



Kissimmee River Restoration

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Note: Chapter 9 of the South Florida Environmental Report
provides detailed information on the Restoration

Kissimmee River

**It is a key
component of the**

**Kissimmee-
Okeechobee-
Everglades**

Ecosystem



Kissimmee River was a highway of commerce



Kissimmee River Restoration Project

Its floodplain was inundated with water almost all year creating a mutually beneficial interaction between upland and river environments



Kissimmee River Restoration Project

**The river supported a
productive and
diverse habitat**



River Channelized for Drainage and Flood Protection

**The floodplain was altered
for flood protection**



Meandering River Dredged into a Straight Canal

The wisdom of alterations was questioned even before the dredging was done



Floodplain Converted to Upland Habitat

New ranch land no longer supported populations of plants and wildlife

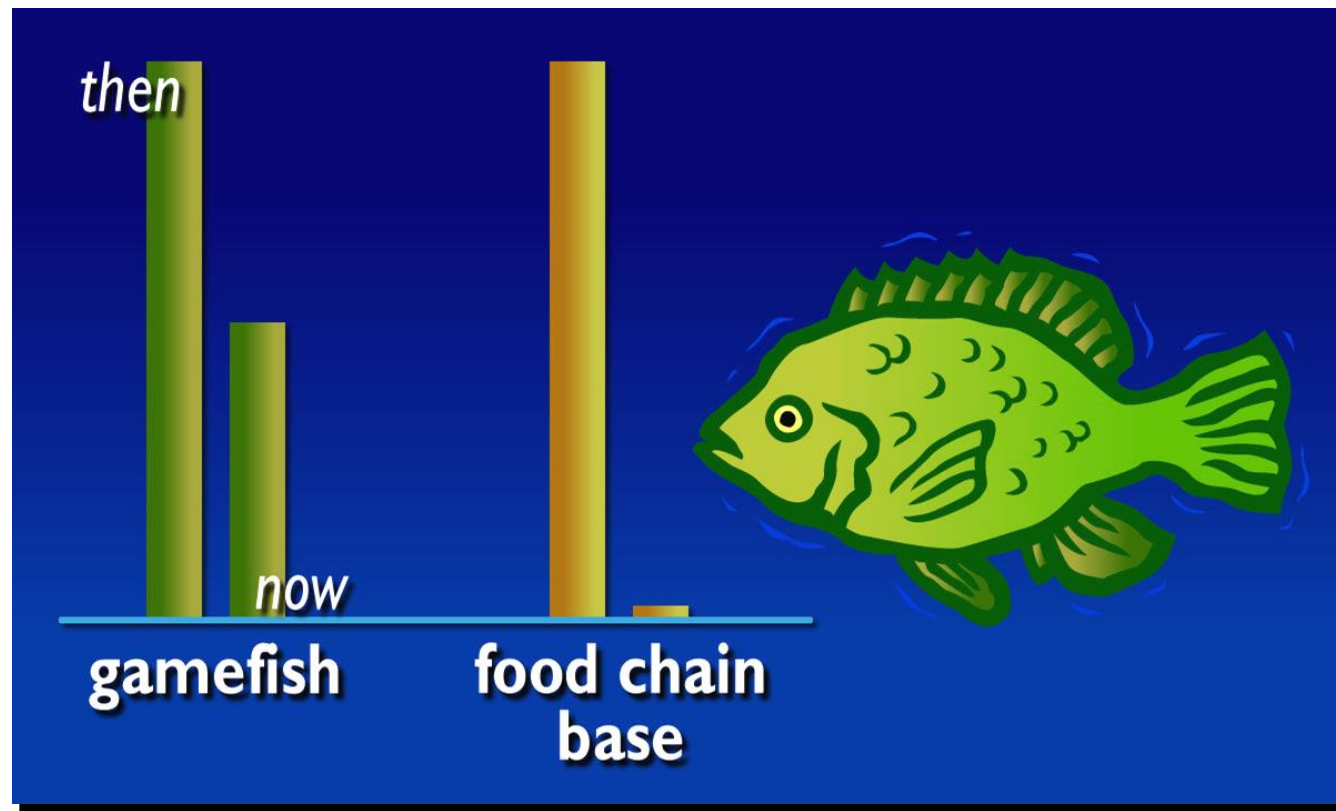


Bird Populations Reduced



Fish Populations Reduced

**Fisheries dwindled –
the food chain base depleted**



Restoration Alternatives Studied



Kissimmee River Restoration Model

University of
California-Berkeley

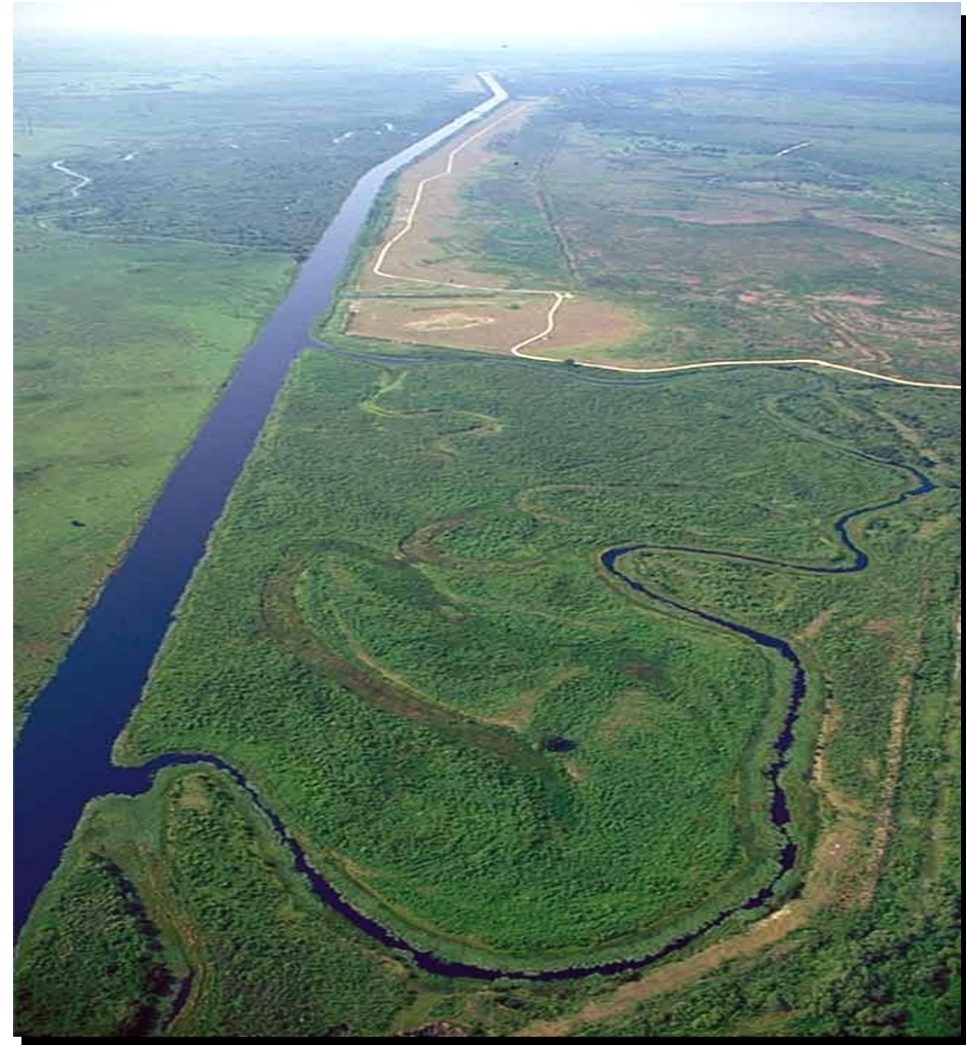
Alternative ways
of reconstructing
the river tried

