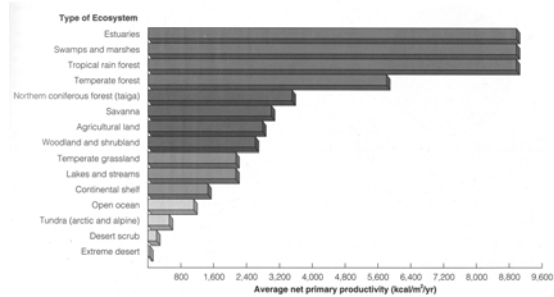
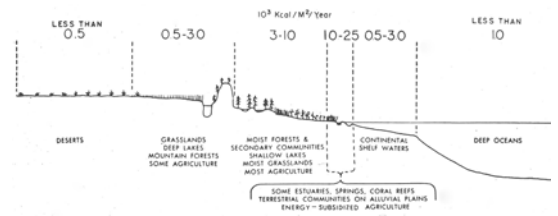


Wetlands and Estuaries: The Ecology Of Ecotones

World Distribution Of Primary Productivity



From: *Living In The Environment* Miller, 13th ed.

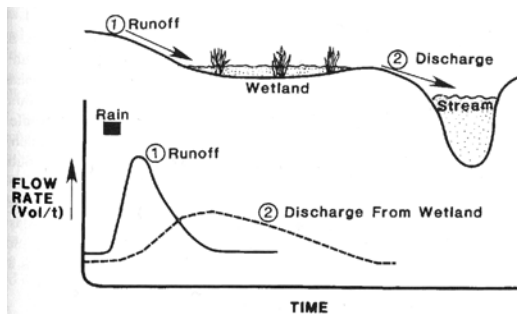
Ecosystem Functions And Services:

1. Wetlands serve as buffers, protecting shorelines from erosion
2. Wetlands store water during hurricanes and storms, releasing it slowly back into the estuary
3. Wetland plants can remediate nutrient overloading
4. Wetlands serve as freshwater recharge areas for municipal drinking water supplies
5. Wetlands filter polluted water
6. Wetlands provide nesting areas for migratory bird species
7. Wetlands provide spawning areas for pelagic fish species
8. Wetlands provide habitat for a wealth of crustacean life, much of which is commercially fished



http://hydra.gsa.gov/pbs/pt/call-in/factsheet/1296/12_96_11.htm

Stream-Wetland Relationship



Australian Wetland



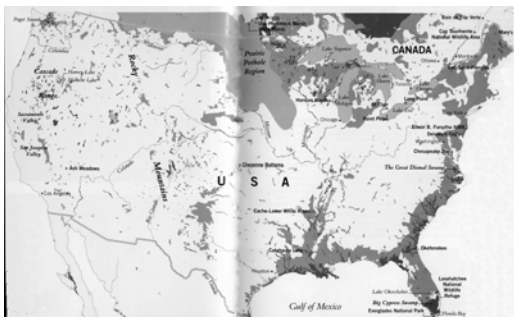


Florida Everglades

Wetlands Of North America



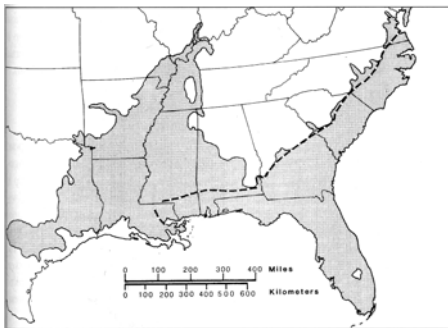
Wetlands Within the Continental United States



**National Wetlands
Research Center**



Distribution Of Bald Cypress



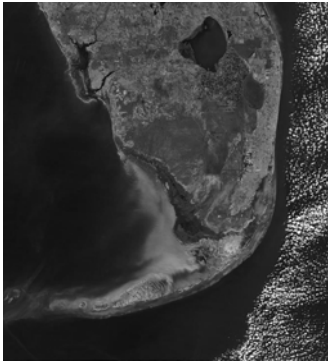
Deep Water Bald Cypress Swamp



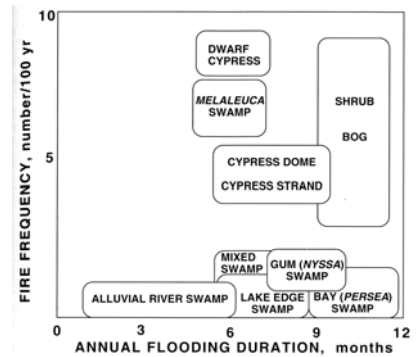
The Florida Everglades
"River Of Grass"



