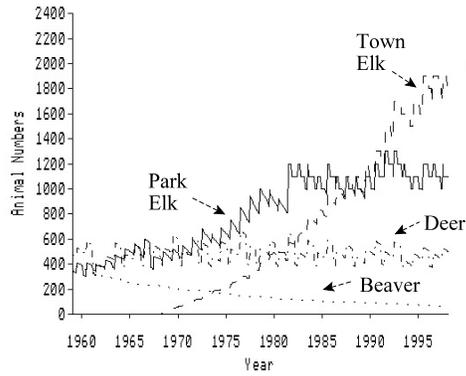
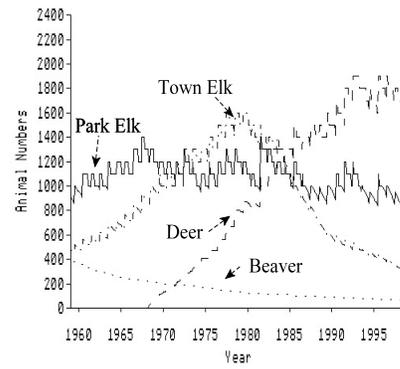


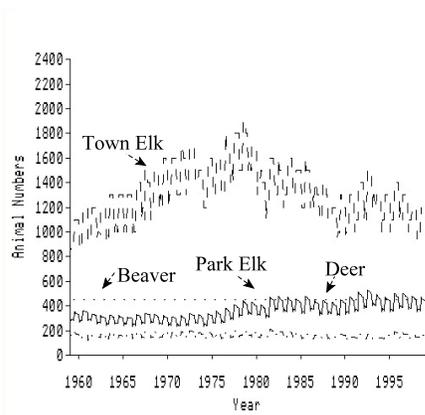
A)



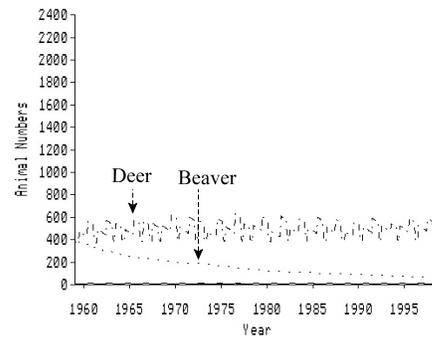
B)



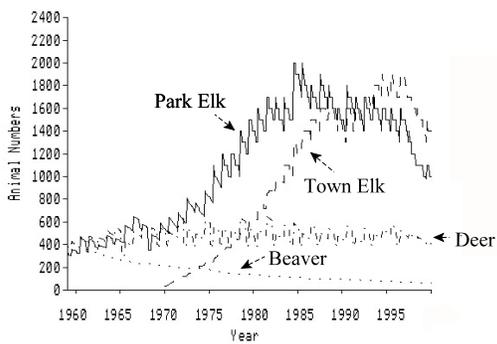
C)



D)



E)



F)

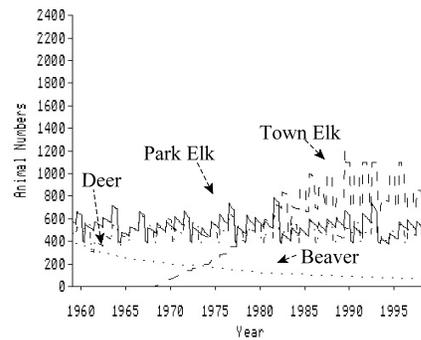
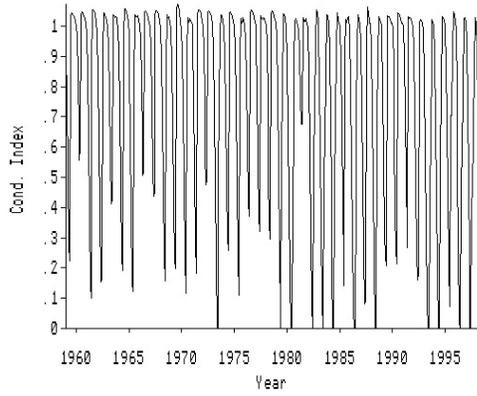
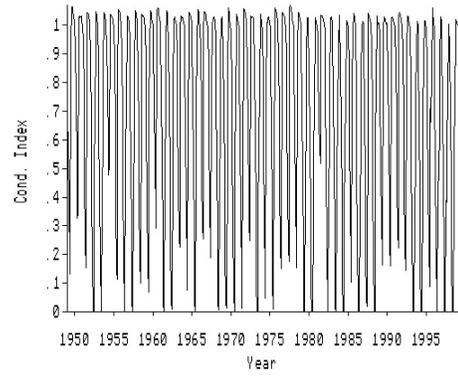


Figure 76. Animal population responses to different conditions during the period 1959-1998. A) Control run (observed conditions), B) no elk or deer removal, C) undisturbed conditions, with undisturbed vegetation, soils with elevated water tables, and wolves, D) no elk, E) control, but using the climate of 1900-1949, F) elk removals to 600-800.

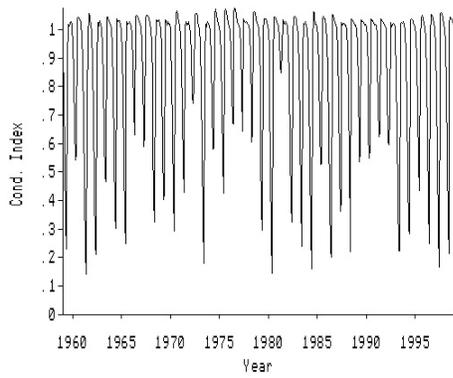
A)



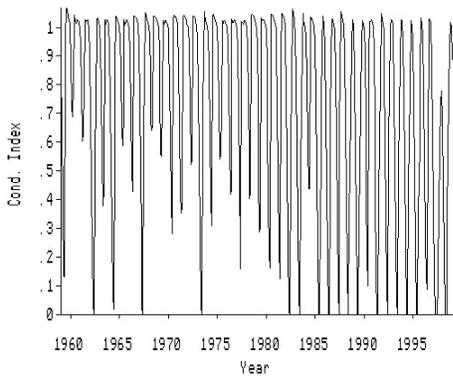
B)



C)



D)



E)

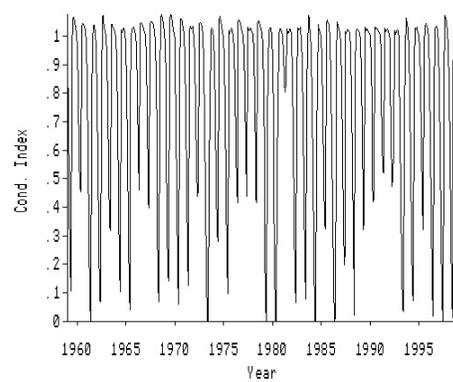


Figure 77. Park elk herd body condition responses to different conditions during the period 1959-1998. A) Control run (observed conditions), B) no elk removal, C) undisturbed conditions, with undisturbed vegetation, soils with elevated water tables, and wolves, D) control, but using the climate of 1909-2948, E) elk removals to 600-800.

