



Lower Colorado River Multi-Species Conservation Program

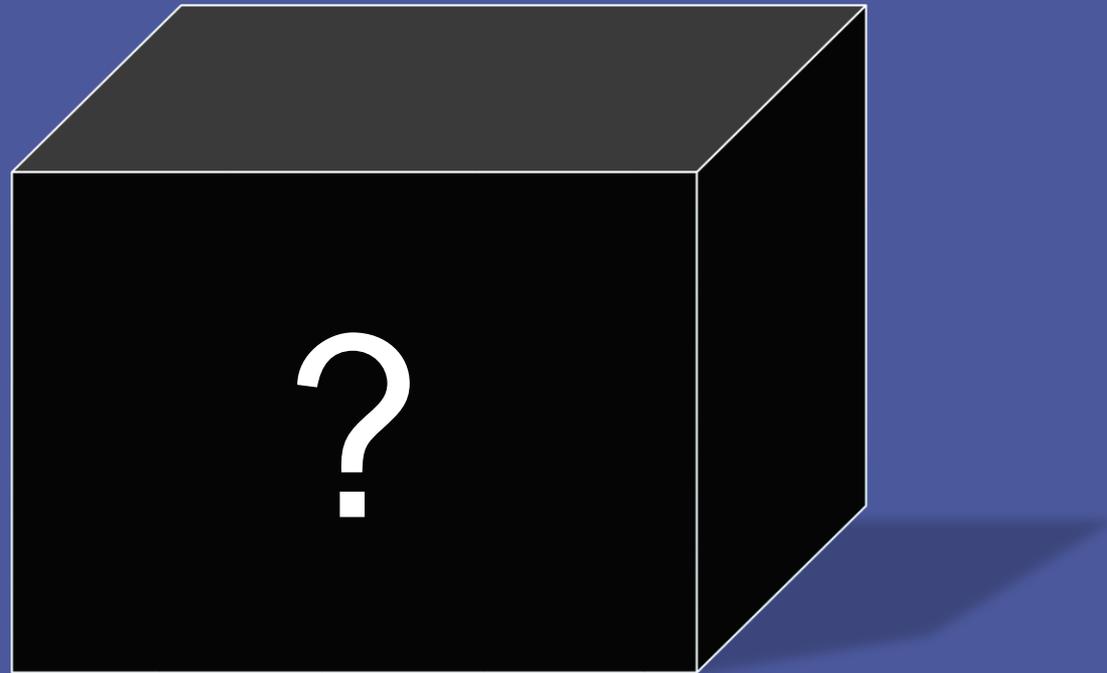
Balancing Resource Use and Conservation

LCR MSCP Adaptive Management Conceptual Models January 28, 2014



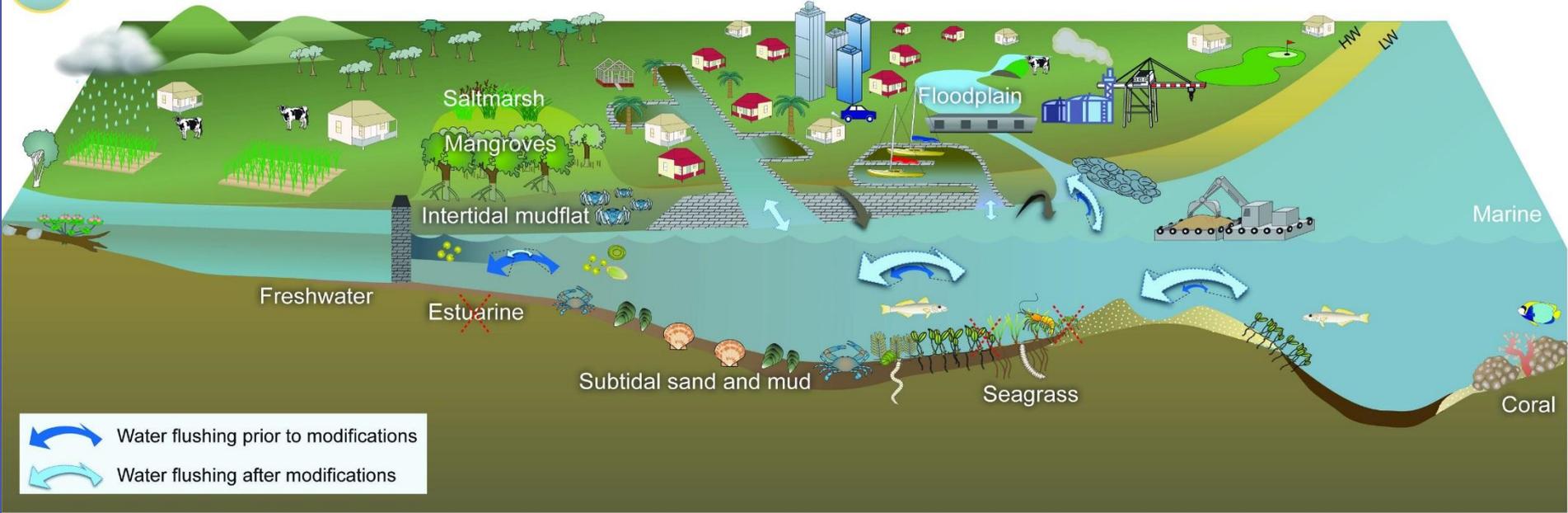
Sonja Hamilton (LCR MSCP)
and Chris McClure (Sound Science)

