

Sandhills Defoliation Response Index System (SanDRIS)

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*Modified for native, warm-season dominated mid-grass grasslands in central Nebraska - 2012

<u>Season of Defoliation (Grazing, Hail, Fire, & Grasshoppers)</u>	<u>Index</u>
× <u>March-April</u> : sedge and cool-season grass green-up	+2
× <u>May</u> : cool-season grass vegetative to rapid growth	+1
× <u>June</u> : early growth of warm-season tall grasses.	-1
× <u>July</u> : rapid growth of warm-season tall grasses.	-2
× <u>Multiple events</u> during <u>June-August</u> .	-3
× <u>August</u> : warm-season tall grasses have flowered.	0
× <u>September</u> : nearly full growing-season deferment.	+2
× <u>October-February</u> : dormant season	+4

<u>Precipitation Regime (October through September)</u>	<u>Index</u>
× <u>Well above average</u> : Abundant previous fall & winter precipitation and abundant precipitation during May-July.	+2
× <u>Near average</u> : Average soil moisture available in early spring and abundant precipitation during May - June.	0
× <u>Drought</u> : little or no dormant-season precipitation during October-April and/or well below average precipitation during May - July.	-2

<u>End-of-Season Residual Herbage (Hydrologic Condition)</u>	<u>Index</u>
× <u>Excellent</u> : residual herbage of palatable species is common, standing herbage and litter are abundant throughout.	+2
× <u>Adequate</u> : standing herbage and litter is uniformly distributed.	0
× <u>Poor</u> : standing herbage absent, litter uncommon, characteristic of fire or severe overgrazing.	-2

** For precipitation Regime and End-of-Season Residual Herbage, it is acceptable to use +1 or -1 scores when conditions are intermediate to those described.

Introduction

Grazing response indices are used to integrate the 3 variables that have the greatest collective effect on vegetation response to defoliation on **upland range sites** in the Nebraska Sandhills. These responses are thought to be similar for other sites such as warm-season grass dominated or mixed-grass grasslands in central Nebraska. The numerical values of these indices are based on published research conducted at the UNL, Gudmundsen Sandhills Laboratory. The fundamental processes by which season of defoliation, precipitation regime, and hydrological condition interact are similar in most Nebraska rangeland ecosystems with 10 to 24 inches of annual precipitation. Many range ecosystems in Nebraska are tolerant of heavy grazing until drought occurs. The combination of heavy grazing and drought is the primary process by which range condition declines. However, rangelands in good to excellent condition are resilient and often recover from drought rapidly when properly managed. Periodically providing full growing-season deferment, from spring green-up to killing frost, is the most effective way to maintain high levels of vigor in key plant species. After killing frost, plants are very tolerant of defoliation within the limits of what cattle are able to remove without the aid of supplemental or replacement feed.

Numerical values for season of grazing in this guide are based on probable response of warm-season tallgrasses which produce 70 to 90% of the herbage on upland sites in the Sandhills. Season of defoliation response index values for cool-season species in the Sandhills will be negative during periods of rapid growth, 0 when headed, and negative if a fall green-up occurs during September and October. Periodic deferment of pastures during April to June may be necessary to maintain relatively high levels of vigor in cool-season species in the Sandhills.

This decision support tool is designed to: (1) Optimize herbage production each year. (2) Minimize the impact of pending drought. (3) Optimize the rate of vegetation recovery after drought.

Use of Response Indices

Index values are additive. Each pasture should be scored in each of the 3 categories based on grazing and precipitation records and on-site evaluations soon after killing frost in October. The sum of a numerical value from each of the 3 categories provides an overall index for ranking pastures. SanDRIS scores for individual pastures could range from -7 to +8. The index system should be used to determine the optimum pasture-use sequences for rotation grazing systems. The **primary objective** is to minimize the occurrence of negative scores in the same pastures in consecutive years. Negative scores in the preceding year should be offset with management practices that result in positive scores at the end of the subsequent growing season, so that the running 2-year sum of SanDRIS scores is ≥ 0 .

Multiple Defoliation Seasons

Pastures should be scored for growing-season use when summer defoliation removes **more than 40%** of the herbage that would be accounted for by traditional summer stocking rates. Do not change the absolute value of scores for these pastures because a percentage of grazing occurred during the dormant season. For example, if last year's use included 9 AUD/ac during July and 12 AUD/ac during November with a traditional summer stocking rate of 15 AUD/ac, the percent of full summer use would be 60%, $(9 \text{ AUD/ac}) / (15 \text{ AUD/ac})$. Score the pasture strictly for July use, -2.

When growing-season stocking rates are **less than 40%** of seasonal rates and other defoliation processes have not occurred, multiply the dormant-season index value, +4, by the percentage of the total stocking rate that occurred during the dormant season. For example, if 5 AUD/ac occurred during June and 16 AUD/ac occurred during December (Season Index = +4), the adjusted season of grazing index value would be +3, $[4 \times (5 \text{ AUD/ac}) / 16 \text{ AUD/ac}]$.