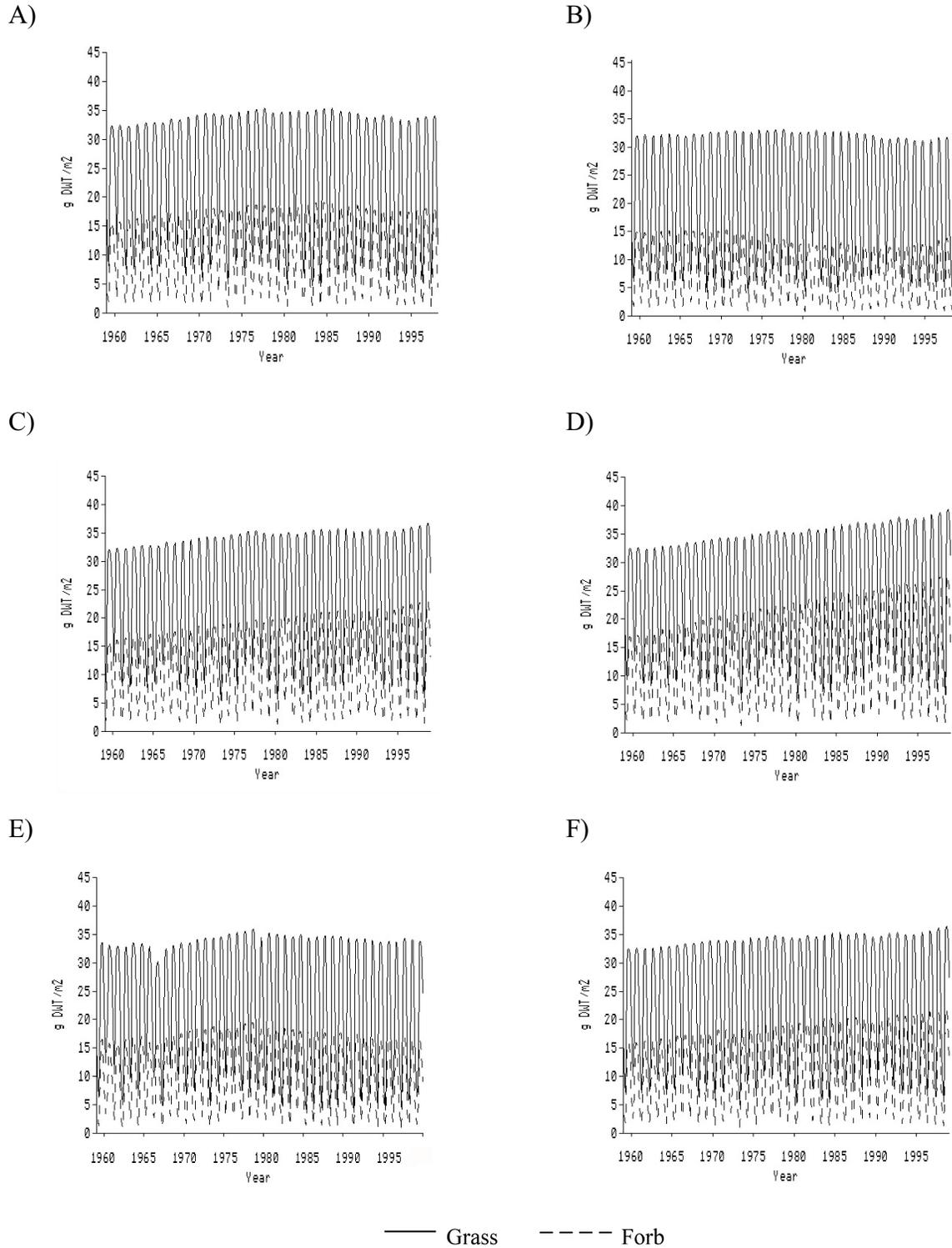
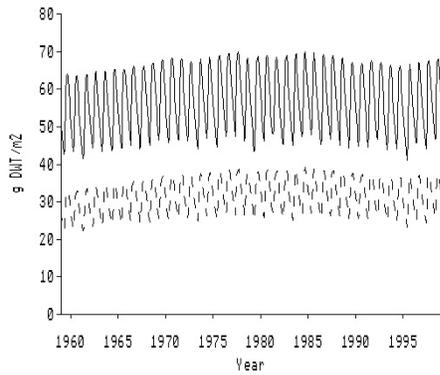
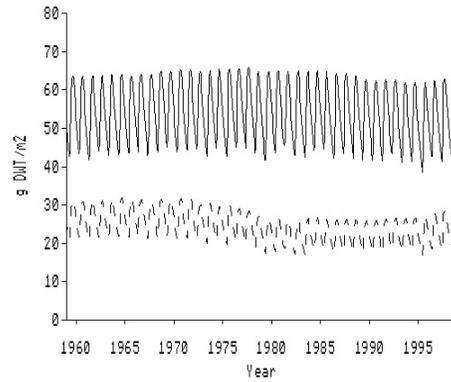


Figure 78. Dryland herbaceous aboveground biomass responses to different conditions during the period 1959-1998. A) Control run (observed conditions), B) no elk removal, C) undisturbed conditions, with undisturbed vegetation, soils with elevated water tables, and wolves, D) no elk, E) control, but using the climate of 1900-1949-1949, F) elk removals to 600-800.

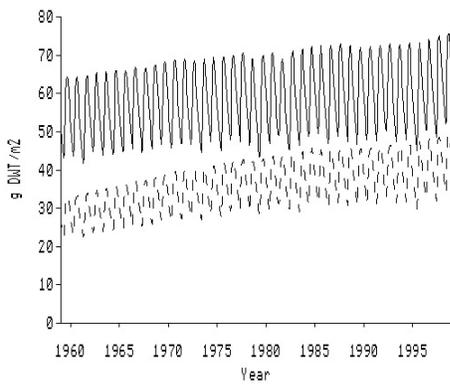
A)



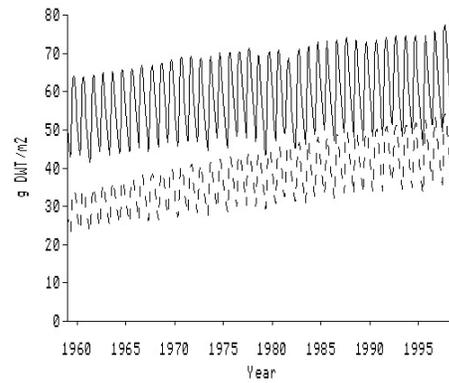
B)



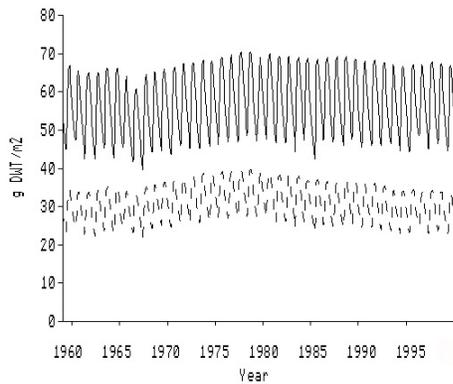
C)



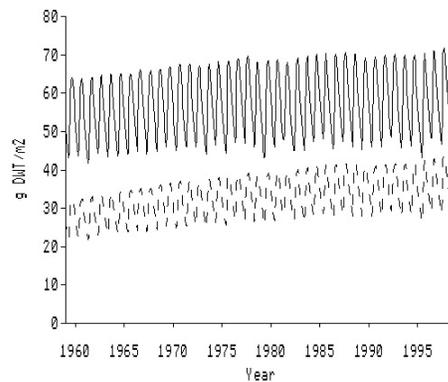
D)



E)



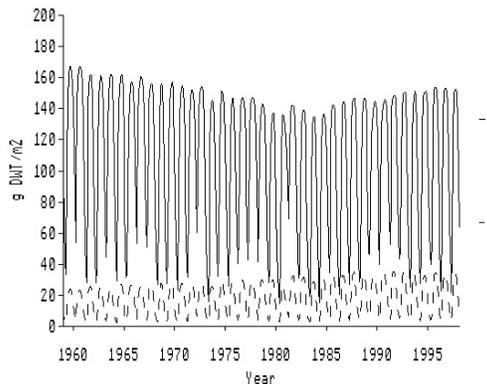
F)



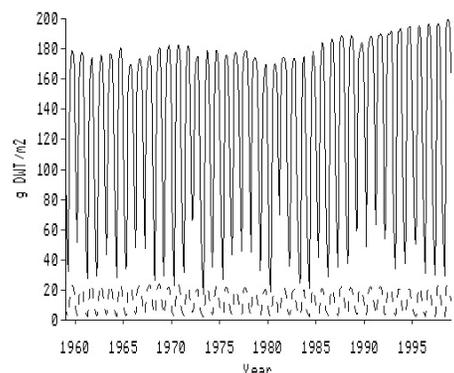
— Grass - - - - Forb

Figure 79. Dryland herbaceous root biomass responses to different conditions during the period 1959-1998. A) Control run (observed conditions), B) no elk removal, C) undisturbed conditions, with undisturbed vegetation, soils with elevated water tables, and wolves, D) no elk, E) control, but using the climate of 1909-2948, F) elk removals to 600-800.

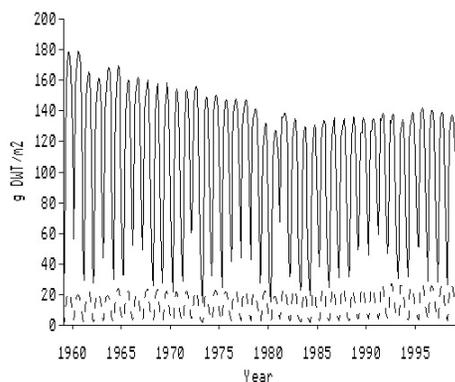
A)



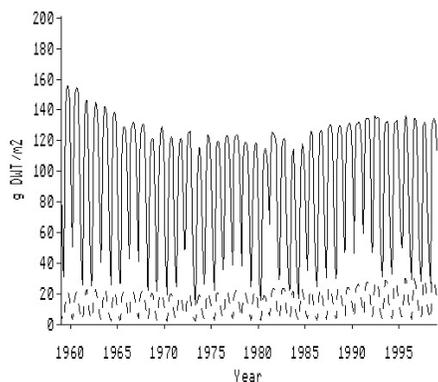
B)



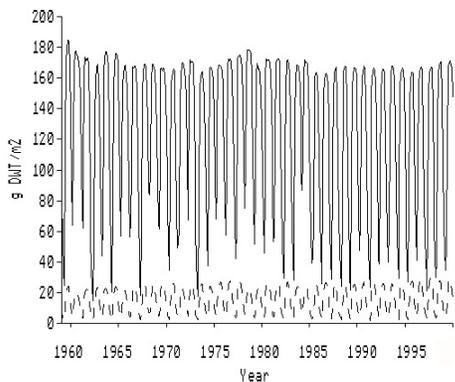
C)