Conceptual Ecological Models





Hydrodynamics

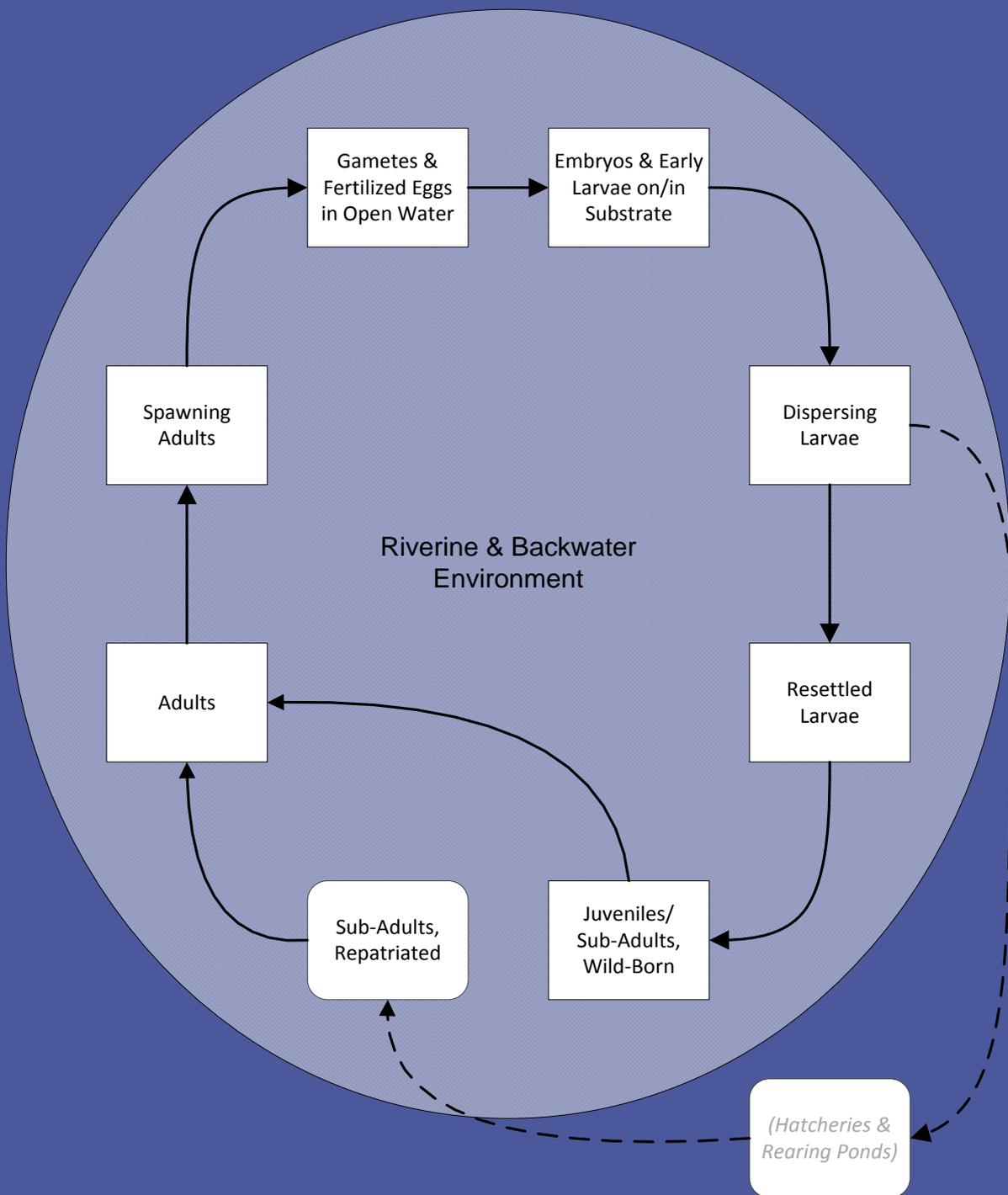


Water flushing prior to modifications

Water flushing after modifications

Legend:

- Solidification of banks and the loss of intertidal vegetation leads to increased sediments reaching the estuary
- Water movement (compared to prior to hydrological modification) is increased () in areas where dredging () and/or entrance modifications () (e.g. removal of bars, training walls) has occurred; and decreased () where impoundments () (e.g. barrages, weirs, ponded pasture) have been constructed
- Dead zones are created in canal estates, marinas and near barrages where water is not regularly flushed and can lead to stratification () of the water column and increased algal growth ()
- Construction of canal estates increases the tidal prism; resulting in increased water velocities () which causes bank erosion () in areas where banks are not solidified and may result in the loss () of benthic habitat ()



Why do we need CMs

- Create an explicit link between the science activities and restoration site management
- A framework for meeting LCR MSCP's conservation measures

Big Picture

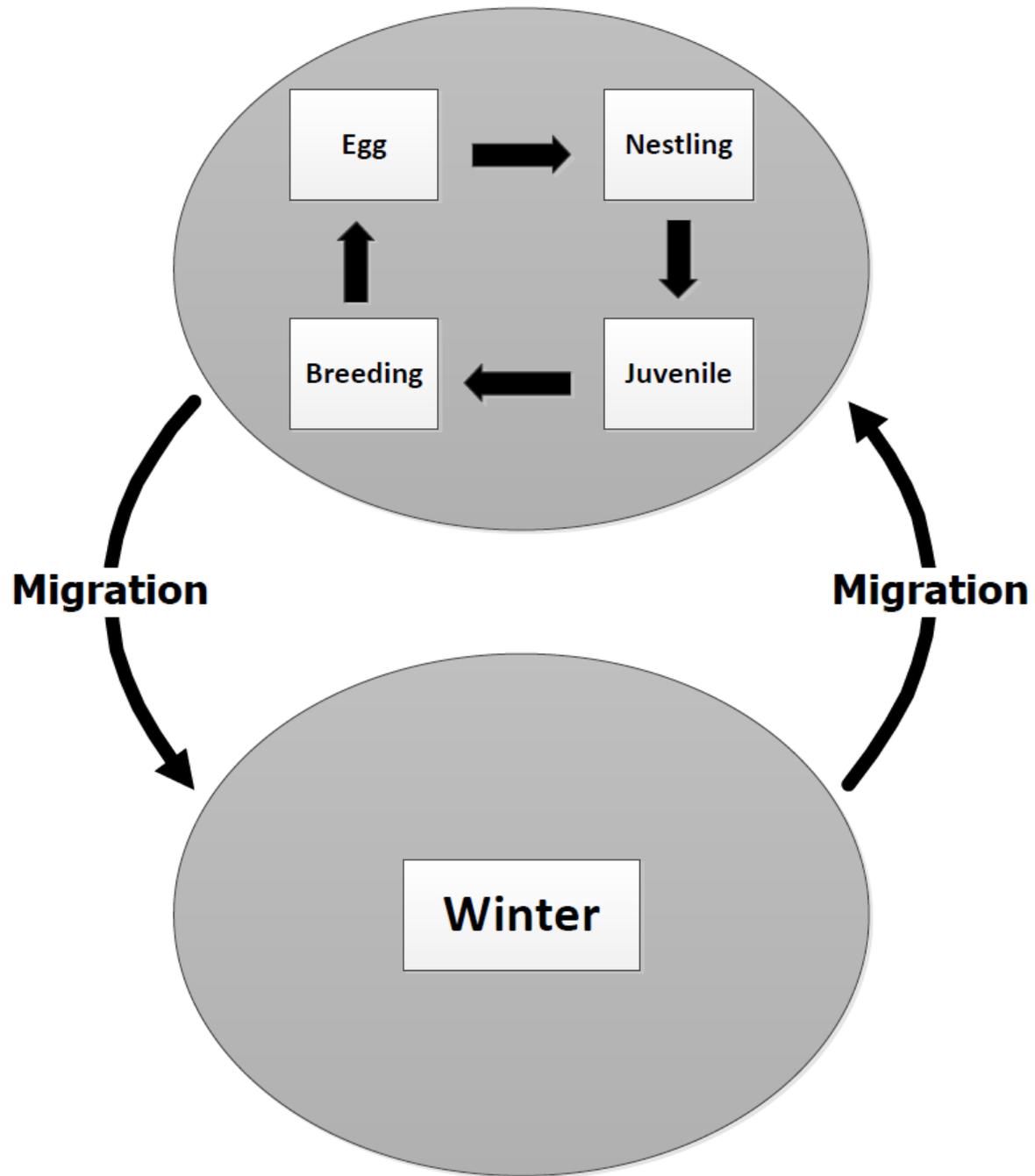
- Species Conceptual Ecological Models
 - Identify what is known and what needs to be known based on current conditions and management
- Evaluate multiple Species models at the LCR MSCP sites
 - Identify the multi-species constraints and the site constraints given the goals of the HCP.

