REstoration, COordination, VERification (RECOVER)

Greater Everglades Hypothesis Clusters

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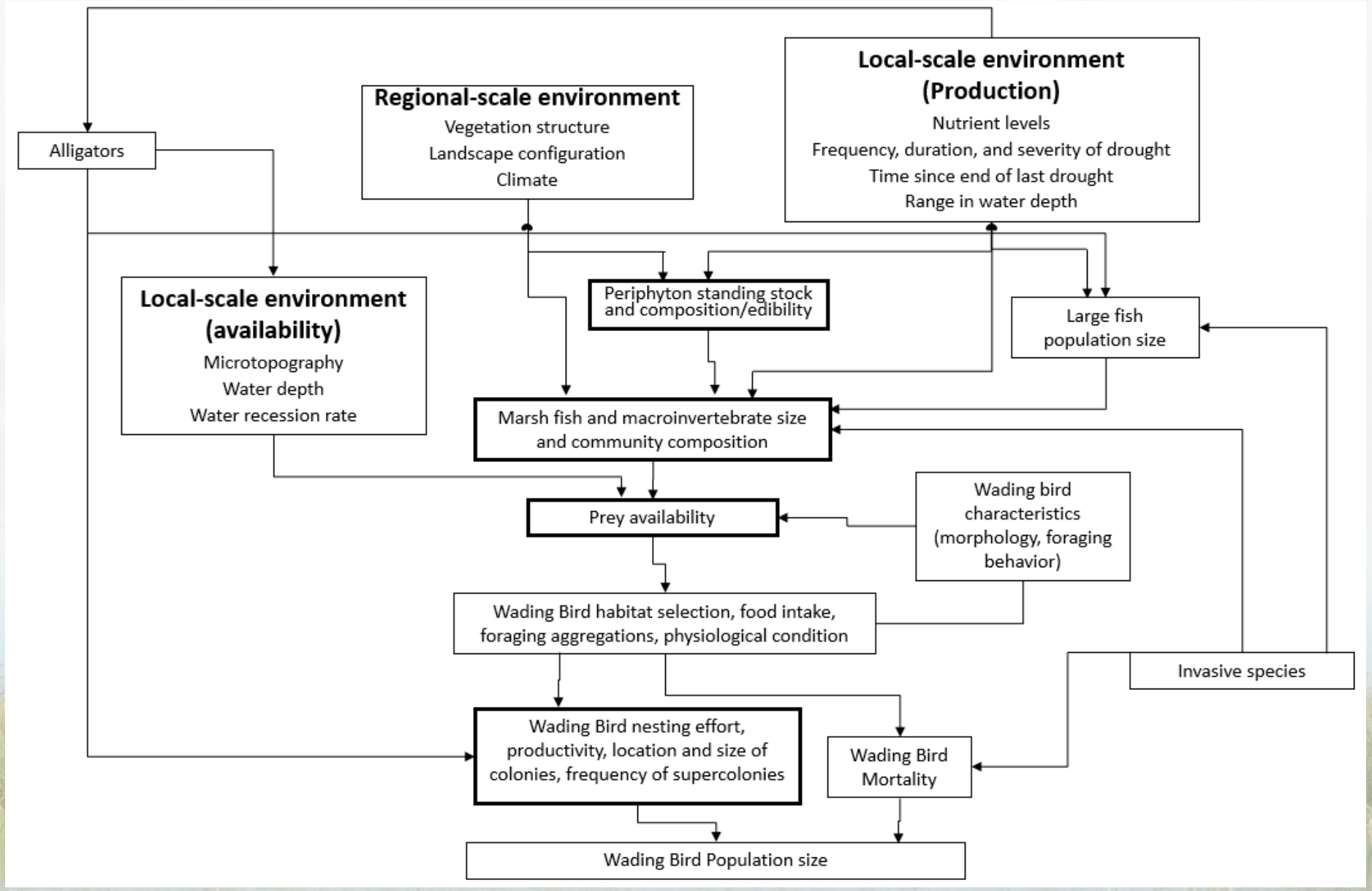
