REMOTE SENSING OF VEGETATION RECOVERY IN GRASSLANDS AFTER THE 1988 YELLOWSTONE FIRES

Evelyn H. Merrill
Department of Zoology and Physiology
and
Ronald W. Marrs
Department of Geology
University of Wyoming
Laramie

Research Summary

In 1988, we developed an algorithm to predict green herbaceous biomass in sagebrush grassland communities of elk summer range using Landsat multi-spectral scanner (MSS) data (Merrill et al. 1988). Our objectives during this contract period were (1) to improve this predictive model and (2) to use the model for predicting vegetation recovery on grasslands burned in 1988.

We made three basic changes in our previous approach to predicting vegetative biomass (Merrill et al. 1988). First, we are now using thematic Mapper (TM) rather than MSS spectral data from the Landsat satellite. TM data are recorded at a higher resolution, i.e. ground pixels are approximately one quarter the size recorded by MSS. Also, TM records seven rather than four spectral wavelength bands which can be used in an algorithm to predict vegetative characteristics. We hope that the inclusion of the additional bands will improve the precision of our predictive algorithm. Second, peer review of our earlier work suggested that we develop green vegetation and soil brightness indices. Finally, we decreased our vegetative sampling effort at each ground truth site and increased the number of sites we sampled.

During early August we sampled 40 sites on elk summer range in the Lower Norris, Upper Cache Creek, and on the Mirror plateau. Twelve of these sites were burned in 1988. We estimated plant cover and height by forage class in 30 0.1 m^2 microplots and clipped 10 of the plots. Vegetation was dried at 100 C for 48 hrs and weighed. Canopy coverage of shrubs was estimated using a 30 m line transect. Vegetation data has been computerized and data analysis is in progress.

Landsat imagery was purchased by Yellowstone National Park for

August 12, 1989. However, because funding for the Landsat program was cut severely in 1989, the Goldstone Receiving Station in California has been shut down. As a result Landsat imagery for the western portion of the United States is not regularly acquired except by the Canadian receiving stations. Time required for obtaining computer compatible tapes (CCT) from Earth Observation Satellite Company (EOSAT) has increased from 10 days to over 8 weeks. Consequently, CCT were received by the National Park Service in mid-December and by the University of Wyoming in late-December 1989. We have completed the downloading of the CCT onto our image processing systems. We expect to complete our data analysis by March 15, 1990.

We will evaluate the accuracy of algorithms developed from 1989 field and satellite data with additional Landsat imagery and ground truthing in 1990-1991. Once the algorithms have been validated, we will use the model to quantify vegetation recovery across large areas burned in 1988 and compare the recovery to comparable unburned areas for the first 33 years post burn.

Literature Cited

Merrill, E. H., M. S. Boyce, R. W. Marrs and M. K. Bramble-Brodahl. 1988. Grassland phytomass, climatic variation, and ungulate population dynamics in Yellowstone National Park. Final Rept. UW-NPS Research Center.