The Rangeland Vegetation Simulator: A system for quantifying production, succession, disturbance and fuels in non-forest environments

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Introduction

Rangeland landscapes occupy roughly 662 million acres in the coterminous U.S. and their vegetation responds quickly to climate and management, with high relative growth rates and extreme inter-annual variability. Current national decision support systems in the U.S. such as the Interagency Fuels Treatment Decision Support System (IFT-DSS) require spatially explicit information describing production, fuels, grazing capacity and successional trajectory. Therefore a system is needed that quantifies these vegetation and fuel characteristics to permit estimations of annual production, grazing capacity, and fire behavior and effects. This situation inspired our project to develop a program for simulating succession, productivity, and fuels in non-forest environments. This system is called the Rangeland Vegetation Simulator (RVS).

Materials and Methods

What Do I need to run RVS?
- User has control over inputs
- Plot location
- Species composition
- Climatology
- Treatment information
- If you don’t have these data then use RVS data loader
- RVS is an open source C++ library written for multi-platform deployment
- The code is hosted on Github at https://github.com/rlank/RVS
- RVS can run 1500 plots for 50 years each on a mid-range desktop in about 30 seconds

Results and Discussion

- Fuels
  - 1, 10, 100, 1000 - hr fuels
  - Surface fire behavior fuel models
  - Fuel loading models
  - Fuel Characteristic Classification System
- Vegetation
  - Annual yield, standing crop
  - Shrub and herb cover and height
  - Stems per acre, various allometric components
  - Effects of herbivory and fire on succession, fuels and biomass

Implications: So What?
- Use RVS to monitor annual production
- Use RVS to project impacts of prescribed grazing
- Use RVS to prioritize restoration resources

Current Applications
- Quantifying above ground carbon in the intermountain Region (supporting Forest Plan Revision)
- Quantifying future range of variability in FS lands in New Mexico under varying climates
- Quantifying post-fire vegetation recovery for improving grazing management guidelines

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Risk management!