

*Arthur R. Marshall Loxahatchee National
Wildlife Refuge Annual Science Workshop*

Managing and Conserving Habitat in the Northern Everglades – Priorities, Challenges and Science Needs

Panelists:

**Brian Benscoter, PhD; Rebekah Gibble, PhD
LeRoy Rodgers; Donatto Surratt, PhD**

Moderator:

Nick Aumen, PhD





Panel Session.....

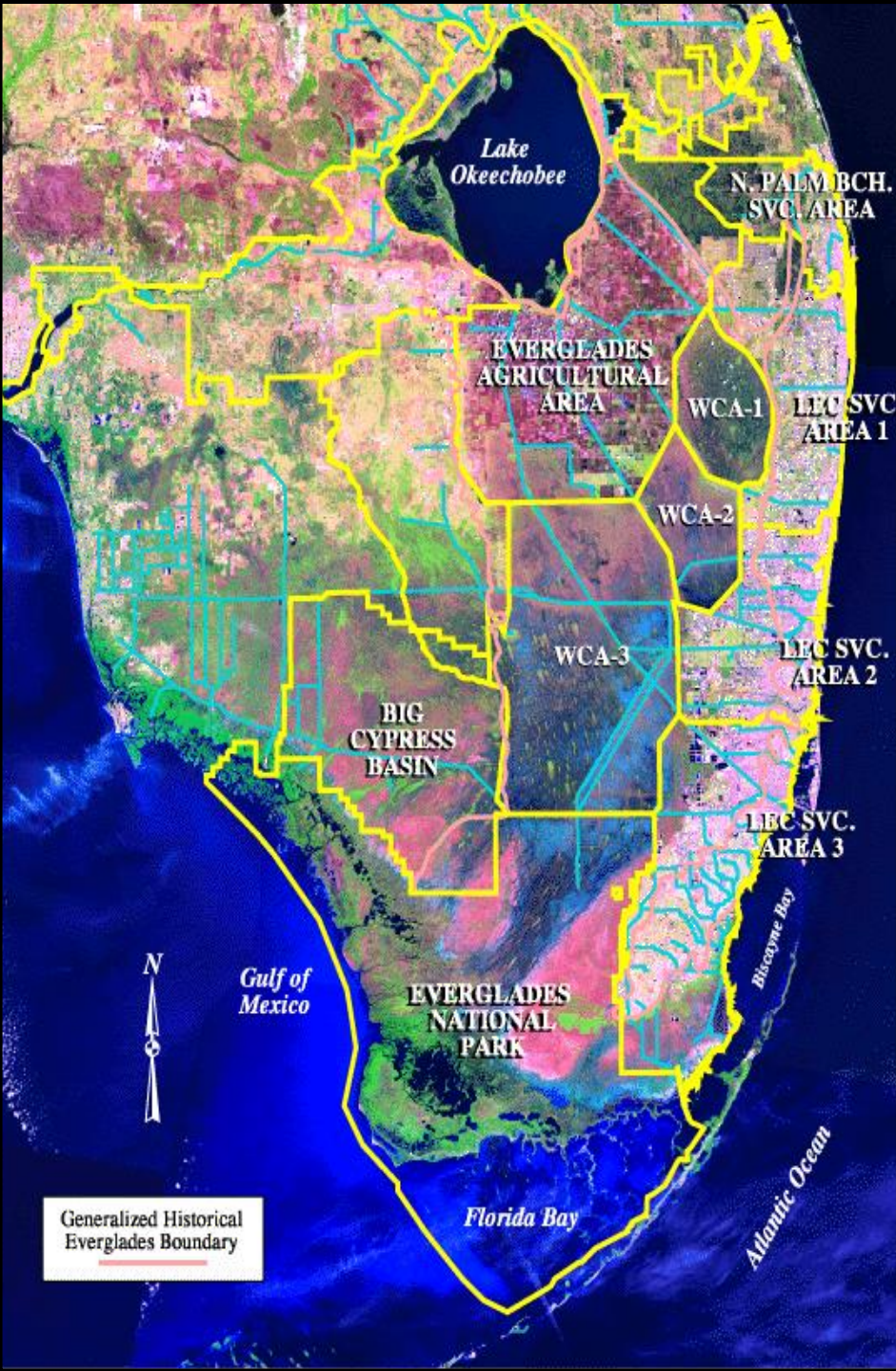
■ Goal:

- *Represent a range of perspectives in a collective discussion with wetland experts regarding ecological conservation targets, priorities, development of future desired conditions, and management strategies in the Arthur R. Marshall Loxahatchee National Wildlife Refuge.*

■ Objectives:

1. *Gather expert input regarding Refuge management targets, strategies, and challenges that will be synthesized into a final report.*
2. *Produce list of potential priority conservation goals.*
3. *Produce a list of potential priority conservation targets for future development.*
4. *Identify major research gaps to support science-driven management.*

Arthur R. Marshall Loxahatchee National Wildlife Refuge



- Managed by USFWS
- Owned by state of Florida (SFWMD)
- Agency purpose/mission
- Multi-use
 - Wildlife Conservation
 - Water Supply
 - Flood Control