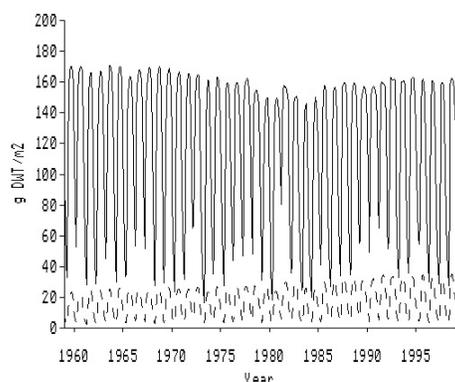
D)



E)



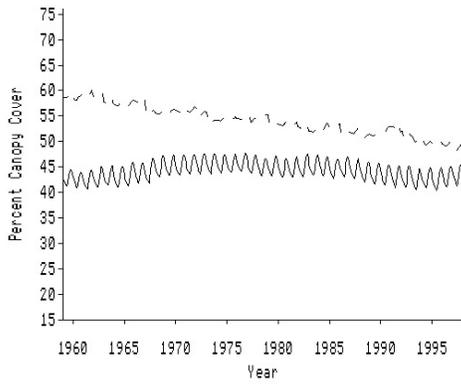
F)



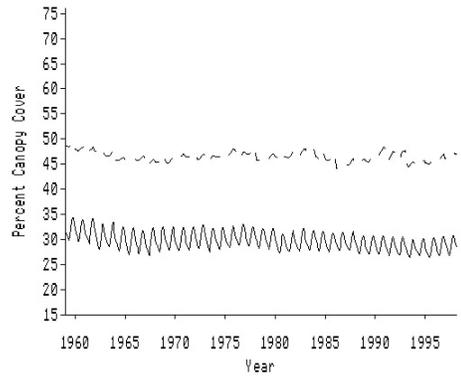
Wet Grass
 Wet Forb

Figure 80. Mesic herbaceous aboveground biomass responses to different conditions during the period 1959-1998. A) Control run (observed conditions), B) no elk removal, C) undisturbed conditions, with undisturbed vegetation, soils with elevated water tables, and wolves, D) no elk, E) control, but using the climate of 1909-2948, F) elk removals to 600-800.

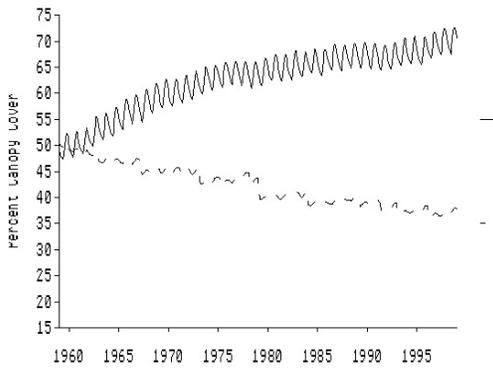
A)



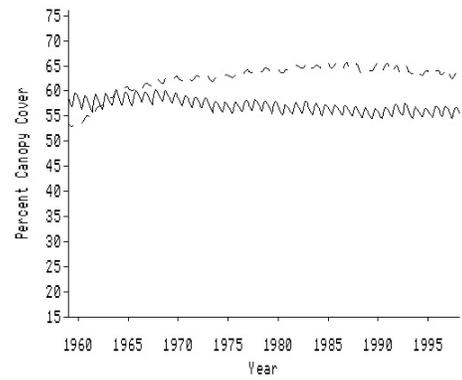
B)



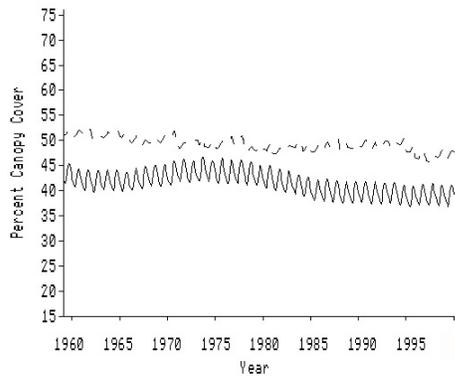
C)



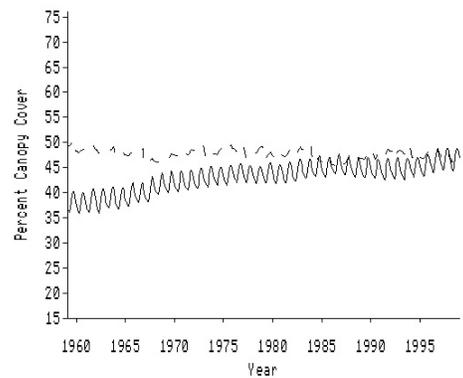
D)



E)



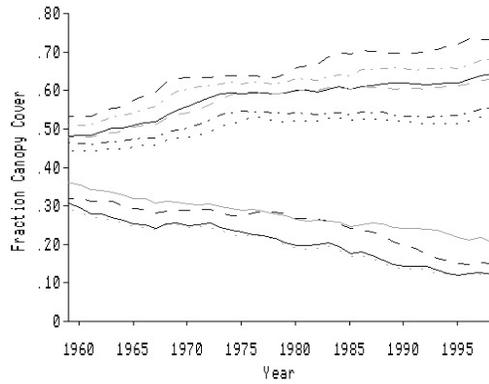
F)



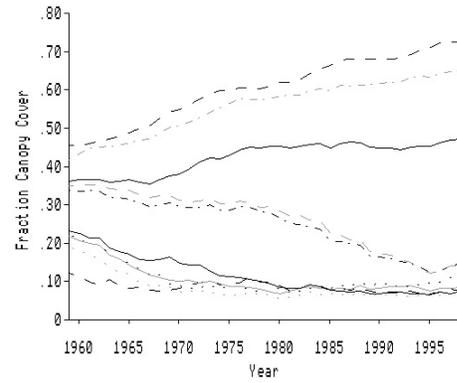
— Willow - - - - Aspen

Figure 81. Willow and aspen cover responses to different conditions during the period 1959-1998 reported as mean canopy cover within the grid-cells having that vegetation type. A) Control run (observed conditions), B) no elk removal, C) undisturbed conditions, with undisturbed vegetation, soils with elevated water tables, and wolves, D) no elk, E) control, but using the climate of 1909-2948, F) elk removals to 600-800.

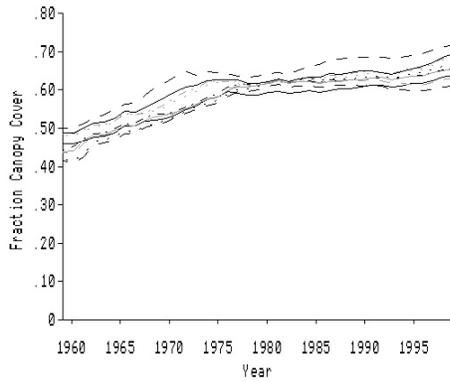
A)



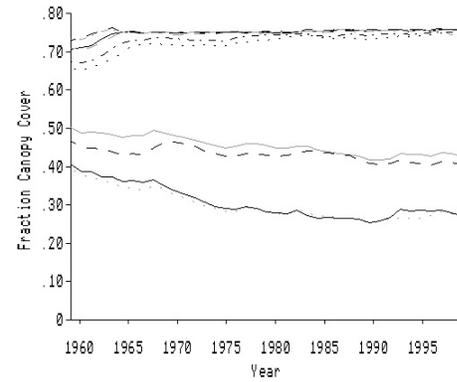
B)



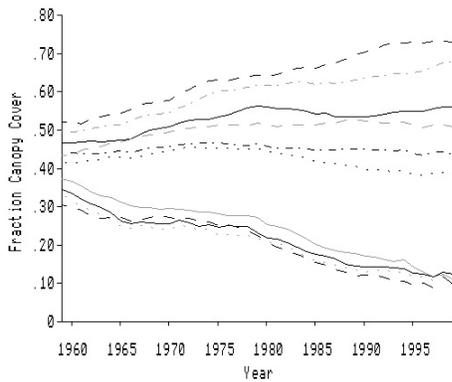
C)



D)



E)



F)

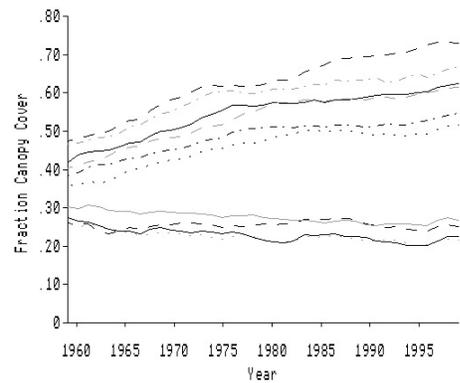
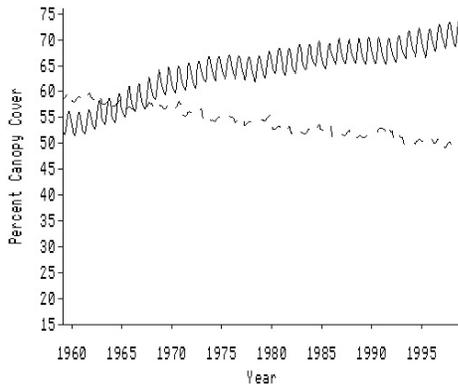
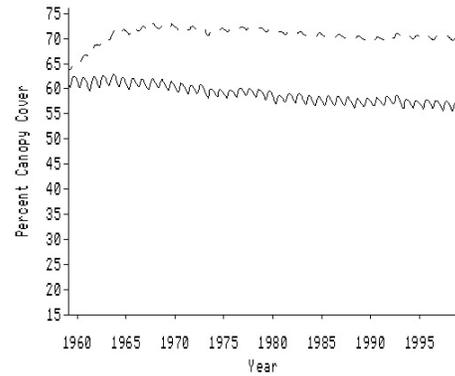


Figure 82. Willow cover in individual grid-cells under different conditions during the period 1959-1998. A) Control run, B) no elk removal, C) undisturbed conditions, with undisturbed vegetation, soils with elevated water tables, and wolves, D) no elk, E) control, but using the climate of 1909-1948, F) elk removals to 600-800.

