

below  
the  
surface  
an in-depth  
look at...



## Kissimmee River Restoration Phase I

### *Environmental Recovery is Under Way*

#### ON THE INSIDE

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**The Kissimmee River basin was once a paradise for fish, bird and wildlife populations. From its headwaters at Lake Kissimmee to its mouth at Lake Okeechobee, the river meandered 103 miles across a 1- to 2-mile wide floodplain dominated by wetland plants and shrubs. Heavy seasonal rains inundated the floodplain for long periods, often year-round, distinguishing it from most other rivers in the United States.**

#### Vital Flood Control

In the Kissimmee River region, the extremely flat landscape, frequent heavy rainfall and limited natural drainage created a recipe for extensive, persistent floods. Responding to Florida's request for help, Congress authorized in 1954 a major construction effort to provide flood protection in the region. Surveying crews visited the Kissimmee Valley to plan for re-engineering the Kissimmee River, which would eventually be cut and dredged and called the C-38 Canal.





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Initial results of Phase I restoration are extremely encouraging. Highlights are covered here and at [www.sfwmd.gov](http://www.sfwmd.gov)

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*In the 1940s, a series of devastating floods inundated towns and farms in the Kissimmee Valley. This prompted federal action, and the Kissimmee Flood Control Project was born.*



*The Kissimmee River was “channelized” to manage its water flow. Over the course of nine years (1962-1971), the meandering river was cut and dredged into a straight canal (C-38) with six water control structures. Two-thirds of the original floodplain was drained.*

Starting in the 1960s, water control structures were built in the major lakes of the Kissimmee’s upper basin, providing management over the timing and amounts of water released downstream into the river. The C-38 canal – 30 feet deep and up to 300 feet wide – was excavated through the middle of the Kissimmee River floodplain. The canal destroyed large portions of the winding river channel and disconnected the remaining river segments from one another. Water control structures built within the canal allowed the river to be managed as a series of impoundments, or pools.

### **The Environmental Cost**

Although the project achieved its flood control objective, the loss of river and floodplain habitat severely impacted fish and wildlife populations and disrupted the entire riverine ecosystem. One primary cause of environmental harm was the lack of flowing water in the remnant river sections. Large amounts of aquatic plants quickly accumulated there. As the vegetation decayed, dissolved oxygen dropped to levels that were deadly for most fish and other aquatic organisms.

Channelization also drained the highly productive floodplain, converting diverse wetlands to dry pasture. Populations of fish, wading birds, waterfowl and other wildlife that used the wetlands for shelter, food and reproduction were significantly reduced.

### **Restoring the Kissimmee River**

Even before completion of the flood control project in 1971, channelization and its highly visible environmental impacts evoked public outcry. This was the beginning of the river’s restoration movement, which evolved over the next 20 years into the Kissimmee River Restoration Project.

Authorized by Congress in 1992, this joint state-federal project was designed to restore ecological integrity to the river while maintaining regional flood protection. Ecological integrity will be achieved through several phases of construction, which will restore the

historic habitat mosaic to approximately one-third of the Kissimmee River and its floodplain. The construction project will fill 22 miles of canal, remove two water control structures and reconstruct 10 miles of river channel. When the project is complete, almost 40 square miles of river-floodplain ecosystem will be affected by the restoration project. Over 12,000 acres of wetlands will be restored (for a total of over 20,000 wetland acres in the project area), and approximately 40 continuous miles of river channel will receive reestablished flow.

### **Completing Phase I**

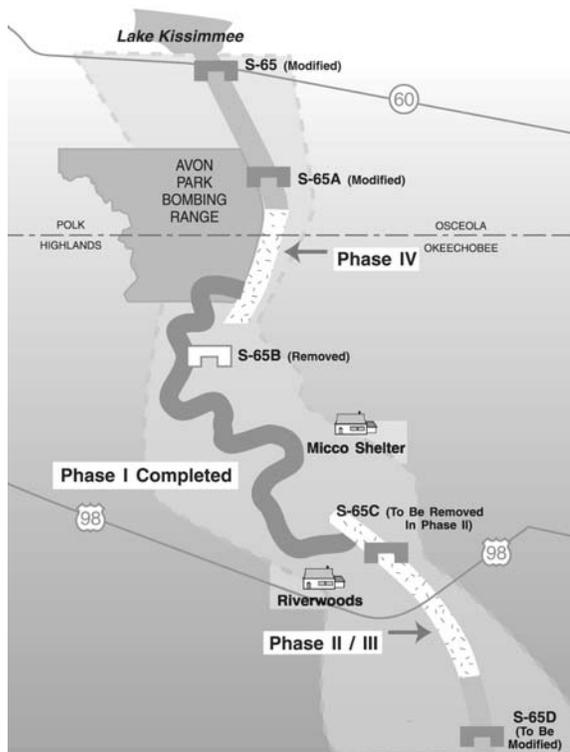
Phase I construction began in 1999 and was completed in February 2001. It took place in most of Pool C and southern Pool B (see map). Eight miles of flood control canal were filled, one mile of new river channel was carved, and one water control structure was removed. As a result, approximately 14 miles of historic river channel were reconnected. In July 2001, continuous flow of water was reestablished through the restoration project area, and later that summer, much of the floodplain associated with the Phase I project area was inundated.

### **Ecosystem Response to Phase I Restoration**

More than five years of continuous water flow through reconnected river channels – plus seasonal inundation of the floodplain – have led to remarkable changes in the Kissimmee River basin. These changes, tracked through a comprehensive monitoring program, reflect a wide range of physical, chemical, biological and functional traits of the river-floodplain system.