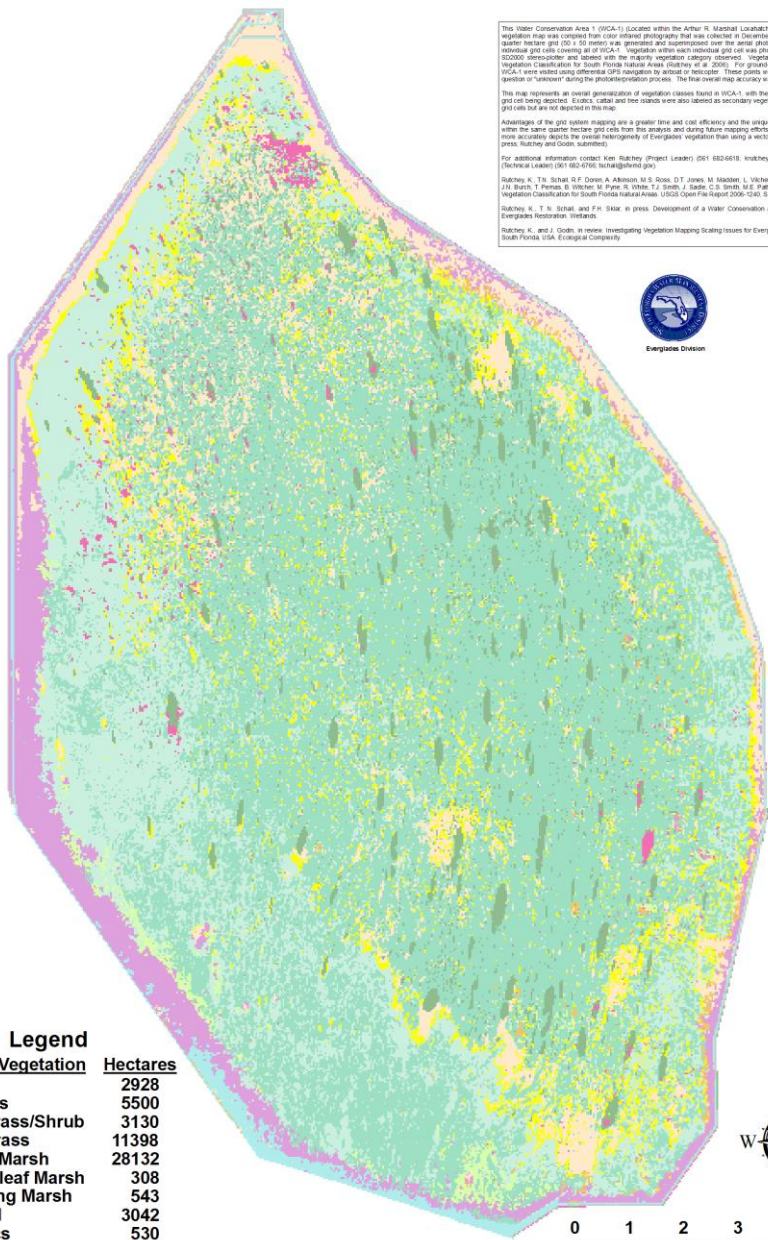
Loxahatchee Refuge Habitats

Consists of 143,924 acres represented by five habitat types:

- Tree Islands
- Wet Prairies
- Open Sloughs
- Sawgrass Communities
- Cypress Swamp



WATER CONSERVATION AREA 1 CERP RECOVER VEGETATION MAP



This Water Conservation Area 1 (WCA-1) located within the Arthur R. Marshall Loxahatchee National Wildlife Refuge vegetation map was compiled from color infrared photographs that were collected in December 2002 and January 2004. A quarter hectare grid (50 x 50 meters) was generated and superimposed over the aerial photography resulting in 227,420 individual grid cells covering all of WCA-1. Vegetation within each individual grid cell was photographed using a Leica SDC0001 stereo-camera and viewed with the analyzer vegetation category observed. Vegetation was classified using the vegetation classification for South Florida Wetland Areas (Cahoon et al., 2004). For ground-truthing, 175 locations within WCA-1 were visited using differential GPS navigation by airboat or helicopter. These points were determined to be areas in question or "unclear" during the ground-truthing process. The final overall map accuracy was determined to be 82.2%.

This map represents an overall generalization of vegetation classes found in WCA-1, with the dominant vegetation within a grid cell being depicted. Exotic, Cattail and tree stands were also defined as secondary vegetation classes within individual grid cells but are not depicted in this map.

Advantages of the grid system mapping are a greater time and cost efficiency and the unique ability to classify vegetation within the same quarter hectare grid cells from the analysis and during future mapping efforts. In addition, the grid system more accurately depicts the overall heterogeneity of Everglades vegetation than using a vector approach (Rutledge et al. in press, Rutledge and Goble, submitted).

For additional information contact Ken Rutledge (Project Leader) (351-682-6616; krutledge@fwrmd.gov) or Ted Schall (Technical Lead) (351-682-2700; tschall@fwrmd.gov).

Rutledge, K., T. Schall, R.F. Davis, A. Anderson, M.R. Ross, D.T. Jones, M. Madden, L. Votaw, K.A. Bradley, J.R. Snyder, J.H. Smith, T. Perna, B. Votaw, M. Pyne, R. White, T.J. Smith, J. Saito, C.D. Smith, M.E. Peterson, and G.D. Clark, 2006. Vegetation Classification for South Florida Wetland Areas. USGS Open-File Report 2006-2045, Saint Petersburg, Florida.

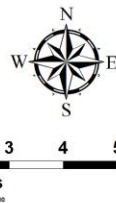
Rutledge, K., T. Schall, and F. Sklar, in press. Development of a Water Conservation Area-2A Vegetation Map for Everglades Restoration, Wetlands.

Rutledge, K., and J. Goble, in review. Investigating Vegetation Mapping Scaling Issues for Everglades Restoration Projects in South Florida. WRC Ecological Complexities.



Legend

Dominant Vegetation	Hectares
Trees	2928
Shrubs	5500
Sawgrass/Shrub	3130
Sawgrass	11398
Open Marsh	28132
Broadleaf Marsh	308
Floating Marsh	543
Cattail	3042
Exotics	530
Open Water/Canals	983
Spoil Areas	363



Loxahatchee Refuge Habitats

Wildlife

March 6, 2013

2 Wk Recession Rate (ft/wk) NEW

- > 0.09 (out of range)
- 0.00 - 0.09 (reversal)
- 0.05 - 0.00 (suboptimal slow)
- 0.12 - -0.05 (optimal)
- 0.18 - -0.12 (suboptimal fast)
- 0.23 - -0.18 (too fast)
- <-0.23 (out of range)

