Benefits of Cattle Grazing for Fuels Reduction and Fire Safety

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Wildfires in California

- Increasing in frequency and severity
- More than 3.8 million acres burned so far this year
- Result in loss of life, impaired air quality, loss of structures, and loss of forage
- Models predict more frequent and severe wildfires

Rangeland Fires

Cattle

Fuel Reduction

Ungrazed

Grazed

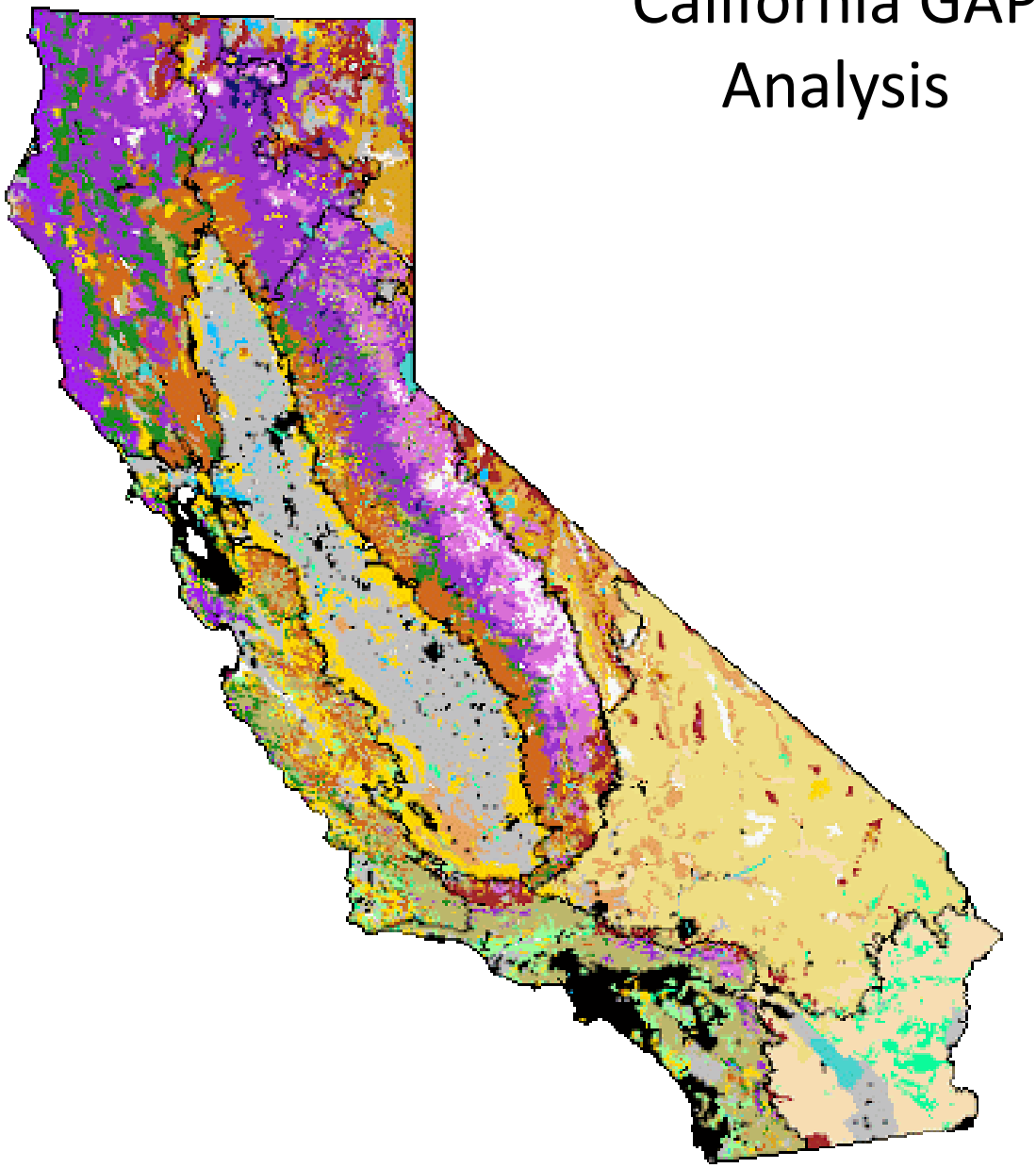
To What Extent do Cattle Reduce Fuel Loads Across the State?

