My name is Erik Molvar, and I am Executive Director of Western Watersheds Project (WWP), a nonprofit conservation group that advocates for the protection and restoration of wildlife and watersheds throughout the western United States. WWP specializes in solving environmental problems caused by livestock grazing on public lands.

I hold a Master of Science in Wildlife Management from the University of Alaska Fairbanks, where I studied moose behavior and ecology as part of the Institute for Arctic Biology. I published my scientific findings in a number of peer-reviewed journals, including studies on moose foraging behavior and the influence of moose foraging on willows and on ecosystem dynamics. In addition, I am author or editor-in-chief of 17 books that focus on western public lands. Prior to becoming a professional conservationist, I worked seasonally for the U.S. Forest Service and for the U.S. Army Corps of Engineers surveying stream habitats for salmon and steelhead in northern Idaho and barging juvenile salmon and steelhead down the Snake and Columbia Rivers to get them past dams that otherwise obstruct their passage.

The Impacts of Livestock Grazing on Western Public Lands

The grazing of domestic livestock on federal grazing leases represents the most widespread cause of environmental impacts on western public lands. While oil and gas development garners the greatest amount of media attention, as it represents a spectacular environmental trainwreck, livestock grazing is like a slow and invisible cancer that is insidiously and inexorably killing native ecosystems over vast areas.

In an analysis of Bureau of Land Management (BLM) Land Health Assessments, Public Employees for Environmental Responsibility (PEER) found that as of 2012 more than 40% of BLM livestock grazing allotments were failing to meet rangeland health standards.[1] In the wake of this analysis, BLM began to combine grazing leases "not meeting, but moving toward" rangeland health standards with those actually meeting land health standards, frustrating the public's ability to discern the degree to which BLM-managed livestock grazing on public lands is causing environmental problems.

It is also notable that the BLM's own conclusions are sometimes biased to hide land health problems. For example, in WWP's Duck Creek (Utah) allotment appeal, after more than 200 hours of expert testimony the Office of Hearings and Appeals ruled that BLM's determination that this allotment was meeting land-health standards was in fact false. While Utah appears to be mostly meeting land health standards according to PEER's review of BLM's data, having traveled extensively through Utah, I have found that land health and vegetation condition in Utah is worse in comparison with other western states, not better.

Impacts to Native Fishes

Native wildlife species (such as bison and elk) are adapted to the arid steppes, deserts, and grasslands of the western United States, but cattle evolved in lush, high-rainfall environments in northern Europe and are poorly adapted to arid environments. As a consequence, cattle concentrate along streamside (or "riparian") habitats, and livestock-induced damage disproportionately falls within these highly sensitive and ecologically important areas. On the Great Plains, 77% of bird species depend on riparian habitats for a

[1] https://www.peer.org/campaigns/public-lands/public-lands-grazing-reform/blm-grazing-data.html

key part of their life cycles.[2] In desert environments, free-flowing springs and streams take on even greater importance.

Livestock grazing along streamsides denudes the tall grass and shrubs that otherwise overhang and shade free-flowing streams that support trout and salmon. At the same time, streambank trampling by livestock breaks down streambanks, causing deep, narrow stream channels to degrade into wide, shallow riffles. Both of these factor into the loss of instream cover that trout and salmon require to hide from and escape their natural predators. In addition, the conversion of deep, narrow, shaded streams to wide, shallow streams exposed to the sun has the effect of raising water temperatures.

Native coldwater fishes (i.e., trout, salmon, and steelhead) take the brunt of these impacts, and livestock grazing represents the single greatest impact on salmonid habitats across much of the West. Trout and salmon require cold, clear waters. Water temperatures above 80°F can be fatal to trout and salmon, and to the extent that livestock impacts to streams result in higher water temperatures, these can extirpate trout and salmon populations.

The concentration of cattle along streamside habitats results not only in streambank collapse but in radically accelerated bankside erosion. This raises the amount of suspended silt in streams, interfering with the ability of trout and salmon, which are visual predators, to feed on insects and smaller fishes. All trout and salmon spawn in depressions (called "redds") that they dig in stream gravels to deposit their eggs. The survival of the eggs is dependent on the free flow of oxygenated water through the gravels, and to the extent that silt from streamside erosion associated from streambank trampling by livestock clogs the interstices between the gravels, trout and salmon eggs are smothered and are unable to survive. This can lead to the failure of entire year-classes of trout and salmon. In addition, cattle wallowing directly in the streamcourse, a common occurrence on hot summer days, trample redds and crush trout and salmon eggs.