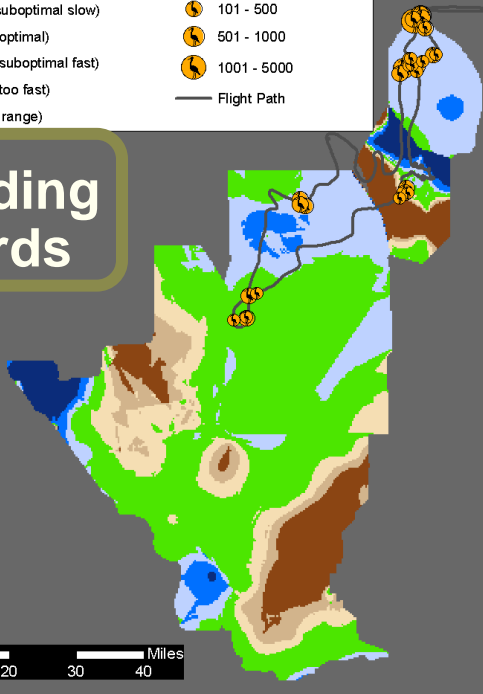
Foraging Flocks

Approx number of birds

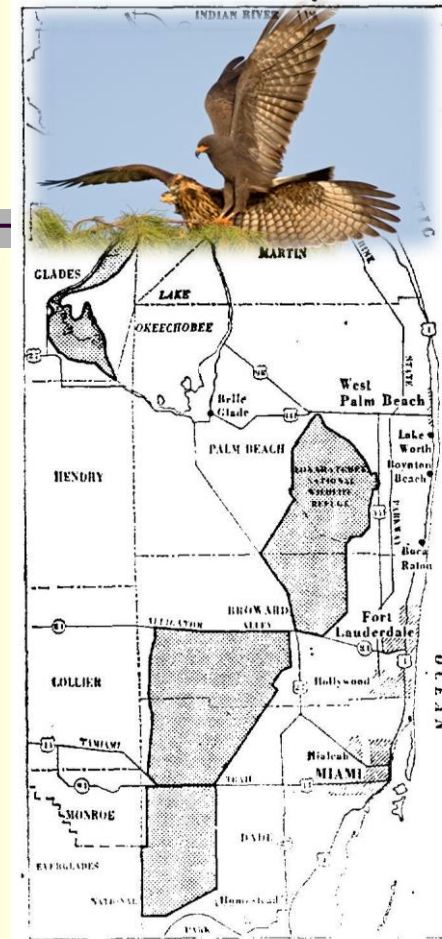
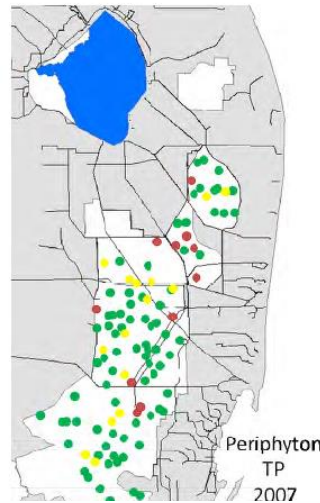
- 51 - 100
- 101 - 500
- 501 - 1000
- 1001 - 5000

— Flight Path

Wading Birds



- Over 257 bird sp; 23 mammal sp; 11 sp of frogs and toads; 10 sp of turtles; 8 sp of lizards; 24 sp of snakes; 40 sp of butterflies; 23 sp of dragonflies; and 7 sp of damselflies