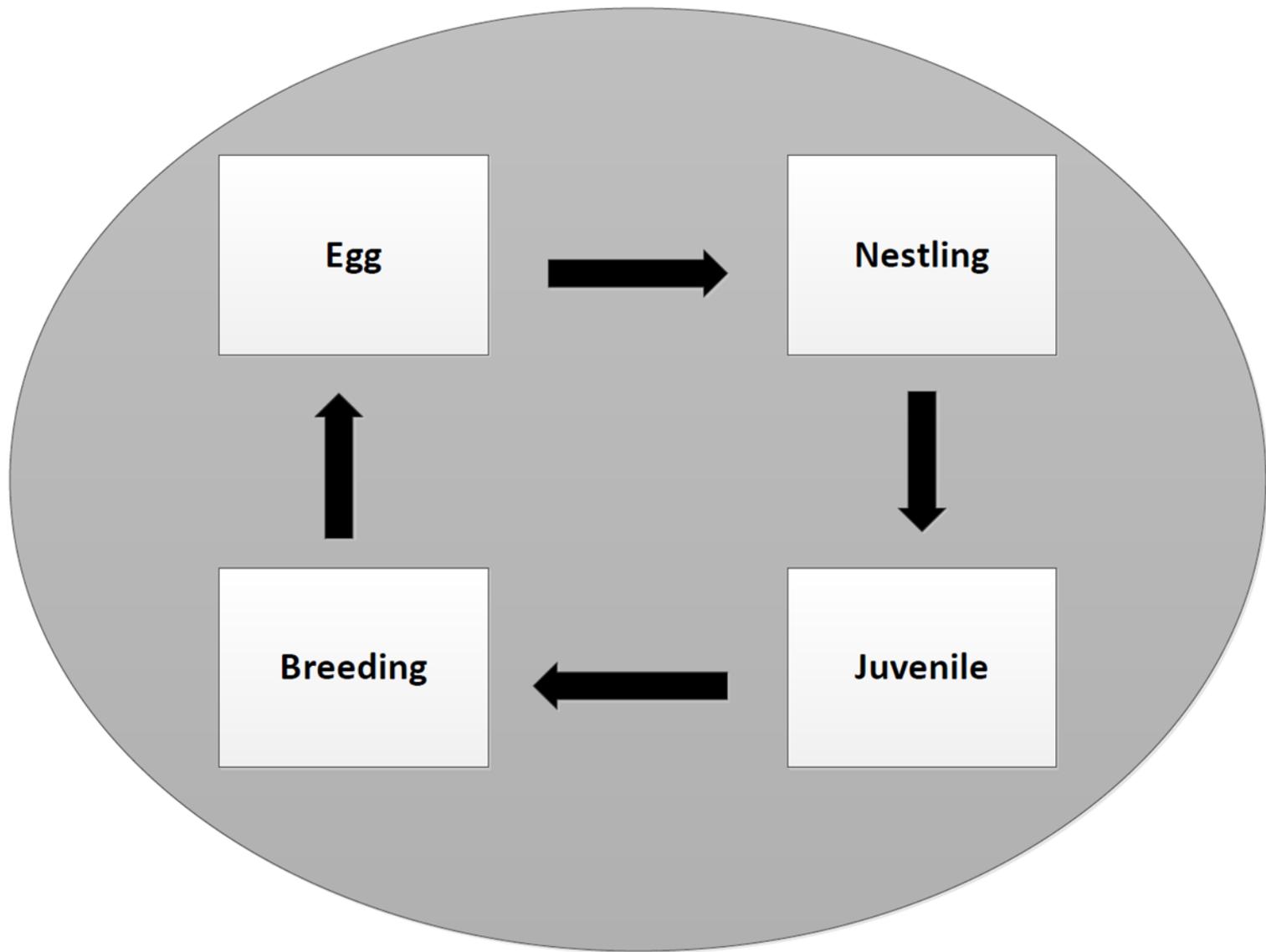
SWFL and YBCU



Photo by
SSRS







SCALE OF HABITAT

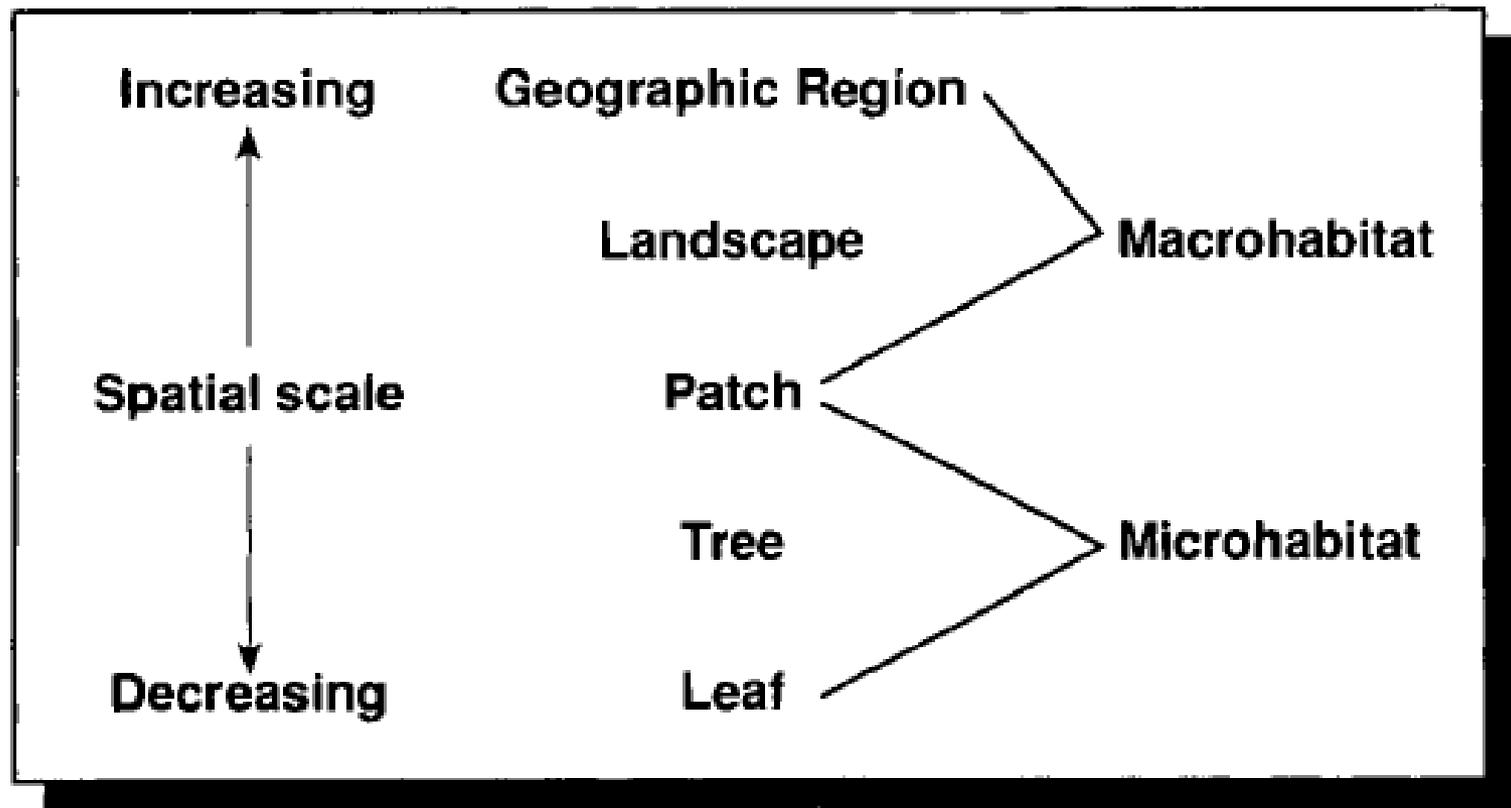


FIGURE 1. Continuum of spatial scales for the study of avian habitats.

(Block and Brennan 1993)

Critical Biological Activities & Processes

- **Consist of**
 - **Activities in which a species must engage to sustain an acceptable rate of transition**
 - **Biological processes that critically shape the rate of transition (+ or –)**