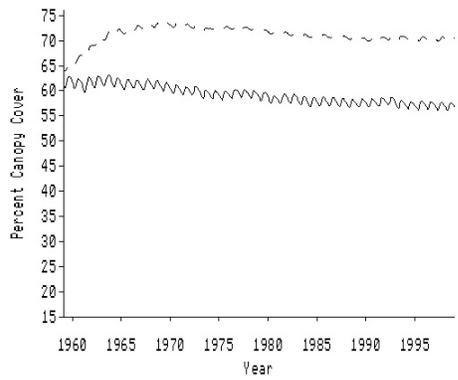
A)



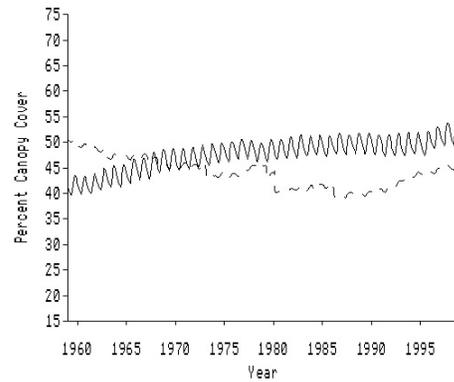
B)



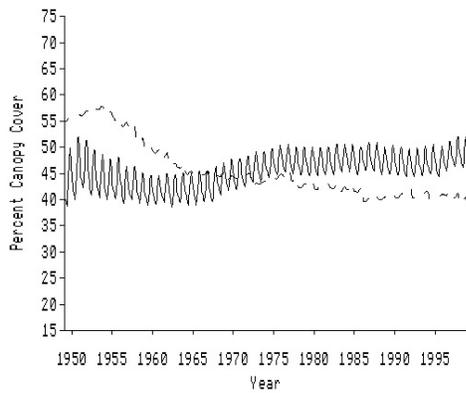
C)



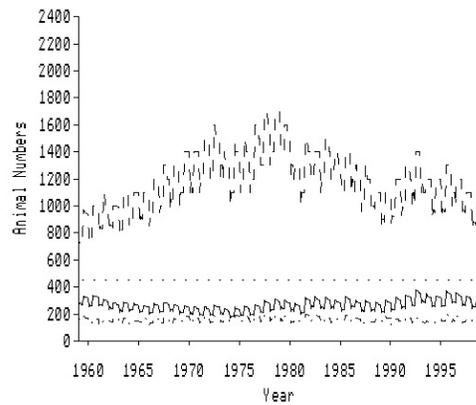
D)



E)



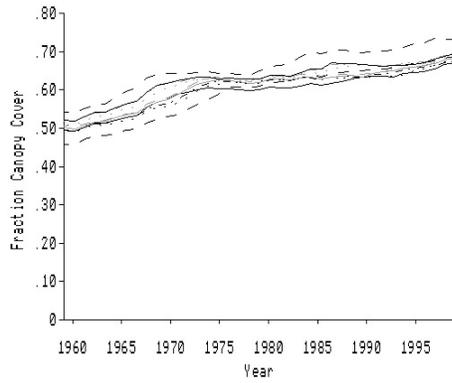
F)



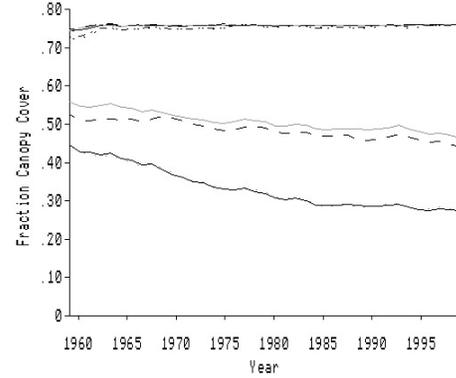
— Willow - - - - Aspen

Figure 83. Willow and aspen cover responses to different conditions during the period 1959-1998 reported as mean canopy cover within the grid-cells having that vegetation type. A) Like the control run, but with undisturbed soil conditions. B) Deer only (no elk or beaver). C) No herbivores at all. D) With wolves, and current soil and water table conditions. E) No elk removal, no wolves, undisturbed soil and water table. F) Animal populations as in D.

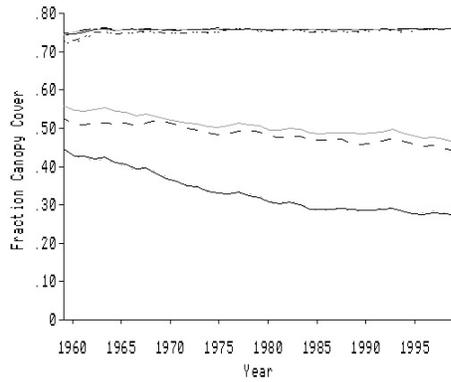
A)



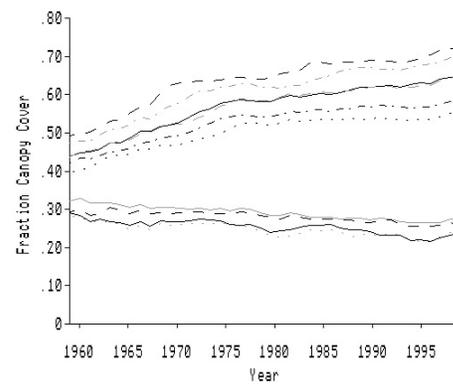
B)



C)



D)



E)

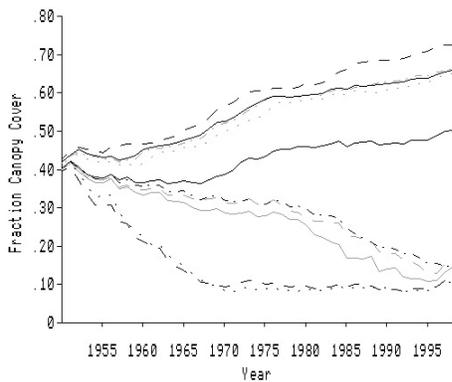


Figure 84. Willow cover in individual grid-cells under different conditions during the period 1959-1998. A) Like the control run, but using pre-disturbance soil conditions. B) Deer only (no elk or beaver). C) No herbivores at all. D) Like the undisturbed run, but with current soil and water table conditions. E) No elk removal, no wolves, undisturbed soil and water tables.