Fires In The Everglades



Flooding And Fire Are Defining Features Of The Cypress Swamp



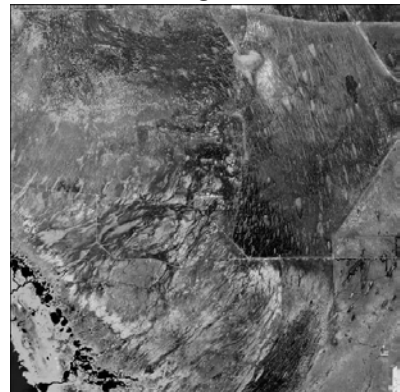
"River Of Grass"

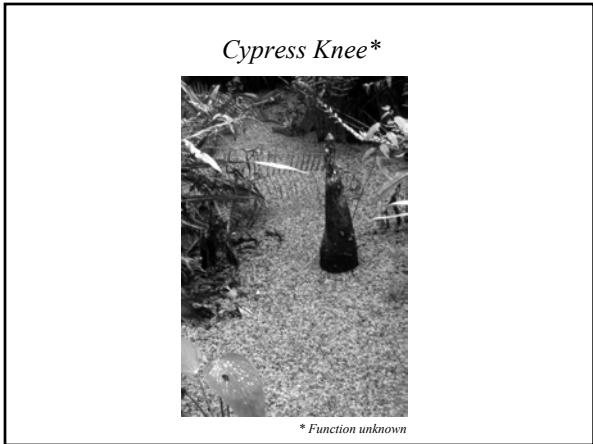
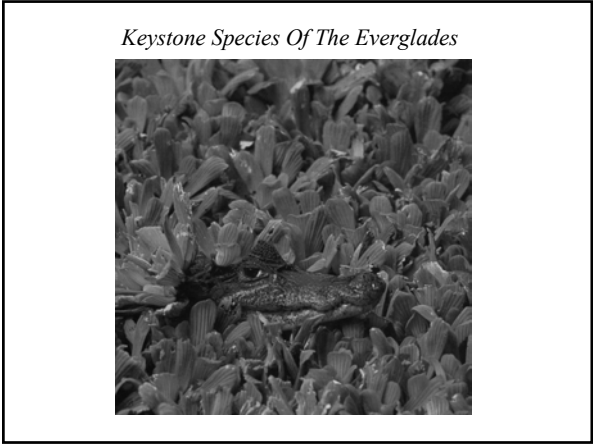


True Color

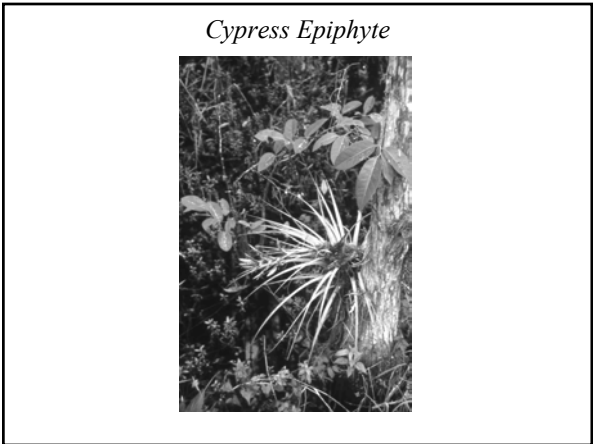
red=46' back, green=nadir, blue=46' forward

Everglades





** Function unknown*





Everglades Lilly



Grand Old Osprey

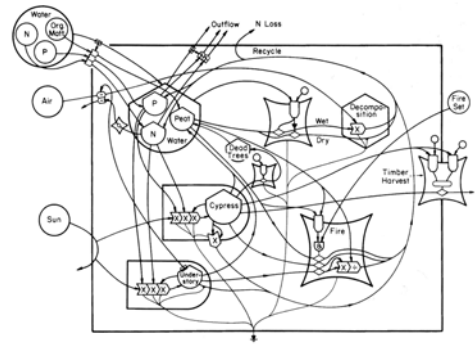


Keystone Species?