Activities & Processes

Foraging

Nest
Attendance

Nest Site
Selection

Temperature
regulation

Predation

Disease

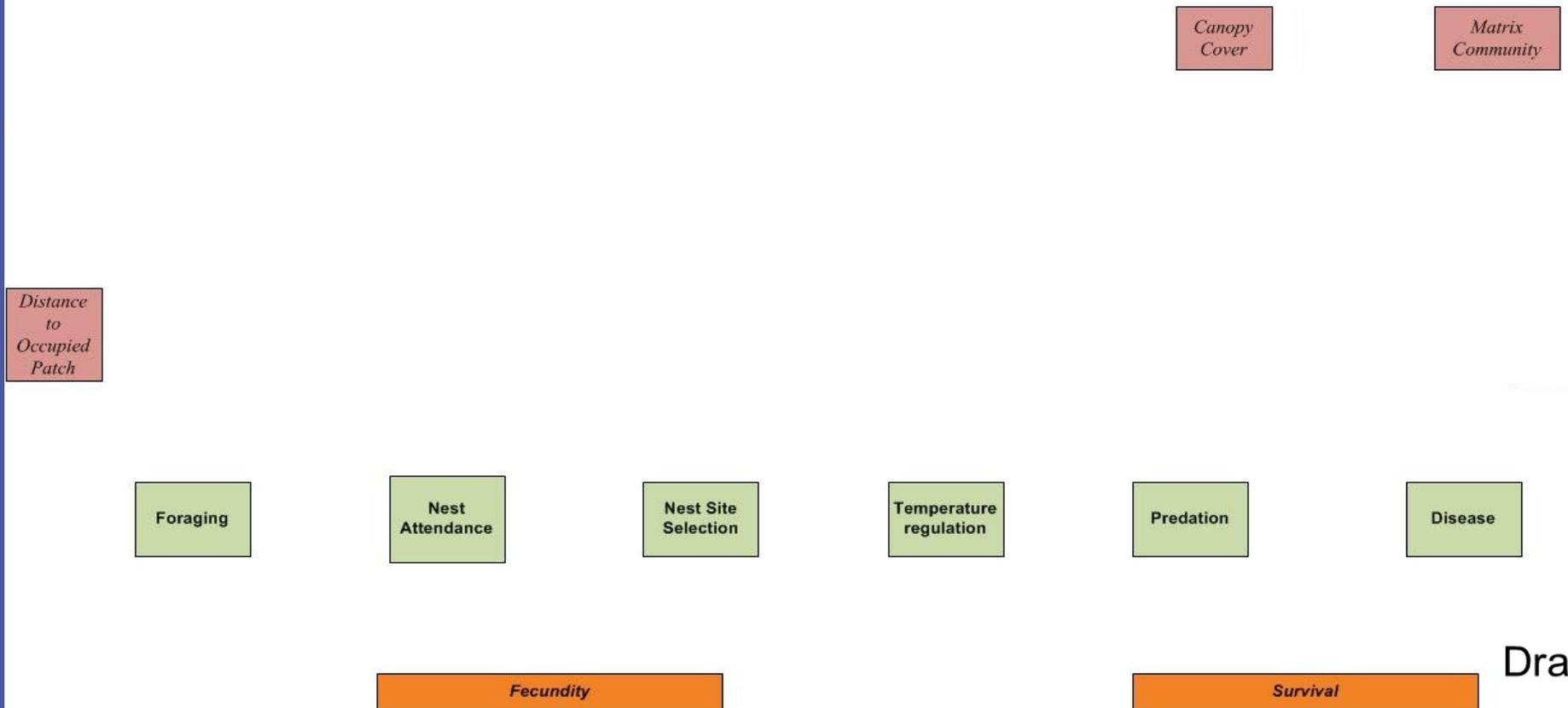
Fecundity

Survival

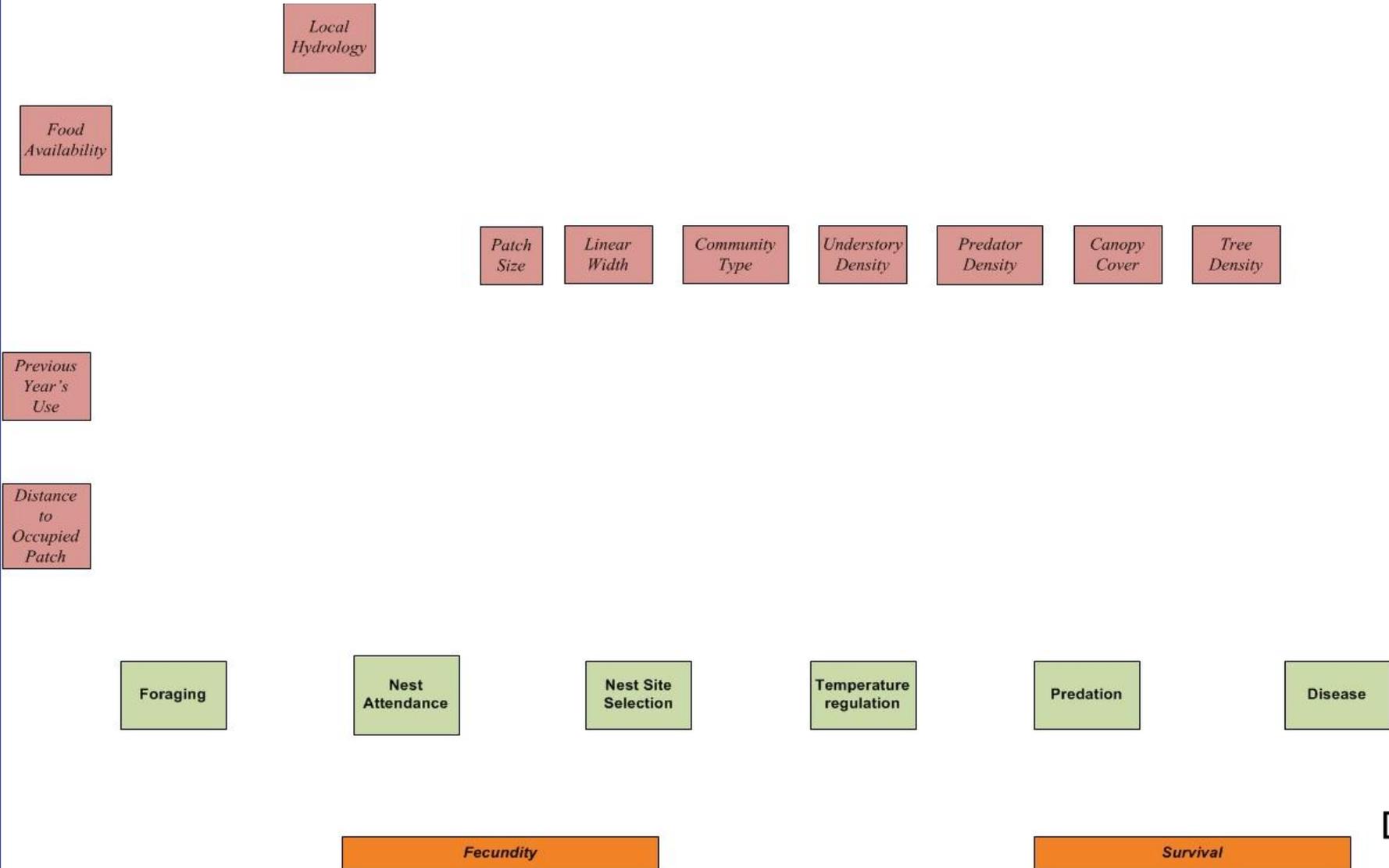
Critical Habitat Elements

- Specific habitat conditions that...
 - Are necessary or sufficient for the critical activities and processes to take place, or...
 - Can interfere with these critical activities and processes

