy cover of marsh grasses
- No marsh-specialist birds in "forest" community in 2016



2004-2016 Long Shoal River

- Fires removed residual canopy/snags
 - No regen
- Shrub cover reduced
 - Some re-sprouting
- "Forest" used by Virginia Rail



Fire Facilitated Marsh Migration

- 4 weeks following Whipping Creek Fire
- Dramatic response from herbaceous vegetation
- Regen next year?



Black Rail

- High Conservation Concern
 - Causes of decline unknown
- 1 detected, potentially more on recorders
 - Using sawgrass transition at forest edge
 - Supports other studies ("high marsh")
- Facilitating marsh migration could potentially benefit



Forest Bird Response to Change

- Breeding Bird Survey
 - 3-min point count
 - 100 points along 2 routes
 - Road based
 - Annually for 30 yrs
- Additional 100 points in 2015
 - Same protocol
 - <1m elevation</p>
 - Multiple surveys



Forest Birds in Transition

Transitioning forest supported diverse bird community

• Including species of conservation value

Cavity Nesters (snags)



Shrub-associated (shrubs)



Early Successional (herbaceous)



Eastern Meadowlark

Next Steps

- Quantify influence of vegetation drivers
 Relative role of fire
- Scale up bird responses spatially using LiDAR
- Predict future change in bird distribution
 Including future role of fire
- Inform forest/marsh management
 - Tradeoffs in ecosystem services
 - Landscape considerations

Facilitate or Mitigate Forest-to-Marsh Transition?

- Identify salinization vulnerability
- Facilitate change with fire in more vulnerable areas
- Resist change in less vulnerable forests





Importance of Landscape Context

- Topography
- Impediments to marsh migration
 - Highways
 - Private lands
- Proportion of forest:marsh
- APP offers flexibility
 - Fewer barriers



Questions

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