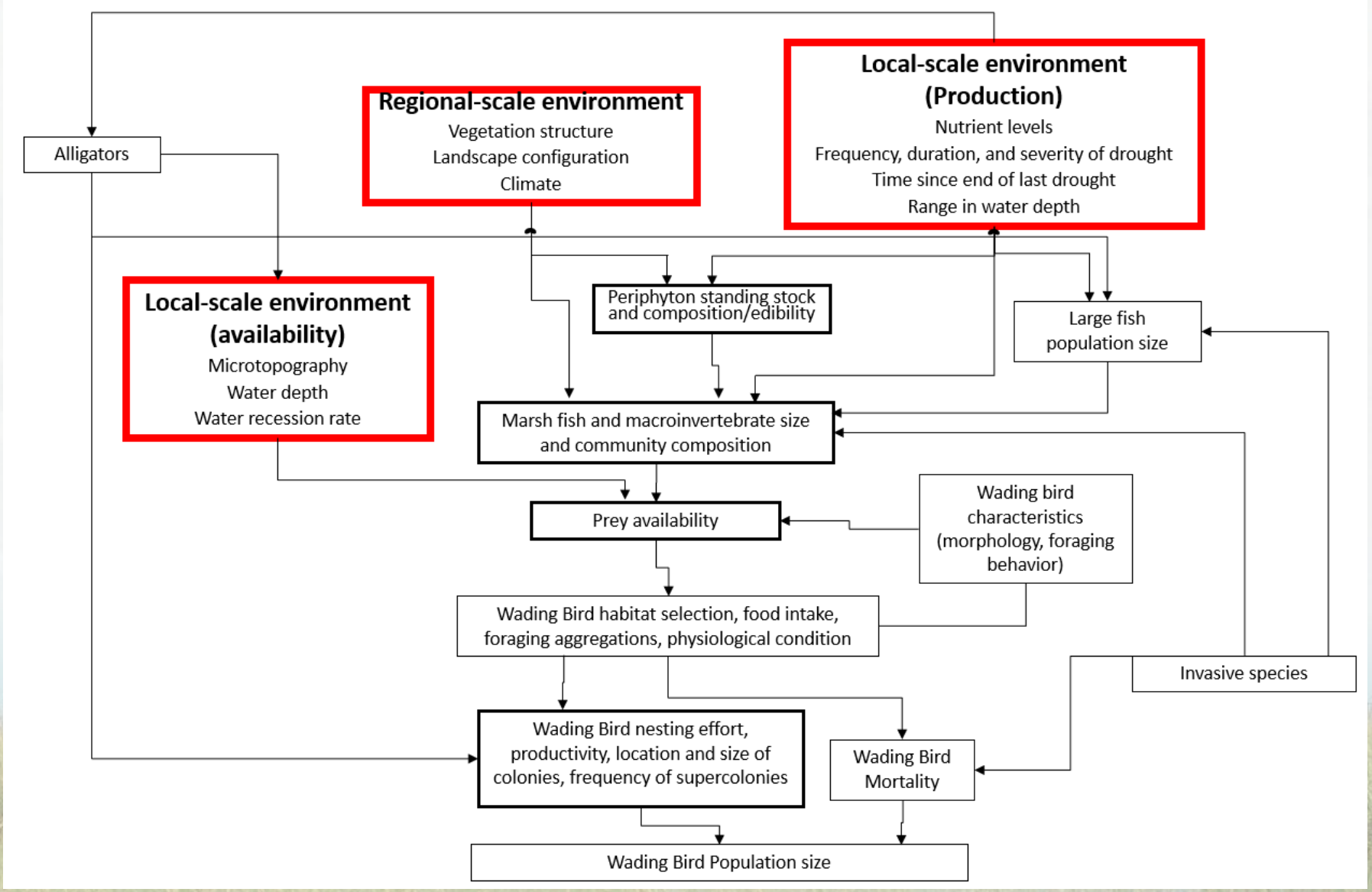
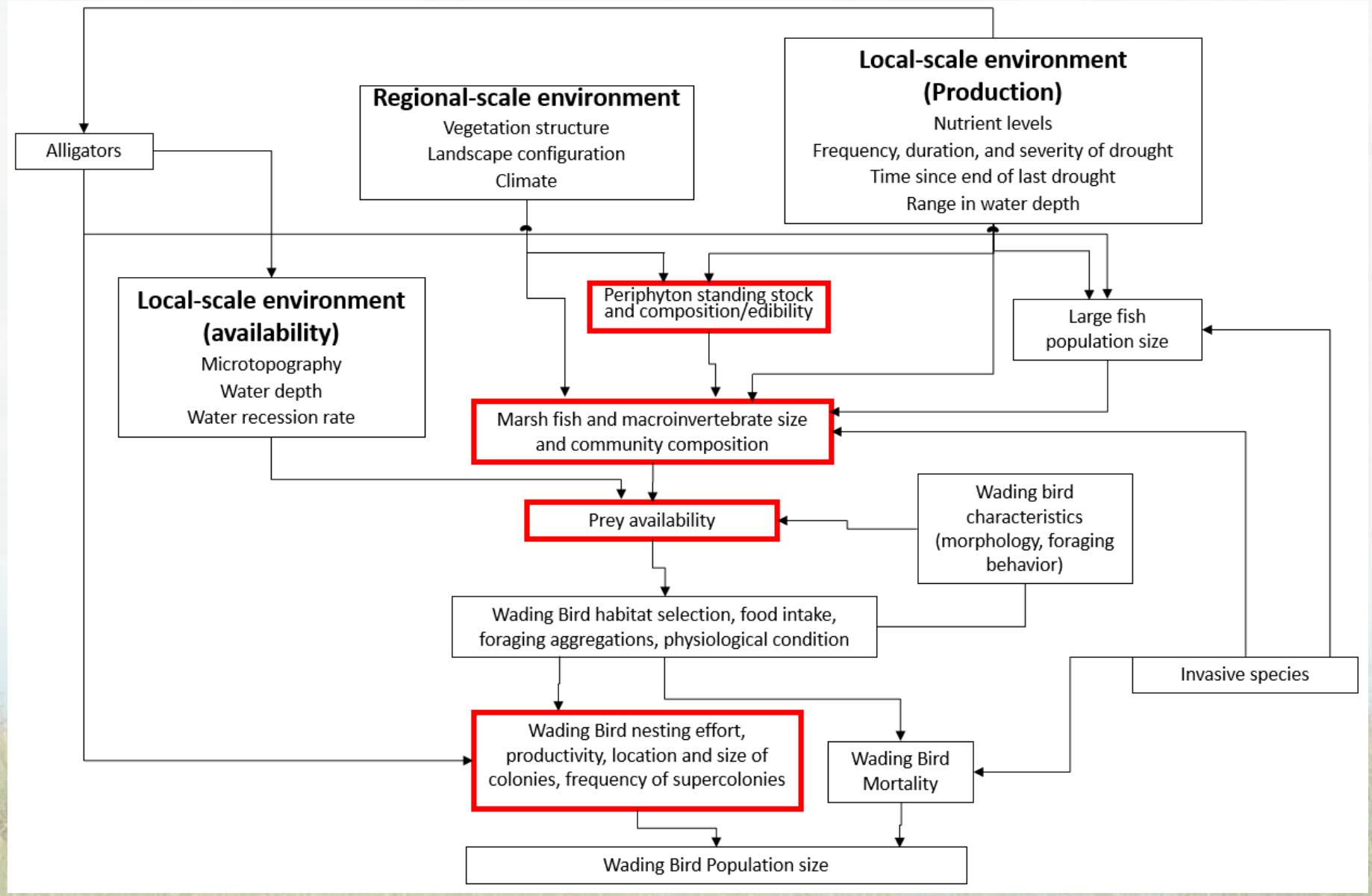
Greater Everglades Trophic HC Diagram



