The Trophic Hypothesis and MAP

Reducing uncertainty in a key series of CERP ecological predictions

US Army Corps of Engineers®

RECOVER assessment integration science evaluation

NATIONAL PARK SERVICE

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

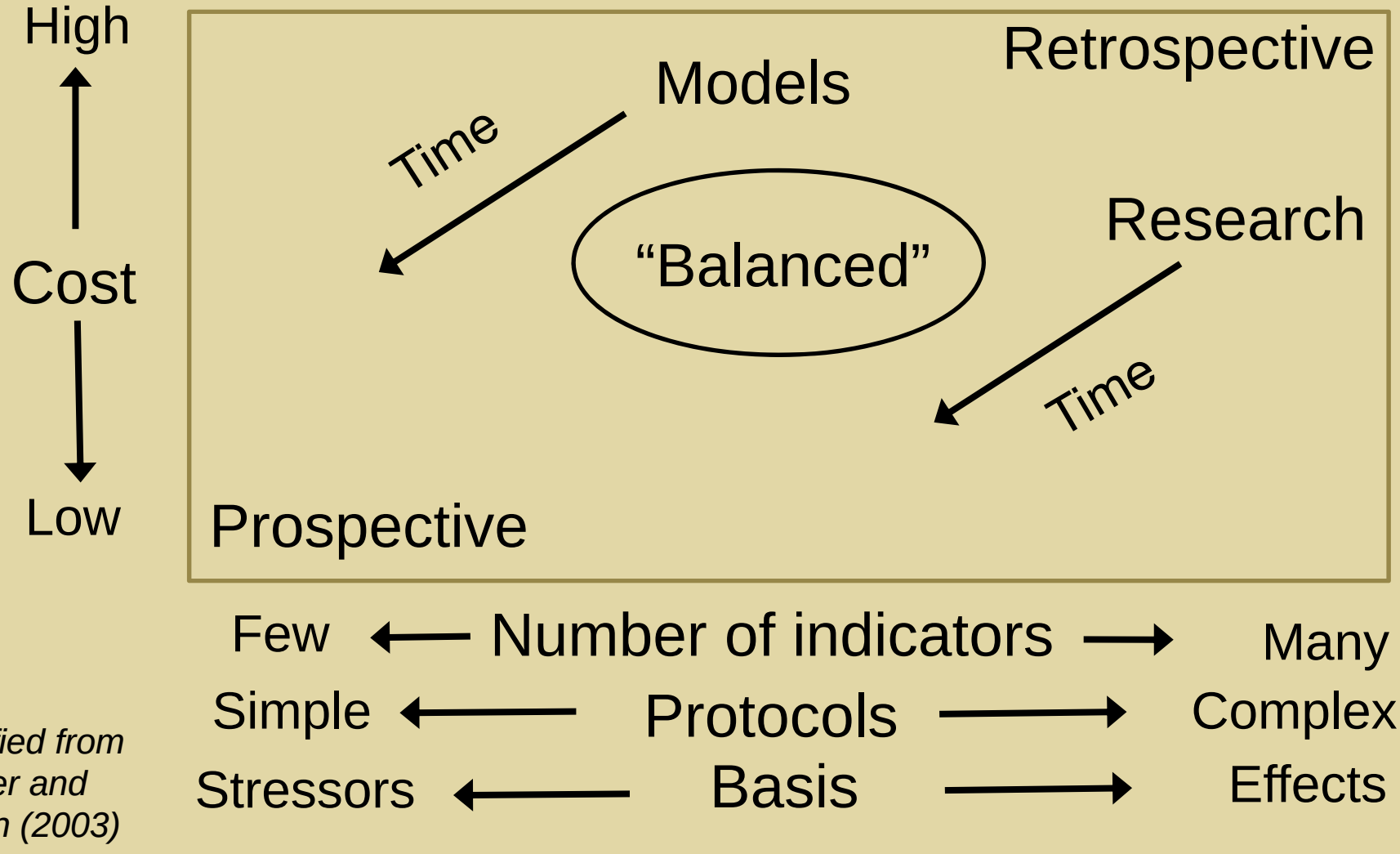
Audubon OF FLORIDA

FIU FLORIDA INTERNATIONAL UNIVERSITY

FAU FLORIDA ATLANTIC UNIVERSITY

UF UNIVERSITY of FLORIDA

MAP monitoring approach



Modified from Trexler and Busch (2003)