Livestock grazing and trampling impacts have contributed to the need to list several species and/or runs of native salmonids under the Endangered Species Act, including the Columbia River spring and fall chinook salmon, Columbia River steelhead, bull trout, and Lahontan cutthroat trout. In addition, stream habitat damage caused by domestic livestock (particularly cattle) is responsible for the decline in Colorado River cutthroat, greenback cutthroat, and Bonneville cutthroat trout, which are likely to become candidates for ESA listing in the future thanks in significant measure to the impacts of domestic livestock. This deterioration of clean, cold stream habitats and loss of native trout and salmon populations has had serious negative impacts on recreational fishing on western public lands, to the detriment of public enjoyment of these lands.

Livestock Grazing on Public Land is a Major Cause of Stream Pollution

Beyond its impacts to native fishes inhabiting streams on public lands, domestic livestock (particularly cattle) are a major cause of fecal coliform contamination in streams on public lands. Cattle have been bred to eat and gain weight at accelerated rates to maximize beef production, and as a result cattle manure (which like all manure is high in *E. coli* bacteria) are large with high bacterial loads. Cattle also concentrate along and wallow

[2] Rich 2002. Using breeding land birds in the assessment of western riparian systems. Wildl. Soc. Bull. 30: 1126–1139.

in streams, in contrast to native wildlife which range widely to forage, and cattle thereby concentrate their manure along watercourses. Based on WWP water quality sampling, *E. coli* levels in Wyoming streams are commonly two to ten times higher than Clean Water Act standards for human contact. This means that for affected streams, anglers wading in the water, or children playing in the water, are at an elevated risk for *E. coli* poisoning, which is a serious health risk and in some cases can be fatal. The Wyoming Department of Environmental Quality recently downgraded 76% of streams from "primary contact" levels of monitoring to "secondary contact" standards, to cut down on Clean Waters Act violations. However, this administrative change does not change the reality that public lands visitors commonly recreate along streams, and continue to be exposed to these high levels of biohazard as a result of cattle defecating in and beside streams.

Impacts to Soils and Vegetation Communities

Like all herbivores, domestic livestock eat plants, and the heavy intensity of livestock grazing has an impact on vegetation communities. High concentrations of domestic livestock increase soil compaction, erosion, and loss of overall productivity of the land. Stocking rates on public lands as approved by the BLM and Forest Service are typically far too high to maintain healthy, functioning native plant communities and high soil productivity. Frequently, federal agencies apply a "take half, leave half" principle, and grazing leases commonly allow 50% of the annual forage plant production to be removed by livestock grazing. This is a very high intensity of livestock grazing, and fails to account for additional grazing by large native herbivores such as elk and mule deer, grazing by rabbits and even voles (which can be abundant during population surges), and grazing by insects such as grasshoppers and Mormon crickets, which can be substantial during their cyclic population irruptions. Federal agencies may also respond slowly to reduce livestock numbers during drought, which is historically so common that it represents the rule in the arid West rather than the exception, with the result that overgrazing by livestock creates long-term damage to the productivity of the range. Overgrazing exacerbates climate change by depleting the ability of cold desert steppes and grasslands to sequester carbon, by not only decreasing bunchgrass foliage and conversion to cheatgrass, but also by the long-term loss of bunchgrass root biomass.[3]

In the Great Basin and on the Colorado Plateau, and across much of the remainder of the West, biological soil crusts are the key ingredient to soil productivity. Biological soil crusts are critical for the retention of soil moisture, prevent erosion, fix nitrogen (a key plant nutrient) from the atmosphere into the soil where it becomes available to plants, and provide a strong degree of immunity against invasive weeds, particularly cheatgrass. Livestock trample biological soil crusts, with weight loading on hooves and shear forces that make them highly destructive. Once destroyed, soil crusts can take up to 250 years to recover to their natural ecological functions.[4] The Great Basin and Colorado Plateau were not originally inhabited by large herds of bison or other herbivores, and these fragile soil crusts therefore evolved in the absence of widespread trampling. The introduction of cattle and sheep into these areas has resulted in catastrophic impacts to biological soil crusts that desertifies the ecosystem and results in permanent loss of soil and vegetation productivity.