2017 USDA Census of Agriculture Data

2017 Brand Inspection Data

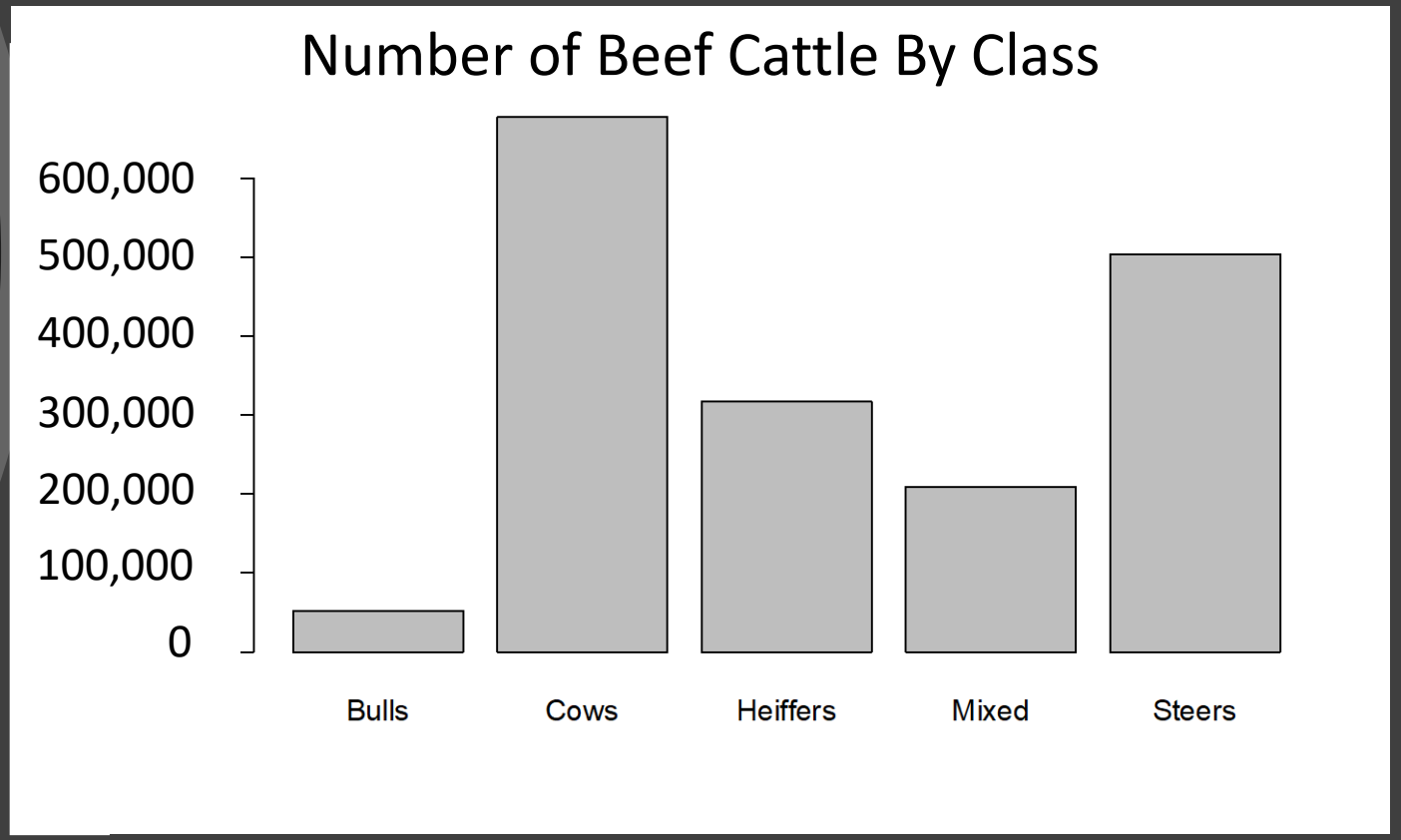
County Crop Reports

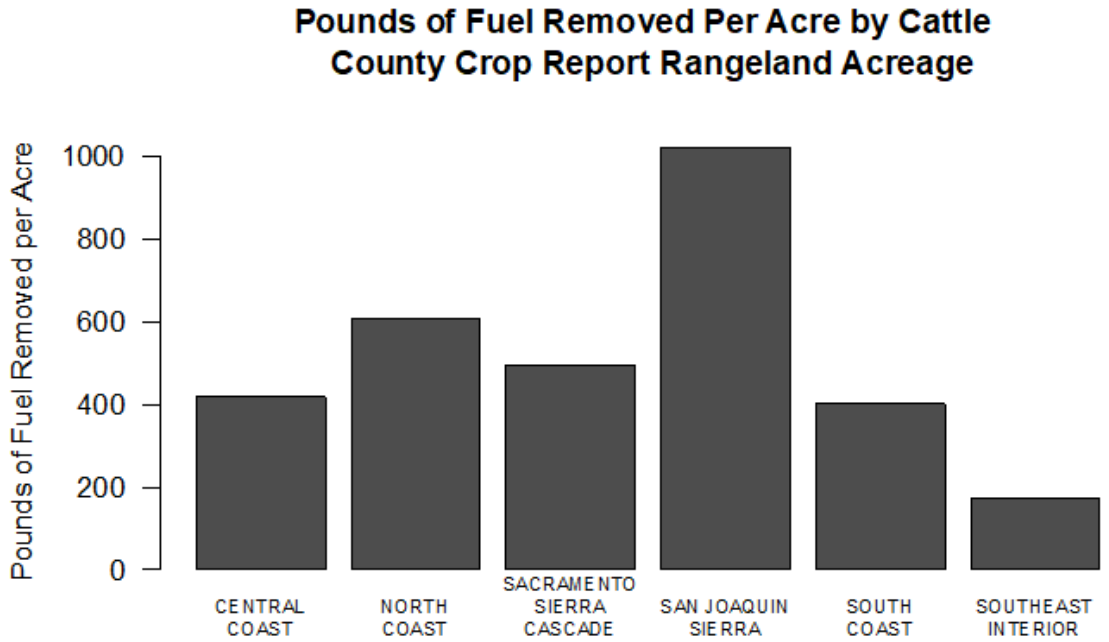
California GAP Analysis