CERP Monitoring and Assessment Plan (MAP)

- Directed at hypothesis clusters rather than regional Conceptual Ecological Models

- Greater Everglades Module hypothesis cluster
  - Wading Bird Nesting in the Mainland and Coastal Everglades in Relation to the Aquatic Fauna Forage Base Hypothesis Cluster

    i.e. "Trophic Hypothesis"

Foundations of the Trophic Hypothesis

- Robertson 1965

"The water spreads across miles of marsh, and food chains of fresh-water organisms flourish in the warm shallows. The summer flood poured into brackish coastal bays feeds nutrients into other cycles. **As the water recedes with the onset of the dry season, aquatic life is forced into an ever-diminishing volume of water. At various points of optimum food concentration, the summer's production of lesser creatures is translated into an increase of alligators, otters, egrets, ibis, anhingas, limpkins, all the rest."**

- Kahl 1967
- Higer and Kolipinski 1967
- Kushlan et al. 1975 and 1976
- Ogden et al. 1976
- Frederick 1980s

Early MAP regional CEMs

Figure 3- 2: RECOVER Monitoring and Assessment Everglades Ridge and Slough

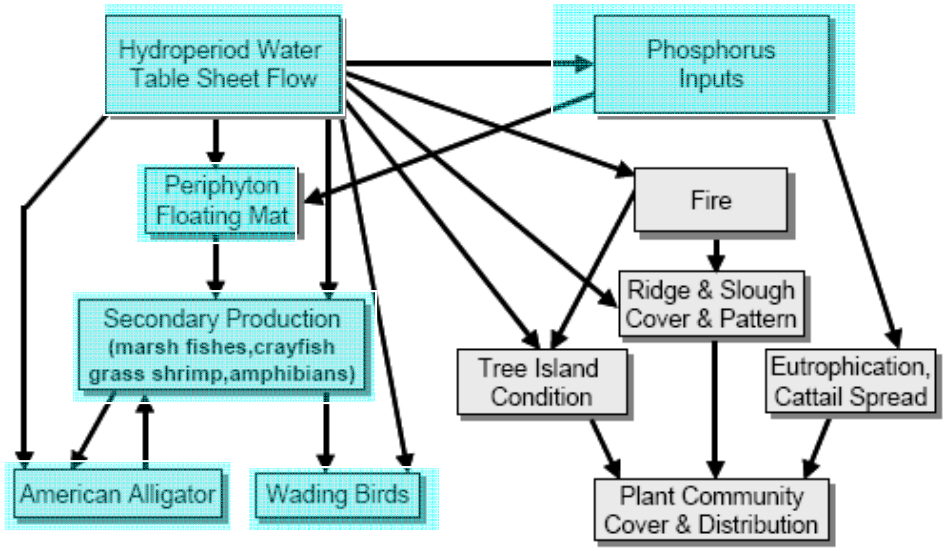


Figure 3-4: RECOVER Monitoring and Assessment Everglades Mangrove Estuaries

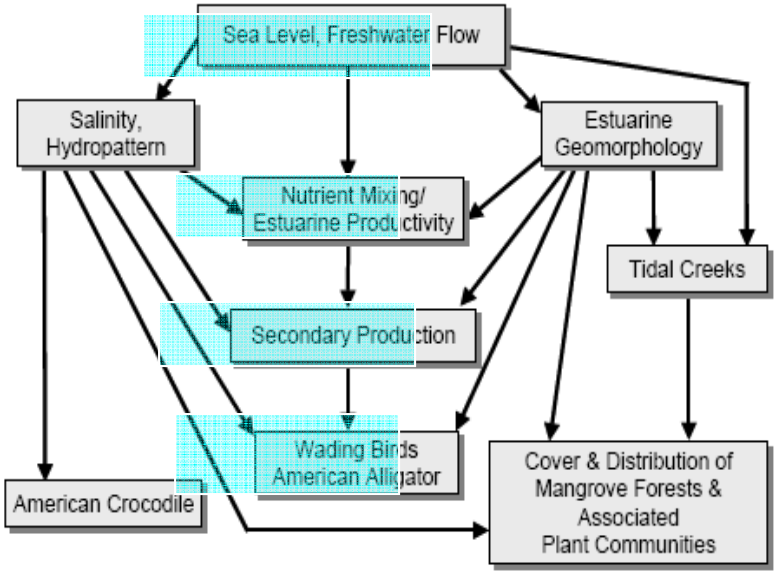


Figure 3-3: RECOVER Monitoring and Assessment Everglades Marl Prairie and Rocky Glades Wetlands