[3] Meyer 2011. Is climate change mitigation the best use of desert shrublands? Nat. Res. Env. Iss. 17:2.
[4] Belnap 1995. Surface disturbances: Their role in accelerating desertification. Env. Monitor. Assess. 37:39-57.

Livestock Spread Noxious Weeds, Particularly Cheatgrass

Livestock are the primary means by which invasive weeds, notably cheatgrass, are introduced and spread in native ecosystems. Scientists have traced the invasion of cheatgrass back to contaminated grain shipments from Eurasia, and this non-native weed then spread along railway lines, and from there moved out across the Great Basin and Columbia Basin with great rapidity, carried by domestic livestock. Livestock overgrazing paves the way for cheatgrass, which specializes in colonizing disturbed habitats, by suppressing or eliminating the two primary defenses that western steppes and grasslands have against cheat: native perennial (multi-year) bunchgrasses, and biological soil crusts. Cheatgrass invasions began in the Great Basin and the Columbia Basin in the 1800s and reached crisis proportions by the 1930s, and the overgrazing that established cheatgrass as a major environmental problem in those years continues today. As a result, cheatgrass is expanding even in high-elevation areas where it has heretofore been scarce.[5]

Native perennial bunchgrasses and biological soil crusts are the key natural defenses against cheatgrass, yet domestic livestock deplete or destroy both defense systems, all the while creating the disturbance that accelerates cheatgrass invasion. Perennial bunchgrasses are preferred forage for both livestock and native wildlife, and are known as "decreasers" because they dwindle early on as grazing intensity increases. Livestock also trample and eliminate biological soil crusts, which under natural conditions retard the germination and seedling establishment of cheatgrass. Once cheatgrass invades the understory of sagebrush habitat types, it accelerates range fire frequency because cheatgrass dies and becomes tinder-dry after an initial few weeks of growth and seed-set. Normal fire-return intervals in basin sagebrush communities averages 196 years, but when cheatgrass takes over fire frequency doubles to every 78 years.[6] The resulting fires entirely eliminate sagebrush (because sagebrush does not stump-sprout), a disaster for sage-grouse and pronghorns, and set the stage for a cheatgrass monoculture by creating a disturbance that colonizing cheatgrass are highly adapted to fill. Importantly, in areas where livestock are absent, cheatgrass is a minor component, and native perennial bunchgrasses remain dominant, fires eliminate the sagebrush but return the area to native perennial bunchgrass instead of cheatgrass monoculture. This illustrates definitively that livestock grazing, not fire, is the key factor spreading cheatgrass infestations. Increasing fire frequency is an after-effect of cheatgrass invasion, not the cause.

At low to no livestock grazing, native grasses and forbs remain dominant, and fire returns the system to native grasses; at moderate levels of livestock grazing, habitats experience a decline in native perennial grasses; with heavy livestock grazing, perennials are replaced by cheatgrass, and fire creates a negative feedback loop, returning the areas to cheatgrass monoculture. Livestock grazing where 50% of the annual forage productivity is allocated to livestock would fall into the "heavy" category, whereas grazing levels limited

[5] Mealor et al. 2012. Postfire downy brome (*Bromus tectorum*) invasion at high elevations in Wyoming. Inv. Plant Sci. Manage. 5: 427-435.

[6] Balch et al. 2013. Introduced annual grass increases regional fire activity across the arid western USA (1980-2009). Global Change Biol. 19: 173-183.

to 25% utilization for sage-grouse conservation fall into the "moderate" level of grazing.[7] Thus, even moderate levels of livestock grazing are harmful to native plant communities (and advantageous to cheatgrass).

