Coastal tidal freshwater forested wetlands: implications of saltwater intrusion on their future

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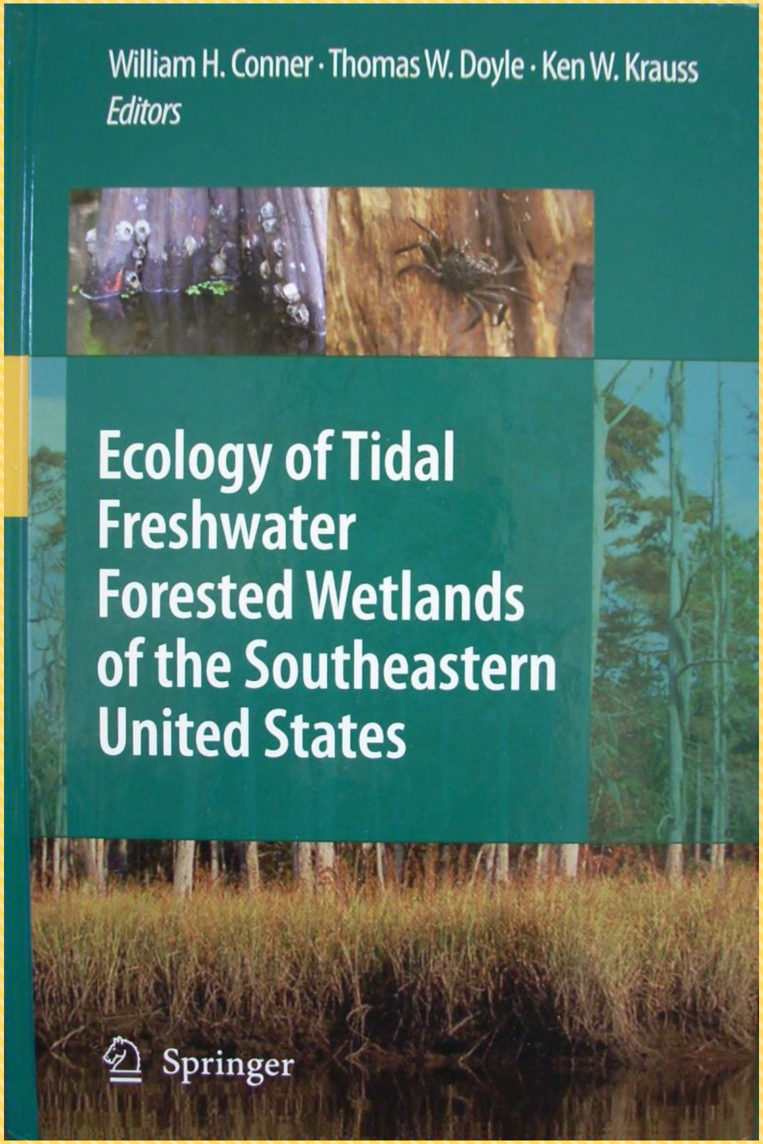
Tidal Freshwater Forested Wetlands

