

Ranch Advisory Partners – Case Study #2

The Dangers of Ignoring Early-Warning Indicators

In an earlier Advisory Case Study, we described how a Colorado rancher was using early-warning indicators to guide his grazing management actions. In this case study, we'll share an example of the dangers associated with ignoring those signals.

When applied to rangeland management, an early-warning indicator is a signal sent by the land that your management actions are leading in an undesired direction. You are not working toward your land-based objectives and are not producing the desired result. An “early” warning signal is distinguished from a “late” warning signal because it is earlier in time and allows for easier changes in management. Late warning signals suggest something has gone significantly wrong, and more intensive corrective actions must be taken.

In this Colorado example, a rancher conducted monitoring in the year 2000, an average precipitation year that was preceded by a series of above-average precipitation years. Thus, he should expect high plant vigor and an abundant plant canopy with good photosynthetic activity. However, a monitoring site established that year showed the opposite: plant vigor was quite low relative to recent climatic activity and the plant canopy showed low photosynthetic activity. Each of these qualitative indicators provided early-warning signals that something in his management program was amiss. (Note that the site had not burned, no insect outbreaks occurred, nor were there other extraordinary management activities like chaining in recent years.)

Further investigation revealed more troubles. The mineral cycle appeared to be slow. Litter was not mixing well with the soil surface (a process called incorporation), litter was being blown by the wind and accumulating against large area plants, and dung from both wildlife and livestock was not breaking down well.

Quantitative measurements provided further information. In this average precipitation year, productivity was 20% of what was expected for the site. Bare ground was only 12%, which was an encouraging figure for this arid site. Relative basal plant spacing, or the measure of distance between perennial plants, was 1.67 inches, or a bit higher than desired for this site. Further, no signs of erosion were observed and no soil cap was present.

With this information and a glance at the rancher's grazing plan, a diagnosis of the situation was made. The rancher turned cattle into this pasture in the early spring where they remained through plant dormancy in the hot part of summer. Plants grazed through the active spring growing season lacked opportunity to recover from being bitten. This explained the low plant vigor, poor plant canopy, and low productivity witnessed during reading of the land health transect. His stock density

was also quite low. The lack of adequate hoof action may explain the slow incorporation of litter into the soil surface.

This rancher needed to alter his grazing plan to shorten the spring grazing duration, shift the timing of grazing, and increase his stock density. The early-warning indicators provided him this guidance. Ignoring them meant problematic declines in land health were to be expected.

Unfortunately, this rancher did not alter his management approach, and another reading of this transect site was conducted in 2007. Qualitative indicators showed continued poor plant vigor and plant canopy, along with poor dung breakdown and litter incorporation. However, more dire signals were observed, such as erosion and increased plant pedestaling.

As the nearby chart shows, quantitative data confirmed continued deterioration of the site. The amount of bare ground increased from 12% to 34%. Live cover dropped from 8% to 4%. Relative basal plant spacing (or the distance between

BASAL COVER		
2000	2007	
12%	34%	Bare ground
80%	62%	Litter
8%	4%	Live cover
RELATIVE BASAL PLANT SPACING		
2000	2007	
1.7 inches	2.2 inches	

perennial plants) increased from 1.67 inches to 2.2 inches, which suggests that fewer perennial plants were growing on the soil surface. Lastly, basal presence of the area's highly desired needleandthread grass decreased from 45% to 23%.

These data present alarming findings. Instead of simply having issues with plant vigor and productivity, this rancher was losing soil through erosion and witnessing shifts in the area's species composition. These are larger-scale trends that require much more than simply modifying grazing duration and altering timing of grazings.

Indeed, since this site occurred on an allotment managed by a public lands agency, more drastic action was taken. The agency enacted a mandatory two-year rest period for this allotment to try to reverse the deterioration on the site. It was hoped that rest would allow plants an opportunity to regrow and provide a standing plant crop that would fall to the soil in winter as litter cover. This would help decrease the amount of bare ground found in the area and hopefully help minimize erosion.

Financially, this forced action was challenging for the rancher. Lacking pasture, he had to reduce his herd size and feed more hay to his remaining herd. The action represented a reduction in his asset base and simultaneous increased expense.

During the two-year rest period, he established additional watering points within the allotment and created a new grazing plan that would allow for much more controlled grazing durations, timing of grazings, ability to provide planned plant recovery periods, and increased stock density. Future monitoring will determine the success of these efforts.

For further information on utilizing land health indicators as early-warning signals, see the *Bullseye* monitoring methodology available at:
http://quiviracoalition.org/Detailed/QC_Publications/Books/Bullseye_Targeting_Y.._934.html