Livestock are a Cause of Widespread Sage-grouse Population Declines

Livestock grazing is a major contributor to the decline of sage-grouse across the western United States. Whereas oil and gas development has received far greater attention as a cause of sage-grouse population crashes in areas such as the Upper Green River Valley and Powder River Basin of Wyoming that have suffered from heavy industrial development, sage-grouse populations in areas with few roads and developments and zero energy and mining activity have also been declining, and livestock grazing is the major human-caused impact in these areas that could possibly be responsible from the deviation of large, healthy sage-grouse populations from their natural abundance that occurred naturally prior to the arrival of Euro-American settlement. Naturalist George Bird Grinnell characterized the original abundance of sage-grouse as follows:

> In October, 1886, when camped just below a high bluff on the border of Bates Hole, in Wyoming, I saw great numbers of these birds, just after sunrise, flying over my camp to the little spring which oozed out of the bluff 200 yards away. Looking up from the tent at the edge of the bluff above us, we could see projecting over it the heads of hundreds of the birds, and, as those standing there took flight, others stepped forward to occupy their places. The number of Grouse which flew over the camp reminded me of the old time flights of Passenger Pigeons that I used to see when I was a boy. Before long the narrow valley where the water was, was a moving mass of gray. I have no means whatever of estimating the number of birds which I saw, but there must have been thousands of them.[8]

The habitats of both greater and of Gunnison sage-grouse have been degraded by domestic livestock. For example, in the Gunnison Basin, fully two-thirds of livestock grazing allotments are failing to meet land-health standards for rare native species including Gunnison sage-grouse.

The best-understood impact of livestock grazing on sage-grouse is the reduction of grass cover between sagebrush shrubs to levels that unnaturally expose sage-grouse to their natural predators. Across the vast majority of the sage-grouse range, the scientific consensus is that 7 inches of residual grass height must be maintained in breeding and nesting habitats to provide grouse the cover they need to survive.[9] In the Northern Plains, where sagebrush are much sparser and afford less hiding cover, 10.2 inches of residual grass height is required to furnish sufficient hiding cover for grouse.[10]

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[7] McIver et al. 2010. The Sagebrush Steppe Treatment Evaluation Project (SageSTEP): A Test of State-and Transition Theory. USDA Forest Service General Technical Report RMRS-GTR-237, Fort Collins, CO: Rocky Mountain Research Station, 16 pp.

[8] Grinnell 1910. American game bird shooting. New York, NY: Forest and Stream Publishing Co., 558 pp.

[9] Hagen et al. 2007. A meta-analysis of greater sage-grouse *Centrocercus urophasianus* nesting and brood-rearing habitats. Wildlife Biology 13:42–50.

[10] Kaczor et al. 2011. Nesting success and resource selection of greater sage-grouse. Studies in Avian Biology 39: 107–118.

While maintaining 7 inches of grass height is a habitat objective for livestock grazing in federal sage-grouse plan amendments, this commitment has been undermined by a failure of BLM and Forest Service to apply it in grazing permit renewals and Annual Operating Instructions (AOIs). In the first year after the final decisions were signed on September 22, 2015 until October 7, 2016, 70% of all grazing permits in sage-grouse habitat were rubber-stamped for another ten-year term under their previous terms and conditions, without revision or analysis. The numbers of AUMs reinstated is even higher: 81% of all AUM permitted in sage-grouse habitat in the last year were renewed without any analysis and under the existing management regimes without including sage-grouse habitat objectives (including the 7-inch grass height objective). An Instruction Memorandum issued to the Forest Service delays the implementation of sage-grouse habitat objectives in that agency's AOIs, which were to be phase in for the 2018 grazing season under the current sage-grouse plan amendments. Furthermore, this measure is slated to be stripped from the plan amendments under the Draft EIS proposals for Nevada/California, Idaho, and Wyoming. Thus, it appears that federal sage grouse protections from irresponsible types of livestock grazing are currently being ignored and are slated to be dismantled.

Livestock infrastructure also has major negative impacts on sage-grouse. Fenceposts and corrals offer perches for raptors, and fences are a deadly collision risk for low-flying grouse. One five-mile stretch of fence in Wyoming killed 146 grouse over a year and a half.[11] Marking barbed-wire fence for visibility reduces deadly grouse collisions only by 57 to 70%, allowing 30 to 43% of the fatalities of unmarked fences to continue.[12] Considering the vast mileage of barbed-wire fence on western public lands, the overall fatality level is massive.

Impacts to Big Game Habitats and Populations

Domestic livestock are direct competitors for forage with native wildlife species, and the degree of competitive intensity varies with the degree of dietary overlap. Cattle graze preferentially on grasses, but will also browse shrubs, while domestic sheep graze more on forbs (broadleaf wildflowers and shrubs) and to a lesser degree than cattle on grasses. One cow-calf pair eats a similar amount of forage as two elk or eight mule deer, and therefore would be estimated to displace that number of game animals.[13] Domestic sheep compete most directly with mule deer and pronghorns. I have personally seen federal a federal NEPA document declaring that the project area had enough forage to sustain 100% of the livestock and 75% of the wildlife, a tacit admission that overgrazing was authorized. To the extent that mule deer and elk populations are substantially smaller today than they were when Lewis and Clark explored the West, competition with cattle and sheep is a driving factor holding big game populations at unnaturally low levels.