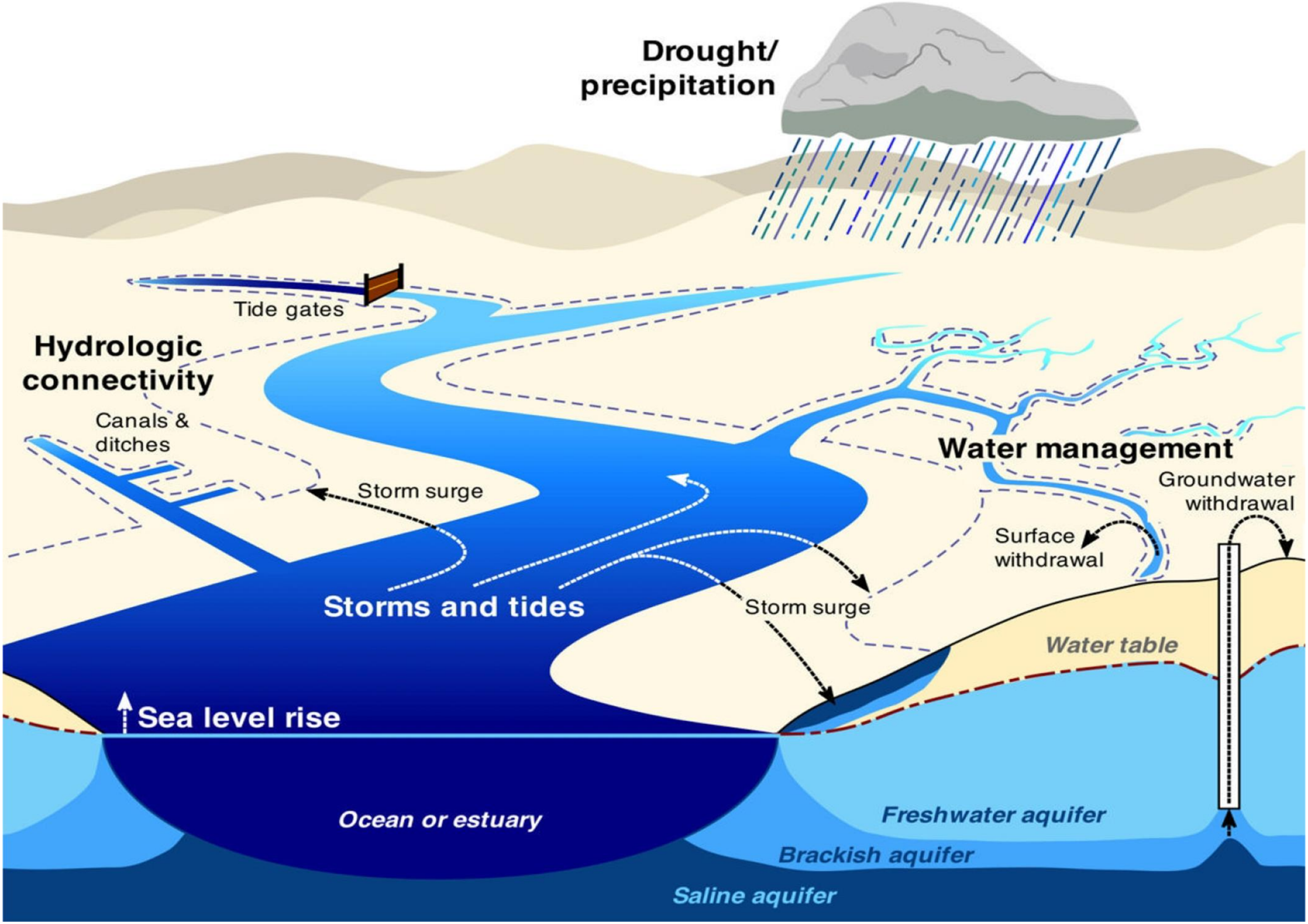
Past interest in TFFW

2005 Symposium at SWS

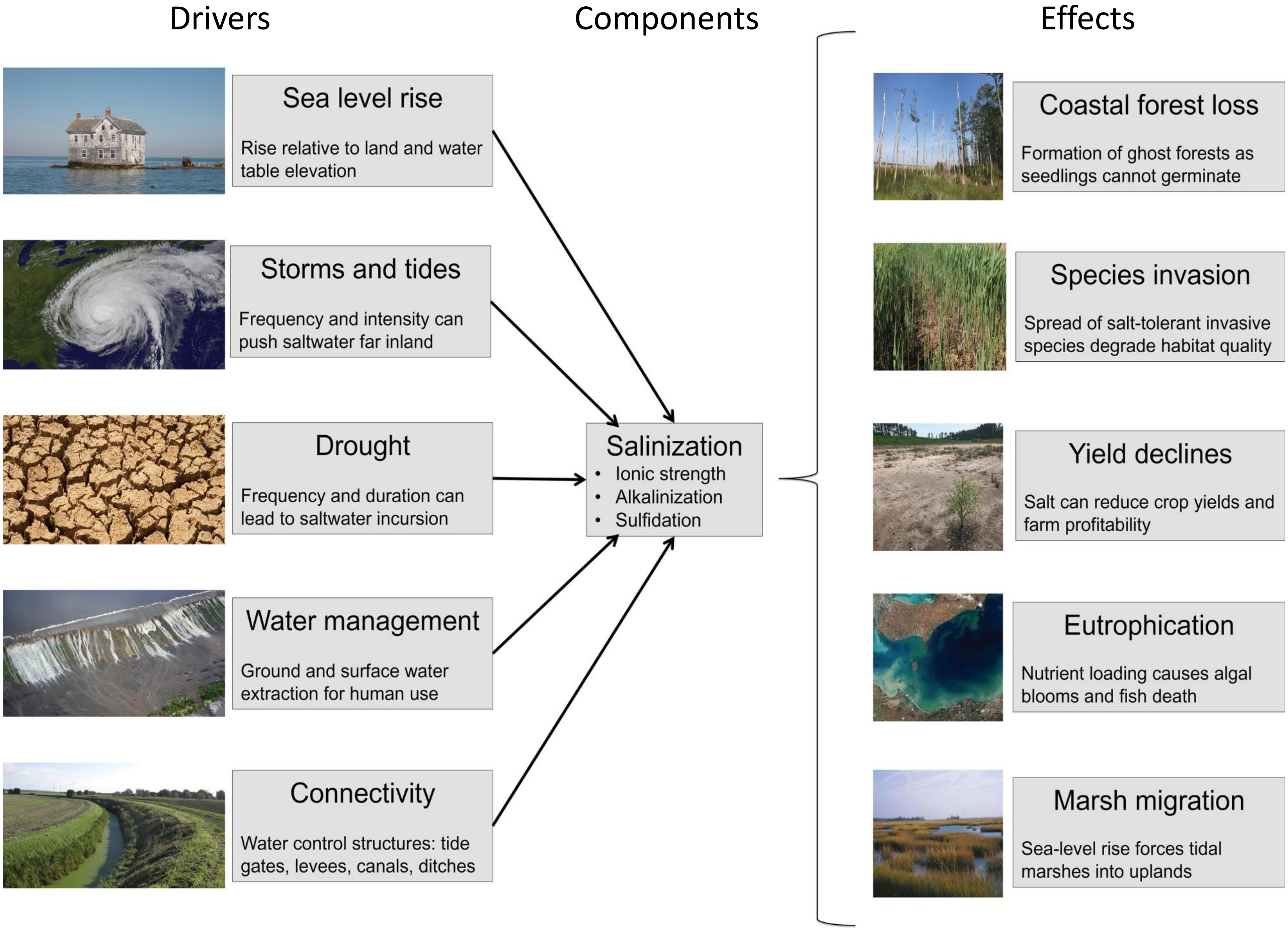
Current interest in TFFW

Google – 3,600,000 results





Tully et al. 2019. The Invisible Flood: The Chemistry, Ecology, and Social Implications of Coastal Saltwater Intrusion. BioScience 69(5): 368–378, https://doi.org/10.1093/biosci/biz027.