A classic
example of a
physical model

River Channel Reconstruction Selected

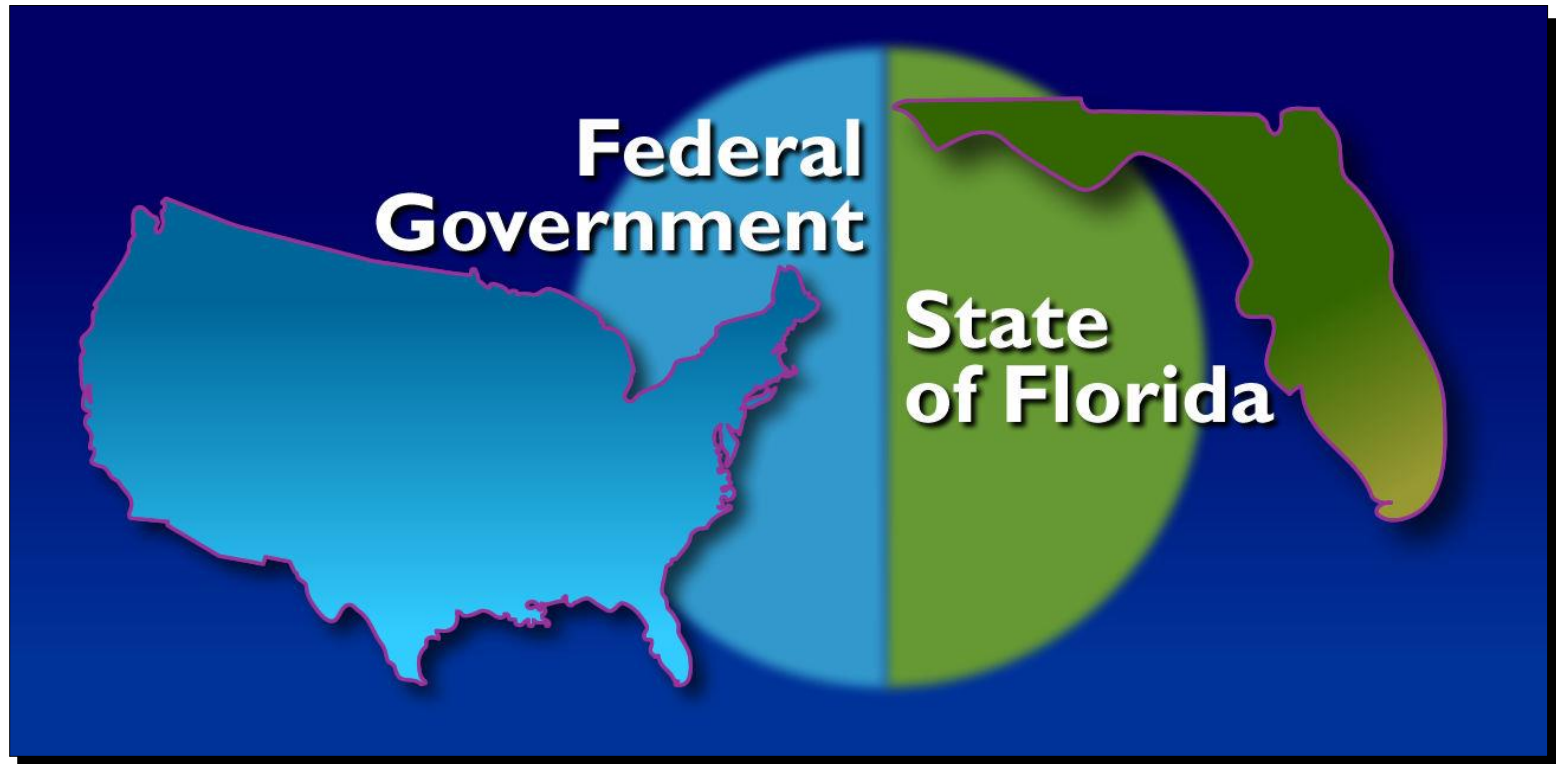