Domestic Sheep Grazing on Public Lands Causes Deadly Disease Outbreaks in Bighorns

[11] Christiansen, T. 2009. Fence Marking to Reduce Greater Sage-grouse (*Centrocercus urophasianus*) Collisions and Mortality near Farson, Wyoming – Summary of Interim Results. WGFD Report, 2 pp.
[12] *Ibid*.; also Van Lanen et al. 2017. Evaluating efficacy of fence markers in reducing greater sage-grouse collisions with fencing. Biol, Conserv. 213: 70-83.
[13] Ogle and Brazee. 2009. Estimating initial stocking rates. USDA NRCS Tech. Note Range No. 3, 39 pp.

Domestic sheep are carriers of multiple pathogens that cause catastrophic epidemics and die-offs in bighorn sheep when the two species come into contact with each other. *Mannheimia haemolycta* (formerly called *Pasteurella*) and *Mycoplasma ovipneumoniae* cause a form of deadly pneumonia that can wipe out an entire bighorn sheep herd following a single nose-to-nose contact between domestic sheep and bighorns.[14] This is a relatively high-probability occurrence because the two species express curiosity toward each other when in close proximity. In some cases, bighorn sheep herds have become infected and decimated by domestic sheep diseases, and in other cases state agencies have eliminated thriving bighorn sheep herds to prevent disease transmission in cases where the two species have been allowed to come into contact. Due to this extreme disease transmission risk, domestic sheep should be grazed 15 miles or more away from known occupied bighorn sheep habitat, which accounts for the propensity of young male bighorns to wander in search of mates.

Vegetation Manipulation Projects to Increase Cattle Forage are Harmful to Wildlife

There are many types of vegetation projects to manipulate native vegetation in an attempt to increase forage for domestic livestock, and which have caused significant problems for native wildlife. Some of these projects have been proposed in the name of wildlife habitat improvements, even though scientific support for wildlife habitat values has been scant, or even contradictory.

Juniper removal projects have been proposed for sage-grouse or mule deer habitat improvements. For sage-grouse, projects that remove junipers from sagebrush grasslands in the early stages of juniper expansion, increased habitat values for sage-grouse are achievable. In cases where juniper removal targets mature or old-growth stands, which have little to no grass or shrub understory, the result is more likely to be the creation of a cheatgrass invasion hotspot, due to the propensity of this invasive weed to colonize disturbed areas. This does more harm than good. There is no valid scientific evidence that juniper or pinyon removal benefits mule deer, as this species benefits from the hiding cover aspect of juniper and pinyon woodlands.

Mechanical destruction of sagebrush, and even the use of herbicides such as tebuthiuron, has been advanced as a means to improve sage-grouse habitat. The Deseret Ranch (managed primarily for livestock grazing and trophy elk hunting) initially reported an increasing population of sage-grouse compared to other Rich County grouse populations in response to mechanical removal of sagebrush using a Dixie harrow. This touched off a welter of copycat projects, but subsequently the Deseret Ranch sage-grouse population plummeted compared to surrounding populations, and as it stands now, Rich County sage-grouse populations inside and outside the Deseret Ranch have an overall population decline that is similar. Thus, this practice should be discredited as ineffective. Tebuthiuron treatments in New Mexico and Texas have been associated with declines in the lesser prairie chicken, which currently is on the verge of Endangered Species listing.