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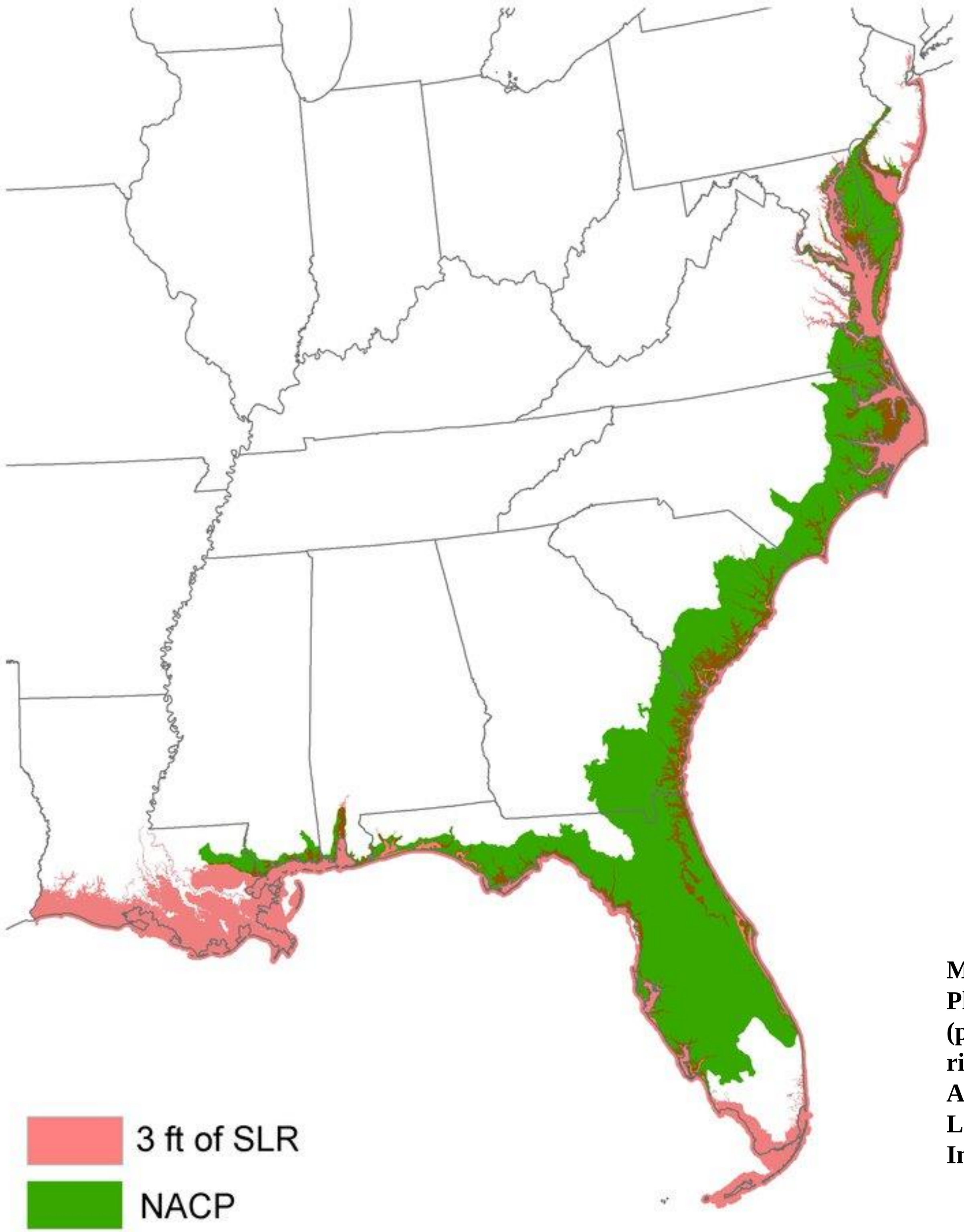


Map of the North American Coastal Plain (green) and potential inundation (pink) given 3 feet of sea-level rise. Photo: National Oceanic and Atmospheric Administration. 2017. Sea Level Rise and Coastal Flooding Impacts.

