

## Everglades Ecosystem Restoration and Management Under Climate Change

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Predictive modeling has been used for decades to help inform planning for natural resources management. With climate change set to impact species and ecosystems in novel ways, incorporating climate forecasts into predictive models can help managers understand potential future impacts to natural resources. Ecological models can focus on the temporal and spatial scales needed by decision makers, including forecasts at near-term, decadal, project, and landscape scales.

The Greater Everglades wetland ecosystem is already experiencing impacts from climate change and sea level rise by virtue of its low elevation and being bounded by three coasts in peninsular Florida. The Everglades is a formerly vast, free flowing wetland (47,000 km<sup>2</sup>) but after the construction of canals and levees to drain the wetland for European settlement, the ecosystem is now intensively managed to maintain the wetland. Water managers and restoration planners continuously make decisions on how and where to move water through control structures to achieve desired water depths and flows.

Predictive modeling can help planners determine which water management actions and restoration projects are most likely to result in the desired hydrologic and ecological outcomes. The Joint Ecosystem Modeling group has developed many predictive models to forecast potential ecological impacts from water management, restoration project implementation, and climate change. Outputs from our models are used weekly for near-term water management planning as well as for restoration planning that looks decades into the future.

The outputs of our models show potential near-term and long-term ecological impacts. Although climate change was not explicitly considered in restoration planning historically, the implementation of restoration projects is expected to help protect freshwater aquifers from saltwater intrusion attributed to rising seas. As Everglades restoration progresses, predictive modeling can continue to help planners and manager identify actions that can yield desired ecological conditions.

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