Perhaps the most ecologically damaging habitat treatment type is the introduction of non-native species, such as crested wheatgrass or forage kochia, either along fuelbreaks or in large-scale plantings to increase forage for domestic livestock. Large-scale fuelbreak creation of this type threatens to fragment and degrade remaining large tracts of sagebrush

[14] Schommer and Woolever 2001. A process for finding management solutions to the incompatibility between domestic and bighorn sheep. USDA Forest Service report, 64 pp.

that sag-grouse require to survive. Crested wheatgrass is known to invade surrounding habitats from plantings, and completely destroys the habitat value of the land for almost all native wildlife.[15]

Livestock Grazing to Combat Cheatgrass is Counterproductive

Cheatgrass is one of the least desirable forage plants from the standpoint of herbivores (including domestic livestock), so when cattle are released onto a range invaded by cheatgrass, they are likely to concentrate their foraging on remnant native perennial bunchgrasses instead of grazing on the cheatgrass. This further depletes the ability of native grasses to persist and to compete with cheatgrass, and further moves the landscape toward an unnaturally fire-prone cheatgrass monoculture. When cheatgrass dries up, it becomes non-nutritious, and their spiny seedheads pierce the mouthparts of herbivores, which avoid it as a forage species. Cheatgrass is green and palatable to livestock for only two weeks or so in the spring, yet it is unheard of that BLM land managers limit livestock grazing in a given allotment to such a short window. As a result, even in cases where livestock grazing could reduce the standing crop of cheatgrass (and therefore flammability) in the short term, it actually increases and further entrenches cheatgrass infestations (and therefore fire risk) over the long term.

Long-term rest from livestock grazing offers the best option for returning the land to a healthy and productive state on lands where native perennial grasses remain. On the Dugway military proving grounds in Utah, where livestock have not grazed for 50 years, cheatgrass is almost absent, and experimental introductions failed to establish.[16] The recovery of native vegetation in the Hart Mountain National Wildlife Refuge, closed to livestock grazing in 1991, has been spectacular.[17]

Livestock-Driven Wildlife-killing Programs are Ecologically Destructive and Pointless

The agriculture industry in general, and western public lands ranchers in particular, are notorious for their propensity to kill every species of native wildlife they find inconvenient to their agricultural operations. Federal, state, and county extension programs routinely target native wildlife including predators (notably coyotes, wolves, and bobcats) and rodents (particularly prairie dogs and beavers) that are believed by farmers and ranchers to have a negative effect on their economic bottom line. USDA's Wildlife Services program alone killed more than 2.7 million animals in 2016,[18] more than half of which were native wildlife species, at the behest of the agriculture industry. Among this agency's tally of death were 77,403 coyotes, 3,931 foxes, 535 river otters, and 21,182 beavers – which is significant because beavers are considered a keystone species, ecosystem engineers that create healthy stream and riparian habitats and increased vegetation in the watersheds they inhabit. any native species are classified by state agencies as 'varmints' with no seasons, bag limits, or reporting requirements for their killing and so

[15] E.g., Reynolds and Trost 1980. The response of native vertebrate populations to crested wheatgrass planting and grazing by sheep. J. Range Manage. 33:122-125; Connelly et al. 1991. Sage grouse use of nest sites in southeastern Idaho. J. Wildl. Manage. 55:521-524.

[16] Meyer et al. 2001. Factors mediating cheatgrass invasion in intact salt desert shrubland. Pp. 224-232 *in* Shrubland ecosystem genetics and biodiversity: Proceedings, USDA RMRS-P-21.

[17] Batchelor et al. 2015. Restoration of riparian areas following the removal of cattle in the northwestern Great Basin. Env. Manage. 55: 930-942.

[18] https://www.aphis.usda.gov/wildlife_damage/pdr/PDR-G_Report.php?fy=2016&fld=&fld_val=

there is no way to estimate the number of native wildlife species killed directly by ranchers through shooting and poisoning. Given the strong public interest in maintain healthy populations of native wildlife and healthy functioning ecosystems on public lands, the killing of native wildlife associated with public-lands ranching should be legally forbidden. If private agricultural operations want to impose their livestock on federal public lands, the least they can do is to run their operations in a way that is compatible with maintaining natural population levels of native wildlife.

Public Lands Livestock Grazing is a Negligible Contributor to Local Western Economies

Far from being an important part of rural western economies, public-lands ranching makes a contribution that, while it may be an important (although usually not the only) source of income for ranchers directly engaged in it, is at the statewide level a rather negligible contributor to jobs and income in western states. Large metropolitan areas are by far and away the overwhelming drivers of western state economies, but even rural counties with little urban development, the economic significance of livestock production is far less than the spatial expanse of lands dedicated to it would suggest. In a 2002 analysis by noted western economist Dr. Thomas M. Power, livestock grazing on federal lands makes up less than 0.1% of the economies of the western states where it occurs.[19]

Harney County, Oregon is fairly representative of a rural western county with no large urban centers. According to Headwaters Economics' Economic Profile System, farming (which includes ranching) makes up only one percent of the wage income in Harney County, and the combined sectors of agriculture, forestry, fishing, and hunting made up 8.8% of the jobs in Harney County in 2016.

