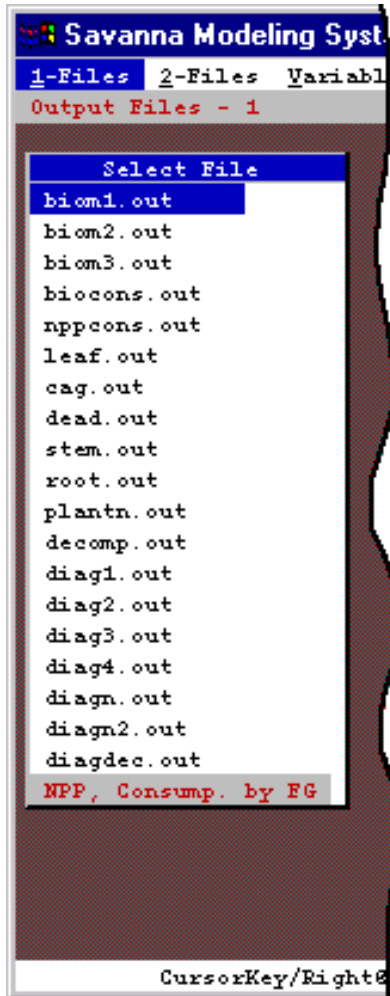


**SMS**

## Temporal Output from Savanna - 1

A large suite of output is produced from Savanna, reporting on vegetation dynamics, diagnostic information, and animal status. Most are viewable using the SMS utility, which we will use to understand how the output types may be organized.



### “1-Files”

*biom1.out* plots above-ground and below-ground net primary production for the three main types of vegetation, and the amount of each type consumed by animals.

*biom2.out* provides detailed biomass values for the three main types of vegetation.

*biom3.out* plots summaries of biomass. Its primary content, however, are plots of the amount of plant biomass consumed by each of the animal groups.

*biocons.out* plots the amount of biomass in each plant group that is available to foragers, and the amount consumed.

*nppcons.out* plots the amount of net primary production in each plant group, and the amount consumed.

*leaf.out*, *cag.out*, *dead.out*, *stem.out*, *root.out*, *plantn.out* all report values for the seven vegetation functional groups. As one would guess, *leaf.out* reports green leaf biomass, *cag.out* reports current annual growth, *dead.out* plots dead vegetation still on the plant, *stem.out* gives the biomass of stems, *root.out* gives the biomass of all roots, and *plantn.out* reports nitrogen content.

*decomp.out* reports on carbon and nitrogen content of the litter and soil.



The remaining files report diagnostic data. In Savanna, a grid cell (specified in SPACEDAT.PRM) may be designated a diagnostic cell. For a specified plant group within that cell, detailed output is given:

*diag1.out* reports rainfall, biomass, and leaf area indices for specific portions of plants, and summarized for the subarea as well.

*diag2.out* plots the phenology of the plant group, nitrogen ratios for specific plant parts, water availability, and weather effects, such as temperature and day length.

*diag3.out* plots the major influences upon photosynthesis rate, the potential rate, and actual photosynthesis rate.

*diag4.out* gives net primary production for the focal plant group, consumption, rainfall, leaf area indices, and household data.

*diagn.out* and *diagn2.out* report nitrogen balances for the plants and facets, transfers of matter from plants to litter to soil, etc., and transfers of nutrients.

*diagdec.out* reports decomposition data for nitrogen and carbon.

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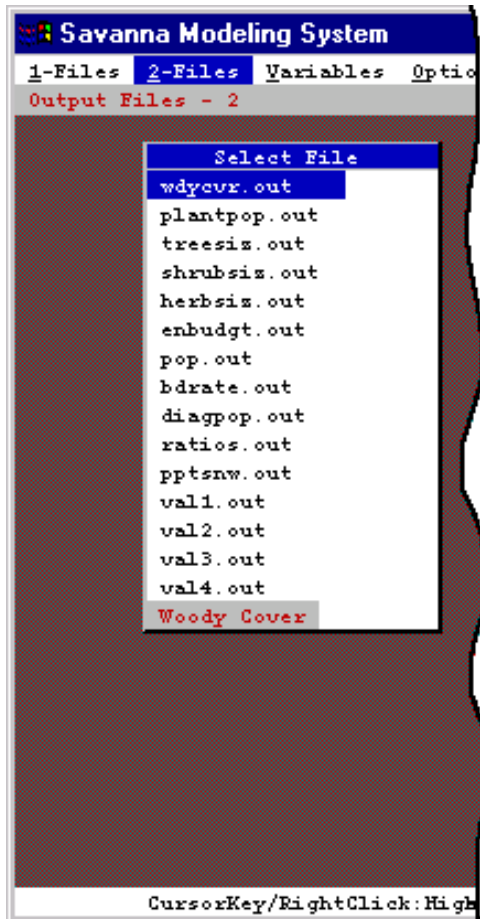
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## Temporal Output from Savanna - 2



### “2-Files”

*wdycvr.out* plots the percent cover of woody vegetation, including canopy cover and understory cover.

*plantpop.out* gives the number of woody plants in the study area, and for herbaceous plants, potential biomass per square meter.

*treesiz.out* gives the proportions of the six size classes for each type of tree simulated.