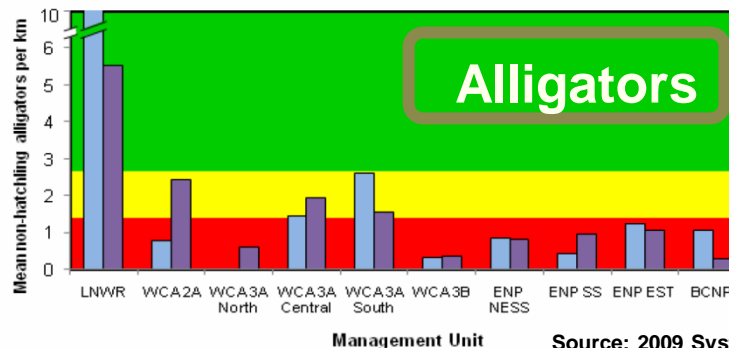


CRITICAL HABITAT FOR THE FLORIDA EVERGLADE KITE

Periphyton



Alligators



Snail kite Critical Habitat

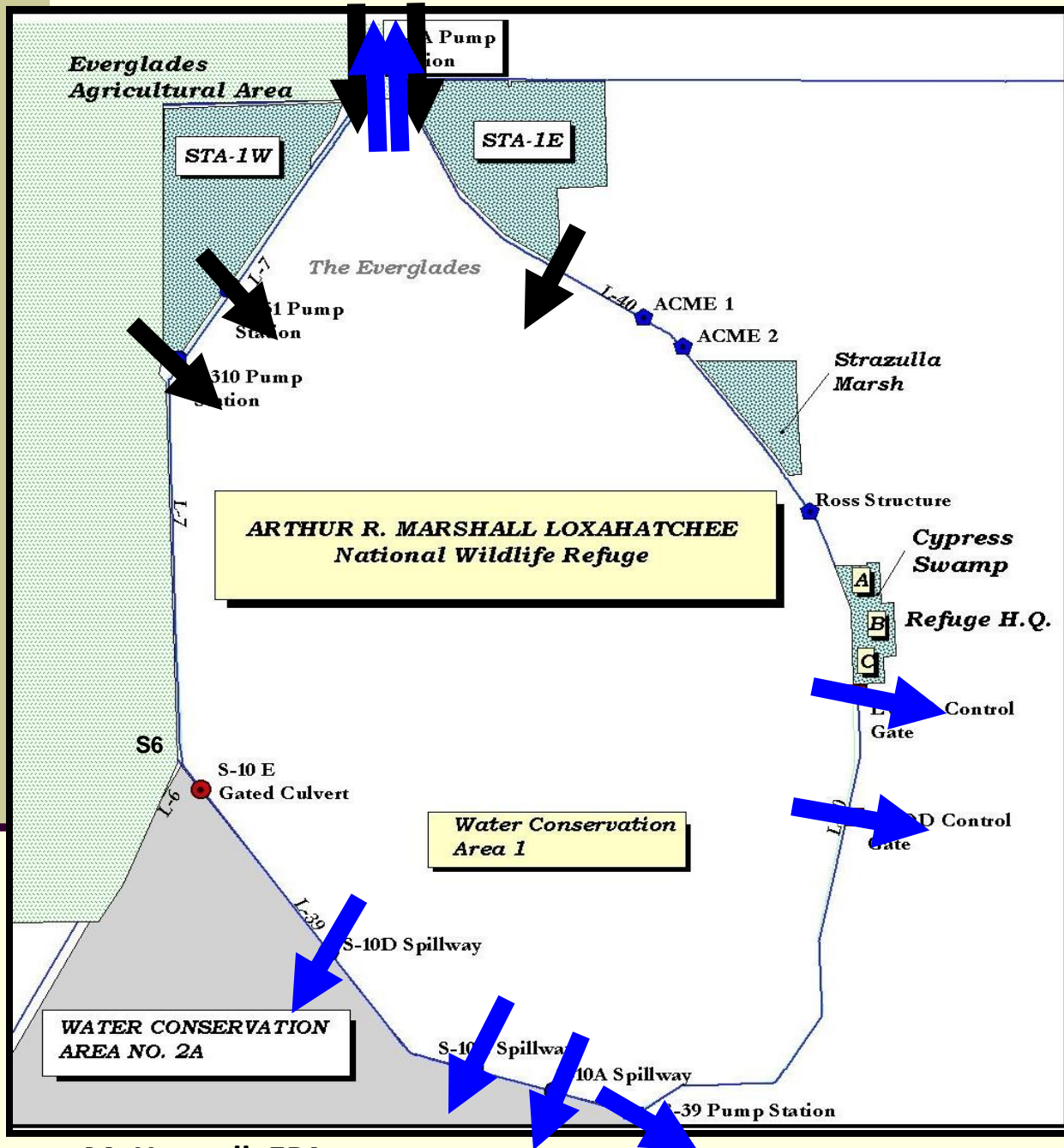


Source: 2009 System Status

Current Refuge Inflows and Outflows

↓ Current
Inflow

↓ Current
Outflow



US Army Corps
of Engineers

Water Management

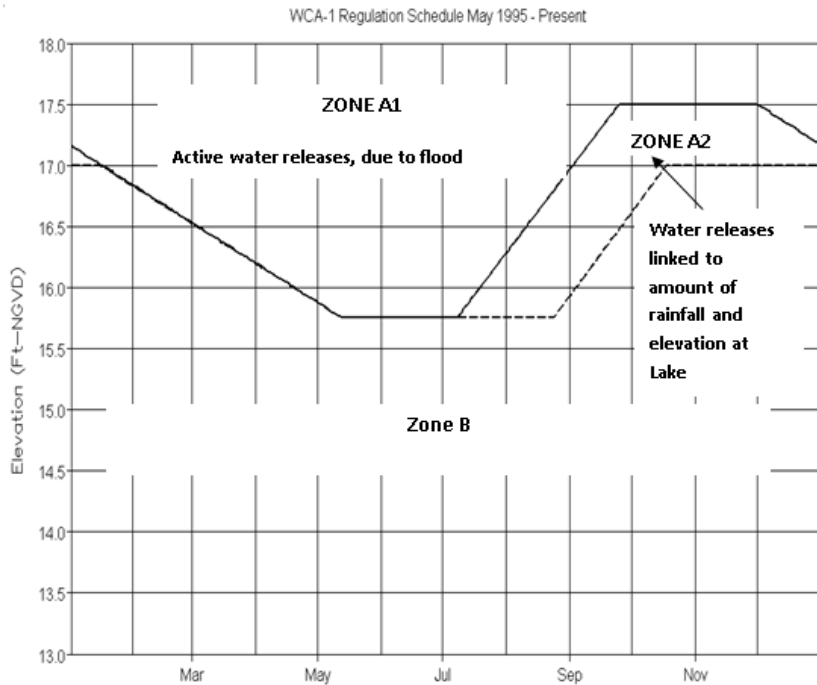
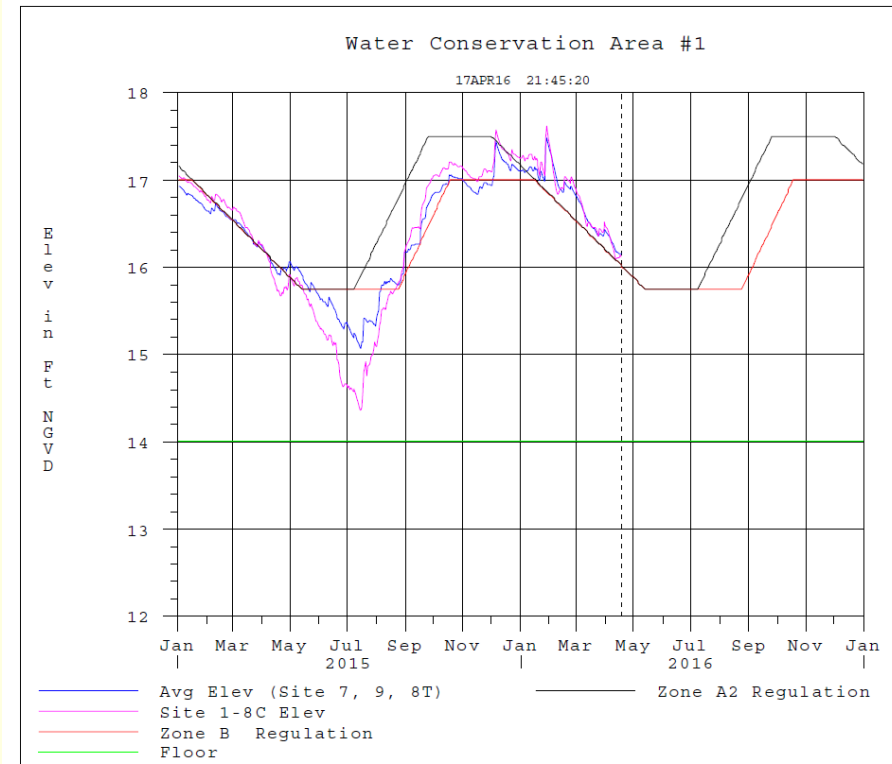


Figure 1. Water Regulation schedule for A.R.M. Loxahatchee National Wildlife Refuge, WCA 1.