I live in Wyoming, which is often referred to as "the Cowboy State" , but in 2017 farming and ranching combined tallied $617 million, making up only 1.5% of the state's Gross Domestic Product.[20] In 2012 it accounted for 4% of the state's full- and part-time employment.[21] Meanwhile, six National Park units in Wyoming received almost 7.5 million visitors in 2017, spending an estimated $882 million in Wyoming.[22] And this excludes Forest Service and BLM lands, which were a major tourism contributor to Wyoming in 2017, particularly due to the total eclipse of the sun, estimated to have produced $63.4 million by itself according to the Wyoming Department of Tourism. Clearly, public lands are more valuable for public enjoyment than for providing livestock forage.

As of 2015, there were 21,916 permit holders grazing commercial livestock on public lands managed by the BLM and Forest Service. Incorporating NCBA estimates that 40% of cattle in western public land states spending some time on federal public land, there are about 1.75 million cattle using public land, out of a national herd of 90 million,

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[19] Power 2001.Taking stock of public lands grazing: An economic analysis. Pp. 263-269 *in* Welfare Ranching, G. Wuerthner and M. Matteson, eds. Washington: Island Press.

[20] Wyoming Dept. of Administration and Information, Economic Analysis Division, Wyoming GDP Report 2017, http://eadiv.state.wy.us/i&e/WyoGDP97_17.htm.

[21] Liu, W. 2013. Wyoming Economic and Revenue Trend. Economic Analysis Division, State of Wyoming.

[22] Cullinane et al. 2018. 2017 National Park visitor spending effects: Economic contributions to local communities, states, and the nation. Natural Resource Report NPS/NRSS/EQD/NRR—2018/1616. National Park Service.

meaning that only 1.9% of America's cattle spend any time on western federal lands.[23] By way of comparison, some 290 million people visit federal public lands each year across 11 western states, based on aggregated data from federal agencies.[24] Examining only rural (nonmetropolitan) western counties, the counties with the greatest proportions of protected public lands have shown the greatest economic growth, job growth, and population growth.[25] Thus, if all domestic livestock using western public lands were to magically vanish tomorrow, it would likely be received as an economic crisis by the beef producers directly involved, but at the national scale, consumers would not notice the difference, and the blip in state economies would be lost in the standard-of-error noise.

Livestock Lessees Graze Public Lands at Bargain-Basement Rates

Federal agencies have the discretion to lease public lands for private livestock grazing, which is supposed to be managed within the sideboards of multiple-use legal mandates that obligate the BLM and Forest Service to balance commercial uses against public recreation, wildlife habitat conservation, and watershed protection. Grazing on federal lands is defined by regulation as a privilege, not a right, and holding grazing lease does not convey a property right. Although public-lands ranchers will at times use a grazing permit as collateral against a bank loan, a practice of questionable legality. Instead, holding a federal grazing permit enters a rancher into a tenant-landlord relationship with the U.S. government which manages federal public lands in a trust relationship on behalf of the American people.

On federal lands leased for livestock grazing, rates are charged per Animal Unit Month (AUM), called a Head Month on Forest Service lands, which is defined as one cow-calf pair or five sheep. Federal grazing fees began at $1.23 per AUM in 1966, and currently stand at $1.41 per AUM. Using an inflation calculator, the 1966 grazing rate translates as $9.66 in 2018 dollars. Meanwhile, the average rate for leasing private pastureland in 16 western states was $22.60 per head in 2010.[26] In FY2015, some $79 million was appropriated to BLM for its rangeland management program, of which $36.2 million was expended for the administration of livestock grazing on BLM lands; the agency collected $14.5 million in grazing fees (at $2.11 per AUM) that same year.[27] As a result, BLM's public lands grazing program ran a deficit in 2015, costing the taxpayers at least $21.7 million, and arguably $64.5 million, each year in subsidies to public lands ranchers.