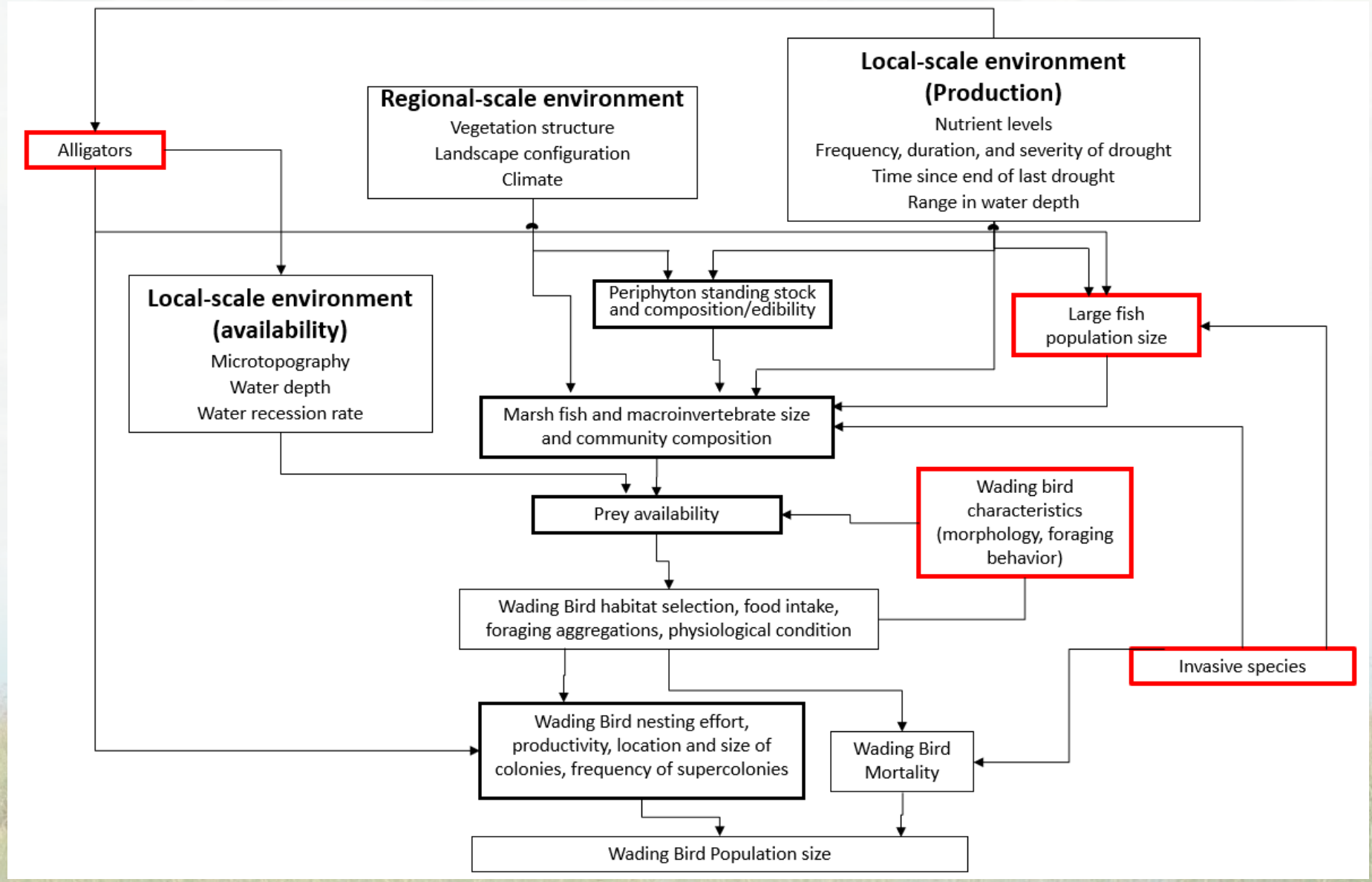
Greater Everglades Trophic Hypothesis Cluster



