Ecological Costs of the Status Quo on Grazing Lands in the Intermountain West

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Perryman et al. (2003) coined the phrase pristine-management-paradigm to describe the widely held management paradigm that ecological systems are static entities that can be held in a static condition if they are protected from burning, grazing, and other disturbances. The authors argued it was impossible to achieve societal objectives today based on returning landscape conditions to those perceived to exist prior to the 20th century and European settlement of the Intermountain West. Processes that created the landscape conditions of 1800 A.D. or any other previous time period have changed or been altered, making their replication impossible. For example: Little Ice Age weather conditions have ended; uncontrolled grazing by wild ungulates presumably influenced by codependent predators is no longer possible or desirable; widespread burning by Native Americans is no longer practiced; and annual grasses have colonized many sagebrush and salt desert shrub communities, permanently altering plant community compositions. Instead, objectives for ecosystem management should focus upon specific measurable goals that society has determined are valuable under current ecological conditions (e.g., soil stability, biodiversity, wildlife habitat, forage production, etc.). Today's landscapes are not those described by Smith, Ogden, and Simpson (Dale 1918, Cline 1974, Petersen 2008). With over 400,000 km^2 colonized by cheatgrass (Bromus tectorum L.) and other annual grasses (Mack 1981), It is time to declare: The pristine-management-paradigm has failed. Continued, wholesale application of this concept is misguided, and managing for this status quo has unacceptable consequences.

Management of the status quo includes the exclusive use of perennial grass grazing systems on ranges where cheatgrass and other invasive annual species are already entrenched, AUM reductions since the early 1980s, and more fire frequency and extent. Although a healthy, resilient perennial grass understory is likely the single most important long-term assurance against invasive annual grass dominance, rangeland ecologists and managers have long applied science-based management practices that exclude consideration of the biology, ecology, and probable management effects these perennial grass grazing systems would have on the non-native annual grass component of modern landscapes. For instance, the two major grazing systems employed in the Great Basin are deferred-rotation and rest-rotation. Both focus on meeting the physiological needs of grazed perennial grasses (Sampson 1913; 1951), but their implementation throughout the region failed to address how annual grasses would respond. Authorized grazing of animal unit months (AUM) on public lands in the Great Basin focuses on allotment carrying capacities provided by only native perennial species (CFR 4110.2–2 Specifying grazing preference). Non-native annual grasses generally are not recognized, authorized, allocated, or normally considered in the development of district wide or allotment management plans. In fact, almost all management planning efforts and implementations are designed to manage perennial grass or palatable shrub species. The allocation of forage derived

from annual grasses requires a separate Record of Decision based on an Environmental Assessment (CFR 4130.6–2 Nonrenewable grazing permits and leases) and is seldom granted. Grazing fuel breaks have received considerable attention for several decades, exclusively for reducing fuel and fire risks in and around annual grass-dominated plant communities. At best, this management tool, especially when applied as a stand-alone action, is only a stopgap measure to postpone the fire effects of annual grasses near areas still dominated by desired native species. All the while, annual grasses have become the ecologically dominant life form on upwards of 20,000 km^2 in the Great Basin (Young and Clements 2009).

Over the past decade or so, a related movement toward an ecologically based weed management approach has spawned the development of potential new tools for the management of invasive annual grasses. Scientists are currently developing delivery methods for newly identified biological control agents. Undoubtedly, these tools will find useful and appropriate applications for yet undetermined situations and scales. The precise combination of chemical fallow and seeding with both native and non-native, deep-rooted perennial grasses and half-shrubs like forage kochia (*Bassia prostrata* L.) has provided success on many ecological sites and topographic settings, but only for a relatively small percentage of the entire affected area (Young and Clements 2009). Likewise, grazing cheatgrass in the fall and early winter months, when perennial grasses are dormant, has demonstrated that managed livestock grazing can reduce carryover fuels going into the next year's fire season, while simultaneously reducing the ability of cheatgrass to dominate areas with a remnant perennial grass component (Schmelzer et al. 2014, Perryman et al. 2020). Managing cheatgrass with dormant season grazing has been successful on demonstration and research projects at a scale of thousands of acres in southeastern Oregon, on winter dominated precipitation sites (W. Dragt, B. Wilber, and S. Davies, personal communication, August, 2017; Davies et al. 2021).

Given the advances and successes in the management tools available, the rangeland ecology and management community must recognize the requirement that annual invasive grasses must be managed as a permanent component of the Great Basin and Intermountain West. For the past 50 years, perhaps longer, most of our collective management objectives, goals, and practices have focused on only the perennial grass component, or toward palatable shrubs in the case of salt desert shrub communities. Rest-rotation and deferred rotation grazing systems (and their various combinations) focus management on the perennial grass component of the plant community while ignoring the annual grasses. Both grazing systems actually favor the proliferation and dominance of annual invasive grasses, especially on warmer and drier sites (Chambers et al. 2016), by essentially maximizing the standing dead biomass left at the end of the traditional grazing season (Trowbridge et al. 2013, Schmelzer et al. 2014). The antigrazing sentiment (Beschta et al. 2013) that led to a general reduction of annual and temporary grazing authorizations over the past several decades has also played a significant role in annual grass proliferation by providing an increase in safe sites for annual grass establishment, as well as creating larger, more contiguous fuel loads. Through our management activities that foster standing dead litter, we have inadvertently exacerbated invasive annual grass dominance in the Great Basin and Intermountain West. Most standing litter eventually becomes surface litter, creating the "safe site" for the germination of seed from annual grasses. Fall grazing of cheatgrass also directly controls seed bank volumes, the higher the grazing intensity, the lower the volume (Perryman et al. 2020). Research-based science has been applied toward the

management of perennial grasses on many landscapes (Launchbaugh et al. 2008), but not toward the ecologically dominant annual grasses that often occur with remnant populations of native perennial species.

The first step for dealing with this issue is recognition of the almost ubiquitous presence of invasive annual grasses across the Intermountain West, particularly at lower and drier elevations. Cheatgrass, medusahead (*Taeniatherum caput-medusae* (L.) Nevski), and North Africa grass (*Ventenata dubia* [Leers] Coss.; a relative newcomer) are here to stay. Not only are annual grasses present, they have become one of, if not the primary driver of the ecological changes occurring in many lower elevation big sagebrush and salt desert shrub communities. It is time that scientists, managers, and policy makers begin to develop and implement research, planning objectives, policies, and management actions that allow and provide for the active landscape-scale management of annual grasses, instead of continuously lamenting of being their victim. We must admit that many of the shrub dominated communities in the Great Basin and Intermountain West now have diminished perennial grass understories, and have become mixed-communities of annual and perennial grasses. They should be recognized and managed first and foremost as annual grasslands, just as the California annual grasslands have been recognized for decades, despite many having some perennial grasses in the plant community.

Current management paradigm practices were often implemented for rational reasons (improve the perennial herbaceous plant community) but failed to fully understand and/or include the ecology of the invasive annual component. The result is an unacceptable large-scale ecological situation for almost all users of sagebrush and salt desert rangelands. For landscapes where annual grasses are an ecologically dominant lifeform, a step in the right direction would be to address both the annual and perennial grass components simultaneously, with all the necessary management flexibility and situationally available tools (Svejcar et al. 2008). This approach requires the recognition and management of mixed annual-perennial grass understories for what they are, but also for what we want them to be in the future rather than what they may have been in the past. The ecological costs are too high to ignore.

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