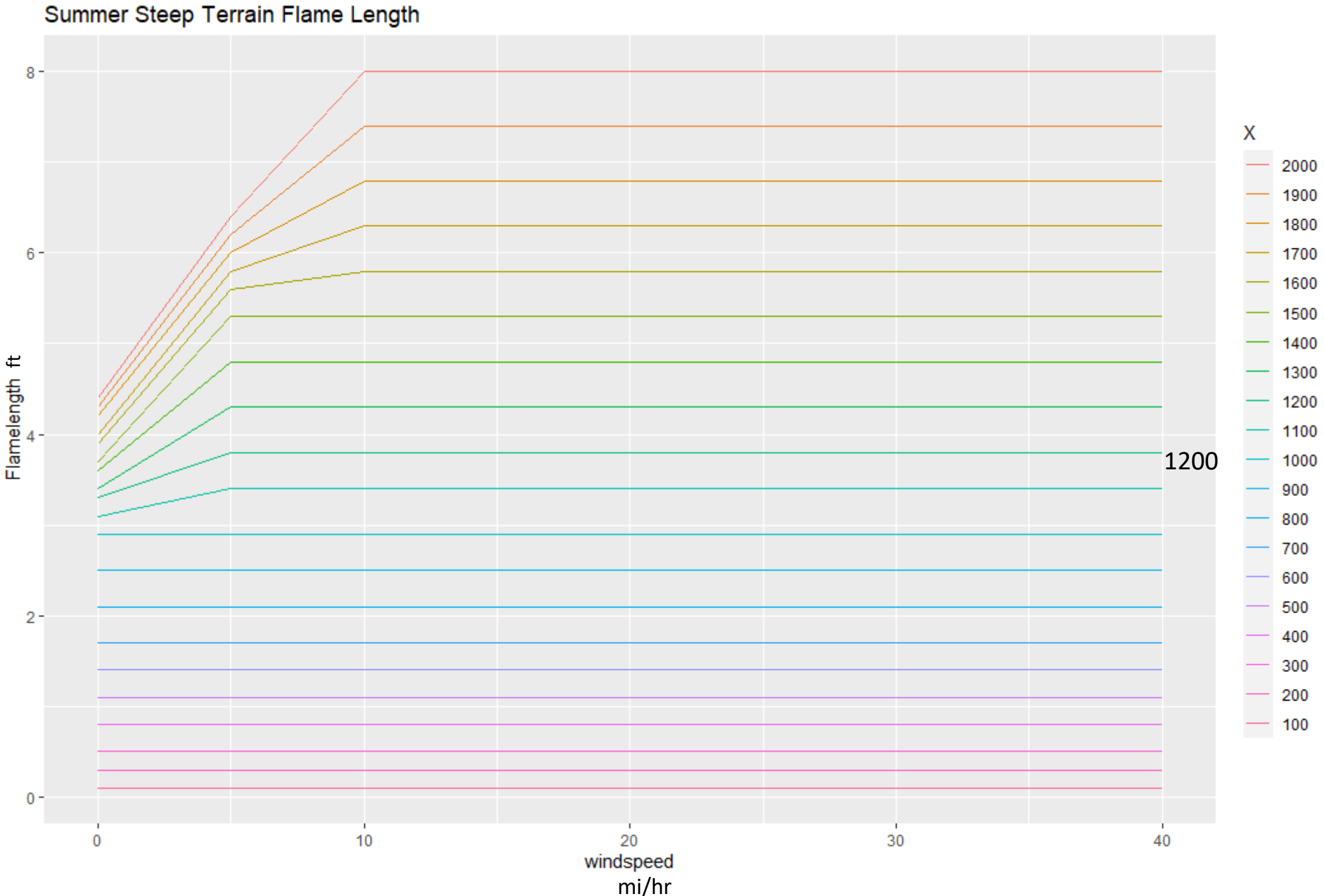
State-Wide Results

- ~1.8 million head of beef cattle were in California in 2017 (not including those on feed)
- > 11.6 billion pounds of forage removed by cattle across the state in 2017
- Grazed rangeland acreage from crop reports was >19 million acres
- Total Rangeland acreage from GAP analysis was ~59.4 million acres
- ~40 million acres of rangeland were not grazed in 2017

