

## Everglades project - Loxahatchee Impounded Landscape Assessment (LILA)

### **Mandate:**

Restoration Coordination and Verification (RECOVER) Management Plan of the Comprehensive Everglades Restoration Plan (CERP)

### **Management Issue:**

With the use of conceptual models, scientists have identified the main human-induced stressors to the Everglades ecosystem, the resulting biological responses, and some idea of the ecological pathways between them. The biological responses in the ridge and slough region, which is the heart of the Everglades, can be broadly categorized as (1) alteration and degradation in the natural patterns of plant community composition and structure and (2) changes in the distribution and reductions in abundance of many native animals that are dependent on aquatic food chains. Stressors for the ridge and slough systems are (1) a loss of spatial extent from urban and agricultural expansion, (2) altered hydrologic regimes from water management practices, (3) contaminants from industrial and agricultural practices, and (4) the introduction of nonnative flora and fauna. Although the stressors and biological responses have been clearly identified, the strength of the ecological pathways between them is poorly known. Because topographic elevation differences in the Everglades are small, slight differences in hydrologic regimes can produce very different ecological responses. There is general agreement among scientists that the ecological pathways are known well enough to initiate the restoration by focussing on key hydrologic processes, but that uncertainty must be reduced before the response of the ecosystem can be predicted reliably. The adaptive assessment process accepts this uncertainty and provides a mechanism to refine the water management regimes as new information arises from experiments, modeling, and monitoring.

The main thrust of the Comprehensive Everglades Restoration Plan (CERP) will be directed at re-establishing more natural hydrologic regimes to the various regions of the Everglades. Specifically, in the ridge and slough system CERP will re-establish natural variation in hydroperiod (length of time marsh is inundated with water), flow rates, and water depths. Seven key attributes of the ridge and slough system have been identified in CERP as priority components for measuring ecosystem responses to hydrologic restoration and using those responses to guide the restoration through the adaptive assessment process. In other words, understanding the response of these priority components offers the best opportunity to reduce uncertainty in predicting the ecosystem response. The priority components are: (1) wading birds, (2) tree islands, (3) marsh plant communities, (4) the community of marsh fishes, invertebrates, and reptiles and amphibians, (5) peat soils, (6) alligators, and (7) periphyton.

## **Project Overview:**

In collaboration with the U.S. Fish and Wildlife Service, this study proposes to construct a scaled-down version of the Everglades landscape in two 17-hectares (ha) impoundments at the A.R.M. Loxahatchee National Wildlife Refuge. Each impoundment will be subdivided into two subcells and each subcell will contain four tree islands, three ridges, two sloughs (different depths), and four deep-water refugia at different depths (simulated alligator holes). Overlain on these relatively static landscape features will be the more rapid hydrologic treatments that are controlled and replicated, something not possible in the natural Everglades. The response to hydrologic manipulations will be measured for five of the seven CERP priority components of the ridge and slough system that can be more generally classified as a wildlife component, a tree island component, and a ridge and slough component.

The main strength of this approach, and one that sets it apart from any alternative, is that water levels can be tightly controlled. Other important advantages of this approach are that it occurs in a field setting, it is at a large enough scale to get a response from natural communities, and it is replicated. The wildlife response will come from free-ranging wading birds, and native fish and invertebrate communities. The tree island and ridge and slough responses will come from biogeochemical, vegetative, and physical factors. Finally, because the critical processes (treatments) are manipulated and replicated, the high variability that occurs in the natural system is greatly reduced and the level of certainty of the conclusions is correspondingly increased.

## **Project Objective:**

The objective of the Loxahatchee Impounded Landscape Assessment (LILA) is to define hydrologic regimes that sustain a healthy Everglades ridge and slough ecosystem. Specifically, this study quantifies the effects of flow rate, water depth, and hydroperiod on five of the seven ridge and slough priority components: (1) wading birds, (2) tree islands, (3) marsh plant communities, (4) marsh fishes and invertebrates, and (5) peat soils.

## **Application of Results:**

The results of this proposed project will establish quantitative targets for CERP performance measures, reduce uncertainty in the response of various priority components, and identify hydrologic regimes that support a healthy ridge and slough system. The results will support CERP, the Everglades Forever Act, and routine water management operations. It will be possible to develop recommendations for hydrologic operation of the Everglades, particularly during flood events, when the flexibility to move water through the system is critical.