Greater Everglades Trophic Hypothesis Cluster



Greater Everglades Trophic Hypothesis Cluster



Greater Everglades Trophic Hypothesis Cluster

- **Working Hypotheses:**
  - *Restoration of hydrologic conditions consistent with the understanding of pre-drainage conditions is expected to reestablish **aquatic prey densities and prey availability** across the landscape that will, in turn, support the return of large, successful **wading bird nesting colonies** to the southern Everglades*

***From observations of supercolonies in 2018 and 2021**

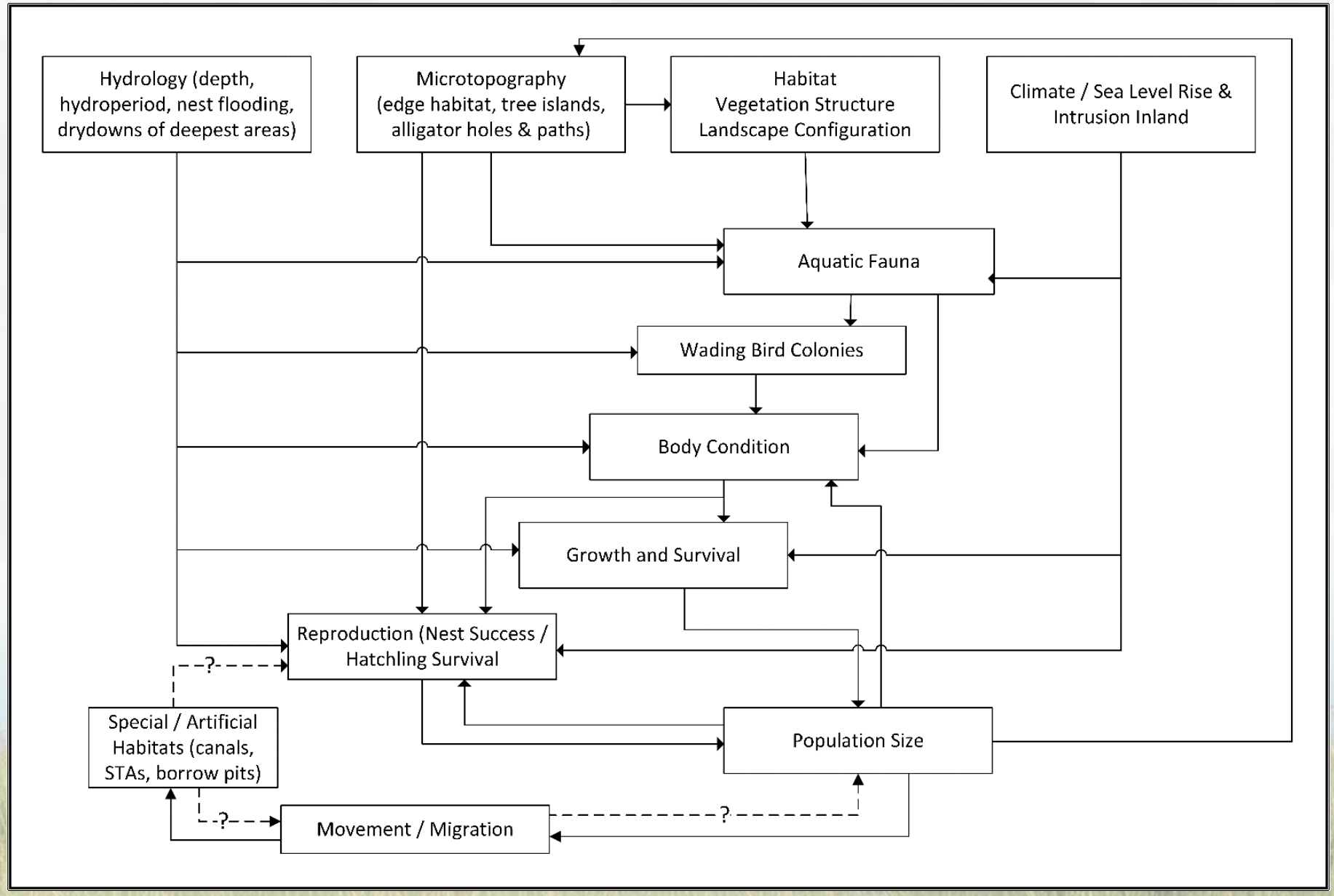
- ***Crayfish availability** in the marl prairies is influenced by chronic droughts and lengthened hydroperiod, which are expected to increase crayfish production and availability for breeding wading birds in the southern Everglades*
- *Nutrient enrichment causes an elevation in **periphyton** nutrient content, a reduction in the proportion of calcareous floating and epiphytic periphyton mats, and a replacement of oligotrophic species by non-mat forming filamentous species.*
- *Shortened hydroperiods cause a reduction in the proportion of diatoms and green algae and an increase in calcareous blue-green algae, possibly reducing food value of **periphyton**, and affecting overall productivity of the Everglades.*

Greater Everglades Trophic Hypothesis Cluster

- **MAP Monitoring:**
  - Wading bird breeding activity (colony size, location, success)
  - Aquatic fauna (wet/dry season abundances)
  - Periphyton (wet season composition and edibility)

- **Key Uncertainties:**
  - Invasive species – Asian Swamp Eel, Burmese Python, African Jewelfish
  - Climate change – Saltwater intrusion from SLR, precipitation patterns