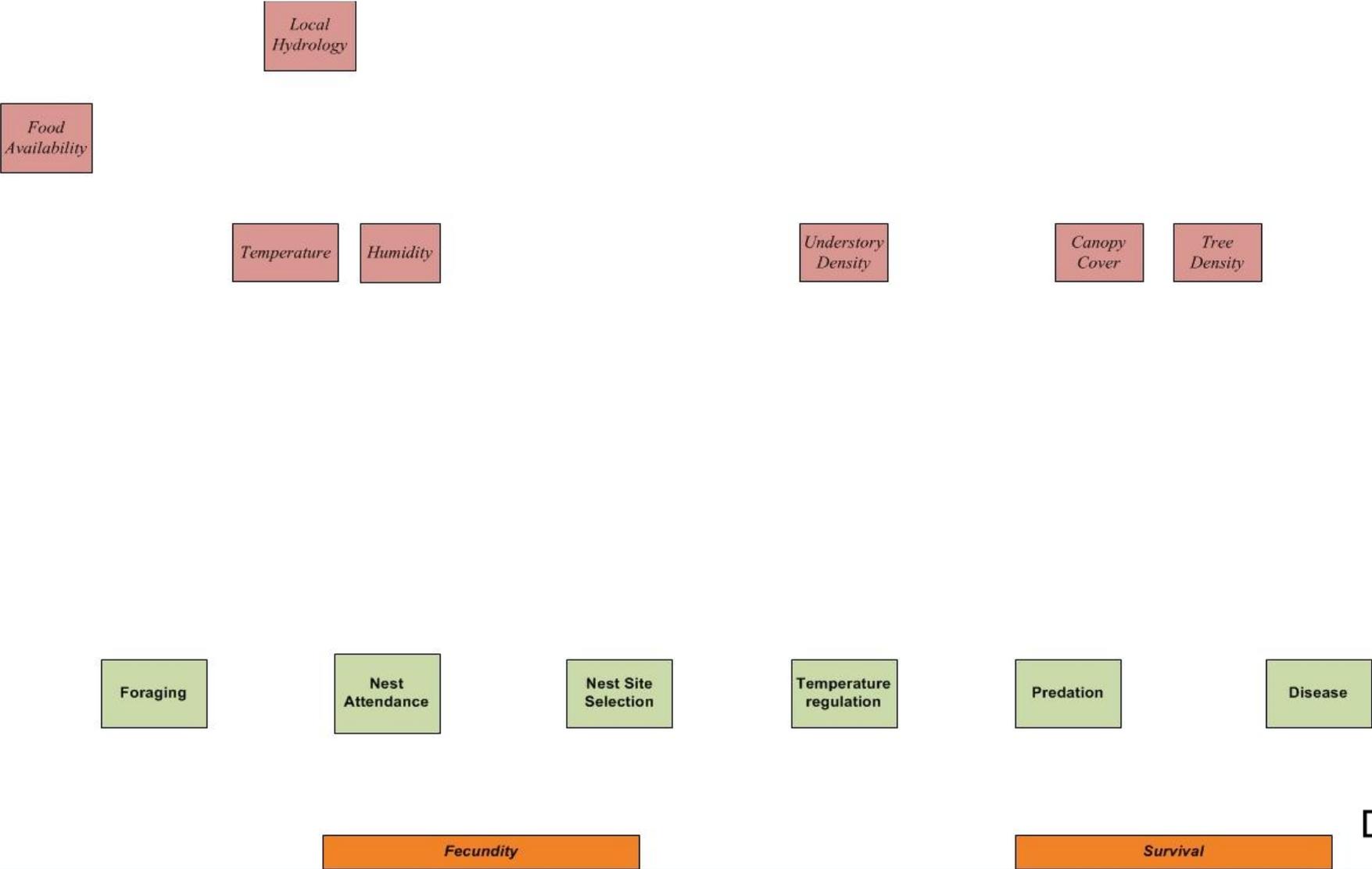
Landscape-scale



Patch-scale



Microclimate



Other factors

Brood Size

*Previous
Year's
Use*

*Anthropogenic
Disturbance*

*Genetic
Diversity,
and
Infectious
Agents*

Foraging

**Nest
Attendance**

**Nest Site
Selection**

**Temperature
regulation**

Predation

Disease

Fecundity

Survival

Draft

Controlling Factors

- **Environmental conditions and dynamics that determine the abundance, spatial and temporal distribution, and quality of key habitat elements**
- **Includes natural and anthropogenic factors**

Pesticide Application

Mainstem Water Storage-Delivery Management

Fire Management

Grazing

Mechanical Thinning

Natural Thinning

Planting Regime

Nuisance Species Introduction & Management

Local Hydrology

Food Availability

Brood Size

Temperature

Humidity

Patch Size

Linear Width

Community Type

Understory Density

Predator Density

Canopy Cover

Tree Density

Matrix Community

Previous Year's Use

Anthropogenic Disturbance

Distance to Occupied Patch

Genetic Diversity, and Infectious Agents

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Causal Relationships (linkages)

- Distribution, abundance, condition, or rate of affected node depends on distribution, abundance, condition, or rate of causal node
- Form “causal chains” and “webs”
- Identifies direct relationships

Linkage magnitudes

- High-magnitude Links
 - **Low understanding (thick red)**
 - **Medium understanding (thick blue)**
 - **High-understanding (thick black)**
- Medium-magnitude Links
 - **Low understanding (medium red)**
 - **Medium understanding (medium blue)**
 - **High-understanding (medium black)**

Linkage magnitudes cont.

- Low-magnitude Links
 - Low-understanding (thin red)
 - Medium-understanding (thin blue)
 - High-understanding (thin black)
- Unknown-magnitude Links
 - *Low-understanding (thin gray)*

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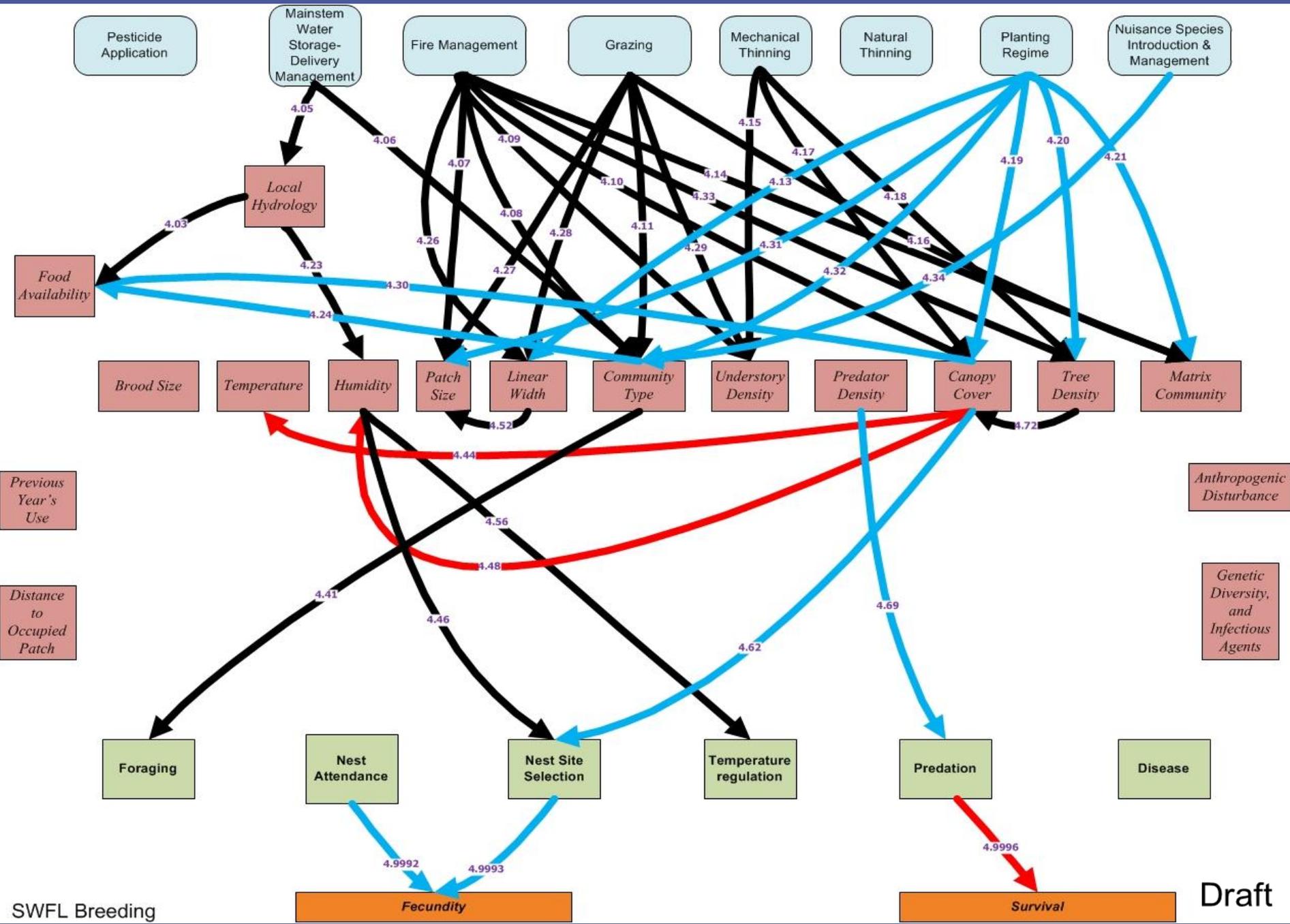
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Disease