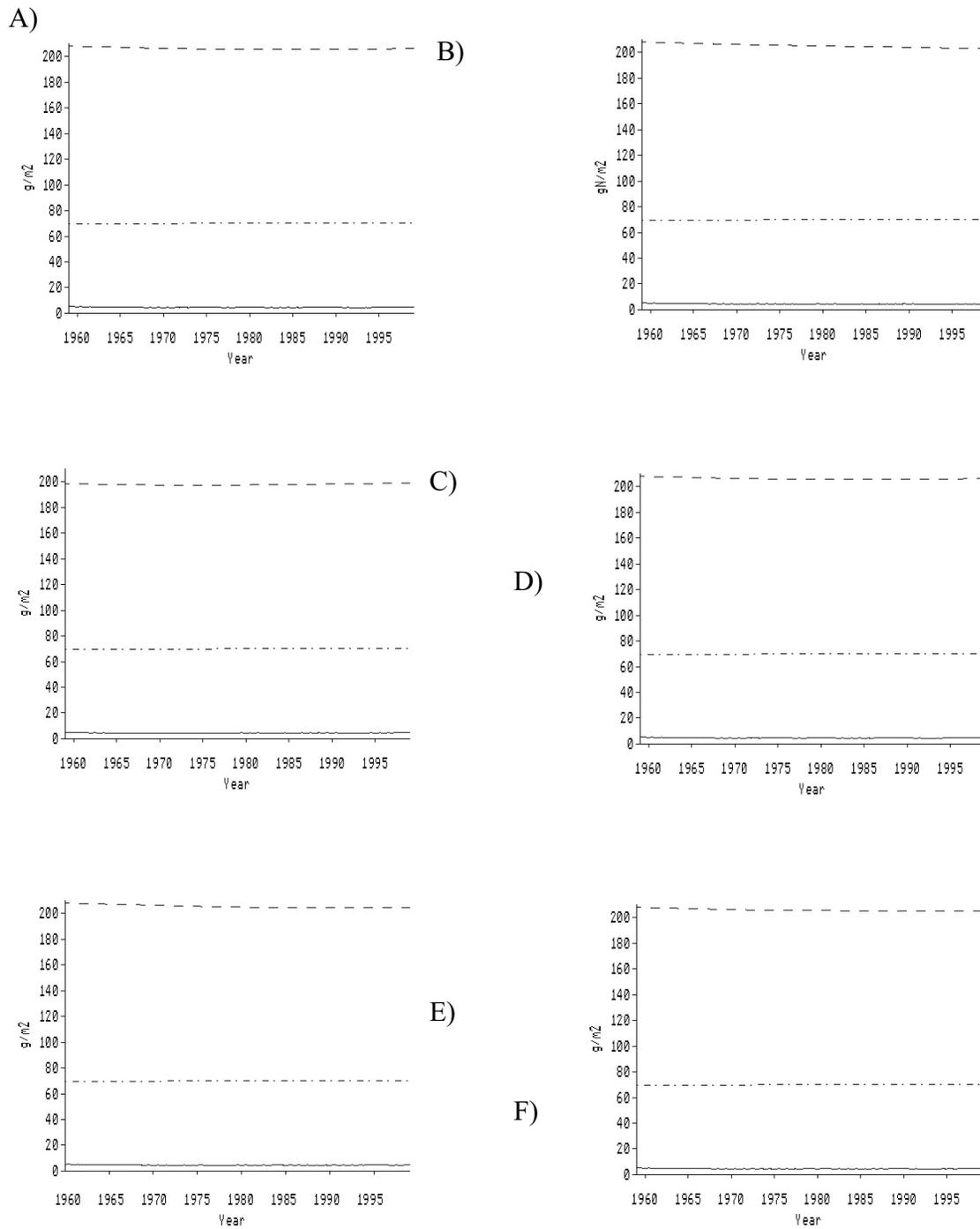
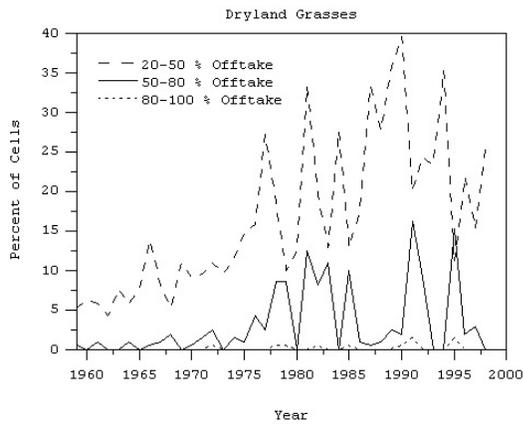
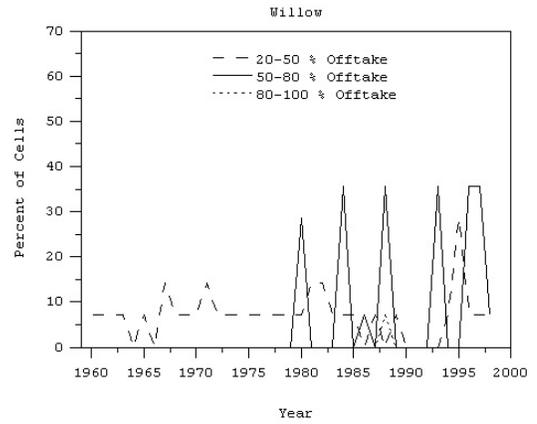


Figure 85. Soil organic nitrogen pools under different conditions during the period 1959-1998. A) Control run (observed conditions), B) no elk removal, C) undisturbed conditions, with undisturbed vegetation, soils with elevated water tables, and wolves, D) no elk, E) control, but using the climate of 1900-1949, F) elk removals to 600-800.

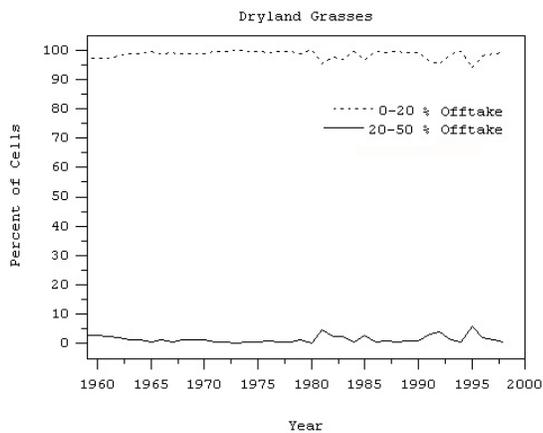
A)



B)



C)



D)

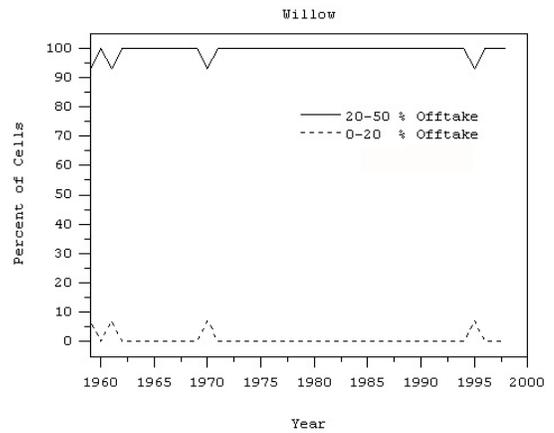
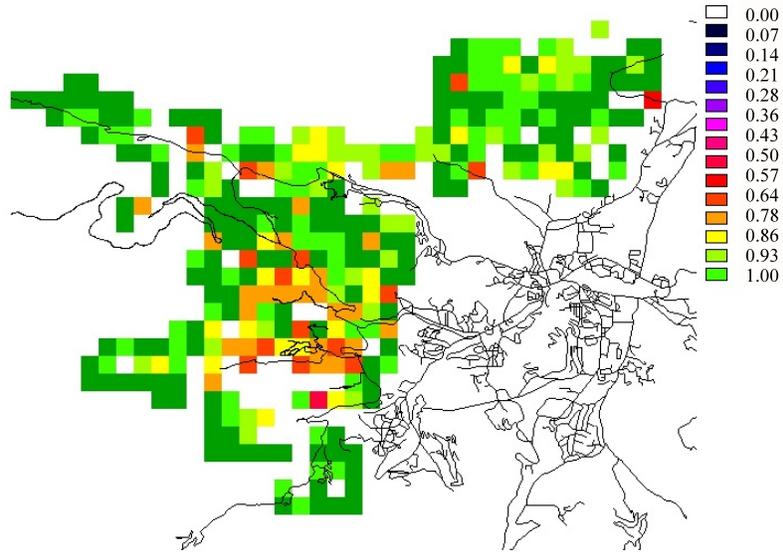


Figure 86. A) and B) are offtake percentages for the control run, showing the percentage of grid-cell cells with >50% offtake. C) and D) are offtake percentages for the undisturbed run 1949-1998 with wolves, and vegetation and animals starting at values at the end of the 1912-1948 undisturbed run. In the undisturbed run, there were < 1% of cells with >50% offtake of grass or willow, throughout.

A)



B)