**Restoration could
be accomplished**

Test fill confirmed

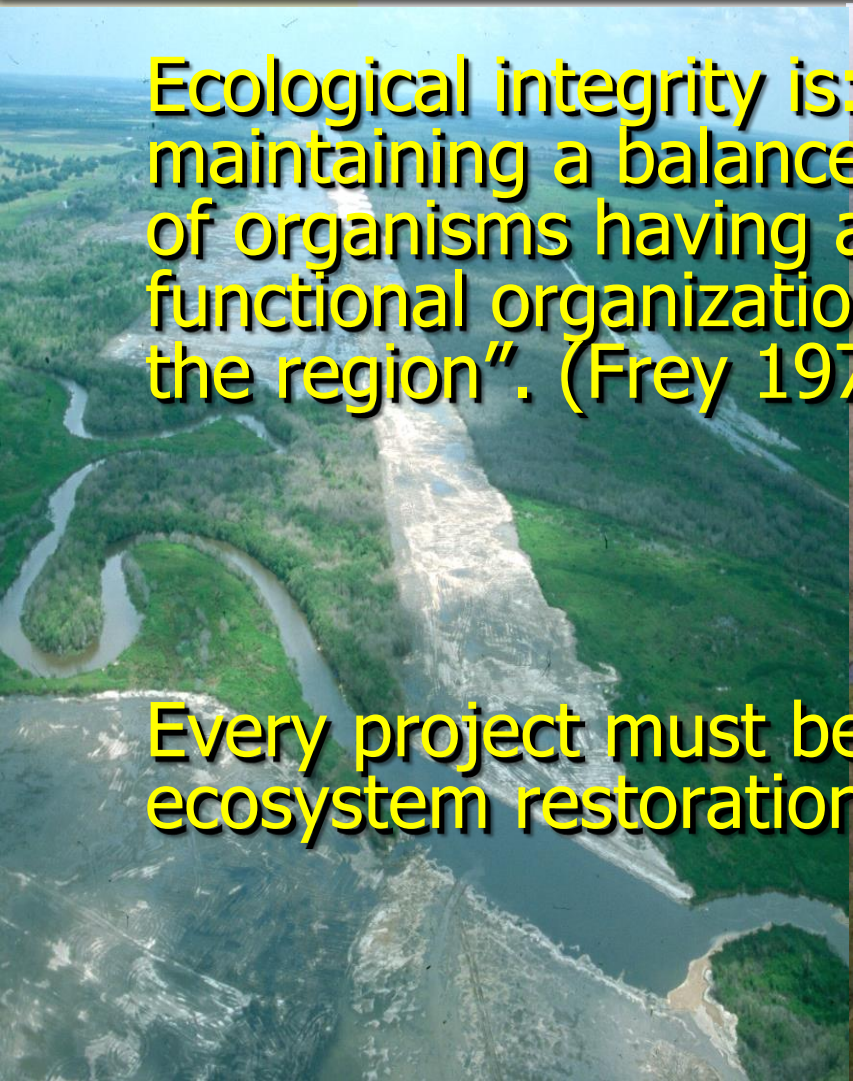