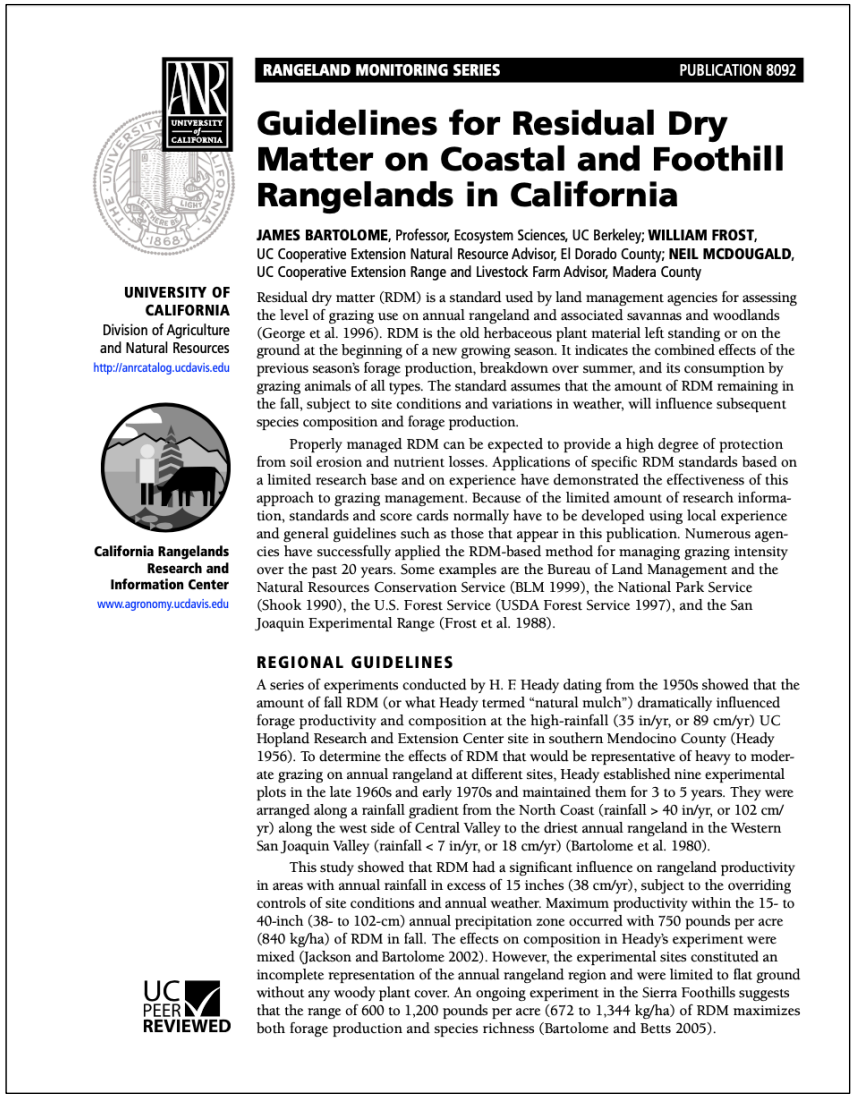




The average amount of fuel removed across grazed rangelands in the state was 596 pounds per acre.


Summer Steep Terrain Flame Length
Flamelength ft
8
6
4
2
0
0
10
20
30
40
windspeed
mi/hr
X
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
1200

Residual Dry Matter (RDM) Standards



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Guidelines for Residual Dry Matter on Coastal and Foothill Rangelands in California

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Residual dry matter (RDM) is a standard used by land management agencies for assessing the level of grazing use on annual rangeland and associated savannas and woodlands (George et al. 1996). RDM is the old herbaceous plant material left standing or on the ground at the beginning of a new growing season. It indicates the combined effects of the previous season's forage production, breakdown over summer, and its consumption by grazing animals of all types. The standard assumes that the amount of RDM remaining in the fall, subject to site conditions and variations in weather, will influence subsequent species composition and forage production.

Properly managed RDM can be expected to provide a high degree of protection from soil erosion and nutrient losses. Applications of specific RDM standards based on a limited research base and on experience have demonstrated the effectiveness of this approach to grazing management. Because of the limited amount of research information, standards and score cards normally have to be developed using local experience and general guidelines such as those that appear in this publication. Numerous agencies have successfully applied the RDM-based method for managing grazing intensity over the past 20 years. Some examples are the Bureau of Land Management and the Natural Resources Conservation Service (BLM 1999), the National Park Service (Shook 1990), the U.S. Forest Service (USDA Forest Service 1997), and the San Joaquin Experimental Range (Frost et al. 1988).