*shrubsiz.out* gives the proportions of the size classes for each type of shrub simulated

*herbsiz.out* plots potential biomass per square meter for the herbaceous plants being simulated.

*enbudgt.out* plot condition indices for each of the animal groups. Each groups’ energy intake and energy use is plotted as well.

*pop.out* plots the number of animals in each of the animal functional groups, and the number of animals culled, if enabled.

*bdrate.out* stored the birth and death rates of populations, but no longer functions.

*diagpop.out* provides detailed information about the five age/sex classes for the diagnostic animal group selected.

*ratios.out* gives, for each animal group, the ratio of calves to adult females, juvenile males to females, and adult males to adult females.





## Spatial Output from Savanna - 1



### “Image1.img”

Maps output from Savanna are stored in three files, with many maps compressed into each file. The menu entries for spatial output have been given descriptive names, and so will not be reviewed line-by-line.

*Image1.img* contains the bulk of the information of interest to people conducting experiments. Maps of rainfall are presented first, followed by maps of tree and shrub cover and green leaf biomass. Note that the units of biomass can vary between map types, with some reported in g/m<sup>2</sup>, and some in kg/ha.

The next set of maps show agriculture, if it is being modeled. Some of the map types store very small numbers, below 1.0. To avoid problems drawing maps in SMS, the output is multiplied by 100 in Savanna, as shown in the unit notation for agriculture. When viewing maps of agriculture or of wildlife with low populations, recall that the key *display values 100 time larger* than in reality.

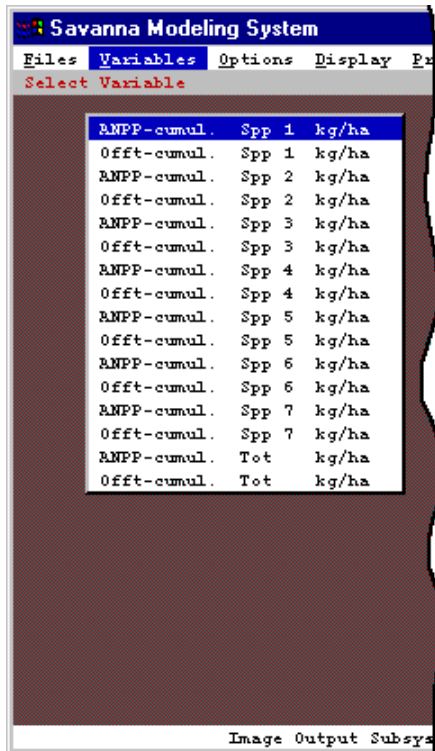
Water available to plants is mapped, followed by cumulative offtake and annual net primary production. More vegetation measures are followed by maps of carbon at the soil surface and beneath the soil, and by the mean daily temperature.

Total grazing pressure, in animal units, is mapped. The animal groups included in this map are adjustable, by changing flags in





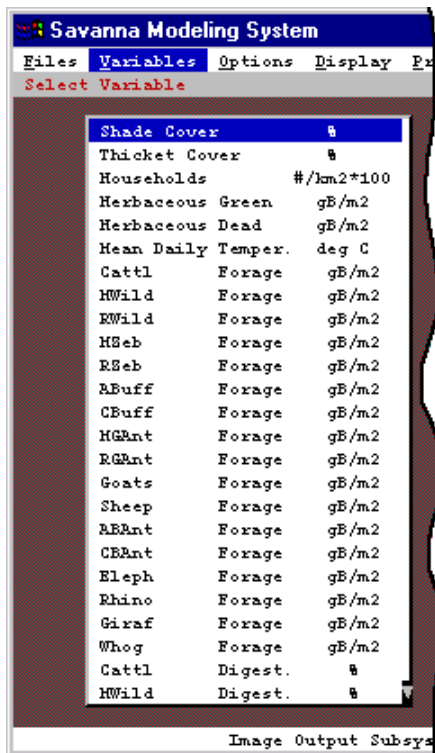
## Spatial Output from Savanna - 2



### “Image2.img”

*Image2.img* contains maps with two types of information repeated for each of the plant functional groups, and a summary map.

The first map type is annual net primary production by the plant group of interest. The second is offtake, the amount of vegetation eaten by animals, for the plant group of interest. Total net primary production and offtake are included as well.



### “Image3.img”

*Image3.img* contains numbers of households, multiplied by 100, and a series of variables that affect the distribution of animals.

The percent of each cell with shade (tall) or thicket (low) cover is included, followed by the households maps. Herbaceous green and dead vegetation maps follow, reported in grams of dry biomass per square meter. Mean daily temperature is repeated in *Image3.img*, because it can modify distributions.





The next suite of maps report forage availability for each of the animal functional groups, given in grams of biomass per square meter. Note that forage availability *does not* take into account the limits on the distributions of species. For example, in NCA-Savanna, at least some forage for migratory wildebeest is shown as available in the Northern Highland Forest Reserve and in the brushy areas of encroachment along the southeast edge of Ngorongoro Conservation Area. Wildebeest in NCA-Savanna are restricted from these areas, however, because of relationships with elevation and a force map.

The final suite of maps report digestibility of forage available for each of the animal groups in the model. As for the previous set of maps, areas that may have highly digestible forage may not be available to animals because of restrictions upon their distributions.

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