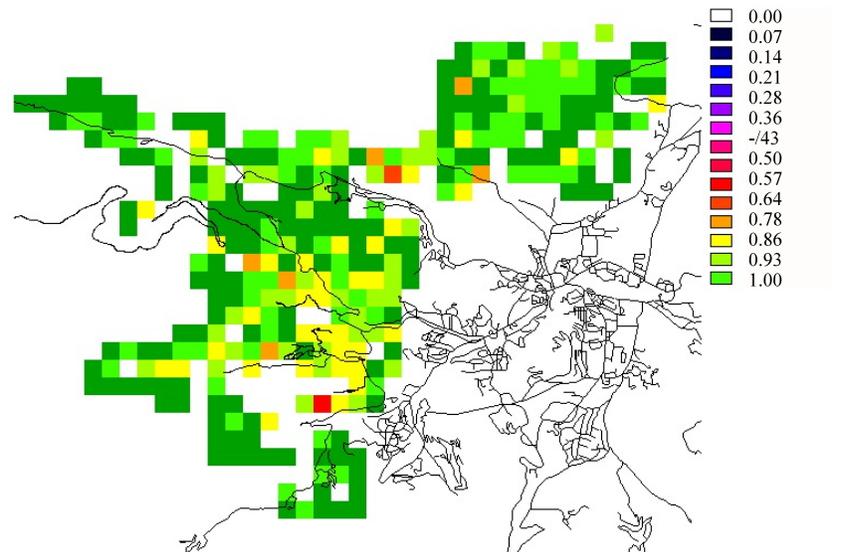
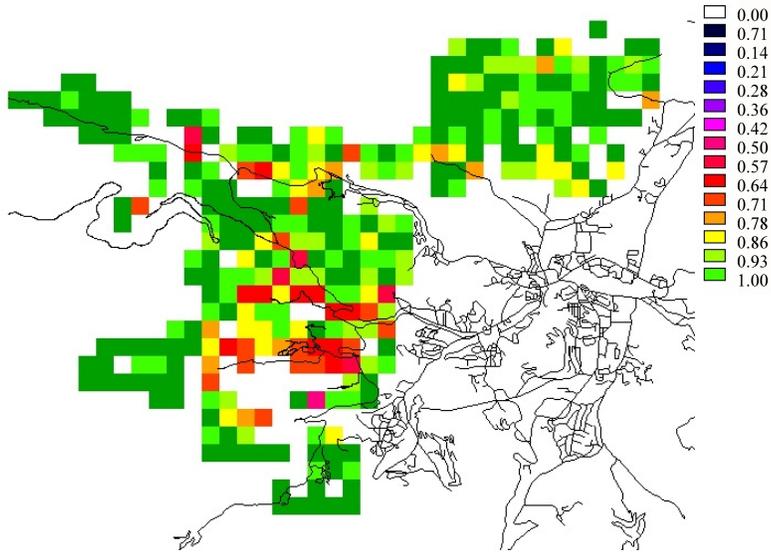


Figure 87. A) Ratio of dryland herbaceous root biomass in the last 10 years of the control simulation 1949-1998 to that in the undisturbed run with wolves. B) Ratio of root biomass with elk culled to 400-600 to that in the undisturbed run. Only cells with $>15 \text{ g m}^{-2}$ in the undisturbed simulation are included.

A)



B)

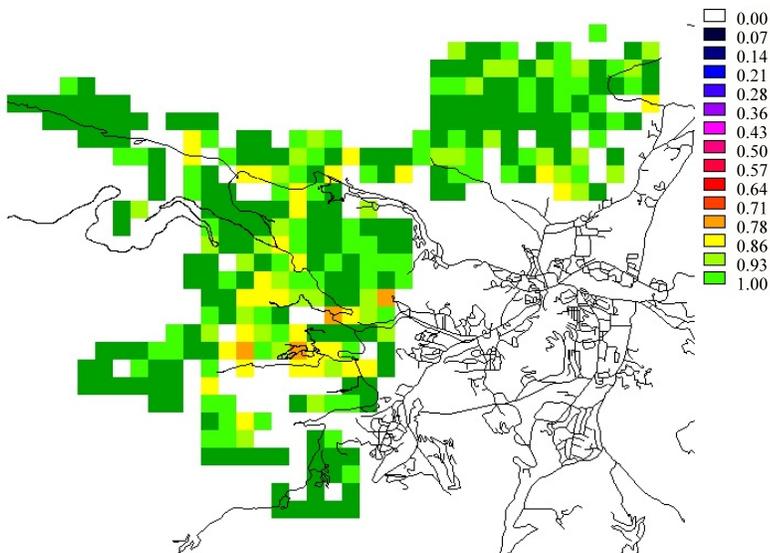
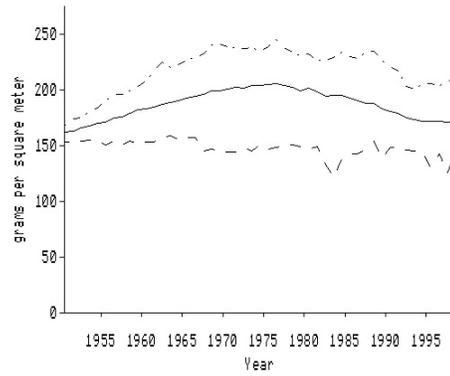
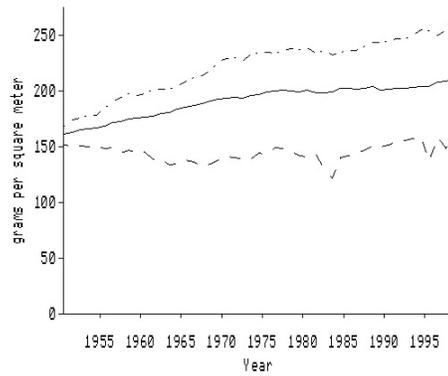


Figure 88. A) Ratio of dryland herbaceous root biomass in the last 10 years in the control simulation to that in the the no-elk simulation. B) Ratio of root biomass in the control simulation to roots in the simulation with elk culled to 400-600. Only cells with $>15 \text{ g m}^{-2}$ in the undisturbed simulation are included.

A)



B)



C)

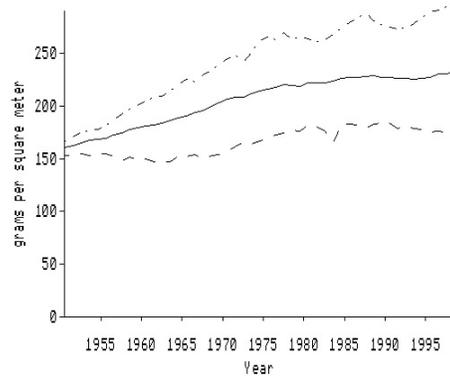


Figure 89. Herbaceous root biomass on the park elk range in July in grassland vegetation types only. A) The control run. B) Culling to 400 when park elk population reaches 600. C) The undisturbed run with wolves. Minimum, maximum, and average values among grid-cells are shown, illustrating the range of spatial variation.

Willow Cover

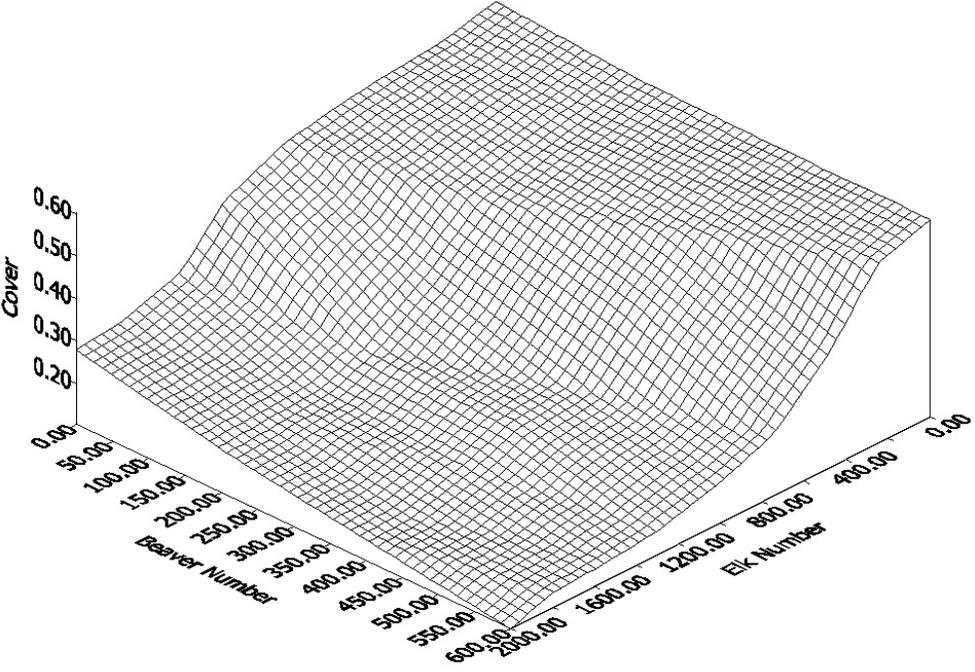


Figure 90. Response surface of willow cover on the elk winter range to elk and beaver numbers after constant stocking for 50 years.

Aspen Cover

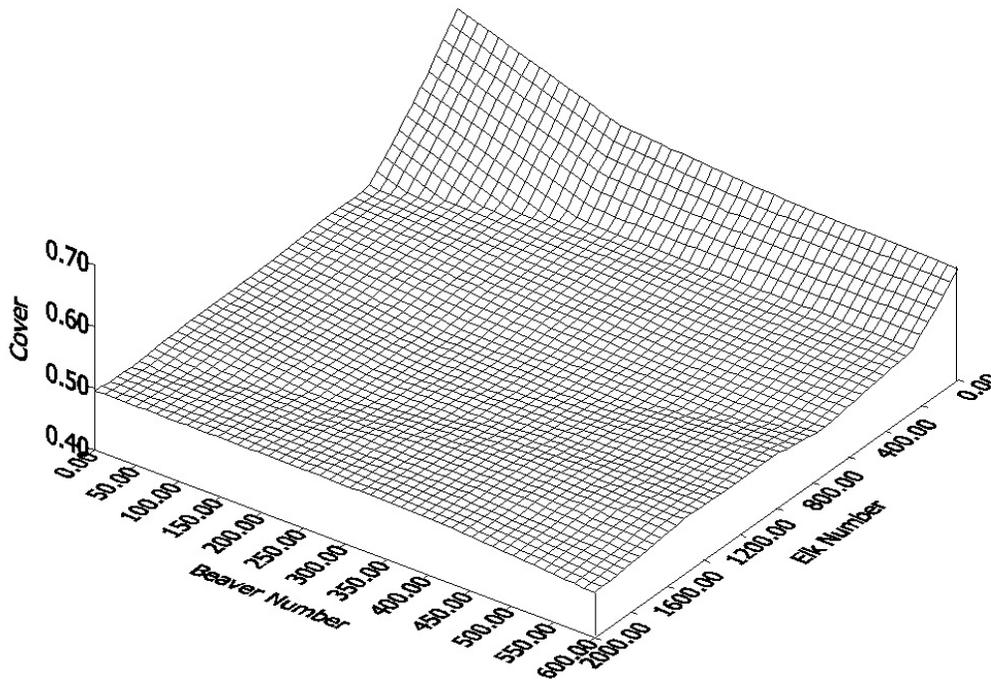


Figure 91. Response surface of aspen cover on the elk winter range to elk and beaver numbers after constant stocking for 50 years. Note the scaling of the z axis may exaggerate the response.