Fecundity

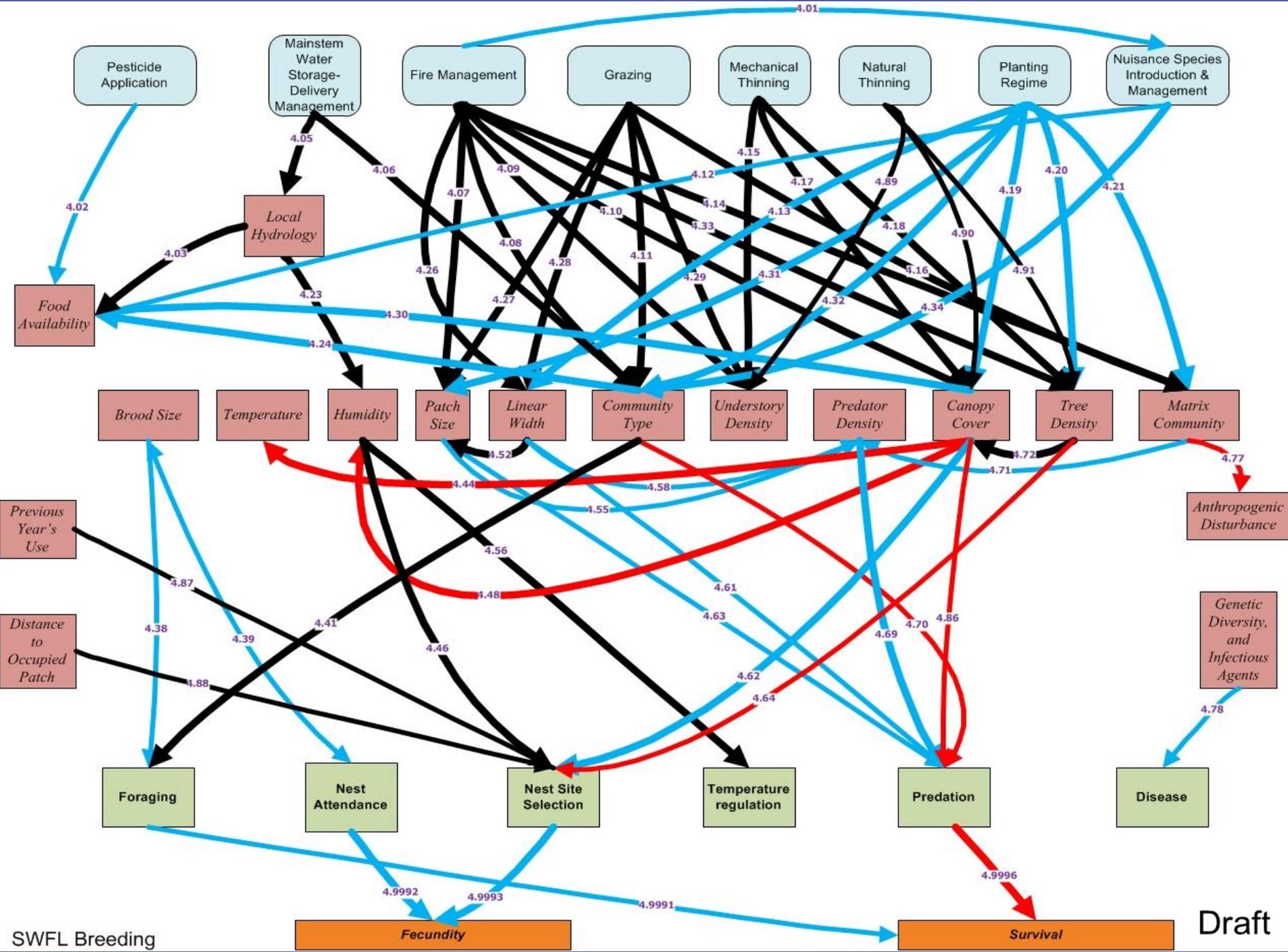
Survival

Draft



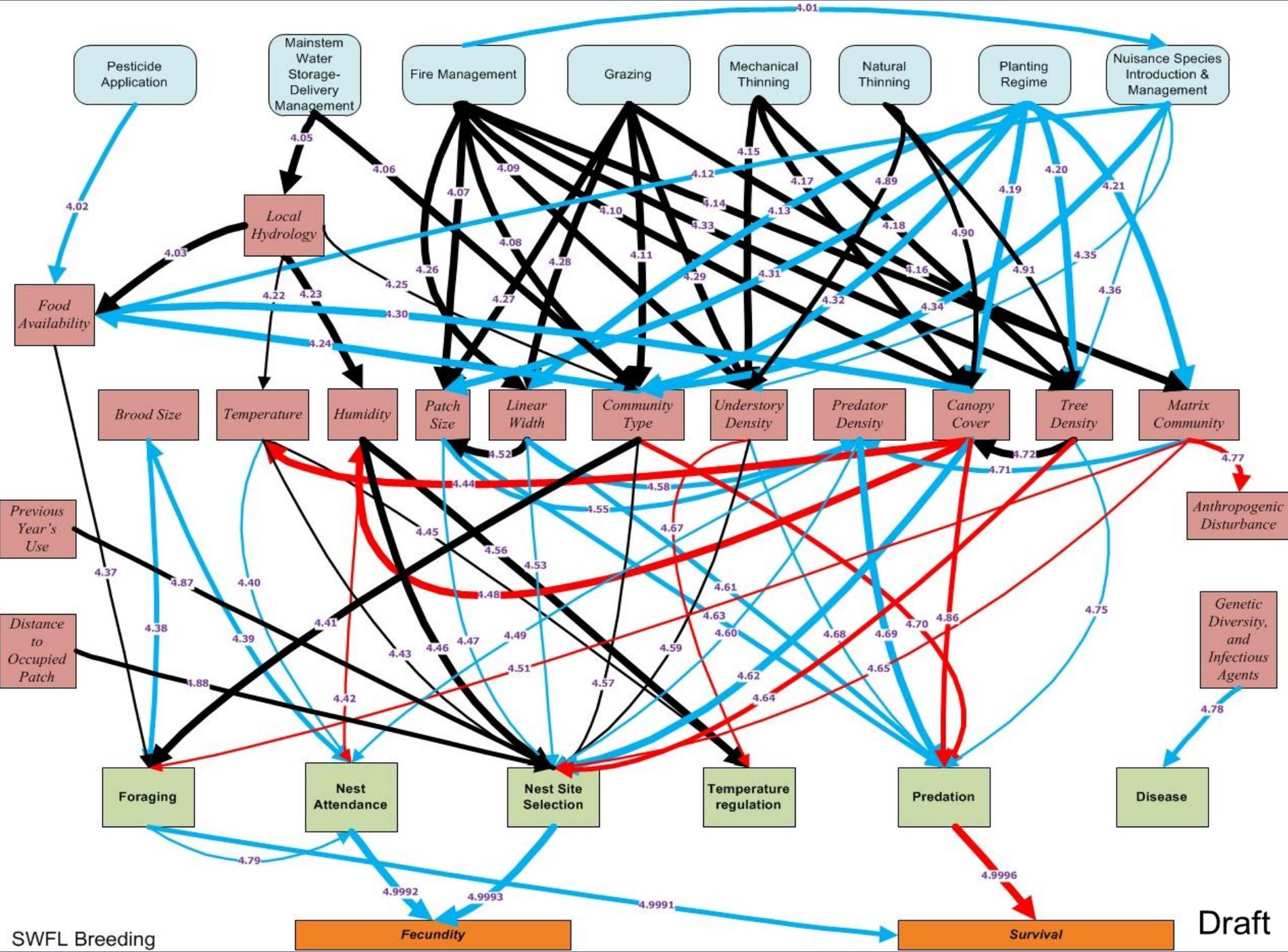
SWFL Breeding

