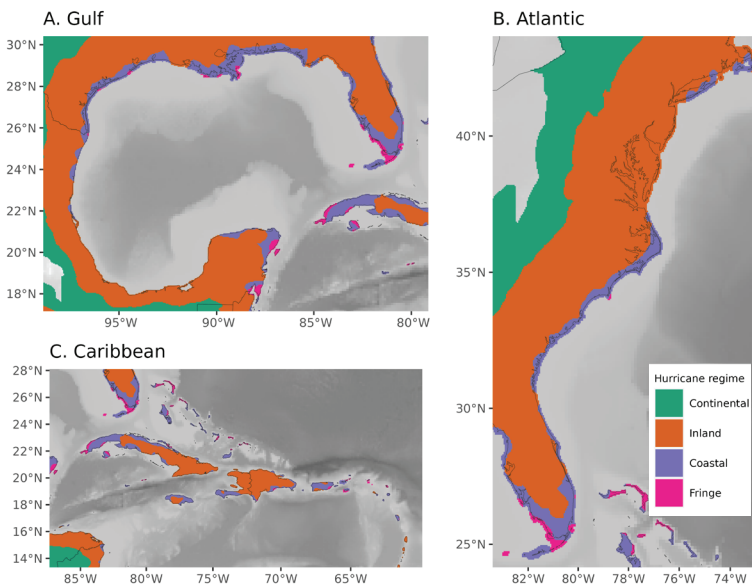


Hurricane Regimes Offer Ecological Insights to Forests of North America

Tropical cyclones routinely make landfall in the southeastern U.S. where they impact forests and cause vast ecological and economic effects. Tree mortality from a single extreme event can cause billions in lost income to owners of [timber stands](#) and [orchards](#). The footprint of large hurricanes can have a species-wide impact, as Hurricane Michael did in 2018 when it affected nearly [one-third of all remaining longleaf pine](#) forests in Florida. The widespread impacts to this ecosystem left complex challenges for managers wishing to continue prescribed burns that are critical to longleaf pine management.



Hurricane disturbance regimes identified for North America in order of increasing hurricane activity including Continental, Inland, Coastal, and Fringe Regimes.

While most research focuses on the catastrophic impacts of a small number of severe hurricanes, the chronic effects of lower intensity events are rarely considered. Understanding the frequency and pattern of hurricanes of all intensities is useful to understand their ecological impacts, and crucial for reducing economic risk. We used a 170-year record of hurricane events to model the wind field from nearly 900 historic hurricanes and delineate hurricane regimes for North America. We found four distinct categories of hurricane frequency and intensity across North America which we denote as Continental, Inland, Coastal, and Fringe, from least to most hurricane prone.

Defining forest hurricane regimes for North America leads to useful insights related to their ecology. For example, [mangrove forests](#) possess many wind-resistance traits including short

stature, buttressed roots, and flexible crowns. Other traits such as wood properties, trunk taper, and crown architecture may differ among species in ways that influence their disturbance resistance. Among southern pines, wood density forms a latitudinal gradient increasing from the inland species, shortleaf pine (*Pinus echinata*), to the extraordinarily high density found in South Florida slash pine (*P. densa*). Some coastal pines even [increase reproduction](#) in the years following a hurricane.

Hurricane ecology may be a useful lens to understand the ecology, biogeography, and conservation of many forest tree species.

MORE INFORMATION

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KEY POINTS

Hurricanes routinely impact North American forests with vast economic and ecological impacts, but chronic hurricane activity is rarely considered as an ecological driver.

We used a long-term dataset on hurricane tracks to define four distinct categories in North America which vary in hurricane intensity and frequency.

Hurricanes provide a useful lens to understand the ecology and conservation of many North American forests.