Current targets

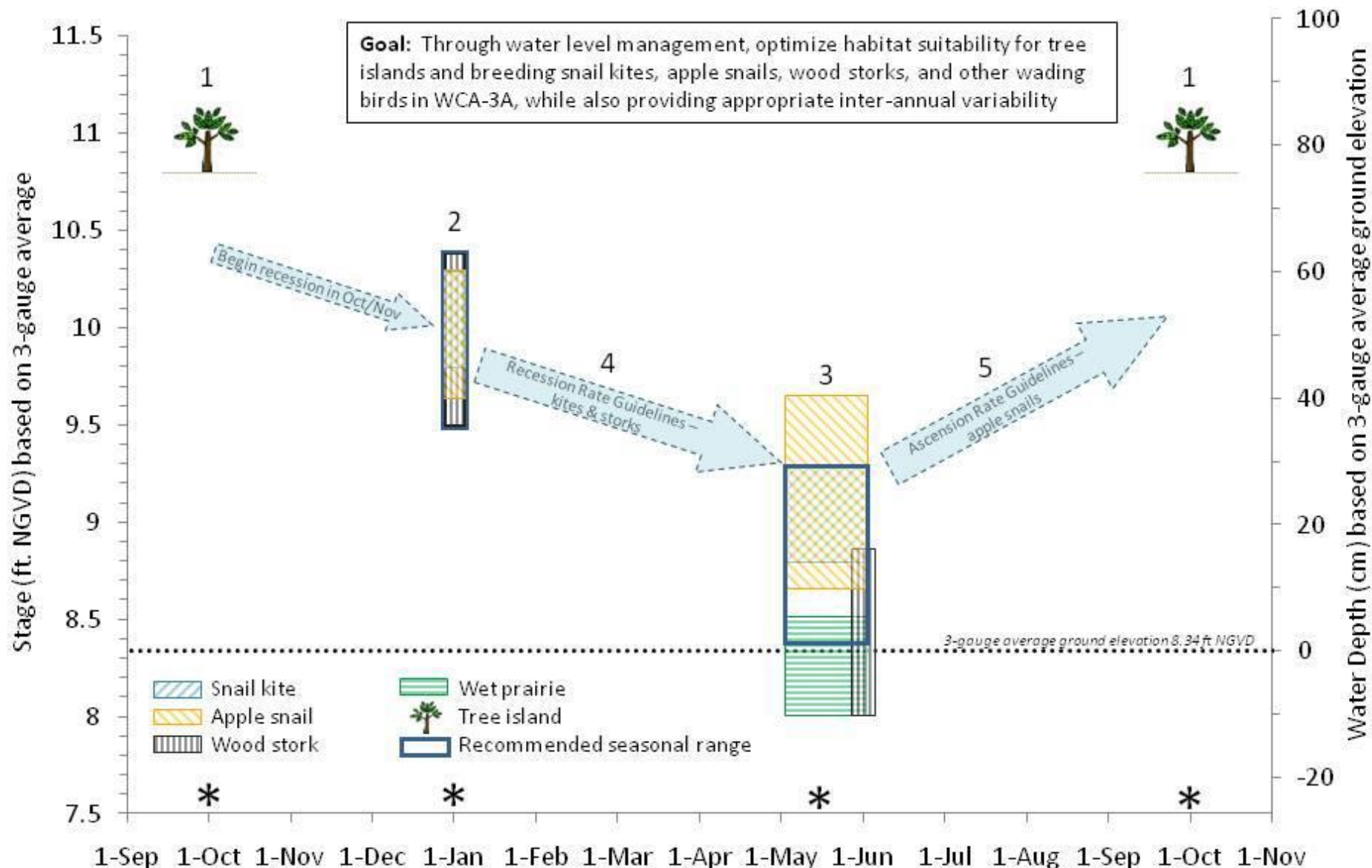
- Water levels
- High water performance measure
- Habitat suitability



- Recession rates
- Ascension rates

USFWS Multi-Species Transition Strategy for WCA-3A

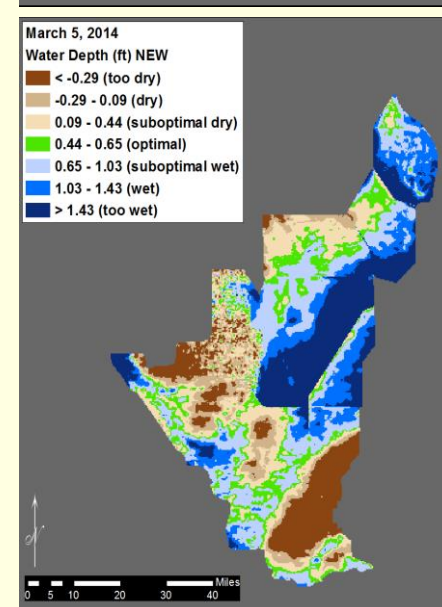
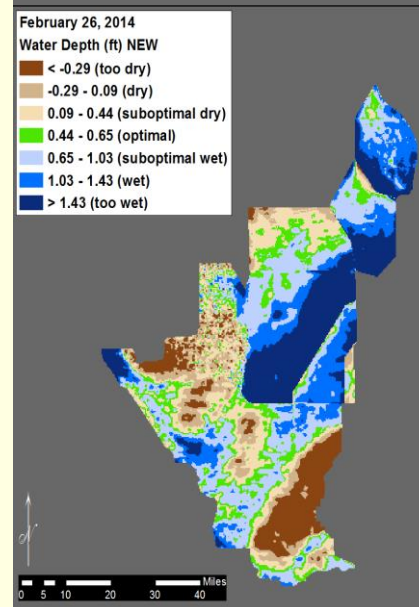
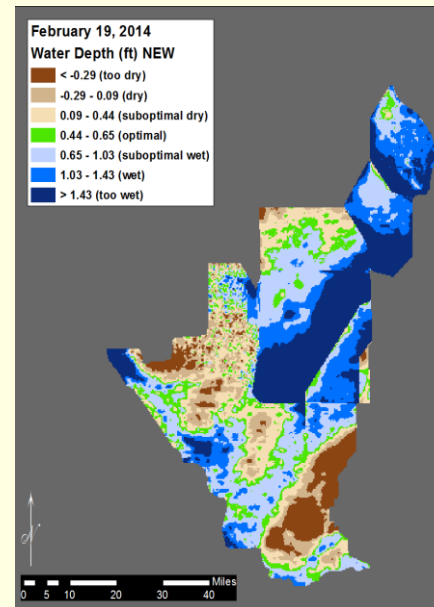
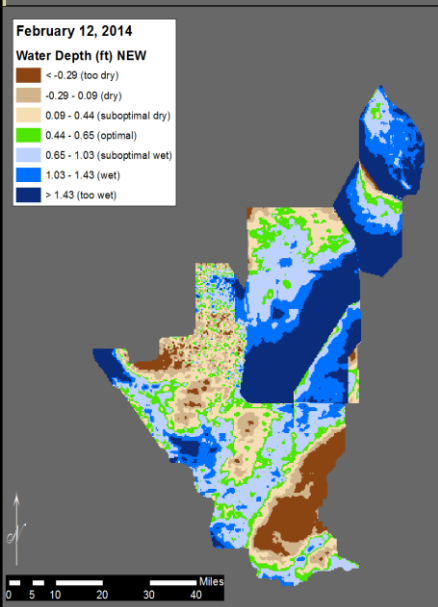
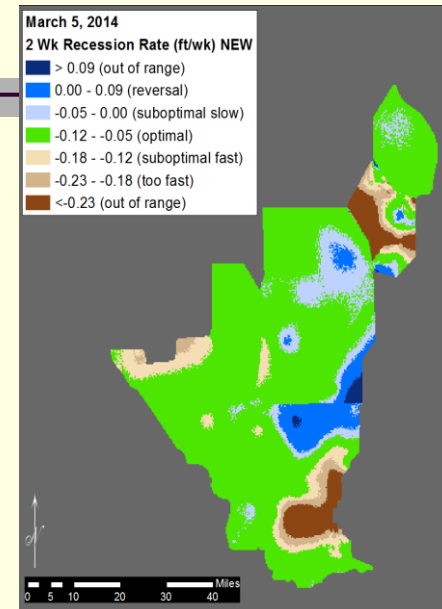
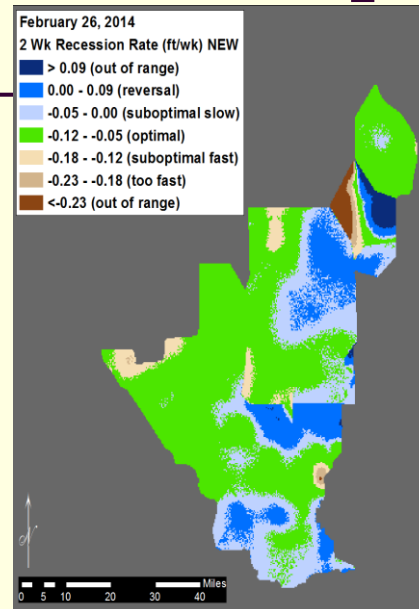
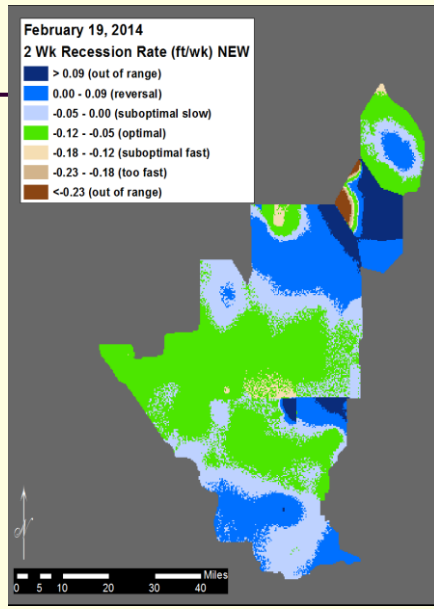
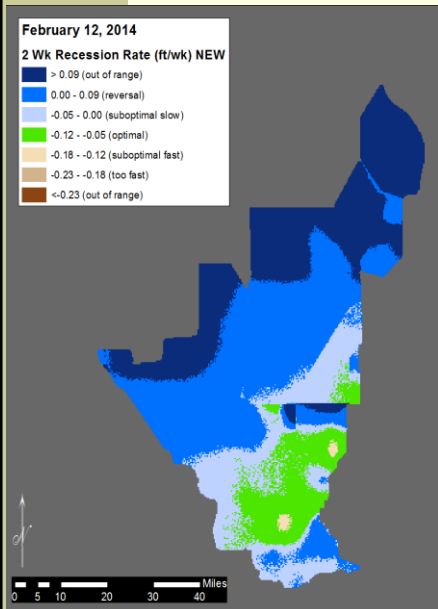
Draft July 1, 2010



