ATLSS SESI Documentation Sheet.

Draft v1.0 May 5, 2003

ATLSS SESI Model Number and Name

AT.DSIv0: White-tailed Deer Spatially-Explicit Species Index Model

Justification

The white-tailed deer (*Odocoilius virginianus*) is the largest herbivore in the Everglades and a major prey source for the endangered Florida panther. Since the early 1960's, when intensive water management began, the greater Everglades and Big Cypress deer population has declined by almost 75%, from a high of 25-30,000 deer. Changing water management strategies for south Florida have impacted deer in several ways, affecting reproductive success and recruitment, movement and foraging, and forage production and availability (Fleming 1997). During wet years, extended periods of inundation with water depths over 2-ft. are common in the impounded marshes of the northern Everglades. During these high water events, deer move to elevated sites such as tree islands, where they often suffer deterioration of physical condition and increased susceptibility to parasites and disease as food stores became depleted. Does and fawns are particularly susceptible to the effects of prolonged high water.

Each of the alternative water management scenarios evaluated as part of CERP will affect potential breeding and foraging activity of deer across the landscape. The ATLSS White-tailed Deer Breeding Potential Index (BPI) uses knowledge of how hydrologic factors affect the production and availability of food resources and the availability of dry bedding sites during the breeding season to compute a BPI for deer. We express the effects of proposed scenarios as changes in the spatial pattern of breeding potential over the model area.

CERP Target

Rather than specifying a single "performance measure" for each model, it is the objective of ATLSS to provide a rational basis for different stakeholders to determine their own criteria for comparing different hydrologic plans based upon their own choices of trade-offs between species, spatial regions and time horizons.

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Evaluation Protocol

The reproductive season for white-tailed deer is the period between January 1 and May 31. Ponded water can act as an impediment to fawning, movement and foraging during the breeding season. If the food supply is interrupted during this period, which can happen during high water conditions, the health of mother and offspring may suffer, resulting in a lessened likelihood that fawns will be recruited into the herd. Elevated water levels can make beds uninhabitable, and high water can drown young fawns.

- In the IBP, a water depth of 55 cm is defined to be the depth above which movement and foraging are assumed to be precluded. Water of any depth during this season is assumed to restrict fawning and impede movement, and so subtracts from the index. The degree to which water is an impediment is represented by calculating the ratio of (water-depth days)/(maximum possible water-depth days) during the reproductive season.

The hydroperiod during the previous year is an indication of the quality and availability of forage prior to fawning. Forage availability will influence the health of females and thus their likelihood of fawning. Too short a hydroperiod reduces the quality of the forage. Too long a hydroperiod reduces the availability of forage.

- The BPI is discounted by a multiplicative factor that depends on hydroperiod. The values of this discounting factor for hydroperiods of 0/1, 2, 3, 4,….. 12-month hydroperiods are {0.0 0.4, 0.6, 0.9, 1.0, 1.0, 1.0, 0.9, 0.8, 0.6, 0.5, 0.4}.

Urban areas are not good for reproduction for white-tailed deer.

- In the BPI, spatial cells in urban areas are excluded (the index for these cells is set to zero).

The Deer BPI is a composite index of spatial and temporal patterns. Spatial patterns will be computed based on ATLSS High Resolution Hydrology (500-m x 500-m meter cells). This scale of resolution captures fine-scale spatial heterogeneity of the South Florida wetlands and permits model representation of the elevated tree island habitats that are critical for deer survival during extended periods of high water.

Details of the SESI are available at: http//:www.atlss.org/d_deer.html.

We express the effects of proposed scenarios as changes in the spatial pattern of breeding potential over the model area at a 500-m scale of resolution. Our sub-area reporting units are based on a combination of public area, drainage basin, and management unit subregion maps, shown in http://www.atlss.org/repunits.pdf .

Model output includes summary tables and three-panel maps displaying landscape results for (a) proposed hydrologic modification scenario on the left, (b) base scenario on the right, and (c) a cell-by-cell difference between index values for the two compared scenarios in the center panel, enabling the reader to make comparisons between alternatives.

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Source and History of Evaluation Protocol

The ATLSS modeling group has worked with field biologists to explore conceptual models and develop spatially-explicit species index models that reflect relationships between hydrologic factors and breeding/foraging potentials for key Everglades species. This SESI was one of 8 identified for development and was developed by Jane Comiskey and Louis Gross.

Selected References:

Fleming, D.M., J. Schortemeyer, and J. Ault. 1997. Distribution, abundance and demography of white-tailed deer in the Everglades. Proceedings of the Florida Panther Conference, Ft. Myers Fla., November 1994, Dennis Jordan, ed., U.S. Fish and Wildlife Service, pp. 494-503.

Loveless, C.M. 1959. The Everglades deer herd, life history and management. Tech. Bull. No. 6, Fla. Game and Fresh Water Fish Comm., Tallahassee, 104 pp.

http://www.atlss.org/d_overview.html

Contact

The Institute for Environmental Modeling (TIEM), Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville, TN 37996-1600

Louis J. Gross, gross@tiem.utk.edu, 865-974-4295
Jane Comiskey, ecomiske@tiem.utk.edu, 865-974-0224