2024 Project Progress Report:

New tools for rangeland productivity: opportunity or hazard

By J. Windh & K. Launchbaugh

PRELIMINARY RESULTS for 2024:

TITLE: New tools for rangeland productivity: opportunity or hazard

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BACKGROUND: A fundamental attribute of sustainable grazing management is the ability to estimate how much forage is available and to manage yearly variation of forage supply. Effectively balancing forage supply and livestock demand can be a challenge in a system where forage supply can be affected by many variables, including increasing climatic variation, elk populations consuming forage, and wildland fire.

In recent decades, several new technologies based on remote sensing have provided tools to estimate biomass production and forage supply (Hudson et al. 2020; Peck et al. 2019). Several internet resources have also been developed to convert remotely-sensed data into information useful to make management decisions. These include: Stock Smart; Rangeland Analysis Platform; Rangeland Allotment Monitoring System; Fuel Cast; Web Soil Survey; Grass-Cast; and RangeSat. Several internet tools have been developed to assess changes in plant community composition and cover such as: Landfire; MRLC Rangeland Viewer; and Rangeland Analysis Platform (repeat from above).

Economically these tools could provide invaluable support to producers and land managers as vegetation monitoring to track biomass changes is expensive and takes significant manpower. However, it is first vital to know if these tools are accurate when used on Idaho landscapes. In a study by Windh (2023), the accuracy of the Rangeland Assessment Platform (RAP) was evaluated over 20 years of data from the University of Nebraska- Lincoln Barta Brothers Ranch in the Sandhills of Nebraska; results showed that in mid-June RAP was very accurate at measuring available biomass, though by mid-August the RAP values were accurate only about 50% of the time.

If accurate, these tools could help increase the economic sustainability of ranches and rangeland across Idaho by: providing information to better set stocking rates and reduce the risk of overgrazing; early informing of developing drought conditions to prompt purchase of hay or rental of additional pasture to mitigate the need to sell livestock; or informing of multi-year trends for future planning purposes.

HYPOTHESIS or OBJECTIVES: Managing livestock, wildlife, water resources, and wildland fire requires understanding of the annual production of biomass, forage supply, and the composition of vegetation. The emerging technologies listed above could help ranchers and land managers make informed decisions that will

affect land condition and economic sustainability. However, it is important to use the right tool at the right time and understand how reliable and accurate these tools are.

Our objective in this project is to review the value of internet tools for assessing biomass production and vegetation cover on Idaho rangelands and clarify their value for making land management decisions in Idaho. We have involved County Extension Faculty to assess the needs of producers and land managers for reliable data on local rangeland vegetation communities. We then reviewed currently available internet tools with respect to their value for needed information. We are in the process of developing a simple summary of effective tools fact sheet for publication through University of Idaho Extension.

Further work includes evaluating the expected accuracy of the tolls across Idaho and publishing a report in Rangelands or a similar journal. We also plan to develop a training guide or video to empower County Extension faculty in Idaho to use these tools with their stakeholders.

PROCEDURES: After discussing the usefulness of an online tool that can help set stocking rates with county extension educators in April and May 2024, we established a list of potential open-access tools to evaluate. We identified nine tools to evaluate and nine criteria in which to base the evaluations. Objective criteria included: region of tool use; does the tool allow you to specify an AOI (area of interest); is a biomass production estimate provided; can the tool calculate stocking rate; what are the data sources that power the tool; are the results downloadable; are there guides to assist in using the tool. Several subjective criteria were also included in our analysis, including ease of use for each tool as well as documenting observed pros and cons.

Once we determine the most useful tools to promote to producers, on-the-ground validation of the tools is necessary. Using biomass measures from western (Cecil Andrus WMA), south-central (University of Idaho Rinker Rock Creek Ranch), and eastern Idaho (USDA US Sheep Experimental Station) we will make statistical comparisons to the tool-derived data. Preliminary results indicate that and Rangeland Analysis Platform, which is one of the most useful tools available, regularly underestimates biomass numbers; if this is consistently true, we will also run an economic analysis of revenue lost due to understocking if producers rely solely on the use of these tools.

ACCOMPLISHMENTS or RESULTS: Thus far in the project we have determined that extension educators would like to know which tools are best to recommend to producers, and having training materials available would be most useful. Of the nine tools evaluated, two tools stood out above the rest: Rangeland Analysis Platform (RAP) and StockSmart. Interestingly, StockSmart uses the RAP and the Rangeland Allotment Monitoring System (RAMS) to inform their biomass estimates. We also completed a manual calculation of recommended stocking rate for a pasture using the biomass estimate from RAP. We then used the RAP stocking rate calculator and the StockSmart stocking rate calculator to do the same calculations and all three yielded the same calculations.

The attached table shows an evaluation summary of all nine tools, ranked by the authors from best to worst, and color categorized by functionality. These rankings are based on our perceived value of these tools to Idaho ranchers and non-technical land managers with the objective to assist producers in making stocking rate decisions.

PUBLICATIONS or OUTPUTS: None yet. We will have a poster at the National Society for Range Management meeting in Spokane, WA, February 2-6, 2025.

TOOL	REGION APPLICABLE	BIOMASS PRODUCTION PROVIDED	STOCKING RATE CALCULATIONS PROVIDED	USER-FRIENDLY	TARGET USER	PROS	CONS
STOCK-SMART	Continental United States	Yes	Yes	Yes	Producers and land managers	Ability to vary stock types, save projects, and adjust features within specific pastures Available for private and public lands	Unable to view climate data
RANGELAND ANALYSIS PLATFORM (RAP)	Continental United States	Yes	Yes	Yes	Producers and land managers	User-friendly Easily accessible support Gives climate data and vegetation data Realtime data	Cannot save projects
WEB SOIL SURVEY (WSS)	Continental United States	Yes	No	No	Producers and land managers	Ecological Site Descriptions (ESD) Offers some flexibility in state and transition models	Slow Difficult to navigate Stocking rates not given Unable to save projects No current satellite data
LANDFIRE	Continental United States	Yes	No	No	Producers, land managers, wildland firefighters	Wide range of data available	Not user friendly Tailored to wildfire risk management
RANGELAND ALLOTMENT MONITORING SYSTEM (RAMS)	Western United States, United States Forest Service (USFS) Allotments	Yes	Yes	No	Producers and USFS land managers	Great for USFS land managers and producers operating on USFS land	Not user friendly Webpage is slow

MRLC RANGELAND VIEWER	Western United States	Yes	No	No	Producers and land managers	Large quantity of data	Not user friendly Can't see specific data for specified areas in real time Can't download tables with quantities would need to use programs like ArcGIS to extract
FUEL CAST	Western United States	No	No	Yes	Producers, land managers, wildland firefighters	Streamlined data User-friendly Offers estimates/forecasts	No biomass production General zones only
RANGESAT	Zumwalt Prairie and Rinker Rock Creek Ranch	Yes	Yes	Yes	Students, land managers of Zumwalt Prairie and Rock Creek Ranch	Easy to navigate	Not applicable to any lands outside of the Zumwalt Prairie and Rinker Rock Creek Ranch
GRASS-CAST	Great Plains and Southwest United States	Yes	No	Yes	Producers and land managers of the great plains and the southwest	Streamlined data User-friendly Offers estimates/forecasts	Limited to Great Plains and Southwest Only shows estimates of total production