Restoration success will be evaluated by tracking specific and documented improvements in these river and floodplain traits. Examples include improvements in water quality; river and floodplain vegetation; aquatic invertebrates, amphibians and reptiles; river and floodplain fishes; wading birds; waterfowl; and threatened and endangered species.

## PHASE I RESTORATION



### Before Restoration



Before Kissimmee restoration began, dense mats of floating vegetation filled much of the river channel.

### After Phase I Restoration



Increased water flow, achieved with various construction projects, has returned sections of the river to its historic, free-flowing state.



This dry prairie was once the Kissimmee River's floodplain, home to countless species of wading birds, fish, invertebrates and aquatic plants.



Today it is a floodplain again, restored with water and filled with abundant wetland life.

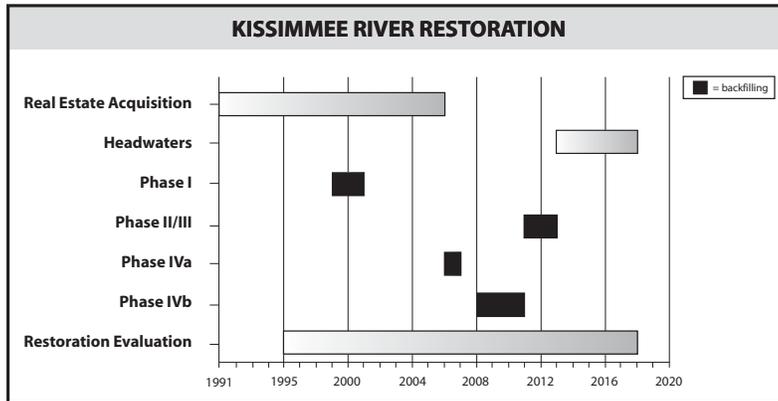
## Phase I Environmental Recovery

The initial results are in! Below are just some of the significant changes that have already been documented along the Kissimmee River and its floodplain. These measured improvements are compared with conditions before Phase I restoration began.

- Continuous flow of water since 2001 has improved plant and animal habitats, water quality and biological community composition.
- Organic deposits on the river bottom decreased by 71%, which also reestablished sand bars, providing new habitat for invertebrates and shorebirds.
- Undesirable floating and mat-forming plants have been replaced by emergent plants native to the historic river.
- Wetland plants are now thriving in the floodplain, including pickerelweed, arrowhead, Carolina willow and buttonbush.
- Dissolved oxygen concentrations, critical for survival of fish and other aquatic organisms, have increased to levels similar to those in relatively pristine rivers in South Florida. Daily concentrations have increased from an average of 1 milligram per liter (mg/l) to 3 mg/l in the wet season and from 3mg/l to 6 mg/l in the dry season.
- Aquatic invertebrate communities are now more characteristic of those found in a free-flowing river. These invertebrates, such as caddisflies and mayflies, are a vital food source for almost all fish species in the river.
- Largemouth bass and sunfishes, popular sport fish, comprise 68% of the fish community, up from 38%, as identified in the first season of data collection. Florida gar, once common in the channelized river, have decreased, meeting expectations for a free-flowing river.
- Long-legged wading birds, including white ibis, great egret, snowy egret and little blue heron, have increased significantly, in some years more than double the expected numbers.
- Duck species have returned to the river, including the American widgeon, northern pintail, northern shoveler, ring-necked duck and black-bellied whistling duck.
- Eight shorebird species, absent before restoration, have returned to the river and floodplain, including breeding black-necked stilts.

## DID YOU KNOW?

- More than 320 fish and wildlife species will benefit from Kissimmee River restoration, including endangered species like the wood stork.
- Successful restoration of the Kissimmee River is essential for Everglades restoration.
- Scientists and engineers from around the world are studying the design, implementation and evaluation methodologies used for Kissimmee River restoration.
- In 2005 and 2006, the Kissimmee River restoration project was a finalist for the prestigious International Riverprize, awarded annually for outstanding work in watershed restoration.
- The headwaters revitalization project will allow greater fluctuation of lake levels in Lakes Kissimmee, Hatchineha and Cypress, which will provide more natural flow patterns for the river and expand shoreline habitat around the lakes.



Timeline to a restored river.

## What's next for Kissimmee River restoration?

Following completion of Phase I, construction Phase IVa began in 2006 and was completed in 2007. It involved backfilling 1.9 miles of the C-38 canal, beginning at the northern end of the Phase I project area. Next, Phase II/III and Phase IVb will be carried out.

As shown in the timeline above, land acquisition is complete. All construction phases plus the headwaters projects, which will increase water storage capacity in the Upper Chain of Lakes to provide the continuous flows necessary for successful Kissimmee River restoration, will be completed by 2013. Restoration evaluation of ecosystem recovery will continue through 2018.

In addition to future lower basin construction features, hydrologic modeling and other regional studies have been or will be implemented to determine whether lakes in the Upper Basin can be managed more naturally to improve lake health, habitat quality and recreational opportunities.

We invite you to stay informed. Visit this District web site for regular updates on Kissimmee River restoration: [www.sfwmd.gov/site/kissimmee](http://www.sfwmd.gov/site/kissimmee)

**The South Florida Water Management District** is a regional, governmental agency that oversees the water resources in the southern half of the state. It is the oldest and largest of the state's five water management districts.

Our Mission is to manage and protect water resources of the region by balancing and improving water quality, flood control, natural systems and water supply.



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