Restoration Project Begins

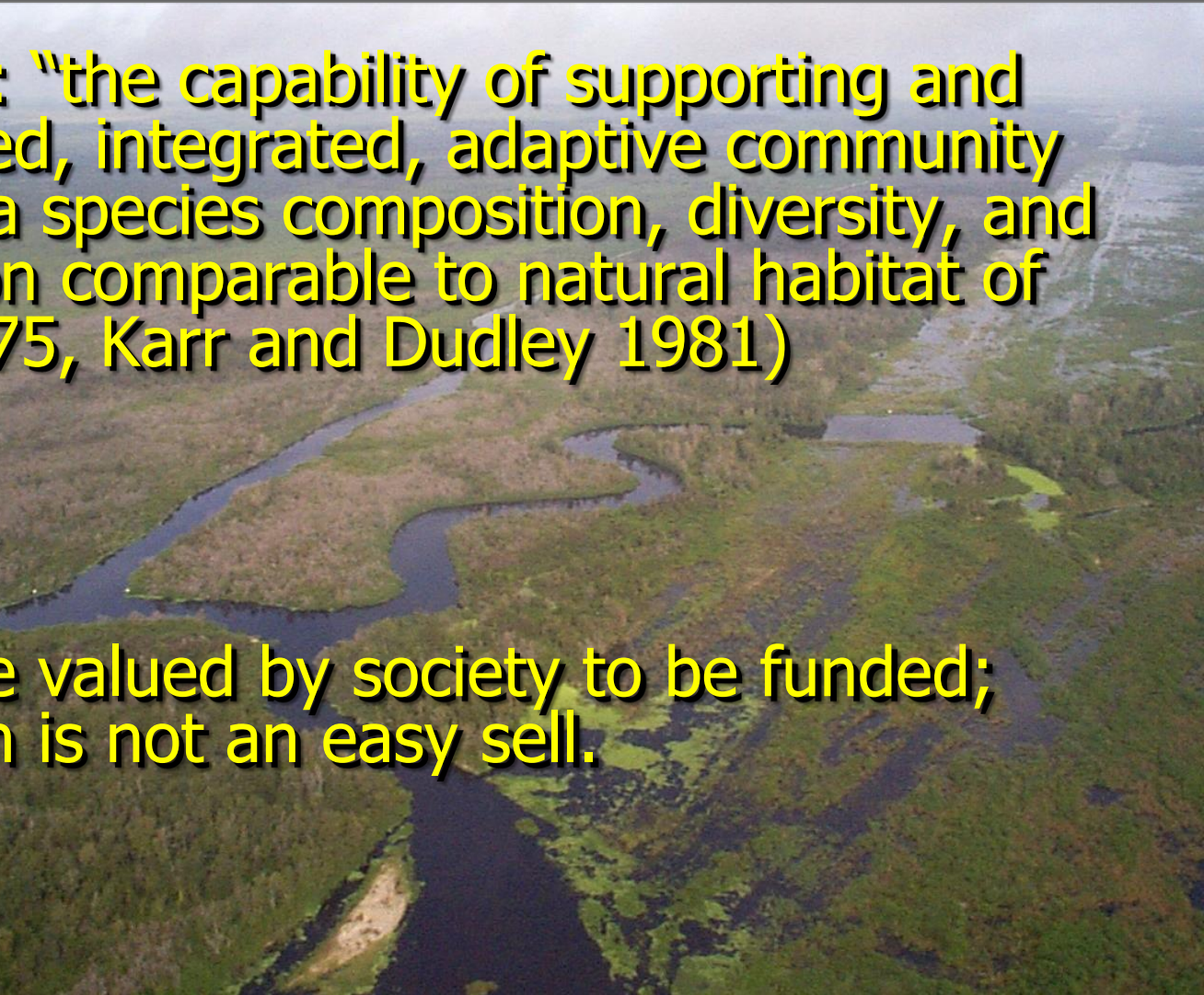
**In 1992,
Congress authorized the project**