Bass River in New Jersey.
Credit: Ted Blanco/Climate Central

Robbins, MD – Matthew Kirwan

Catlett Islands in Gloucester County, VA
Matthew Kirwan

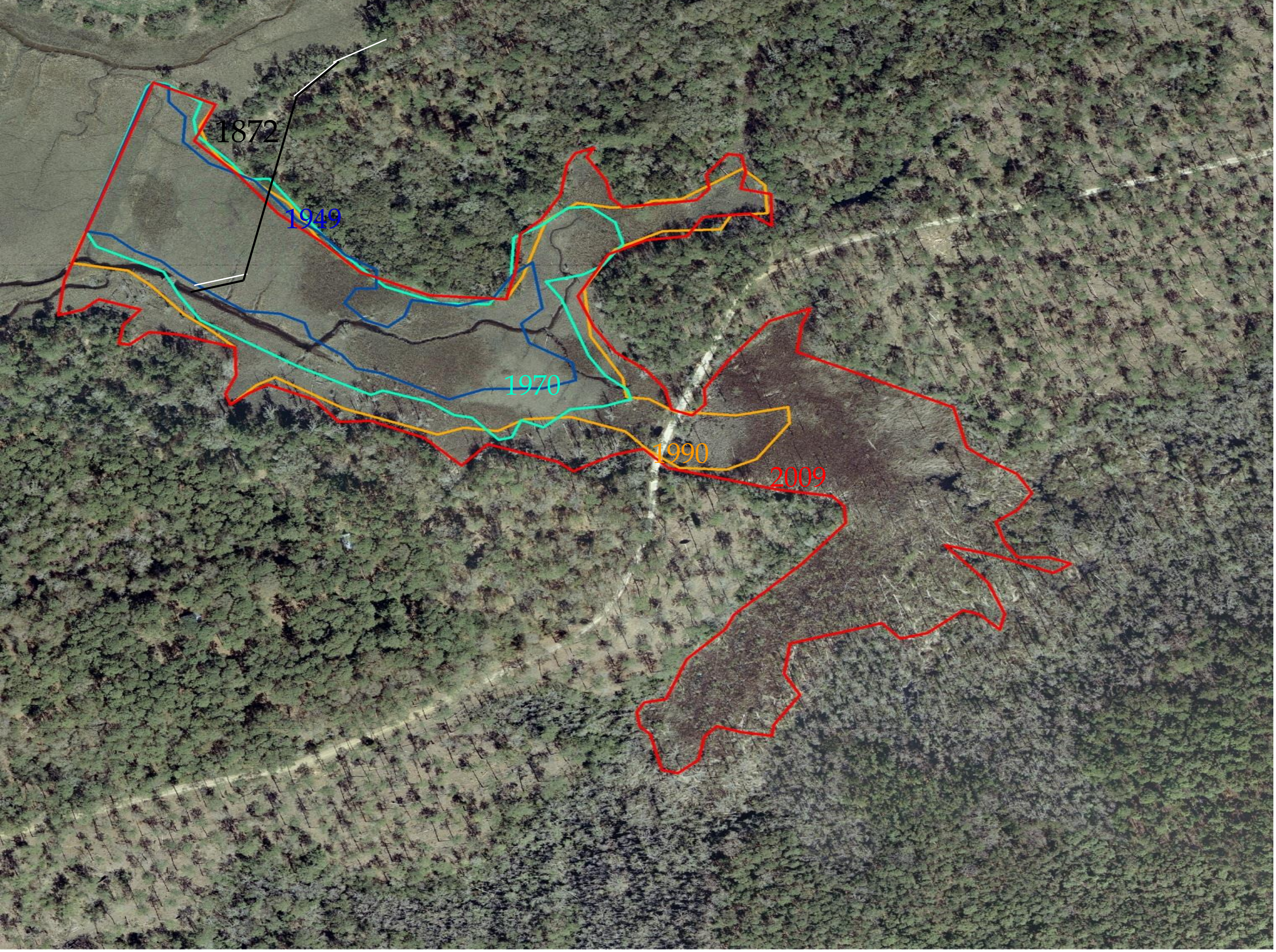
Northampton County, NC
Matthew Kirwan

Georgetown, SC
William Conner

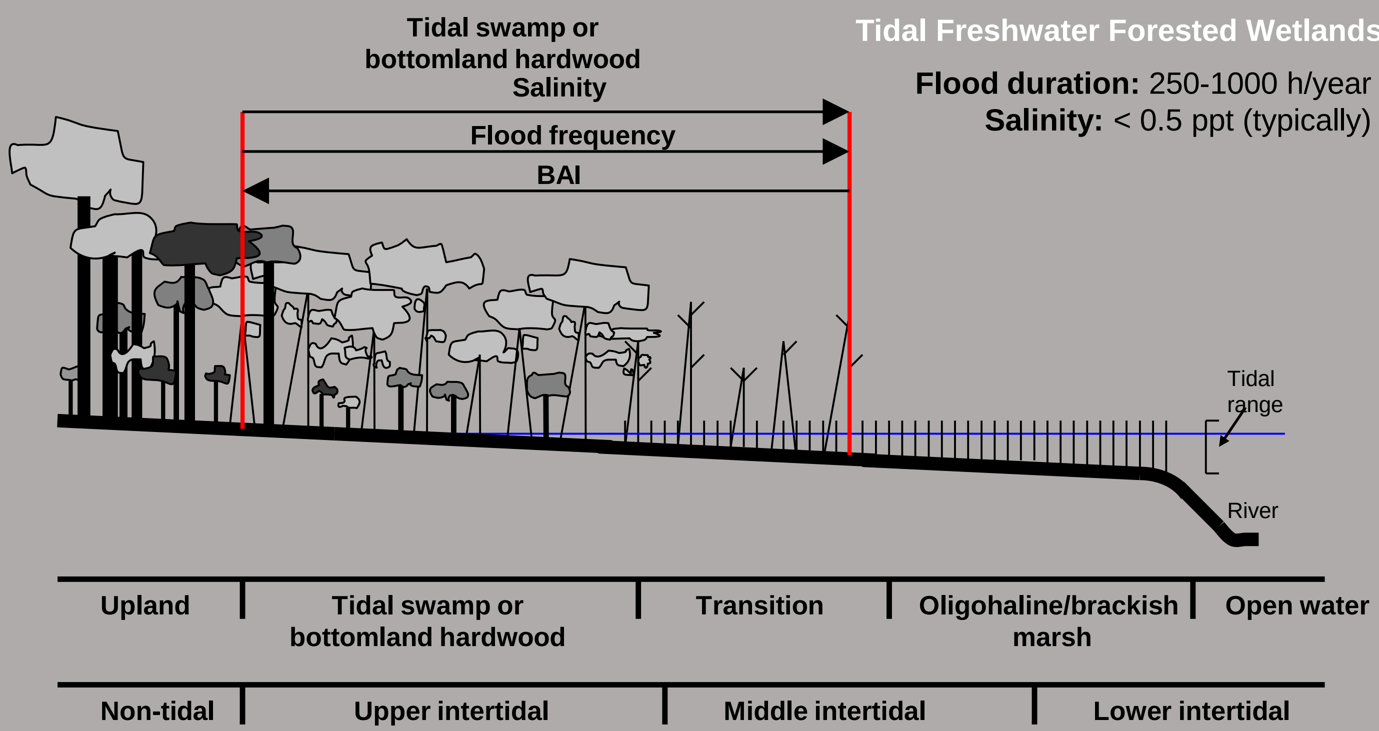
Savannah River, GA
Jamie Duberstein

Houma, LA
USGS

Withlacoochee Gulf Preserve
Amy Green


1872
1949
1970
1990
2009

Rising Sea Level and Saltwater Intrusion



Species	Flood tolerance[1]	Low-level+flooding[2]	Storm surge[3]
Baldcypress	Most tolerant	Tolerant	Moderately tolerant
Water tupelo	Most tolerant	Weakly tolerant	Moderately tolerant
Buttonbush	Most tolerant	Weakly tolerant	Moderately tolerant
Swamp tupelo	Most tolerant	Intolerant	Moderately tolerant
Chinese tallow	Tolerant	Intolerant	Moderately tolerant
Overcup oak	Tolerant	Intolerant	Intolerant
Green ash	Moderately tolerant	Weakly tolerant	Moderately tolerant
Nuttall oak	Moderately tolerant	Intolerant	Intolerant
Water oak	Weakly to moderately tolerant	Intolerant	Intolerant
Swamp chestnut oak	Weakly tolerant	Intolerant	Intolerant

[1]Based on rankings by McKnight et al. 1981 and Hook 1984, except for Chinese tallow
[2]Based on responses to flooding with 2 ppt water, such as may occur during early stages of saltwater intrusion
[3]Based on responses to simulated storm surge treatments during flooding, such as may occur as a result of hurricanes

