

# Rangeland Devastated by Invasive Annual Grass

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## Introduction

This paper serves as an introduction to the thematic session on protection and restoration of western US rangelands. Exotic annual grass species have steadily invaded western US rangeland for decades. More recently, the problem of invasive annual grasses received national attention with multiple stakeholders working together under the auspices of Western Governors' Association to develop a common strategy to fight back.

## Discussion

There are multiple invasive winter annual grass species causing degradation of Western US rangeland. The most common are *Bromus tectorum*, *Bromus japonicus*, *Ventenata dubia* and *Taeniatherum caput-medusae*. Others include *Bromus rubens*, *Bromus secalinus*, *Schismus barbatus* and *Secale cereale*. These exotic annual grasses compete directly with native species that are predominately perennial forbs, perennial grasses (both C3 and C4 grasses) and shrubs. The winter annual grasses typically germinate in late summer, fall or winter. In late winter they start rapid above ground growth, stealing moisture and nutrients before the desirable perennials start to break dormancy in the spring. Since much of the Western US is semi-arid, the loss of water resources to the invasive annual grasses effectively places the native perennial population in a state of permanent drought. Each year after the annual grasses mature and produce seed, they senesce in late spring into summer. The new seed production is added to the soil seed bank and the dry foliage is added to the thatch layer. The thatch layer and standing dead annual grass creates a continuous bed of fine fuel that ignites easily and increases wildfire frequency. With repeated wildfire, desirable perennial species never have a chance to fully recover. The trend is towards replacement of deep-rooted diverse native perennial systems with shallow-rooted monotypic stands of annual grass.

Negative impacts to Western US rangelands from invasive annual grasses have been well documented and include loss of wildlife habitat (Coates et al. 2016), larger and more frequent wildfires (Fusco et al. 2019), increased fire frequency even at low annual grass cover (<5%; Bradley et al. 2018), depleted forage for livestock operations impacting rural economies (Brunson and Tanaka 2011), disrupted hydrologic and nutrient cycles (Germino et al. 2016), reduced biodiversity (Davies et al. 2011) and degraded pollinator habitat (Arathi and Hardin 2021). The wildfires are a threat to humans, wildlife, structures and access to grazing lands.

The need for urgent action to combat the growing threat of invasive annual grasses is highlighted in a recent study of the Great Basin region (Smith et al. 2021). In the Great Basin, the area that has converted to an undesirable stable state of > 50% annual grass cover and minimal remaining shrubs increased eight-fold since 1990 and now covers 7.7 million hectares (one fifth of Great Basin rangelands). Over the last decade 230,000 hectares per year have converted and the leading edge of the infestation moved upslope by 138–459 m over the last 30 years. Another example is the spread of *ventenata* in Wyoming which was first discovered in June 2016. This was a new occurrence for the Great Plains ecoregion. *Ventenata* is even more devastating than *Bromus tectorum*, currently the most common annual grass species, because it is less palatable to livestock and it can easily invade undisturbed rangeland areas. Total gross acres of *Ventenata* distribution (as determined by connecting all confirmed locations as an outer boundary) approached 2 million acres in December 2017, although net infested acreage is estimated to be dramatically less than this (Northeast Wyoming Invasive Grass Working Group website accessed May 1, 2023 [NEWIGWG | Invasive Grasses](#)).

The desert southwest region of the US is impacted by *Bromus rubens* and *Schismus barbatus*. Infestations of these annual grasses provide fuel resulting in increased wildfire frequency in systems where wildfire was previously very rare. The wildfires pose a serious threat to Mojave and Sonoran Desert environments, including threats to iconic species such as the Joshua tree (*Yucca brevifolia*), saguaro cactus (*Carnegiea gigantea*) and desert tortoise (*Gopherus agassizii*).

To address the growing threat of invasive annual grasses, the Western Governors' Association collaborated with multiple stakeholders to develop a toolkit for invasive annual grass management (Western Governors' Association 2020). The result was a new framework for targeting the annual grass problem on a regional scale. It was recognized that targeting the most highly invaded areas first was not the best utilization of limited

resources. This is because restoration of these areas requires a multi-step process of controlling the annual grasses and then re-establishment of desirable perennial species through seeding or transplanting. Since much of the west is semi-arid, re-establishment of vegetation is expensive and often not successful. The new direction outlined in the Western Governors' Association report is to focus regional efforts on defending the core of intact perennial rangelands. This means early and aggressive management of annual grass invasions to stop the leading edge of devastation from advancing.

## Conclusions

In this thematic session, multiple facets of invasive annual grass in Western US rangeland are covered including control methods, ecosystem benefits of invasive annual grass removal, revegetation opportunities, wildfire impacts and an introduction to annual invasive grass issues in Canadian rangeland.

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