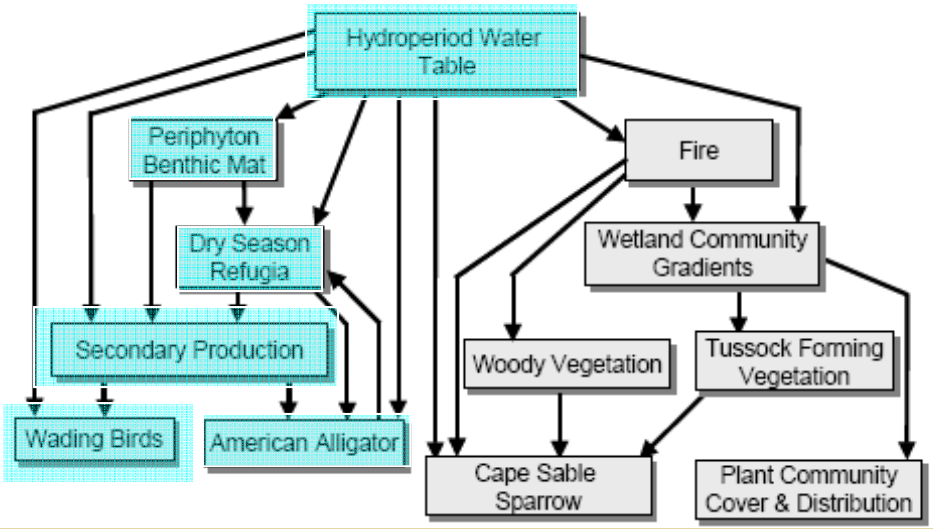
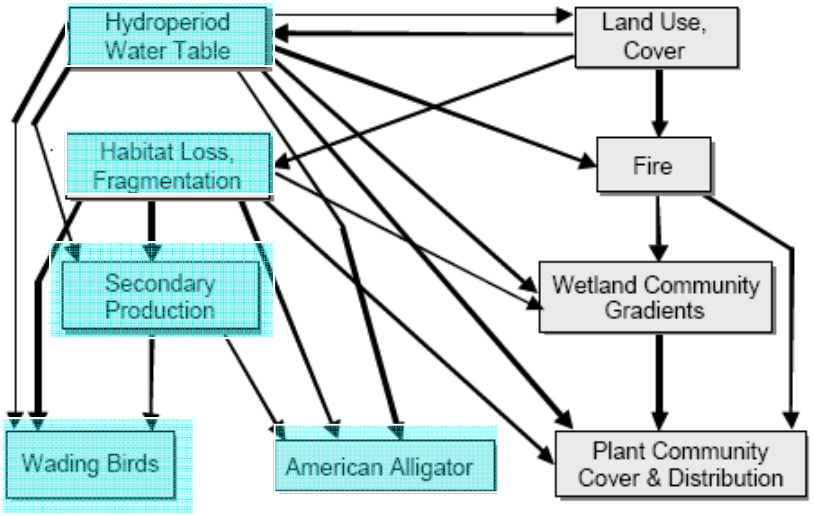