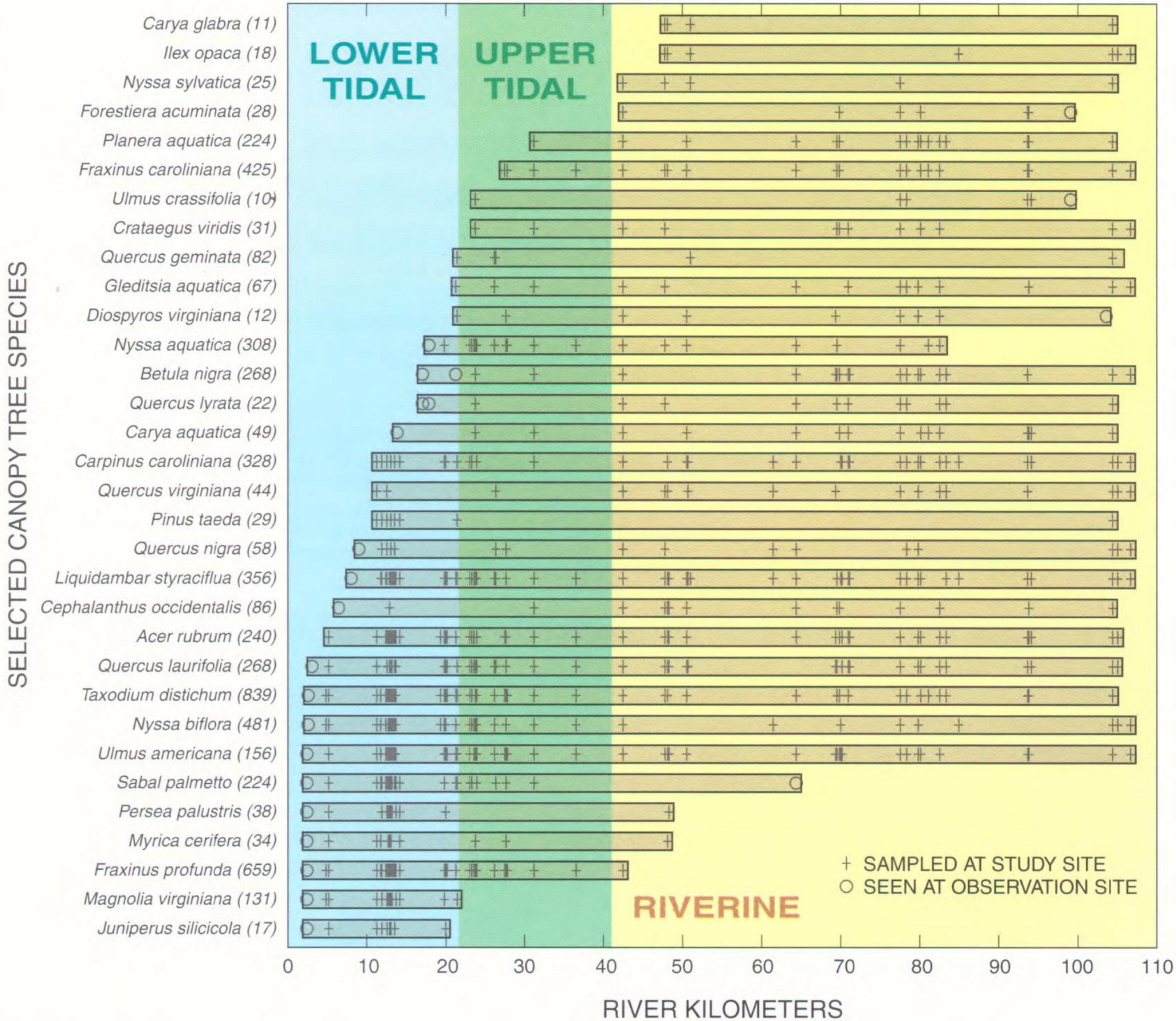
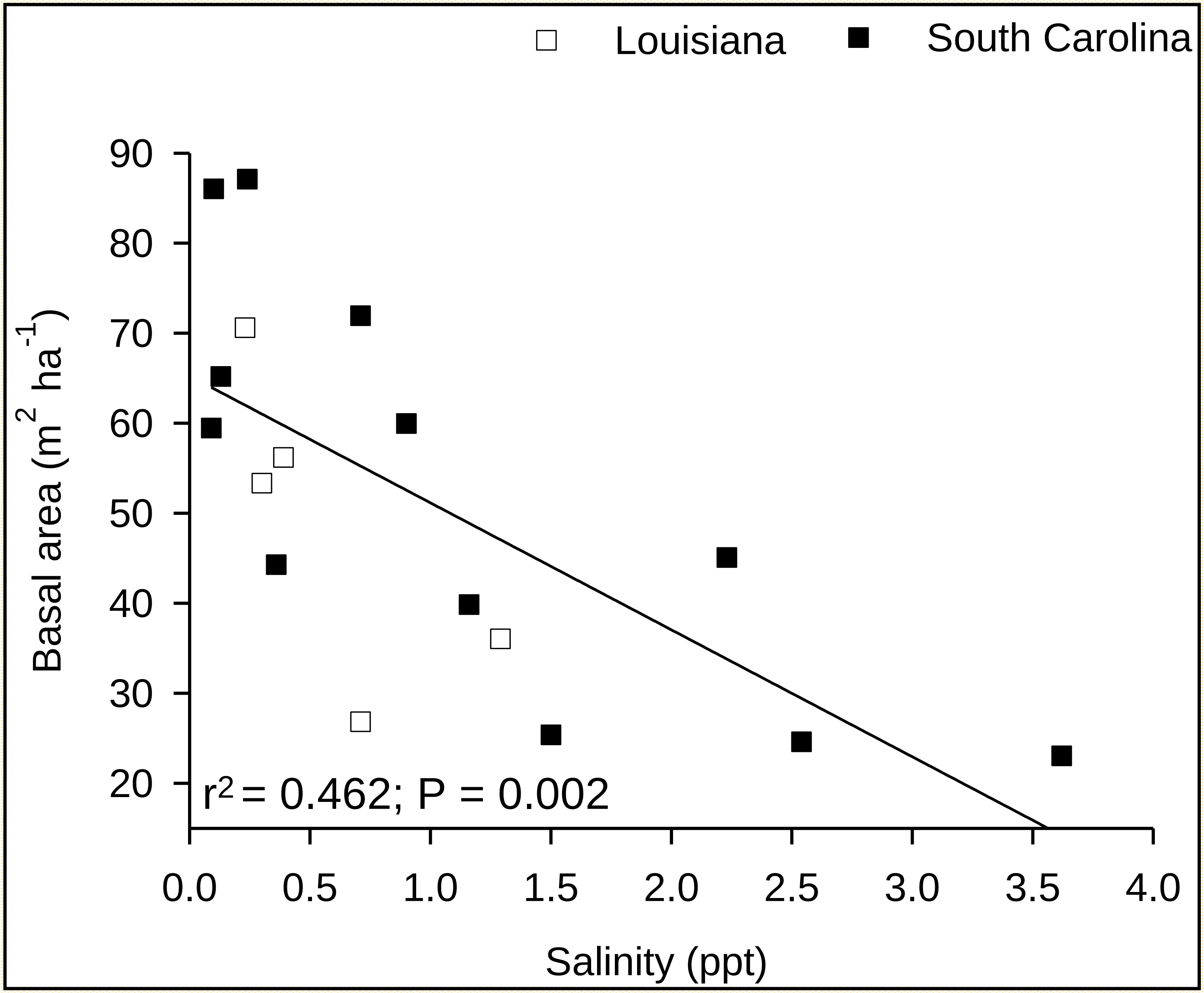


