

RESTORATION of DEGRADED RANGELAND ECOSYSTEMS

Preface

Restoration of degraded rangeland ecosystems has been a primary research effort of the rangeland scientists working at the NDSU Dickinson Research Extension Center for over 80 years with at least 110 scientist years devoted to this subject. The research challenge has been that rangeland ecosystems are complex consisting of numerous biotic (living) and abiotic (nonliving) components which are connected through complicated mechanisms and processes. The major biotic component are the grass plants, soil organisms, and grazing graminivores that have biological and physiological requirements. The abiotic components are comprised of the radiant energy from sunlight, the numerous environmental factors, the four major essential elements of carbon, hydrogen, nitrogen, and oxygen, and the minor essential elements of seven macrominerals and ten microminerals. The major and minor essential elements are transformable between organic forms and inorganic (mineral) forms. The major ecosystem processes are the defoliation resistance mechanisms, the biogeochemical processes, and the grass resource competitiveness. All traditional concepts for management of rangelands can interfere with any of the components or processes and cause ecosystem degradation. The conceptualized potential restoration treatments, which have been fertilization, alfalfa interseeding, prescribed burning, long-term nongrazing, traditional grazing management, and biologically effective grazing management, have required indepth evaluations to determine the treatment effectiveness at rebalancing the interactions among the ecosystem components and at reestablishment of the functionality of the processes. Included in this compilation of reports are the results of this extensive effort to identify treatments for the restoration of degraded rangeland ecosystems.

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