REGIONAL GUIDELINES

A series of experiments conducted by H. F. Heady dating from the 1950s showed that the amount of fall RDM (or what Heady termed "natural mulch") dramatically influenced forage productivity and composition at the high-rainfall (35 in/yr, or 89 cm/yr) UC Hopland Research and Extension Center site in southern Mendocino County (Heady 1956). To determine the effects of RDM that would be representative of heavy to moderate grazing on annual rangeland at different sites, Heady established nine experimental plots in the late 1960s and early 1970s and maintained them for 3 to 5 years. They were arranged along a rainfall gradient from the North Coast (rainfall > 40 in/yr, or 102 cm/yr) along the west side of Central Valley to the driest annual rangeland in the Western San Joaquin Valley (rainfall < 7 in/yr, or 18 cm/yr) (Bartolome et al. 1980).

This study showed that RDM had a significant influence on rangeland productivity in areas with annual rainfall in excess of 15 inches (38 cm/yr), subject to the overriding controls of site conditions and annual weather. Maximum productivity within the 15- to 40-inch (38- to 102-cm) annual precipitation zone occurred with 750 pounds per acre (840 kg/ha) of RDM in fall. The effects on composition in Heady's experiment were mixed (Jackson and Bartolome 2002). However, the experimental sites constituted an incomplete representation of the annual rangeland region and were limited to flat ground without any woody plant cover. An ongoing experiment in the Sierra Foothills suggests that the range of 600 to 1,200 pounds per acre (672 to 1,344 kg/ha) of RDM maximizes both forage production and species richness (Bartolome and Betts 2005).

UC PEER REVIEWED

Table 1. Minimum RDM standards for dry annual grassland in pounds per acre (dry weight)

Woody cover	RDM standard for percent slope (lb/acre)			
(%)	0–10	10–20	20–40	>40
0–25	300	400	500	600
25–50	300	400	500	600
50–75	NA	NA	NA	NA
75–100	NA	NA	NA	NA

Note: Metric conversion: 1 lb/acre = 1.12 kg/ha.

Table 2. Minimum RDM standards for annual grassland/hardwood rangeland in pounds per acre (dry weight)

Woody cover	RDM standard for percent slope (lb/acre)			
(%)	0–10	10–20	20–40	>40
0–25	500	600	700	800
25–50	400	500	600	700
50–75	200	300	400	500
75–100	100	200	250	300

Note: Metric conversion: 1 lb/acre = 1.12 kg/ha.

Table 3. Minimum RDM standards for coastal prairie in pounds per acre (dry weight)

Woody cover	RDM standard for percent slope (lb/acre)			
(%)	0–10	10–20	20–40	>40
0–25	1,200	1,500	1,800	2,100
25–50	800	1,000	1,200	1,400
50–75	400	500	600	700
75–100	200	250	300	350

Note: Metric conversion: 1 lb/acre = 1.12 kg/ha.

Conclusions

- Cattle grazing is an important tool for reducing fine fuels on grazed rangelands
- Fuel reduction rates on grazed rangelands varied by region from 174 to ~1000 lbs/acre
- Based on our model, to reduce fire risk, fuels would ideally be <1,200 lbs/acre to keep flame heights <4 ft even in high wind speeds, but this may not be feasible in high production years or in areas with higher RDM standards or competing resource needs
  - Also this needs to be tested experimentally on-the-ground

Takeaways

- Win-win-win by more strategic grazing, including grazing some private and public lands in **high risk areas** that currently are not being grazed or that are being very lightly grazed. The triple-win is: 1) increasing fire fuels reduction and public safety, 2) achieving grassland habitat conservation goals, and 3) increasing financial sustainability of ranching.

- Grazing all rangelands to ideal fuel levels is not logistically feasible or compatible with management goals, but two practical takeaway messages for ranchers from this study are that they can: 1) incorporate fuel reduction goals in their grazing management planning and 2) target higher levels of grazing in high risk areas such as near homes, near infrastructure, or at the wildland-urban interface.

Thank you!

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