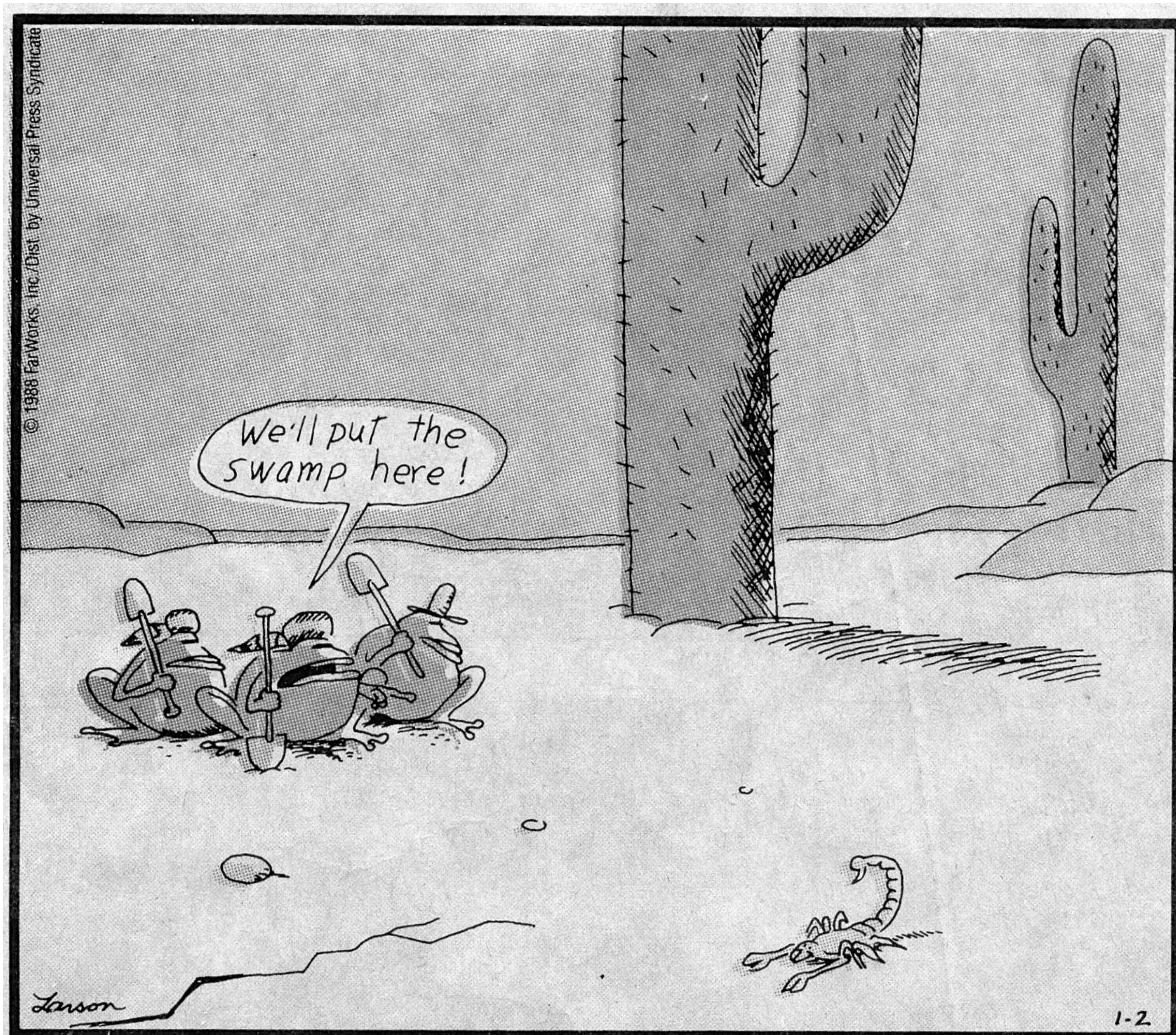
Figure 25. Distribution of selected canopy tree species in relation to distance from the mouth of the Suwannee River, Florida. Trees species sampled at study sites are indicated by +. Species seen at observation sites (indicated by o) are shown only when they result in a range extension. Total sample size is written in parenthesis after species name.



