ATLSS SESI Model Number and Name

AT.SSIv0. Cape Sable Seaside Sparrow Spatially-Explicit Species Index Model

Justification

The Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) is an ecologically isolated endangered subspecies of the seaside sparrow, restricted in its range to the extreme southern portion of the Florida peninsula, almost entirely within the boundaries of the Everglades National Park and Big Cypress National Preserve. Recent declines have occurred in the sparrow population across its entire range. Because the current range of the sparrow is limited to a few hundred square kilometers and because it is subject to flooding and fires, the population is highly vulnerable.

The sparrow breeds in marl prairies typified by dense stands of graminoid species below 1-m in height and naturally inundated by freshwater during part of the year. As water levels recede during the dry season in late winter and spring, the sparrows establish territories and initiate nesting in dense grass tussocks. Several broods may result from a single male territory if hydrologic conditions allow (Lockwood et al. 1997). If water levels do not recede early enough in spring, nesting may be delayed, and if water levels subsequently rise during the nesting season eggs or nestlings may be drowned. Both short and long-term effects of changing water levels within the sparrow's range would affect the reproductive success of the sparrow. This model attempts to quantify the relative impact of alternative hydrologic regimes on the breeding potential of sparrow populations.

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.

Evaluation Protocol

Cape Sable seaside sparrows prefer dry marl prairie habitat dominated by *Muhlenbergia* or sparse *Cladium* grass. Habitat quality improves as the percentage of these grass types in an area increases. The quality of a cell also depends on a hydroperiod of sufficient length to produce adequate insect prey. Sparrows do not nest in the vicinity of trees or other woody vegetation.

- Therefore, in the BPI model only spatial cells with > 15% cover by *Muhlenbergia* or sparse *Cladium* are included. Cells containing or adjacent to cells with woody vegetation are excluded. Two habitat quality factors, (1) percent of *Muhlenbergia* or sparse *Cladium* and (2) length of hydroperiod in preceding year modify the index value.

Nesting can occur from January 1 to June 30. Male defense of territory begins when water depths fall below approximately 5 cm, and a reproductive cycle can start at that point.

- Therefore, the index model tracks conditions from January 1 to June 30. When the water depth falls below 5 cm in a cell, the index model starts to add up the continuous days for which depth stays below that level.

One reproductive cycle lasts approximately 43 days (but 5 more days are needed if a male has to find a new territory). A nest will be abandoned if water depths rise to 16 cm during the cycle. Up to three complete reproductive cycles are possible for the sparrow.

- The index tracks the number of potential reproductive cycles on a cell during a reproductive season. As soon as the continuous number of days with water level below 16 cm reaches the time needed to complete a breeding cycle, the index value is incremented. If a reproductive cycle is interrupted before completion, no addition is made to the BPI.The total BPI consists of three factors; (1) the total number of cycles in a year, with a maximum of three, (2) the percent of *Muhlenbergia* or sparse *Cladium* in a cell, and (3) the length of hydroperiod in the preceding year. The maximum value for the BPI is 1.0

Details of the CSS Sparrow SESI are available at: http://www.atlss.org/d_spar.html. We express the effects of proposed scenarios as changes in the spatial pattern of sparrow breeding potential over the model area at a 500-m scale of resolution. The applicable regions for this SESI are the Ingraham Highway (Core), Eastern, and Western sparrow population centers, shown at: http://www.atlss.org/csssregions.pdf

Model output includes time-series plots for each subregion of interest showing percentage of available habitat in which successful breeding occurrs for each model year, and three-panel maps displaying landscape results for (a) a proposed hydrologic modification scenario on the left, (b) the 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.

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 Phil Nott and Jane Comiskey.

Selected References:

Nott, M.P., O.L. Bass, Jr., D.M. Fleming, S.E. Killeffer, N. Fraley, L. Manne, J.L. Curnutt, T.M. Brooks, R. Powell and S.L. Pimm. 1997. Water levels, rapid vegetational changes, and the endangered Cape Sable seaside sparrow. Animal Conservation (in press).

Lockwood, J.L., K.H. Fenn, J.L. Curnutt, A. Mayer and D. Rosenthal. 1997. Natural history of the Cape Sable seaside sparrow. Wilson Bulletin (in press).

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

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