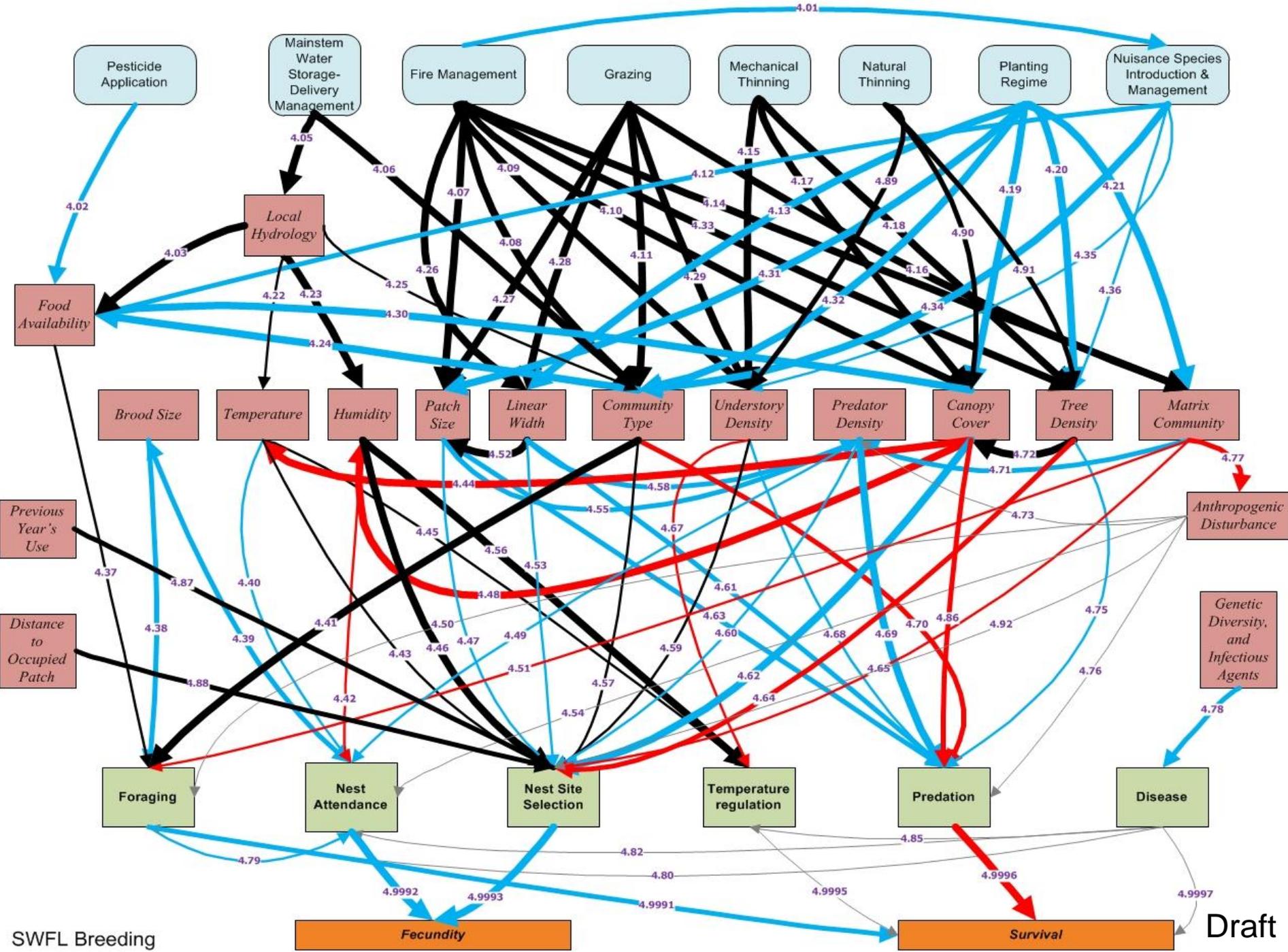
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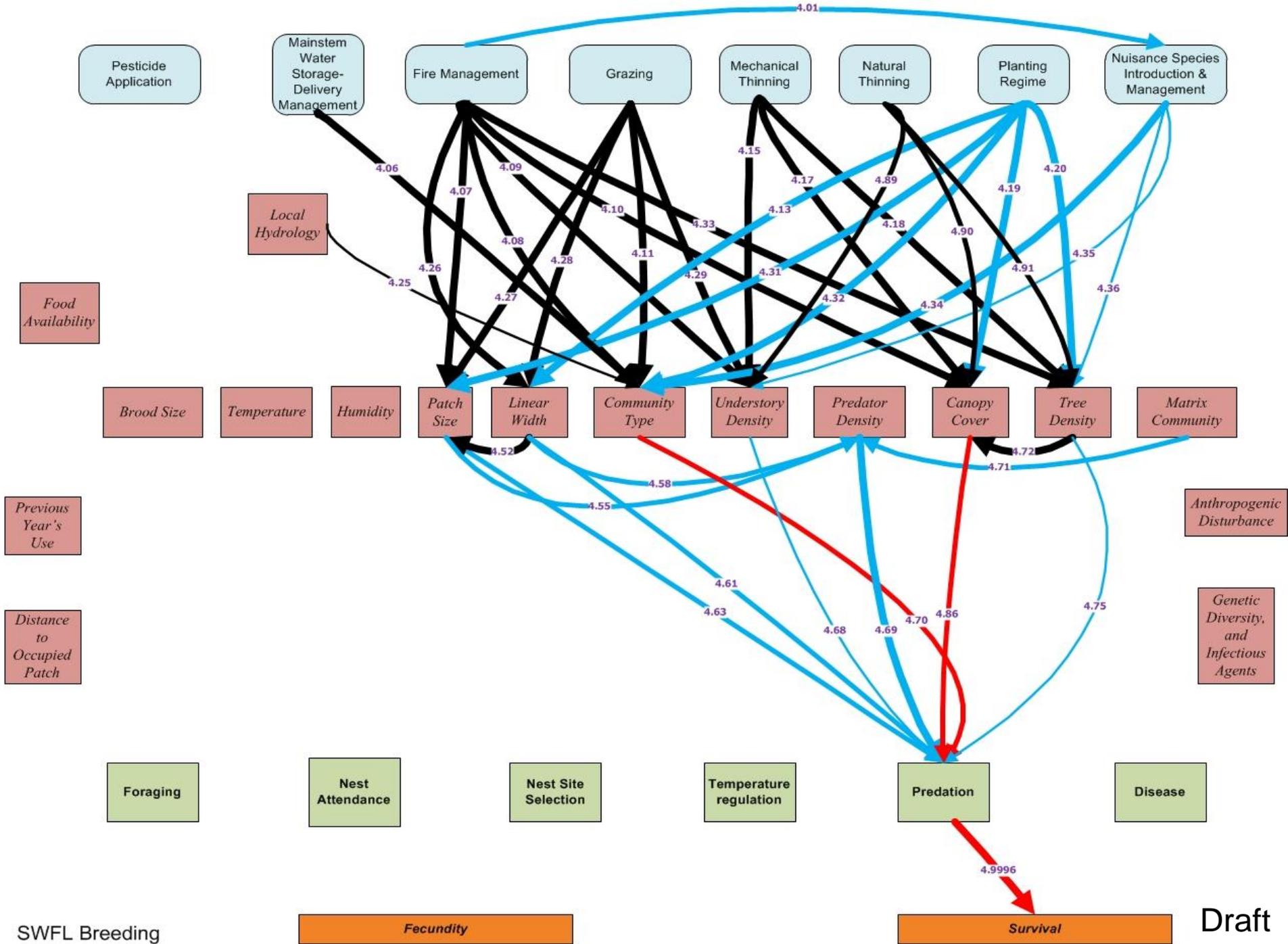
SWFL Breeding