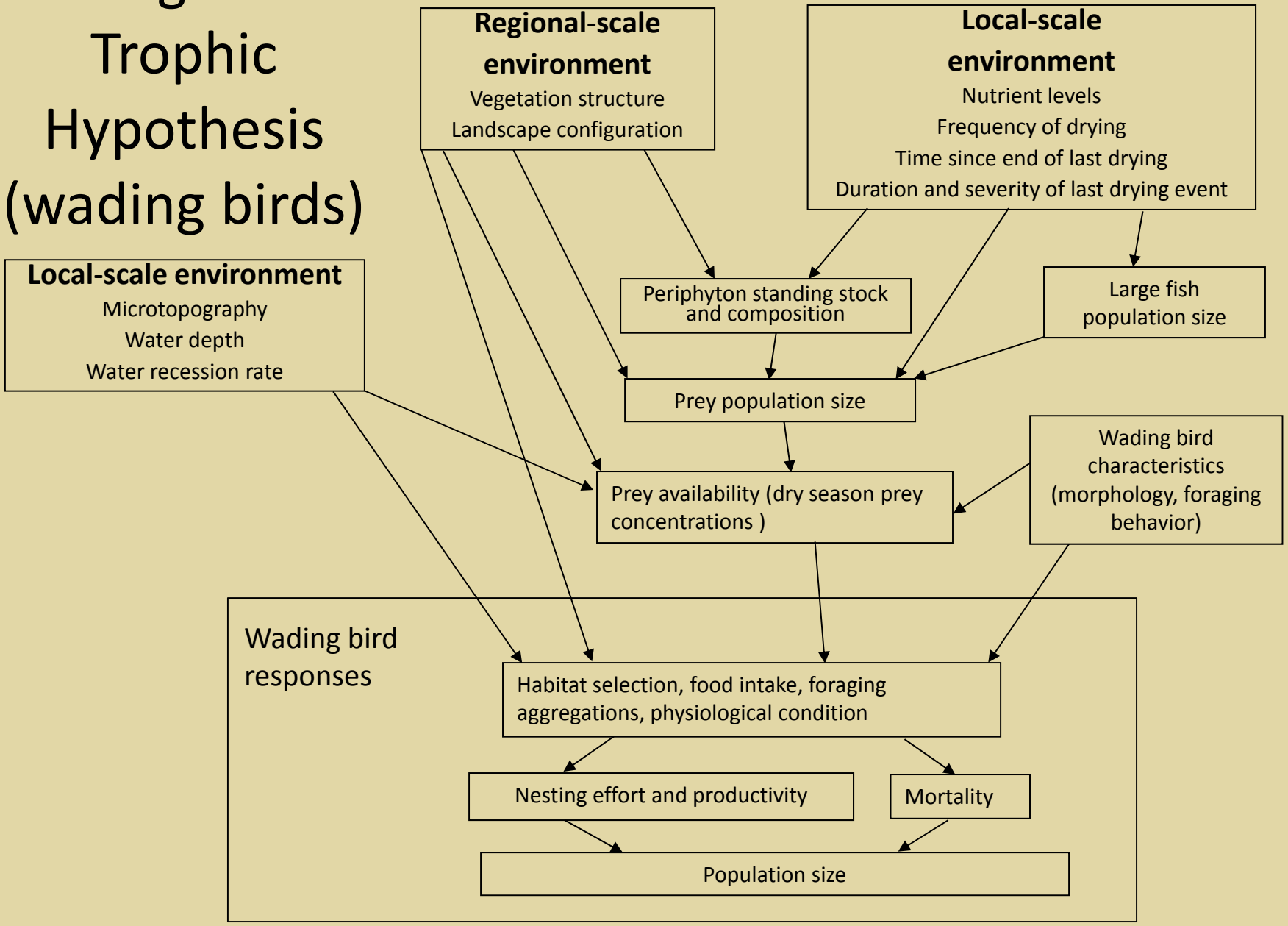