Aboveground Net Primary Production - Mesic Herbs

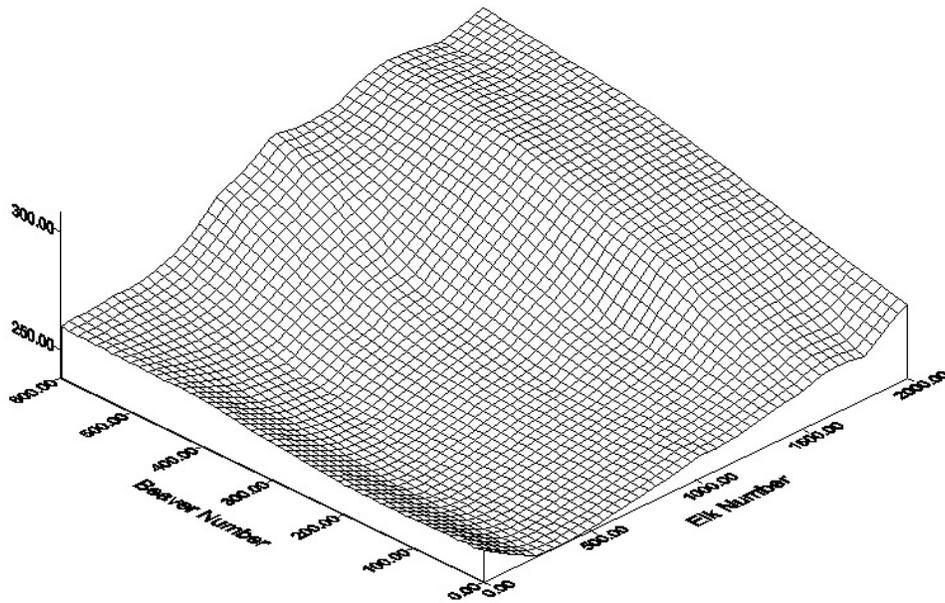


Figure X. Response surface of mesic (riparian) herb aboveground net primary production to elk and beaver number after constant stocking for 50 years. Note the scaling of the z axis. Also note that the X and Y axes are inverted compared to Figs. 80,81.

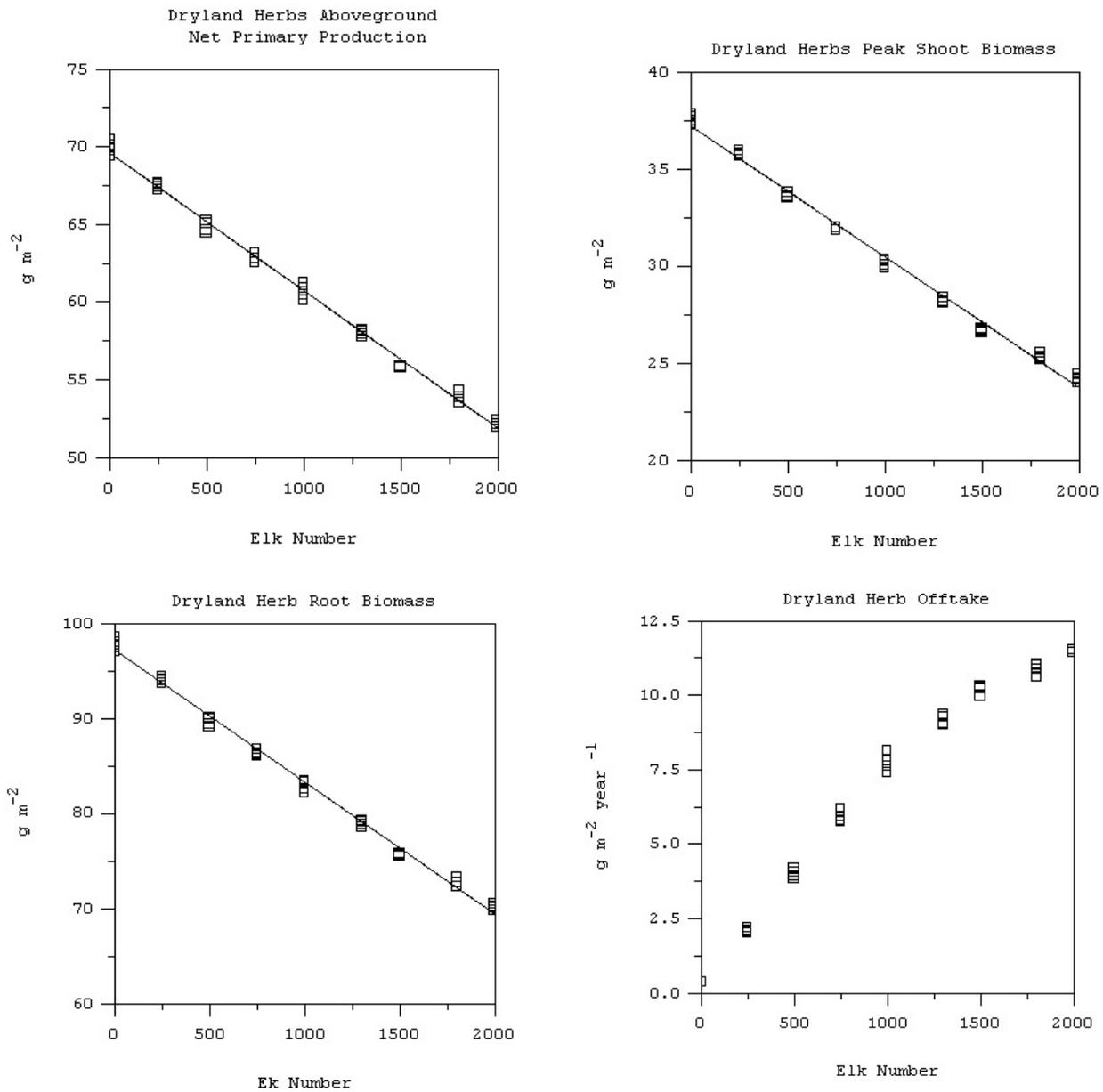


Figure 92. A-C) Responses of dryland (upland) herbs to elk number after constant stocking for 50 years. D) Offtake of herbaceous biomass by elk. Multiple points at each elk density represent runs with different beaver densities in the factorial experiment.

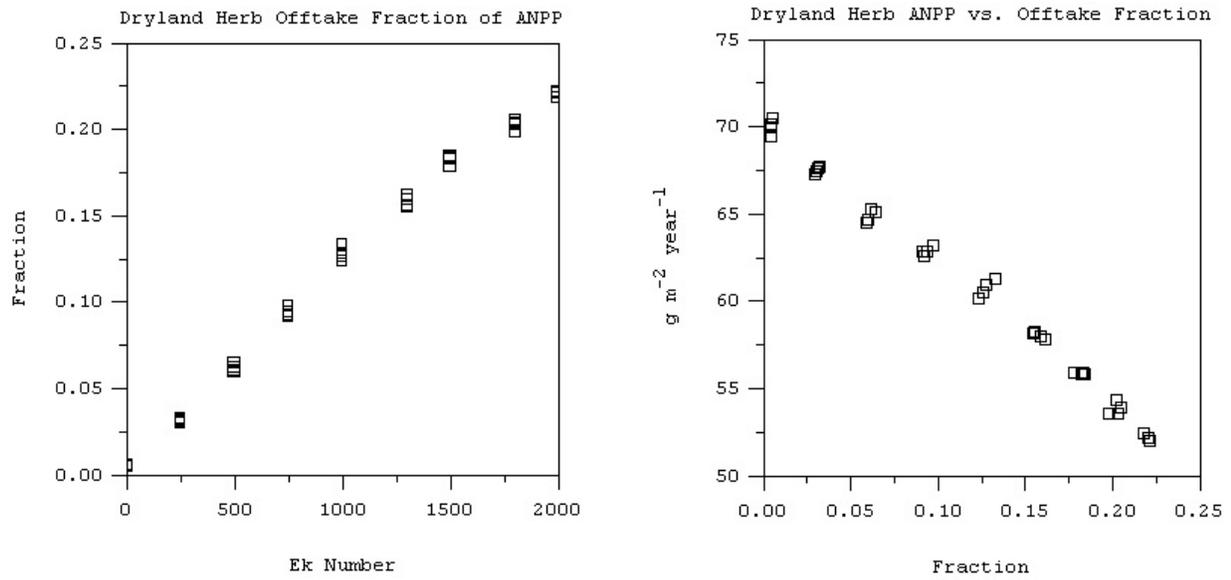


Figure 93. A) Fraction of dryland herb ANPP consumed by elk vs. elk number after constant stocking for 50 years. B) Dryland herb aboveground net primary production vs. fraction of ANPP consumed. Multiple points at each elk density represent runs with different beaver densities in the factorial experiment.

