

Assessment of Windborne Debris Risk in Florida

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Background: In 2024, the Florida Building Commission sought clarification for the definition of Windborne Debris Regions (WBDR) to be adopted in the development of the 2026 FBC. This request was specific to whether inland lakes that result in Exposure D conditions, where design wind speeds are between 130 and 139 mph, should be considered to create WBDRs and how far from the water (coastal or inland) the risk for WBD damage exists. A team from the University of Florida (UF) and Applied Research Associates, Inc. (ARA) has conducted a study to evaluate the WBD damage risk in both coastal and inland areas with Exposure D conditions with design wind speeds between 130 and 139 mph. This risk was evaluated through review of available literature, evaluation of historical storm damage assessment reports, and simulation of WBD impacts in a neighborhood with a range of terrain conditions representing regions adjacent to large lakes and the coastline. The simulation results indicate that there is similar risk for WBD damage of homes on both large lakes and the coast. When comparing 130 mph conditions with terrain roughness conditions resulting from large lake and coastal exposure to 140 mph conditions with Exposure C conditions, equivalent WBD risk is observed when the homes are within approximately 3,000 ft from the water line.

Problem Statement: While the simulation results, based on validated simulation techniques, provide a reasonable basis for preliminary WBDR recommendations, there remains a gap in the observed damage during actual storm events to further inform the definition of a WBDR to be adopted in FBC. Previous post-hurricane damage assessments were not carried out to specifically quantify the prevalence of WBD damage in inland lake regions, nor were they carried out in a way that provides a measure of WBD risk as a function of distance from the water line. Furthermore, the simulation results are based on a single prototype neighborhood, uniformly made up of single-story houses with one roof type, potentially limiting the applicability of the resulting risk assessment.

Proposed Research Scope: The objectives of the proposed research are to 1) obtain damage assessment data to specifically inform the definition of WBDRs, 2) conduct more realistic WBD simulations that capture the neighborhood characteristics specific to lake-side and coastal development and 3) provide refined, science-based recommendations for defining WBDR in FBC. The tasks proposed to achieve the objectives of this research are:

1. Collect and utilize aerial drone imagery generated in previous post-storm assessments near the coast and inland lakes to quantify the presence and density of structural debris generated during the storms.
2. Conduct targeted post-storm damage assessments in both coastal and lake regions for storms with estimated speeds above 125 mph at the sites of interest (inland lakes and coastal areas).
 - a. Document the presence and origin of debris likely to break glazed fenestration and associated damage in coastal and lake regions.
 - b. Characterize the prevalence of debris and associated damage as functions of downwind distance from the water line.
3. Develop HurMis models with more refined neighborhood characteristics and terrain conditions to evaluate the risk of damage from WBD in lake and coastal regions. Use data collected in Task 2 or from observations in Task 1 for validation of the model by simulating the hurricane trace and impacted neighborhood and comparing the results with observed WBD damage.
4. Develop recommendations for the definition of WBDR to be used in future edition of FBC.