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

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RVS

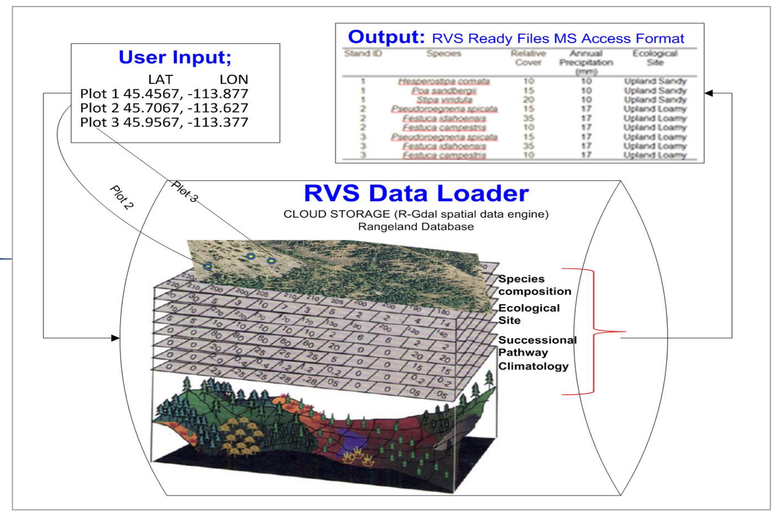
Introduction

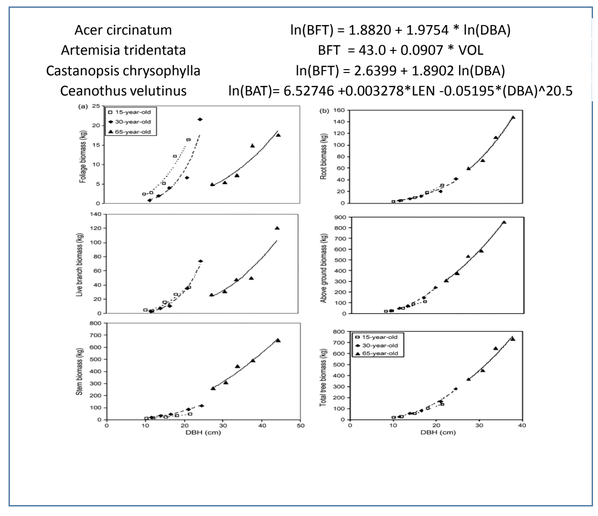
Rangeland landscapes occupy roughly 662 million acres in the coterminous U.S. and their vegetation responds quickly to climate and management, with high relative growth rates and extreme inter-annual variability. Current national decision support systems in the U.S. such as the Interagency Fuels Treatment 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?

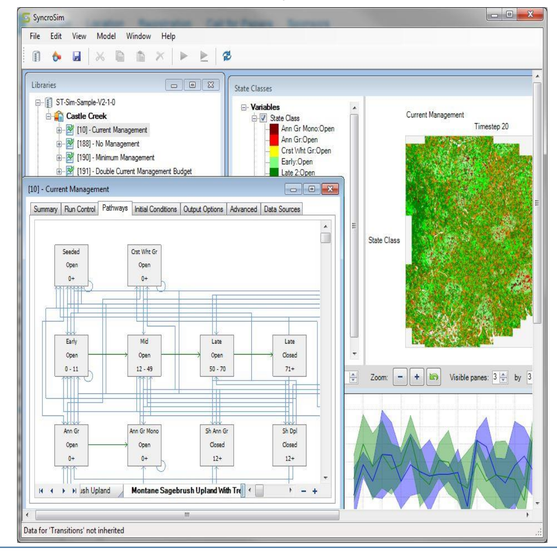
- User has control over inputs
- Plot location
- Species composition
- Relative cover
- Climatology
- Treatment information
- If you don't have these data then use RVS data loader