* Interagency Meeting – Management decisions (targets) to be determined by an interagency team. The team should meet regularly throughout the year (minimum October, January, and May). The intent is to manage for inter-annual variation with seasonal targets based on an interagency assessment of species’ needs (evaluated w/monitoring data), forecasted climatic conditions, and past years’ hydrology.

1-5 See explanatory text below for detailed information on recommended water levels and rates.

Habitat Suitability Index— Recession Rates & Depth



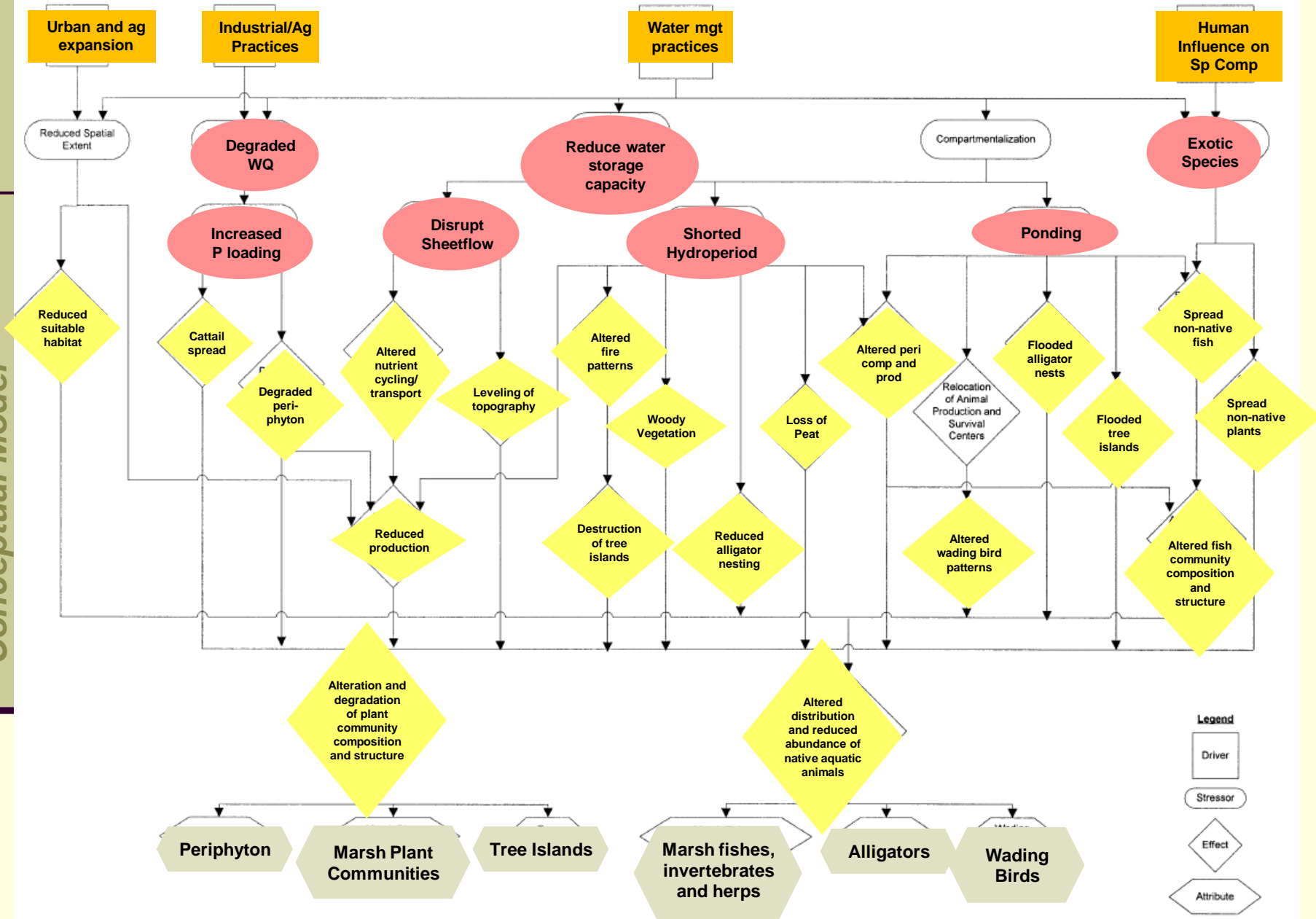
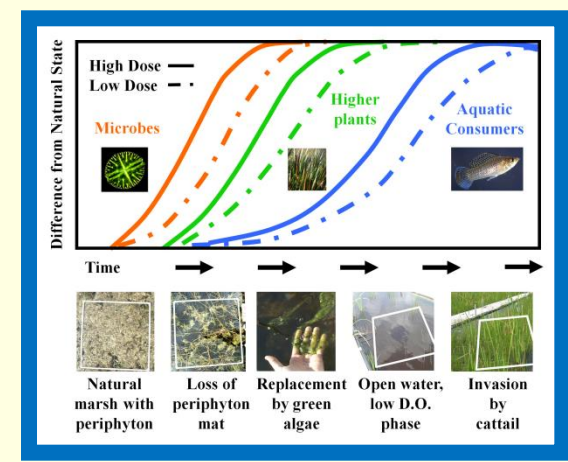


