



Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Rocky Mountain Research Station Science You Can Use *Tools*

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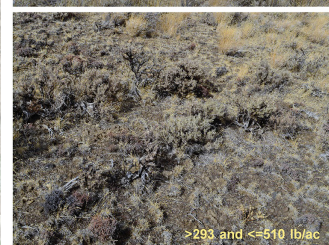
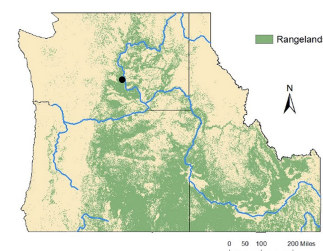
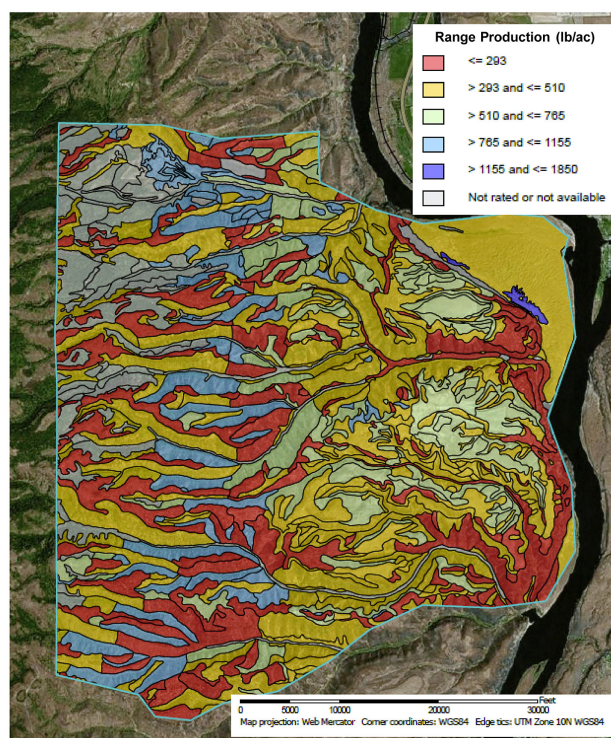
StockSmart Tool: Big data for big landscape grazing decisionmaking



STOCKSMART

Livestock grazing is a common use of rangelands that can be managed to support rangeland health, including the wide array of ecosystem services that benefit society from public lands and private lands. This requires careful allocation of naturally occurring forage on large landscapes for both domestic and wild herbivores. Managers know grazing can sustain rangeland health as long as they time it right and balance the duration, frequency, and intensity of the grazing. However, forage production on a single area or landscape varies significantly from year to year, which, until recently, has limited the accuracy of data available to managers when they make decisions about grazing.

Lead scientist Tip Hudson along with Sonia Hall, both at Washington State University, and Rocky Mountain Research Station Research Ecologist Matt Reeves have developed a new dataset and tools that provide improved data to support grazing decisions. [StockSmart](#), a grazing decision support tool, integrates remote-sensed vegetation production data and livestock terrain use modeling



Big landscapes meet big data: Informing grazing management in a variable and changing world. The left panel illustration breaks down range production conditions on a site in eastern Washington. Location photographs on the right show existing conditions that can be identified with the [StockSmart](#) tool. (illustration is copied from Hudson et al. 2021)

to more accurately provide estimates of stocking rate values based on where animals actually graze and how much forage is (and has been) in those specific areas.

Land managers rely on annual aboveground net primary

productivity (ANPP) as a basis for deciding when, where, and how much forage could and should be consumed by livestock. These are primary stocking rate decisions. ANPP is highly variable spatially and temporally, influenced by specific environments, growing



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conditions, interannual variation in the timing and amount of precipitation, and potential climate change impacts seen over a longer timeframe.

“The tool is a significant step forward in the ability for private landowners and public land managers to make calculations over millions of acres very quickly. Calculations that may have taken weeks to process a decade ago are accessible in minutes,” says Reeves. Offering spatial resolution of 30-m by 30-m pixels, StockSmart allows managers and landowners to evaluate and incorporate regularly updated geospatial datasets to add essential information to management decision processes.

In addition to near real-time data, StockSmart supports detailed evaluations of prior history and potential future conditions. As implications of climate change influence decisionmaking, the tool can assist in forecasting future variations in forage conditions and potential stocking rates.

As with many decisions on public lands, evaluations of available data can be interpreted differently and lead to different conclusions. Reeves says: “StockSmart is intended to give decisionmakers common starting points. This tool can bring people together in ways we never thought about, because

there’s nothing hidden. It’s a unifier, because now everyone gets to look at the same data.”

Effective land use decisionmaking combining remote-sensing data with the experience of local land managers creates opportunities for sustainable grazing in landscapes affected by changing conditions such as long-term drought, normal interannual variability in precipitation, and climate change.

StockSmart assists landowners in managing rangeland environments toward viable, resilient rangeland providing the full suite of ecosystem services.



StockSmart has a responsive design making it compatible for different users. It can calculate stocking rate, compare scenarios, collaborate with other users, draw boundaries, and more.

Further Reading

Hudson, Tip D.; Reeves, Matthew C.; Hall, Sonia A.; Yorgey, Georgine G.; Neibergs, J. Shannon. 2020. [Big landscapes meet big data: Informing grazing management in a variable and changing world](#). *Rangelands*. 43(1): 17–28.

Management Implications

- With access to quick, accurate, time-sensitive scientific and historical data, producers and public land managers can improve the accuracy of grazing management decisions.
- The StockSmart software program can identify geographic areas where there is an imbalance between available forage and demand based on current rangeland conditions.
- With transparency and accountability, StockSmart provides public land managers and related stakeholders with free access to a state-of-the-art resource management tool. Providing scientifically valid historical records reduces the learning curve of knowledge acquisition and improves decisionmaking over time.

Lead Scientists

Tip Hudson is an Extension Professor in Rangeland & Livestock Management at Washington State University.

Sonia Hall is an Associate in Research at the Center for Sustaining Agriculture and Natural Resources at Washington State University.

Matt Reeves is a Research Ecologist in the Human Dimensions Program at the USDA Forest Service Rocky Mountain Research Station.

Louis Dzierzak is the author of this Science You Can Use in 5 Minutes.

The Rocky Mountain Research Station is one of seven units within USDA Forest Service Research & Development. RMRS maintains 14 field laboratories throughout a 12-state geography encompassing parts of the Great Basin, Southwest, Rocky Mountains, and the Great Plains. While anchored in the geography of the West, our research is global in scale. RMRS also administers and conducts research on 14 experimental forests, ranges and watersheds and maintains long-term research databases for these areas. Our science improves lives and landscapes. More information about Forest Service research in the Rocky Mountain Region can be found here: <https://research.fs.usda.gov/rmrs>.

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