Ecological Integrity Goal

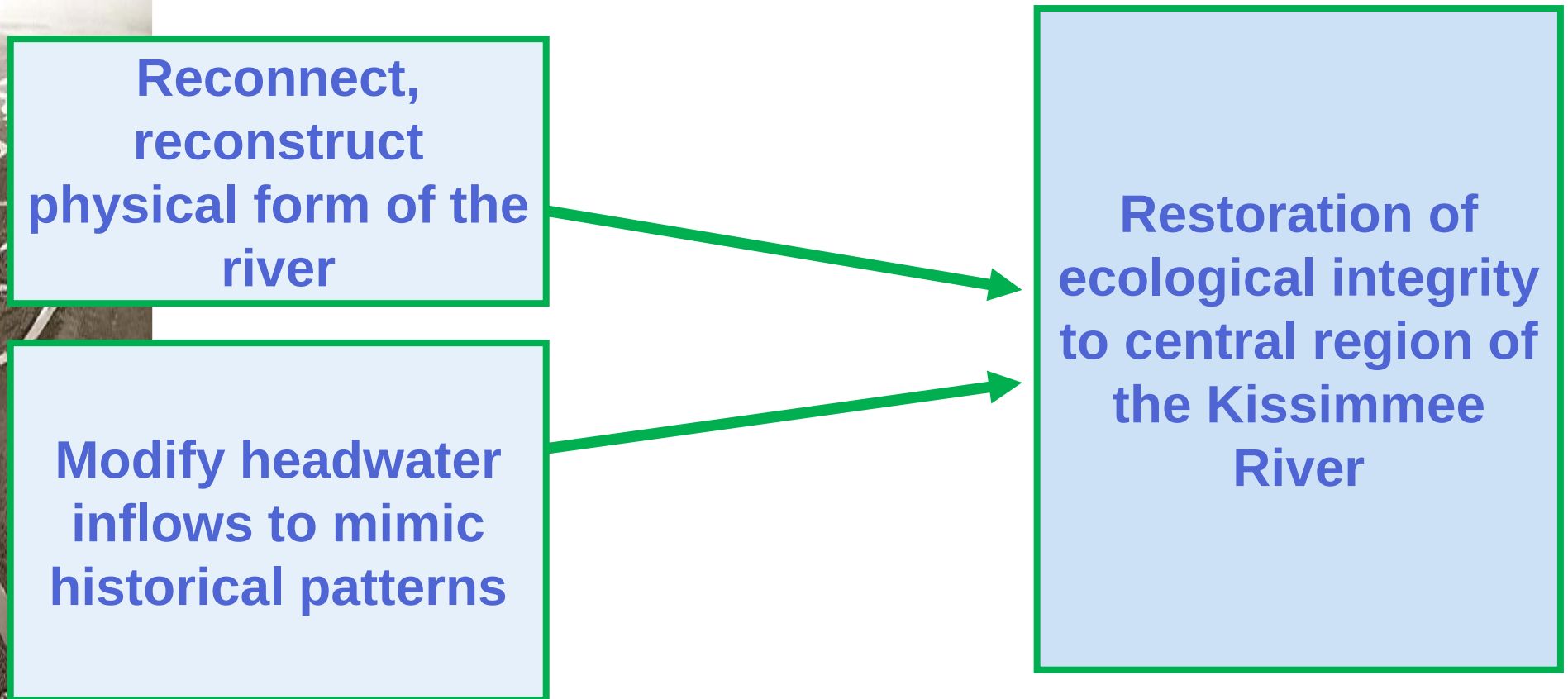


Ecological integrity is: "the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to natural habitat of the region". (Frey 1975, Karr and Dudley 1981)



Every project must be valued by society to be funded; ecosystem restoration is not an easy sell.

Approach to River Restoration



Restoration Objectives

The restoration project was designed to:

- **Backfill 22 miles (35 km) of the canal**
- **Re-carve 9 miles (14 km) of former river channel**
- **Restore over 40 square miles (10,540 ha) of river/floodplain ecosystem**



Five Hydrologic Criteria



Extensive data analysis and modeling characterized flow dynamics and criteria.

- 1. Continuous flow comparable to pre-channelization periods**
- 2. Average flow velocities 0.2 - 0.6 m per second within bank**
- 3. Stage discharge relationship for overbank flow between $> 40 \text{ m}^3/\text{sec}$ and $> 57 \text{ m}^3/\text{sec}$**
- 4. Stage recession rates on floodplain $< 0.3 \text{ m/month}$**
- 5. Floodplain inundation comparable to historic hydrographs**

Restoration Financing

The cost was estimated at nearly \$500 million. The final cost will be about double because of unavoidable land and construction costs.



Phase I Construction



Project Status

- Land acquisition 100% complete
- Phase I construction completed - 2001
- Phase II restoration activities completed in 2007 with 3 weirs removed and more backfilling of the canal



Project Status

- Phase III backfilling and recarving are complete
- All construction to be completed by 12 / 2015
- Headwaters Revitalization Project is underway
- Wading birds are doing well, meeting long-term expectations
- *Restoration evaluation to 2017, documents project benefits – a unique scientific record*