Figure 2. Everglades Ridge and Slough Conceptual Ecological Model Diagram. External drivers are shown as squares or rectangles, internal stressors as ovals, the ecological effects as diamonds, and the key attributes as hexagons (see Ogden et al. 2005).

Water Quality Impacts

Degraded Water Quality



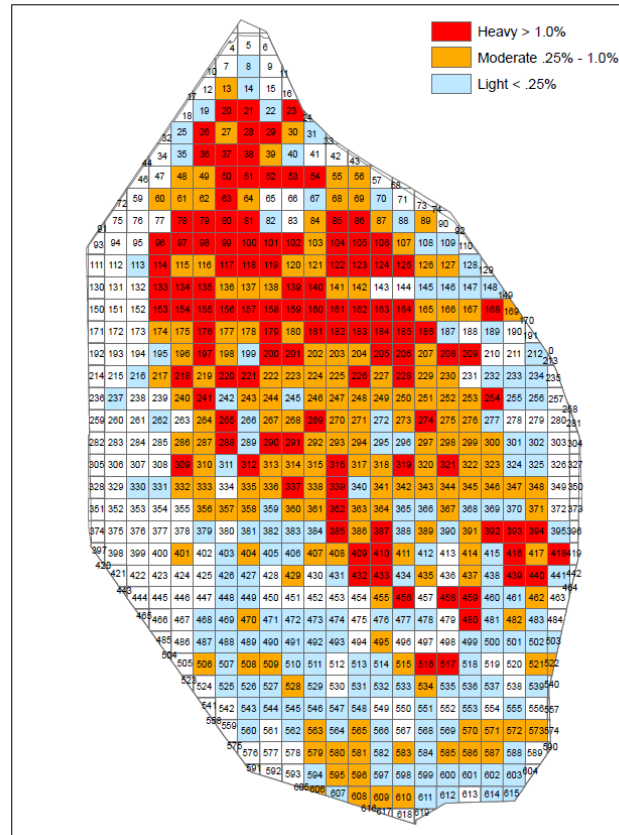
Ecological Effects



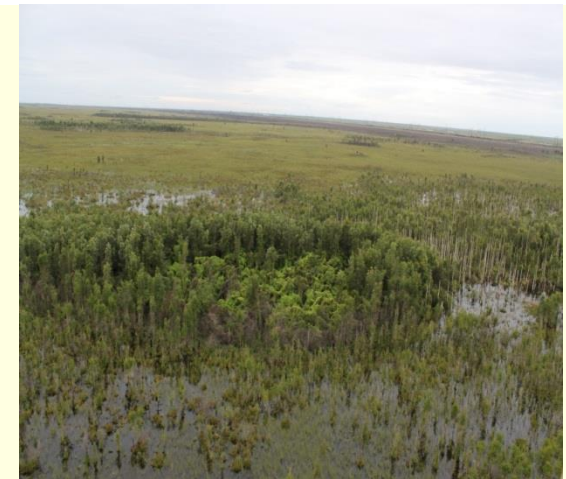
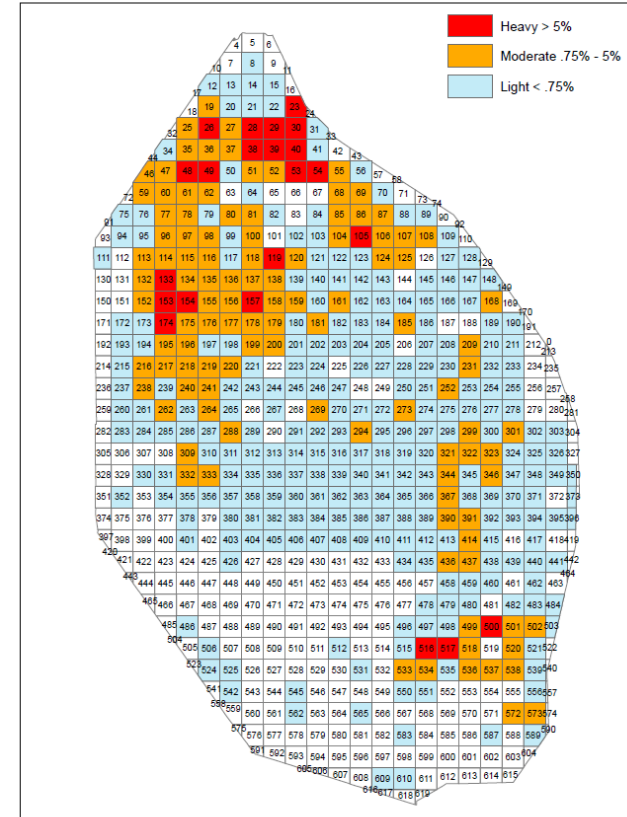
Exotics