Florida Key Deer



Summary Of Ecological Relationships In A Cypress Swamp In Florida



N = nitrogen; P = phosphorous

The Everglades' sawgrass fields, dry pinelands, "islands" of trees, and mangrove forests once supported over 600 kinds of animals and 900 of plants. In the past 50 years, pollution, fragmentation, disruption and complete drainage in some areas have destroyed many habitats. Wild populations, especially of wading birds, have plummeted; the number of wading birds that nest in the national park has dropped by more than 90 percent.

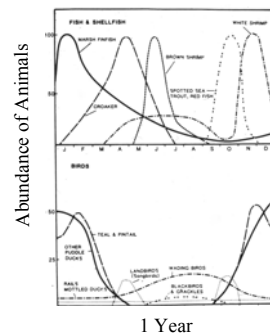


The Southern Salt Marsh

Sapelo Island, Georgia



Migration In An Estuary



Bounty Of The Estuary

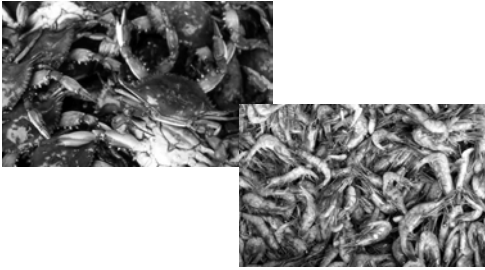
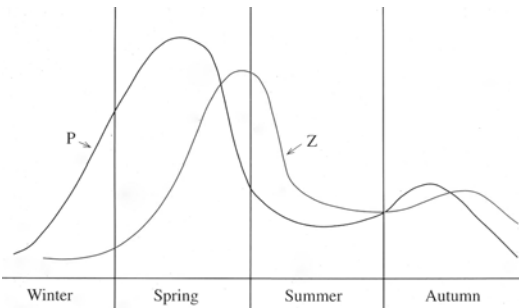
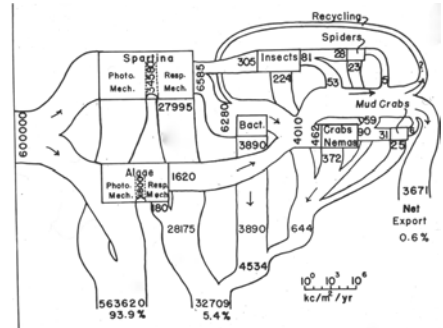