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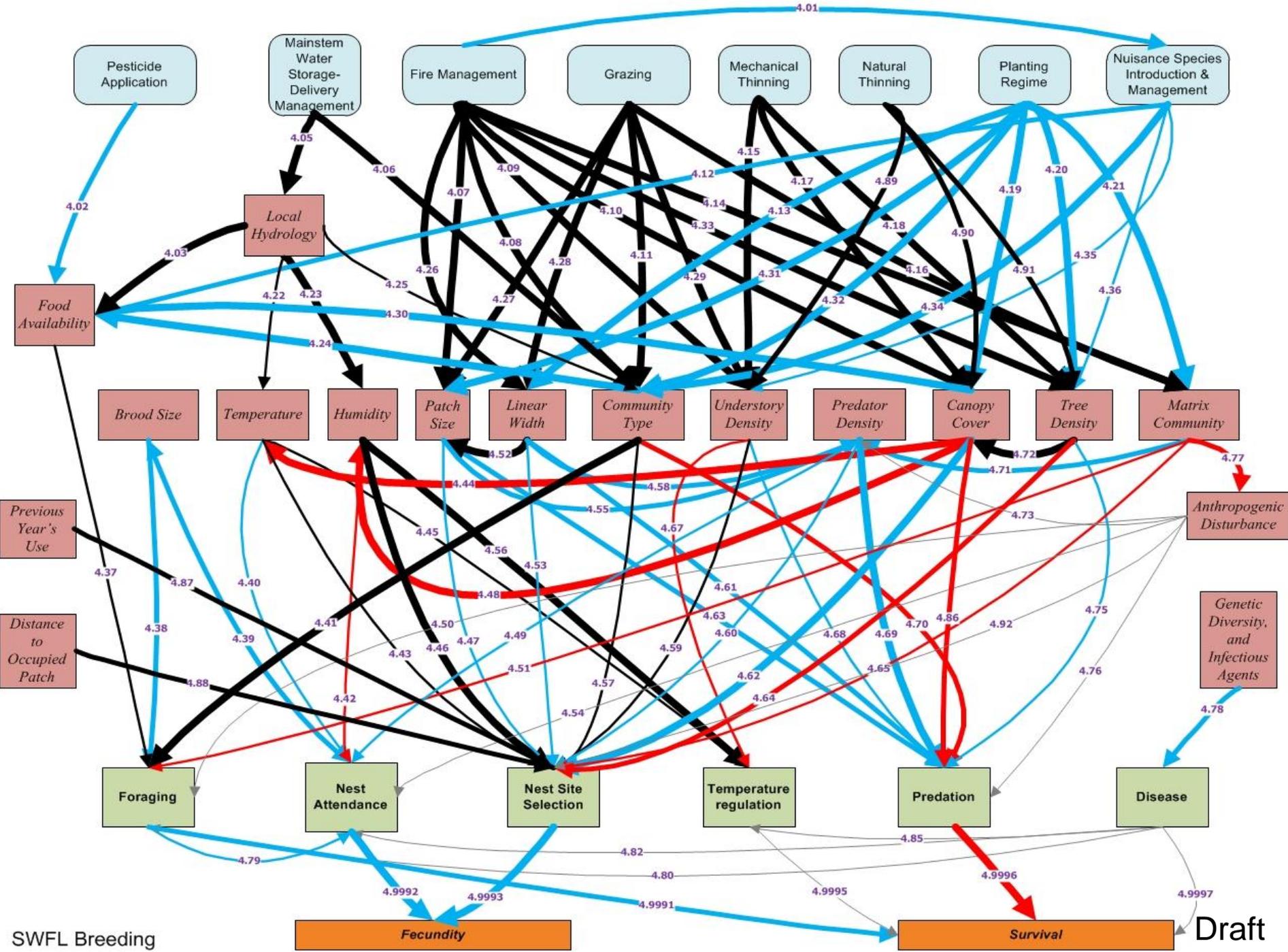


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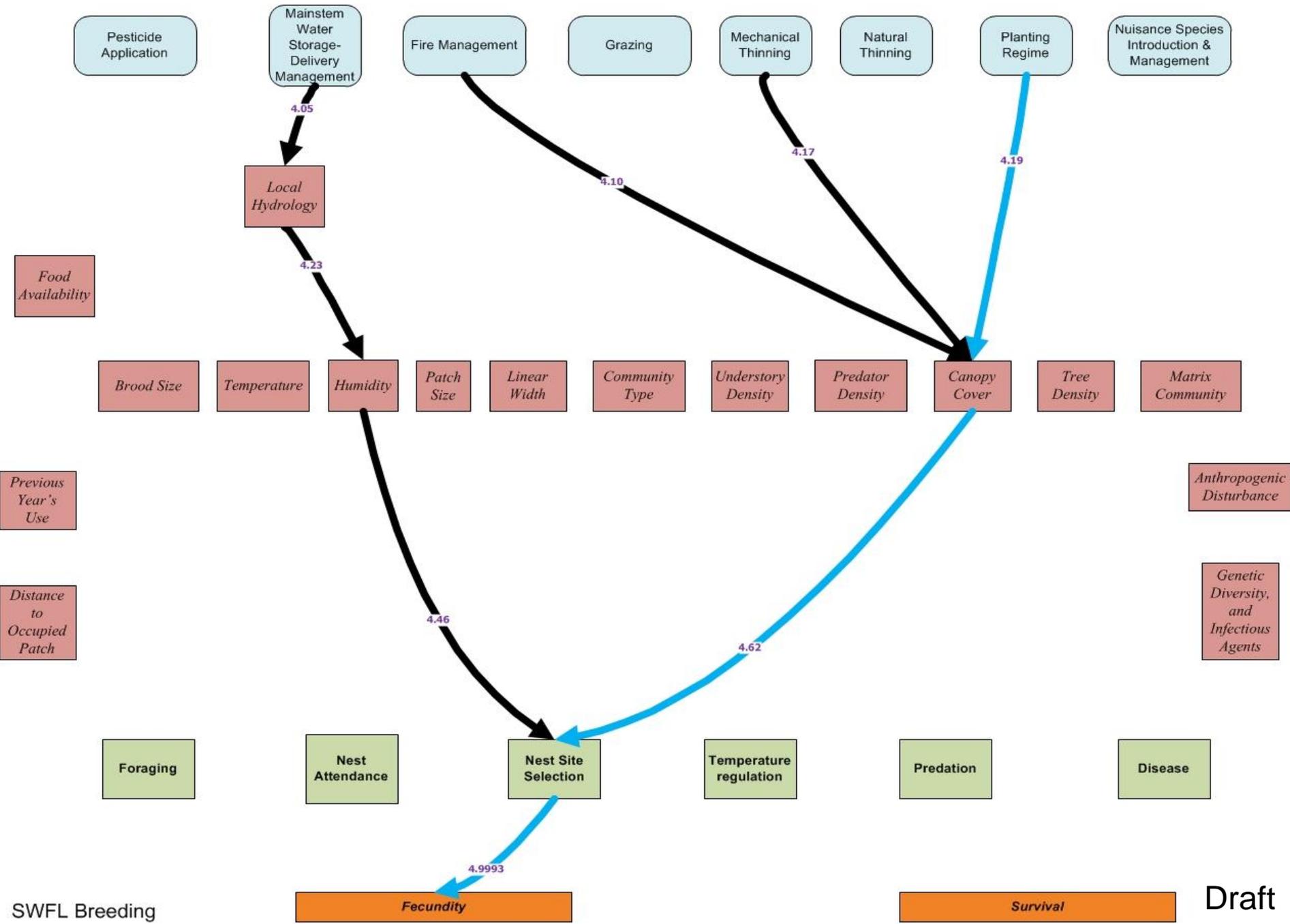
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Patch Phenology

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Foraging

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Nest Site Selection

Molt

Temperature regulation

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