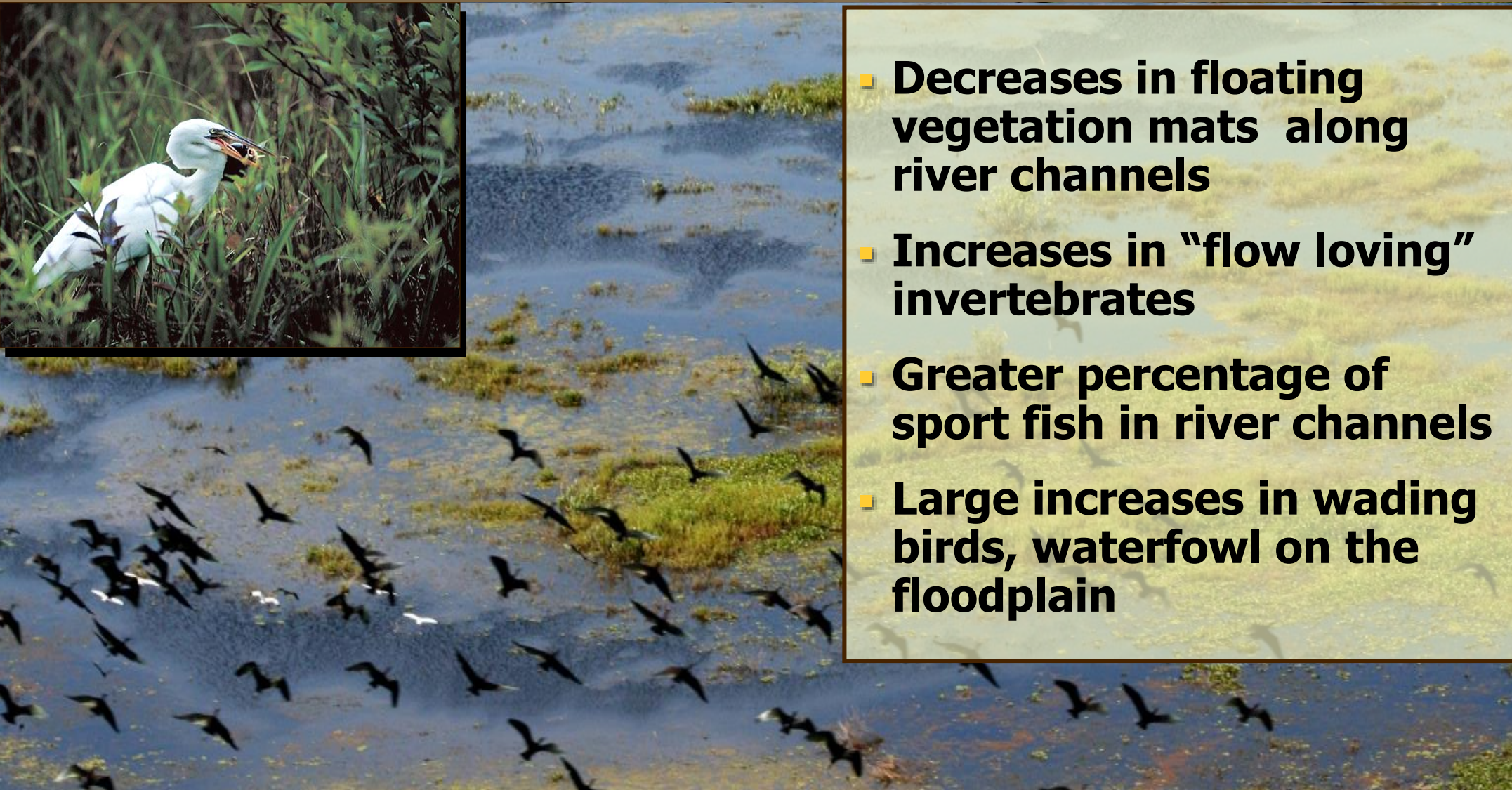


Initial Responses to Phase I Construction

- Continuous flow in restored river channels
- Reestablishment of flood pulse
- Sandbar formation in river channels
- Improved dissolved oxygen levels in river channels



Initial Responses to Phases I & II



- Decreases in floating vegetation mats along river channels
- Increases in “flow loving” invertebrates
- Greater percentage of sport fish in river channels
- Large increases in wading birds, waterfowl on the floodplain

Floodplain Vegetation Response



Pre-restoration



Post-restoration

River Channel Vegetation Response



Pre-restoration



Post-restoration

Comprehensive Restoration Evaluation Program Components



- **Hydrology**
- **Geomorphology**
- **Dissolved Oxygen and Water Quality**
- **Plant communities**
- **Invertebrate communities**



Biological Evaluation Program Components

Documenting responses and ecological integrity

- Reptile and Amphibian communities
- Fish communities
- Bird communities
- Threatened and Endangered species



Unique Opportunity Succeeds



Restoration in the true sense, but it is not simple

Five parts:

- River Restoration
- Evaluation Program
- Basin Modeling
- Headwaters revitalization
- Lakes Management



See:
***The South Florida
Environmental
Report, Chapter 9***



What have we learned?

- Think more for the long-term, then dredge and drain less
- Both physical and mathematical models can evaluate alternatives in complex systems
- Restoration of ecological integrity based on returning physical structure and flow dynamics
 - *Give nature resources and amazing things happen!*
- Final costs subject to national/international factors over long-term



Enjoy your visit to The Kissimmee River