Photo: Eliot Porter

Seasonality Of Phytoplankton-Zooplankton Blooms

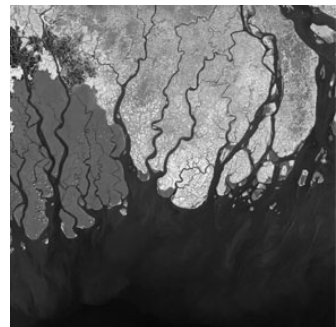


Energy Flow Through A Georgia Salt Marsh



Mangrove Swamps

Bay Of Bengal





Keystone Species Of The Mangrove Swamp



*Keystone Species Of The Sundarban**



**estimates vary from 250 down to 35 tigers*

Trophic Relationships Of The Mangrove Estuary



The Northern Salt Marsh

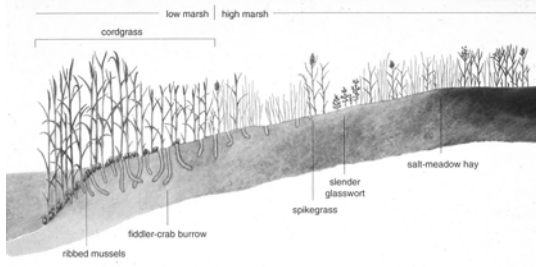
Long Island Salt Marsh



Clamming On Long Island Sound



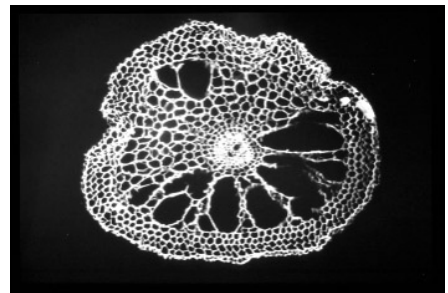
Northern Salt Marsh Ecology



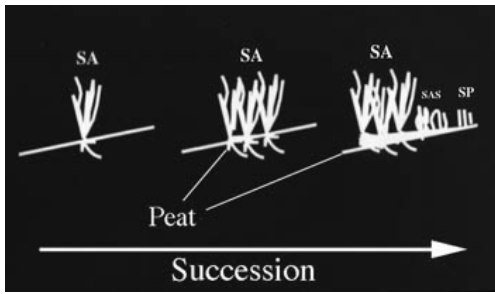
Spartina Seedlings



Aerenchymal Tissue Of Spartina alterniflora



Salt Marsh Succession



Ribbed Mussels



Fiddler Crab



Intact Salt Marsh



Ice-damaged Salt Marsh



Ice Damage To An Eastern Shore Salt Marsh



Slender Glasswort To The Rescue!*



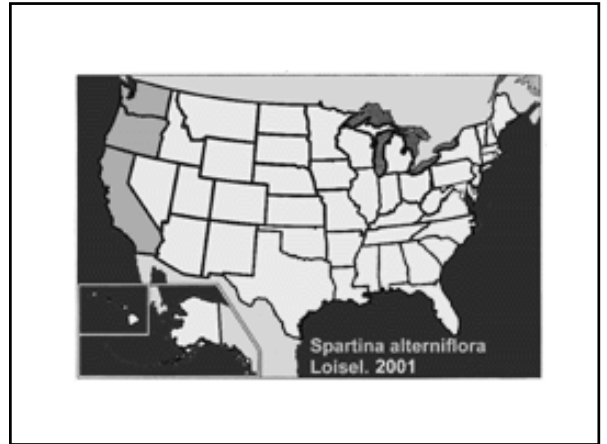
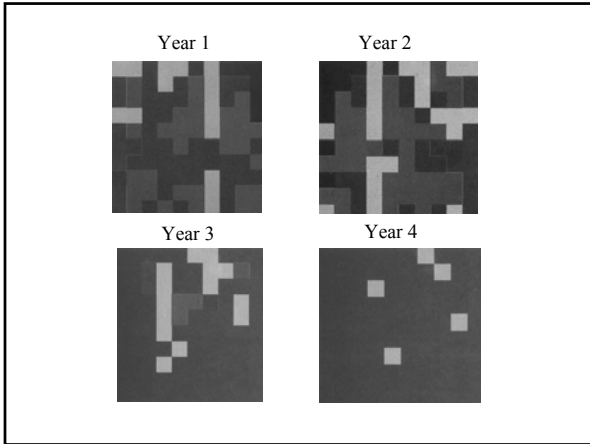
The Most Salt-tolerant Plant Of The Salt Marsh

* makes a great addition to salads!

Spike Grass Fills In The Gaps



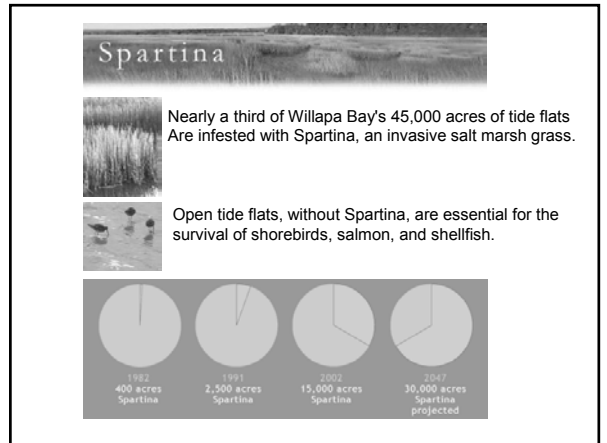
Spike Grass Is Also Salt-tolerant



Ecological Impact Of Spartina Invasion

Impacts to Endangered Species

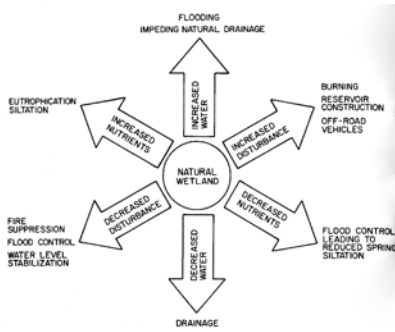
- *Conversion of Tidal Mudflat to Meadow
- *Loss of Shorebird Foraging Habitat
- *Loss of Critical Channel Habitat
- *Local Extinction of Native California Cordgrass
- Failure of Local Wetland Restoration