Greater Everglades Alligator Hypothesis Cluster



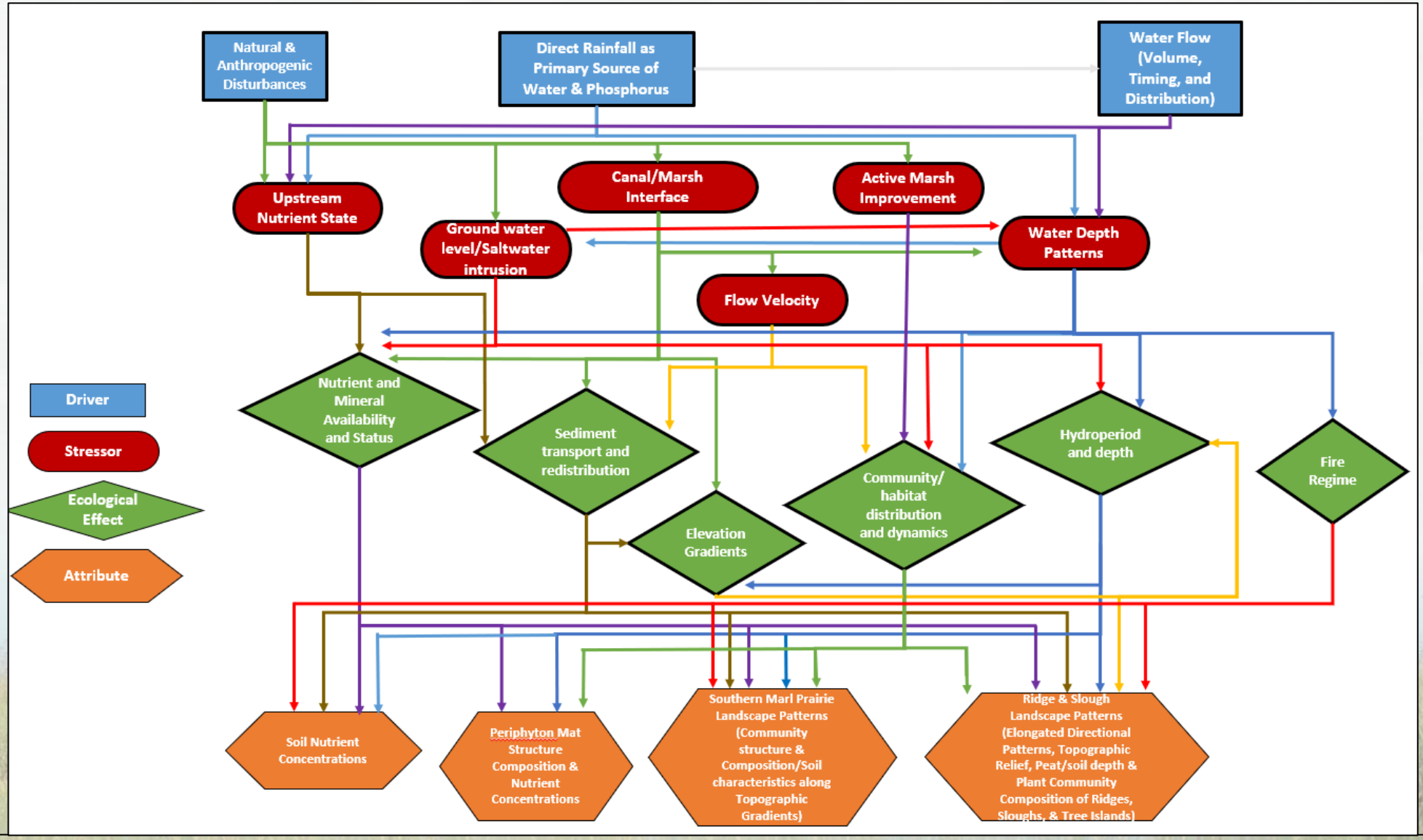
American Alligator Density and Body Condition in Relation to the Hydrologic Patterns and Artificial Canal Habitats in the Everglades Hypothesis Cluster

