# VISIONING THE FUTURE: SCENARIOS MODELING OF THE FLORIDA COASTAL EVERGLADES

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To achieve some measure of lasting success, Everglades restoration must build resilience to climate change and sea level rise. Here we provide a screening-level analysis of the ecological responses of the coastal Everglades to two plausible 2060 scenarios: +/-10% precipitation, along with +1.5 degrees C, +7% ET, and +0.5 m sea level rise, all relative to 2010. Under these conditions, we loosely linked the South Florida Water Management Model and the Ecological Landscape Model to generate plausible "book-end" ecological outcomes for the coastal Everglades in 2060. In general, and under both rainfall scenarios, water depths increased as freshwater inflows backed up against rising sea levels, flooding lower elevation environments, especially in an arcuate environment that trends NW-SE through Whitewater Bay; salinities increased along a topographic-influenced gradient, as the press of sea level moved the oligohaline isoline landward; phosphorus accumulation rates increased due to higher phosphorus concentrations in marine source waters; peat accretion rates decreased due to interactions between changing habitat types, altered nutrient availabilities, and increased salinities, and thus decreased plant productivity/turnover, especially in deeply flooded environments. Freshwater marsh (e.g., sawgrass) area decreased under both scenarios, replaced by mangrove (e.g., a maximum of 70,000 ha under the -10% rainfall scenario) and open water (e.g., a maximum of 116,000 hectares under the +10% rainfall scenario). Importantly, the two rainfall scenarios differ in detail, but not in the direction and magnitude of change. Rising sea levels necessitate rising freshwater levels, but only topography and not freshwater flows alone will halt seawater incursions. The sum total under both scenarios is large-scale retreat along topographic controls, which implies that adaptive planning efforts that foster upward peat accretion may slow that retreat and help support the long-term sustainability of both freshwater marsh and mangrove habitats.

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