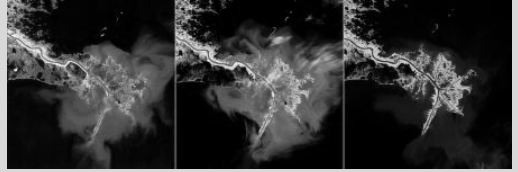
You Can't Please All The Ecosystems All The Time

What Will Be The Ecological Consequences Of This Invasion?

Causes Of Loss Of Wetlands



Land Use And Agriculture Mississippi Delta

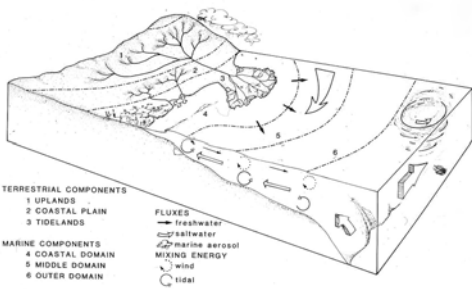


1973

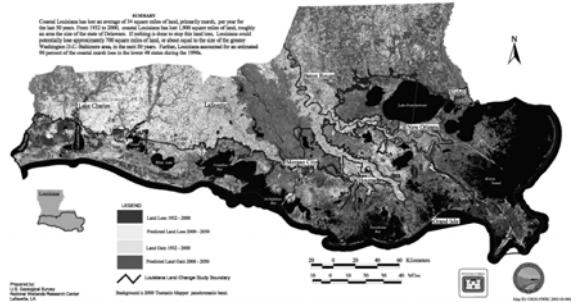
1989

2003

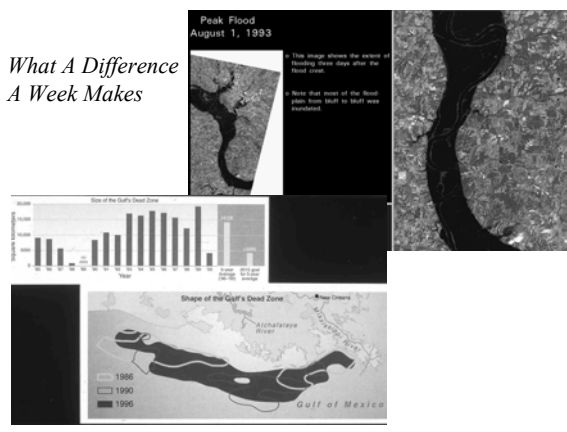
Circulation Patterns Of The Gulf Of Mexico Near The Mississippi Delta



100+ Years of Land Change for Coastal Louisiana



What A Difference A Week Makes

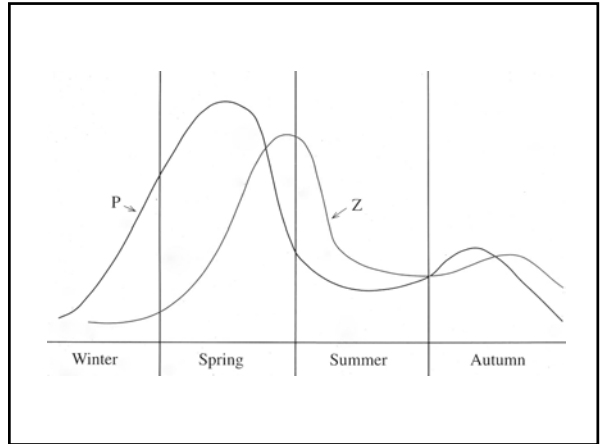
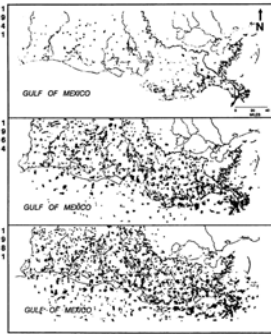