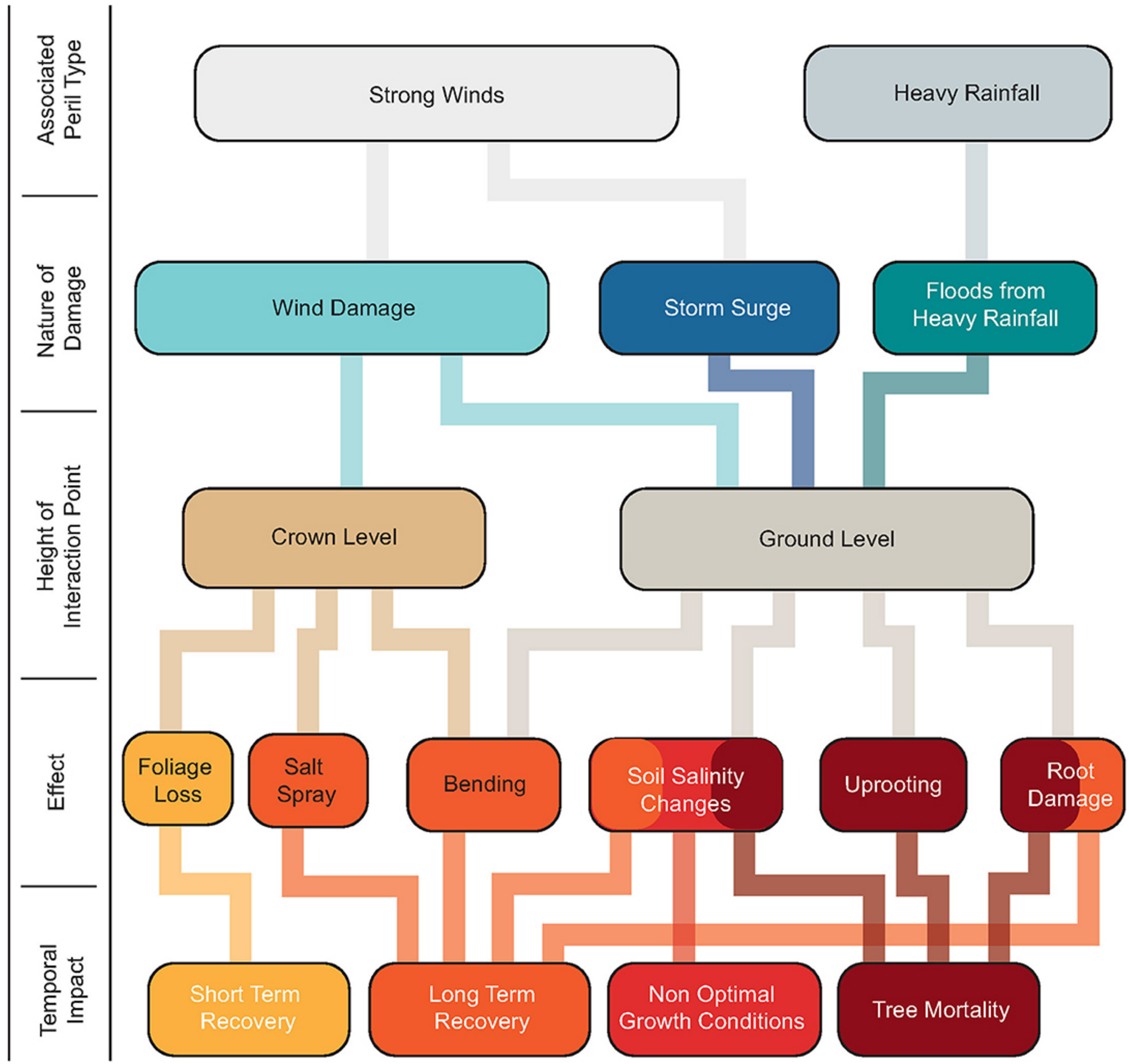
Louisiana
South Carolina
Basal area (m2 ha-1)
90
80
70
60
50
40
30
20
r2 = 0.462; P = 0.002
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Salinity (ppt)

Table 2. Summary of best practices for wetland management under climate change.

Authors	Best Practices
Burkett and Kusler (2000)	Increased protection/remove stresses
	Develop setbacks
	Sediment diversions
	Link fragmented wetlands and waterways
	Use water control structures to enhance particular functions
	Secure water resources for wetland conservation
	Wetland restoration
Erwin (2009)	Significantly reduce non-climate stressors
	Protect coastal wetlands and accommodate SLR (acquisition, setbacks, restoration)
	Monitoring, training, and education
	Incorporate climate oscillations
	Medium- and long-range planning: strategize conservation priorities
Koch et al. (2015)	Integrative & resilience-focused management
	Paradigm that considers coupling of connected terrestrial, freshwater, & marine ecosystems
	Develop comprehensive regional/local governance and planning frameworks
Wiens and Hobbs (2015)	Frame realistic and complementary goals
	Embrace uncertainty
	Enlist public support



Frog pioneers



Associated Peril Type
Nature of Damage
Height of Interaction Point
Effect
Temporal Impact
Strong Winds
Heavy Rainfall
Wind Damage
Storm Surge
Floods from Heavy Rainfall
Crown Level
Ground Level
Foliage Loss
Salt Spray
Bending
Soil Salinity Changes
Uprooting
Root Damage
Short Term Recovery
Long Term Recovery
Non Optimal Growth Conditions
Tree Mortality