- **Working Hypotheses:**
  - *Changes in density, body condition, reproduction, growth, and survival of American alligators (Alligator mississippiensis) over time are due to alterations of hydrologic conditions (e.g., depth (maximum, minimum, range), hydroperiod), which influence habitat suitability and prey densities across all life history stages.*
  - *Heterogeneity of topography and landscape features (deep sloughs, higher ridges, tree islands, alligator holes) support healthy alligator and prey populations. These aspects of hydrology, landscape complexity, and prey availability have direct, measurable effects on alligator density, body condition, reproduction, growth, and survival.*
  - *Sea level rise is expected to result in change in location and spatial extent of suitable habitat.*

American Alligator Density and Body Condition in Relation to the Hydrologic Patterns and Artificial Canal Habitats in the Everglades Hypothesis Cluster

- **MAP Monitoring:**
  - Alligators (relative density, body condition)
- **Key Uncertainties:**
  - Climate change effects on alligator biology (metabolism, nesting, etc.)
  - Relationship of alligators to landscape and hydrologic conditions has been measured during degraded conditions and may not be the same in restored conditions
  - Role of STAs and FEBs to alligator populations and condition
  - Effect of extreme events and their frequency on alligator populations at local and regional scales

GE Interrelationships of Sheet Flow, Water Depth Patterns, Oligotrophic Nutrient Status, and Landscape Patterns Hypothesis Cluster



GE Interrelationships of Sheet Flow, Water Depth Patterns, Oligotrophic Nutrient Status, and Landscape Patterns Hypothesis Cluster

▪ Working Hypotheses:

- **Canal- Marsh Interactions Hypothesis**

  Canal-marsh interactions have altered or eliminated sheet flow and related natural system hydrologic and landscape characteristics throughout the Everglades. Canals do not support biological mechanisms that reduce nutrient levels to their historic oligotrophic status. ***Canal backfilling combined with resumption of natural volume, distribution, and spatial distribution of freshwater delivery is expected to restore sheet flow, sustain pre-drainage landscape characteristics, and reduce downstream nutrient concentrations.***

  Re-oligotrophication Hypothesis

  Regions of the Greater Everglades with legacy high nutrient, altered landscapes will require active and passive management techniques to restore ridge-slough landscape functionality, in addition to reductions in external loads and concentrations.

- **Accretion and Microtopography Hypothesis**

  Sheet flow interacts with hydroperiod, water depth, fire, and nutrient dynamics to maintain organic soil accretion and loss in a state of dynamic equilibrium. *The dynamics of accretion and peat oxidation is predominately controlled by hydroperiods and the exclusion of peat fires from pre-drainage landscapes.*

GE Interrelationships of Sheet Flow, Water Depth Patterns, Oligotrophic Nutrient Status, and Landscape Patterns Hypothesis Cluster

- **Working Hypotheses:**
  - **Surface water and Groundwater Nutrients and Organic Carbon Hypothesis**

    Surface and groundwater nutrients and organic carbon have a major influence on landscape patterns of soil chemistry and peat stability as well as periphyton and vegetation composition, density, and productivity. ***Increased sheetflow and altered inflow sources will cause local and regional ecological changes due to elevated mineral and nutrient supply.***
  - **Periphyton Hypothesis**

    Periphyton mat structure and community composition is slowly shifting in the Everglades due to increasing volumes of water into the Greater Everglades and rapidly shifting in areas near nutrient point sources and of legacy nutrients.
  - **Tree Island Hypothesis**

    Vulnerability of tree island productivity and diversity varies spatially due to regional hydrologic legacy. Tree island vulnerability increases with shallower elevation gradients and impoundment.
  - **Elevation Gradients Hypothesis**

    Non-linear elevation breaks and slopes (topographic contours that do not progress smoothly or that exhibit abrupt changes) affect landscape patterning and vegetation communities. ***Non-linear elevation breaks and slopes control water movement on the landscape and landscape hydrology.***

GE Interrelationships of Sheet Flow, Water Depth Patterns, Oligotrophic Nutrient Status, and Landscape Patterns Hypothesis Cluster

- **MAP Monitoring:**
  - Soil Nutrient Concentrations
  - Periphyton – structure, composition, and nutrient composition
  - Southern Marl Prairie Landscape Patterns – community structure and composition and soil characteristics
  - Ridge and Slough Landscape Patterns – elongated directional patterns, topographic relief, soil/peat depth, veg community structure and composition
- **Key Uncertainties:**
  - Impact of legacy nutrients within and downstream of structures
  - Re-establishment of ridge and slough patterns with hydrology restoration
  - Invasive and non-native species impacts and management