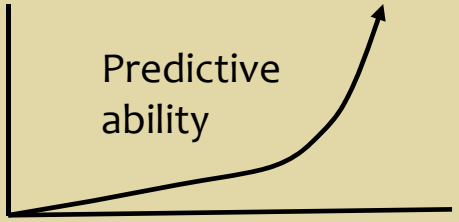
Figure 3-5: RECOVER Monitoring and Assessment Big Cypress



Everglades Trophic Hypothesis (wading birds)



Snowballing advances in understanding, evolving priorities



I. **Prey Production:** Linking fish production and hydrology (1970 – present)
II. **Bird Foraging:** Understanding avian foraging success in relation to prey density and depth (1990 – present)
III. **Bird Reproduction:** Linking avian reproduction with foraging (1930 – present)
IV. **Bird - hydrology Models:** Modeling tradeoffs between depth, hydroperiod, water trend and timing for predicting avian foraging and reproduction. (1998 – present)
V. **Feedback to Operations:** weekly and periodic meetings
VI. **Feedback to Restoration Planning:** Examining restoration scenarios with new modeling tools. (2010 – present)
VII. **Linkages with CERP family of models** – hydrology, vegetation, nutrients, contamination, fire, tree island formation.

Session objectives

1. Show recent evidence of the causal linkage of hydrology and nutrients to fish and birds – what mechanisms support this linkage? How far can we trust the predictions?

2. Examine limits of the assumptions of the hypothesis, and dangers of assuming stationarity.

Session structure

Questioning assumptions inherent in the trophic hypothesis – novel predators, contaminants and distant magnets. **Frederick, Oberhofer**

Advances in understanding dynamics of lower trophic levels in relation to hydrology. **Trexler, Cook, Lorenz**.

Linking prey production, prey availability, and wading bird foraging and nesting dynamics. **Lorenz, Klassen**.

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Reducing uncertainty as a foundation for CERP

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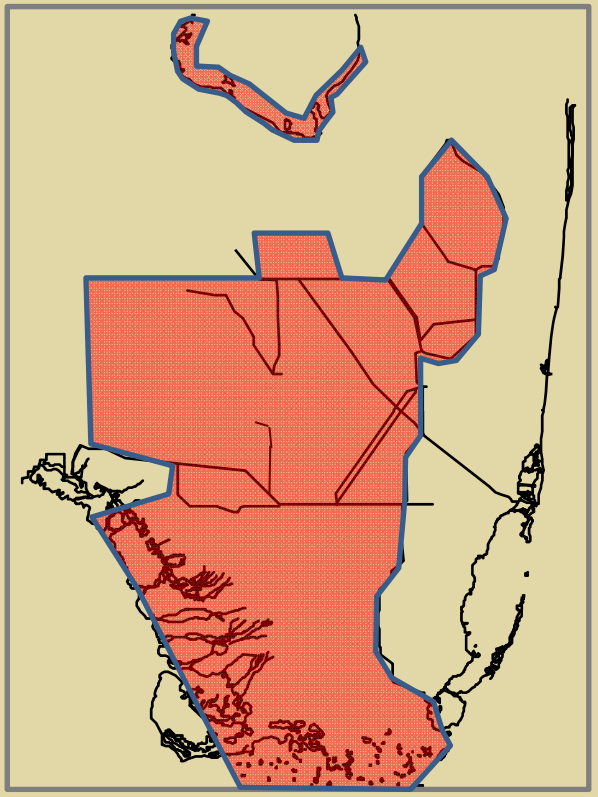
Spatially comprehensive annual monitoring

For nearly 10 years:

- Avian nest monitoring Okeechobee to Florida Bay
- EDEN available
- spatially comprehensive aquatic prey sampling



For 5 – 9 years:

Validation of models relating fish production to hydrology

Models relating fish availability to wading bird foraging