Welcome To The Dead Zone



The Gulf of Mexico Dead Zone and Red Tides

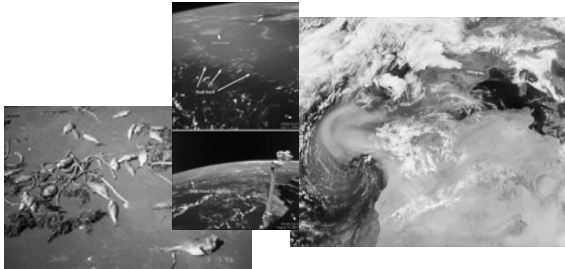
Oil And Gas Fields In Louisiana



NASA NEWS ARCHIVE
August 28, 2001

DUST FROM AFRICA LEADS TO LARGE TOXIC ALGAE BLOOMS IN GULF OF MEXICO, STUDY FINDS

Saharan dust clouds travel thousands of miles and fertilize the water off the West Florida coast with iron, which kicks off blooms of toxic algae, according to a new study.



Red Tide*



* "They Call Alabama The Crimson Tide" (Line from a Steele Dan Song)



Karenia brevis

Karenia brevis



"Red Tide"



Dead Fish

**TWO NEW REPORTS INDICATE DRAMATIC SLOWDOWN
IN LOSS OF U.S. WETLANDS**

**TABLE II-2: Wetlands Lost and Remaining,
1780s-1980s (lower 48 States)**

Status	Acreage (millions)	%
Original	221	100
Lost	117	53
Remaining	104	47

Source: Dahl, T.E., 1990.

**TABLE II-3: Wetland Conversion, mid-1970s to
mid-1980s (lower 48 States)**

Use after conversion	Acreage (millions)	%
Agriculture	1.41	54
Urban	0.13	5
Other	1.07	41
Total	2.61	100

Source: Dahl, T.E. and C.E. Johnson, 1991.



What Happened To Our Salt Marsh



United States
Environmental Protection
Agency

Office of Water
Office of Wetlands,
Oceans and Watersheds (OWOW)



<http://www.epa.gov/OWOW/wetlands/vital/toc.html>

**The Ramsar Convention's resources on
Wetland Restoration**



http://www.ramsar.org/strp_rest_appr_index.htm

Useful Links

Great Eastern recommends the following web-based resources:

- [General Environmental](#)
- [Ecological Society of America Links Page](#)
- [Envirofile](#)
- [EnvironmentalExpert.com](#)
- [Environmental Web Directory](#)
- [National Environmental Directory](#)

Wetland Information

- [100 Top Wetland Sites](#)
- [Association of State Wetland Managers](#)
- [Association of State Wetland Managers Links](#)
- [EPA - America's Wetlands](#)
- [Society of Wetland Scientists](#)
- [OWOW - Wetland Related Sites](#)
- [WET Links](#)
- [WetNet - Wetland Links](#)

Restoration

- [Global Network of Environment & Technology](#)
- [River Corridor and Wetland Restoration](#)
- [Society for Ecological Restoration \(SER\)](#)
- [SustainableBusiness.com](#)
- [Stream Corridor Restoration](#)
- [Watershed Restoration Information Centre \(WRIC\)](#)
- [Wetlands Reserve Program \(WRP\)](#)

Environmental Protection Agency Pages

- [Acid Rain Program](#)
- [California EPA](#)
- [Environmental Protection Agency, USA](#)
- [Environmental Monitoring and Assessment \(EMAP\)](#)
- [EPA - America's Wetlands](#)
- [EPA Office of Water, River Corridor & Wetlands Restoration, USA](#)
- [Office of Science and Technology](#)
- [Office of Wetlands, Oceans and Watersheds](#)
- [Federal, State and Local Government Resources](#)
- [Association of State Wetland Managers Wetland Links](#)
- [Links to State Environmental Agencies](#)
- [NIT and the Environment](#)
- [State Government Environmental Resources](#)
- [State Regulatory Agencies](#)

[Back to top](#)

Its Getting Late