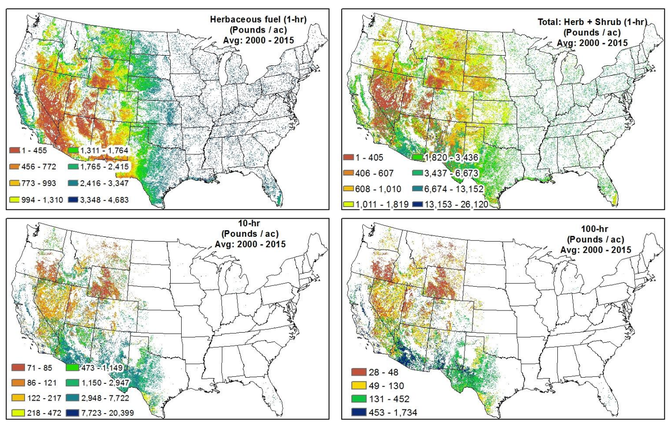
- RVS is an open source C++ library written for multi-platform deployment
- The code is hosted on Github at https://github.com/rlank/RVS
- RVS can run 1500 plots for 50 years each on a mid-range desktop in about 30 seconds

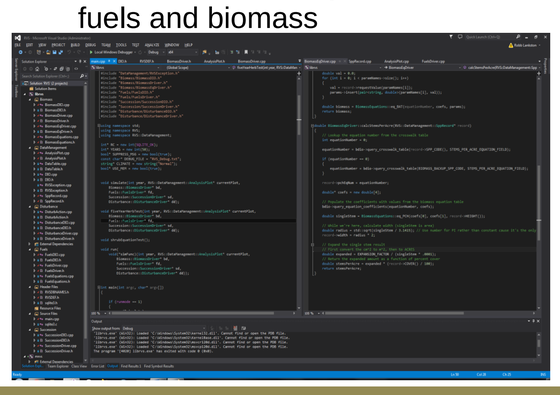
Can be coupled with ST-SIM

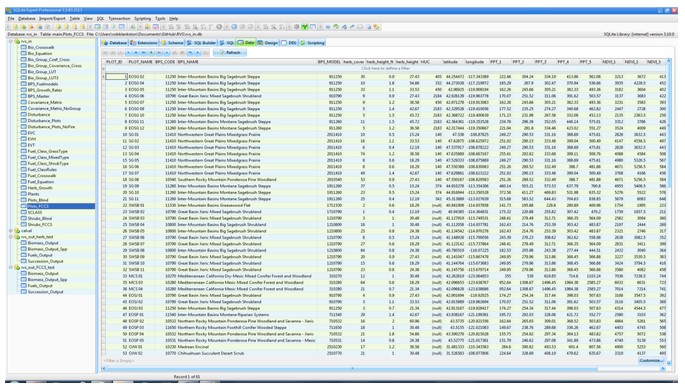


Results and Discussion

- 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

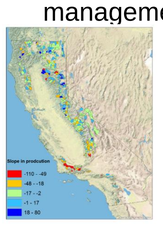


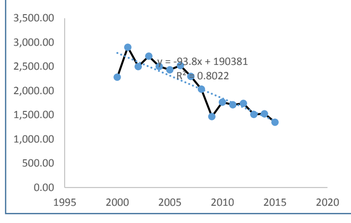


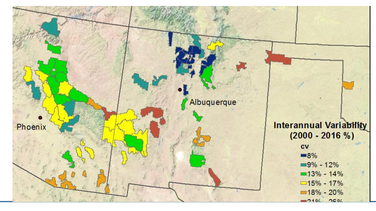


Current Applications

- Quantifying trends in forage in California grazing allotments
- Estimating 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







National Forest	Area	Maximum	Average	Minimum
	ha	Mg ha^{-1}		
Uinta-Wasatch-Cache National Forest	280,720	6.48	5.06	3.63
Boise National Forest	179,803	3.89	2.67	1.61
Caribou-Targhee National Forest	341,063	3.08	2.35	1.52
Fishlake National Forest	140,290	10.55	9.62	8.91
Ashley National Forest	125,121	4.80	4.08	3.60
Humboldt-Toiyabe National Forest	1,256,071	7.48	6.16	5.26
Sawtooth National Forest	381,122	5.38	4.49	3.25
Salmon-Challis National Forest	357,765	3.19	2.10	1.03
Payette National Forest	36,791	2.72	1.90	1.09
Dixie National Forest	114,065	13.33	12.45	11.75
Bridger-Teton National Forest	362,678	1.38	1.19	0.61
Manti-La Sal National Forest	111,428	7.27	6.46	5.83

Implications: So What?

- Use RVS to monitor annual production
- Useful for understanding links between climate, management, site production, and fuels
- Use RVS to quantify how your management will change fuel and fire behavior
- Use RVS to project implications of prescribed grazing
- Use RVS to identify areas of strength and weakness in your grass-bank
- Use RVS to prioritize restoration resources

Risk management!

Acknowledgements

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