In 2008, as a member of the Laramie City Council, I was appointed as the Council representative to the Monolith Ranch Advisory Committee, and personally tasked as part of the city's team to negotiate grazing lease terms with a private rancher to graze his cattle on the city's Monolith Ranch property. This ranch was purchased for the purpose of perfecting

[23] The Nature Conservancy 2016. U.S. Beef Supply Chain: Opportunities in fresh water, wildlife habitat, and greenhouse gas reduction.

[24] http://westernpriorities.org/wp-content/uploads/2018/03/290-Million-Visits-Report.pdf

[25] Lorah and Southwick 2003. Environmental protection, population change, and economic development in the rural western United States. Population and Environment 24: 255-272; Rasker et al. 2013. The effect of protected federal lands on prosperity in the non-metropolitan West. Journal of Regional Analysis and Policy 43: 110-122.

[26] Grazing Fees: Overview and Issues. Congressional Research Service Report RS21232, September 29, 2018.

[27] *Ibid.*

water rights for municipal use. We negotiated a rate of $14.44 per head-month for summer grazing, which also obligated the rancher to plant and tend crop fields, implement irrigation, and repair or rebuild up to five miles of fencing each year. It is my understanding that the city's grazing lease offered more favorable terms to the rancher than the rates charged to lease similar private lands in the Laramie Basin.

It is clear that the $1.41 per AUM currently charged to public lands grazing lessees is far below fair-market value, and indeed is insufficient even to pay for the cost of administering the program, much less also cover the cost of remediating the damage to public lands caused by excessive or inappropriate livestock grazing on federal public lands. Private-lands ranchers, who pay taxes on the private lands they graze, are placed at a competitive disadvantage. This is a cruel irony given that private-lands ranchers often are raising livestock in areas with deeper soils and much more abundant rainfall that make them far more ecologically appropriate for cattle. Western public lands are among the most arid and least resilient to livestock grazing damage. These lands are among the least productive places to raise domestic livestock from an economic perspective. Given that livestock grazing interferes with and degrades other uses of the land (including wildlife habitat, watershed protection, and public recreation and enjoyment) that may be substantially more important economically and from a public interest standpoint, running a heavily-subsidized public-lands grazing program for the benefit of private ranching interests is a losing proposition for the American people.

Permit Buyouts Offer a Very Generous Option to Solve Livestock-Wildlife Conflicts

Ranching is becoming an increasingly marginal way to make a living, typically requiring one or more unrelated side jobs to maintain a viable income. Ranchers are faced with consolidation in the meat-packing industry, where four corporations control basically all the purchasing of cattle and sheep for meat production and sale. At the same time, drought, which has always been more the rule than the exception west of the 100th longitudinal meridian, brings with it cyclical decreases in water and forage, which are only getting longer and more pronounced with ongoing changes in global climate. When beef prices are low, it is difficult to sustain cattle operations economically, and when drought hits, it is also difficult to prevent ranching operations from cratering from an economic standpoint. It takes a perfect alignment of precipitation and commodity prices to make ranching profitable, and so it should surprise no one that the children of ranching families are increasingly looking to other occupations when they make their career choices.

As a result, family ranches are increasingly run by an aging population, many of whom would like to retire their federal land allotments, receive a cash distribution from a conservation purchaser, and either retire for good or else trim back their operations to a more manageable private-land operation that they can manage as they age. This is a beneficial outcome for the public, because the removal of livestock gives rangelands a chance to heal and recover, and increase in productivity without the constant grazing pressure of domestic livestock. In conservation, success is often measured by reductions in the losses of natural areas or a slower decline in wildlife populations, so the opportunity to actually increase natural health is a significant one. However, without the assurance that livestock grazing permits bought out and returned to federal agencies for the benefit of wildlife and habitat restoration won't simply be returned to livestock grazing under a different rancher, it is a poor investment for conservation buyers give substantial money

(typically $250 per AUM) to a grazing lessee to retire a grazing lease. Legislation in the Boulder-White Clouds and Owyhee River wilderness complexes has worked well in stimulating the buy-out of unwanted grazing leases from willing sellers, while requiring permanent closure of these leases for the benefit of livestock and stream health. The Rural Economic Vitalization Act (REVA) would extend this opportunity and option to public lands ranchers nationwide, creating a win-win for conservationists and ranchers without children who want to carry on the family business and who simply would like a golden saddle to ride off into their golden years.