Alligator Production Suitability Index Model for Restoration Planning and Assessment

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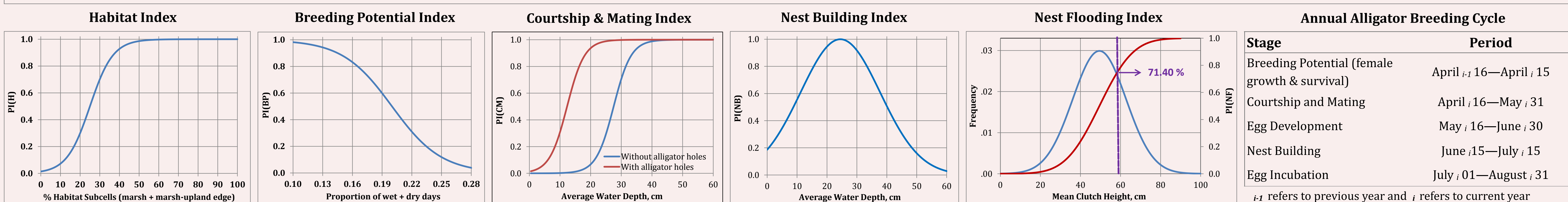[1]South Florida Natural Resources Center, National Park Service, Everglades National Park
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The Alligator Production Suitability Index Model (APSI) incorporates concepts from existing alligator habitat suitability models, the literature, and data that have been collected in the last decade. The model estimates an alligator production suitability index that includes components for habitat assessment and quality, breeding, courtship and mating, and nesting success (nest building and nest flooding). The major input requirement for the model includes daily continuous surfaces of water depth over the modeling time period, habitat, locations and height of tree islands, locations of alligator holes, and, optionally, salinity for coastal regions. Users will typically only need to provide water depths and salinity (if used). Examination of individual components of the index during a year provides insight to any limiting hydrologic conditions that contribute to a poor overall index, thus inhibiting successful hatchling production. The APSI model can help in optimizing water management to stabilize and improve alligator populations and has been used to evaluate the effects of alternative Everglades restoration scenarios on habitat suitability for alligator production in the Central Everglades Planning Project (CEPP).
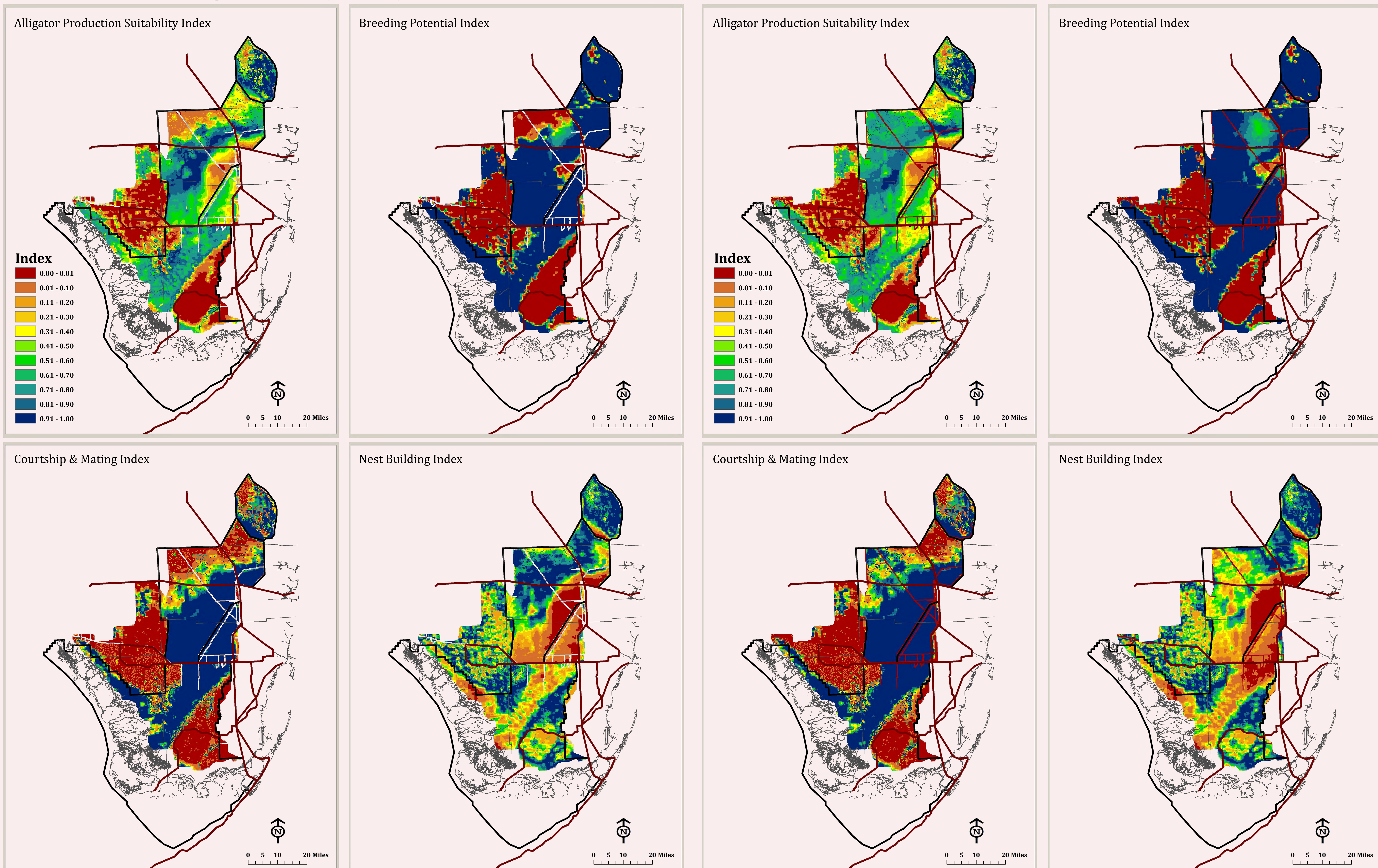
$$APSI = \{PI(H) * PI(BP) * PI(CM) * PI(NB) * [1-PI(NF)]\}^{1/5}$$

Index curves: Habitat Index, Breeding Potential Index, Courtship & Mating Index, Nest Building Index, Nest Flooding Index

Annual Alligator Breeding Cycle	
Stage	Period
Breeding Potential (female growth & survival)	April $_{i-1}$ 16—April $_i$ 15
Courtship and Mating	April $_i$ 16—May $_i$ 31
Egg Development	May $_i$ 16—June $_i$ 30
Nest Building	June $_i$ 15—July $_i$ 15
Egg Incubation	July $_i$ 01—August $_i$ 31

$_{i-1}$ refers to previous year and $_i$ refers to current year

RSM existing conditions (2012EC)
Simulation Results: Year 1983
RSM CEPP tentatively selected plan (Alt4R2)

Index
- 0.00 - 0.01
- 0.01 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.40
- 0.41 - 0.50
- 0.51 - 0.60
- 0.61 - 0.70
- 0.71 - 0.80
- 0.81 - 0.90
- 0.91 - 1.00

REFERENCES: Shinde, D., L. Pearlstine, L.A. Brandt, F.J. Mazzotti, M.W. Parry, B. Jeffery, and A. LoGalbo. 2014. Alligator Production Suitability Index Model (GATOR–PSIM v. 2.0): Ecological and Design Documentation. South Florida Natural Resources Center, Everglades National Park, Homestead, Florida. Ecological Model Report. SFNRC Technical Series 2014:1. 18pp.

Model documentation and code is available at: http://www.cloudacus.com/simglades/alligator.php