2015: 1KM SRF Lygodium



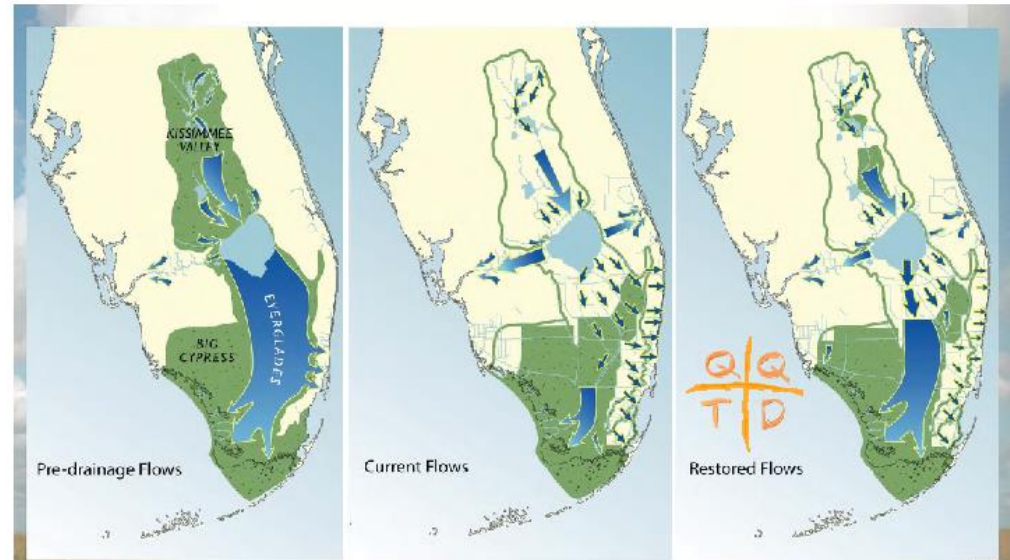
2015: 1KM SRF Melaleuca



COMPREHENSIVE EVERGLADES RESTORATION PLAN

2014 System Status Report

AUGUST 2014



Pre-drainage Flows

Current Flows

Restored Flows

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Restoration Strategies – Key Projects



HISTORIC FLOW

CURRENT FLOW

RESTORED FLOW

THE HEART OF THE EVERGLADES

CENTRAL EVERGLADES

JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

DATES	USE GAGE	CONDITIONS
1 JAN - 30 JUN	1-B CANAL	ALL
1 JUL - 31 DEC	1-B CANAL	EXCEPT AS NOTED BELOW
	REG. 1-T, 1-ET, 1-F	DURING RISING STAGES WHEN CANAL STAGE EXCEEDS AVERAGE.

CENTRAL AND SOUTHERN FLORIDA INTERIM REGULATION SCHEDULE

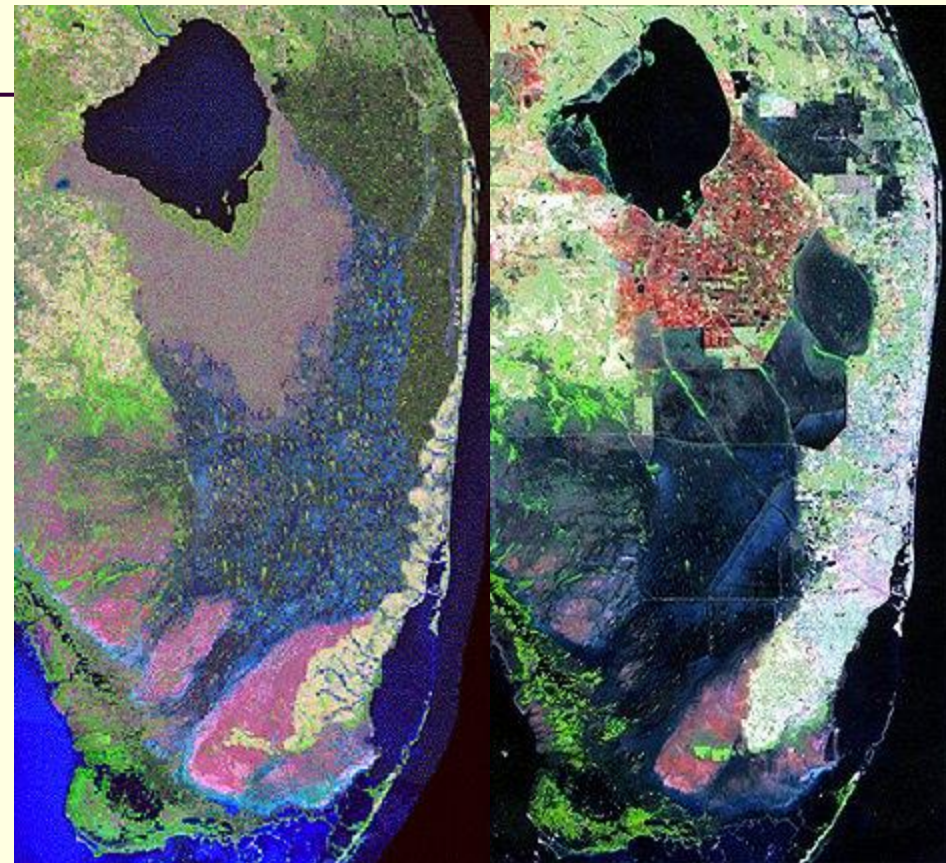
WATER CONSERVATION AREA NO. 1

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

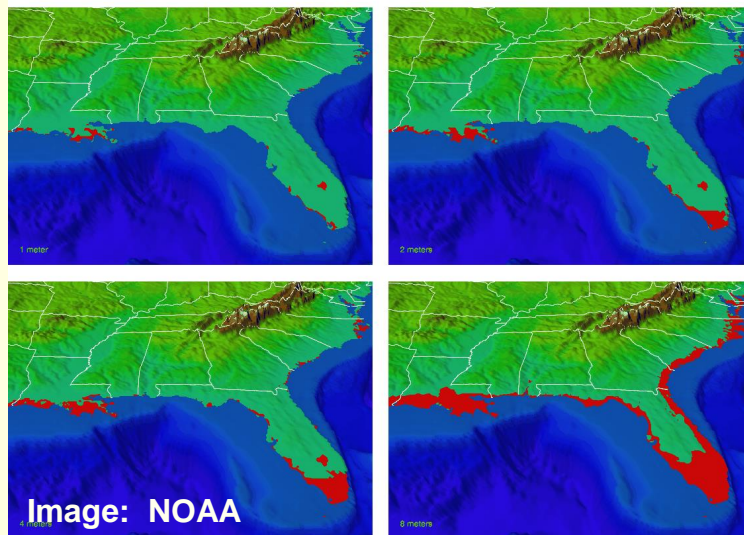
DATED: 03 MAY 1995

Additional Drivers

- Urban development
- Adjacent land use changes
- Increasing urban populations/water needs
- Climate change
- Funding



Sea Level Rise



Refuge Goals

- Develop future desired conditions
- Develop specific conservation targets
 - Strategic Habitat Conservation
- Update planning documents/
management plan
 - Current goals
- Continue developing science-
driven management strategies
- Coordinate closely with all
partners to achieve goals



Excerpt from 2009 'BioReview of existing Habitat Management Plan:

1. Determine future desired conditions of the Refuge interior. This may require assigning current staff to this task at the expense of other duties and/or securing additional personnel to review, analyze, and synthesize data.