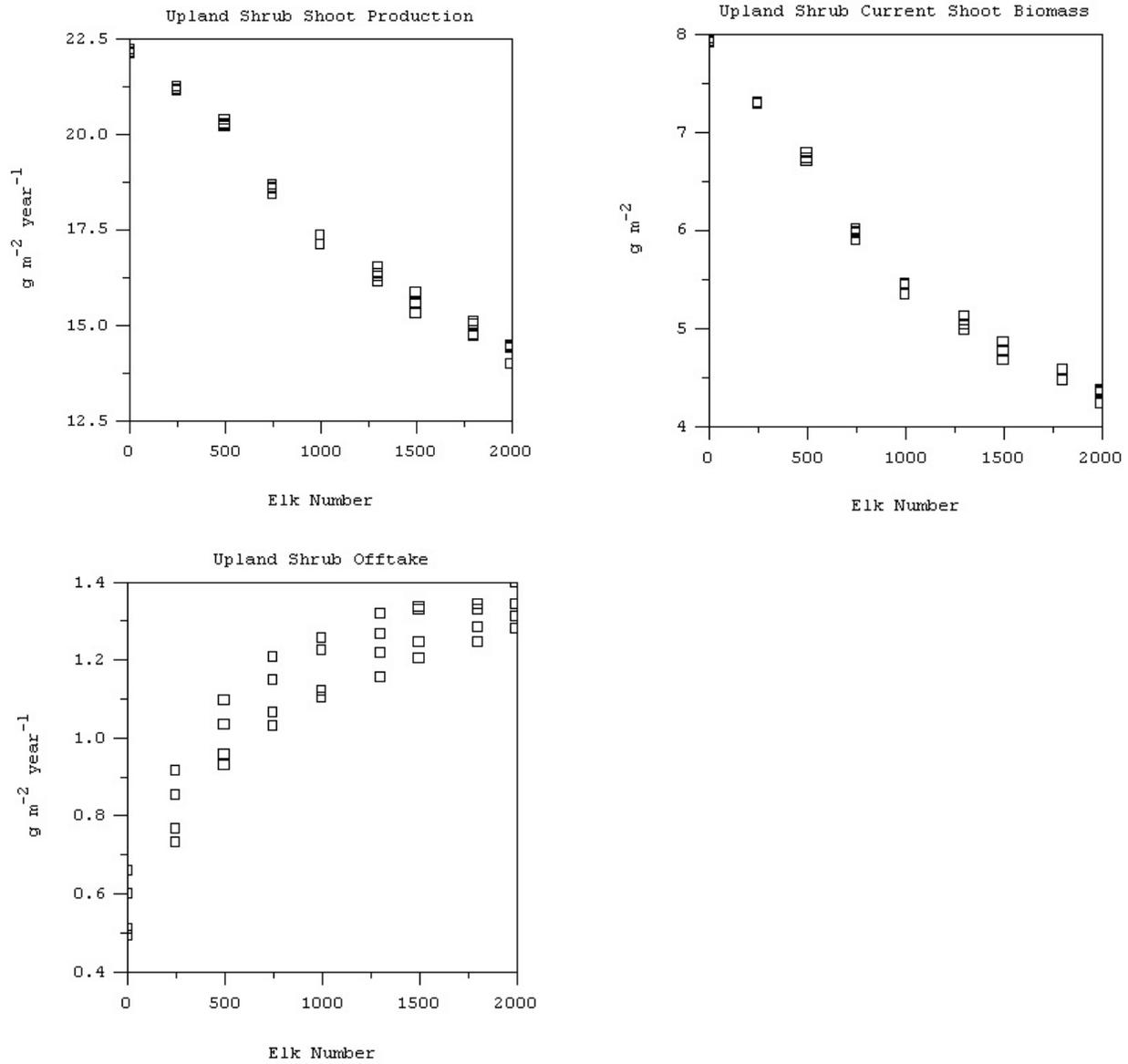


Figure 94. Responses of upland shrubs to elk number, constant stocking rate for 50 years. Multiple points at each elk density represent runs with different beaver densities in the factorial experiment.

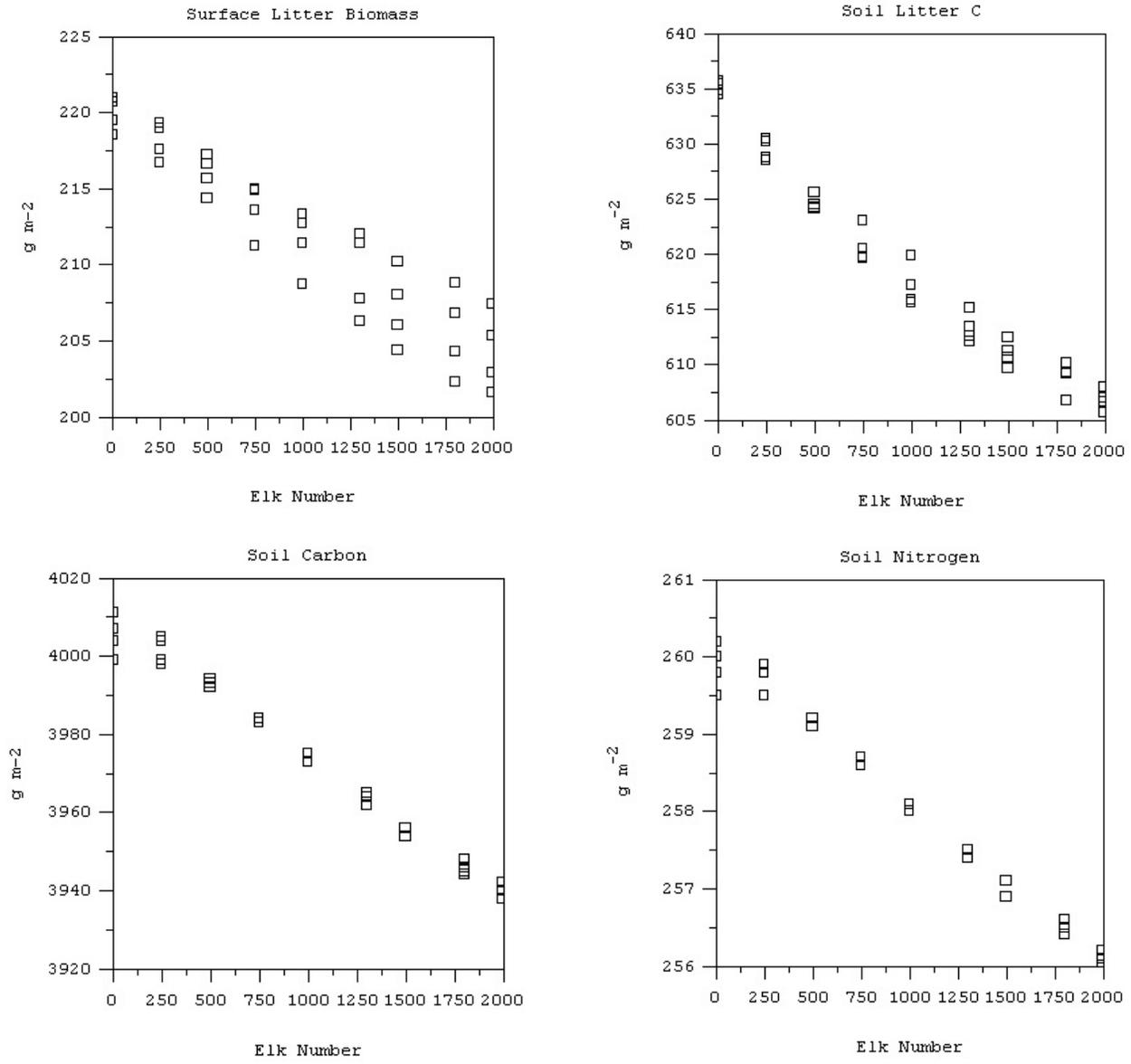


Figure 95. Responses of litter, soil carbon, and soil organic nitrogen to elk number after constant stocking for 50 years. Multiple points at each elk density represent runs with different beaver densities in the factorial experiment. Note scaling of y axes.