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16

Race, Nature, Nation, and Property in the Origins of Range Science

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Introduction

United States Forest Service photograph 381785 (Fig. 16.1), taken in June 1939 by one W. H. Shaffer and filed under the heading "Handling Stock, New Mexico, Carson N[ational] F[orest]," bears the innocuous caption: "Sheep herder Damacio Lopez talking with Forest Ranger R. L. Grounds." This apparently banal and innocent encounter, dutifully recorded in black and white, is arresting and troubling for anyone familiar with the history and politics of national forests in northern New Mexico (Kosek 2006). Manifold signs of unequal power can be found encoded in the bodies, clothing, postures, and expressions of the two men. Lopez is clearly *not* talking but *listening* while Grounds speaks, a pen in his right hand, gesturing as though to emphasize a point and casting his gaze into the distance over Lopez's head. The sheepherder, by contrast, holds his hands together at the waist, patient and impassive, looking up into the ranger's face. Grounds does not appear angry or argumentative, merely didactic. Tall grasses shroud both men's feet from view, which in June in northern New Mexico suggests either good range conditions, a wet previous year, or both. Yet it is hard not to sense that Grounds is lecturing to Lopez, and that he feels authorized to do so both by his office and by his knowledge of how rangelands work; a notepad, open in his left hand, signals the nature of his expertise. Lopez neither smiles nor frowns, his

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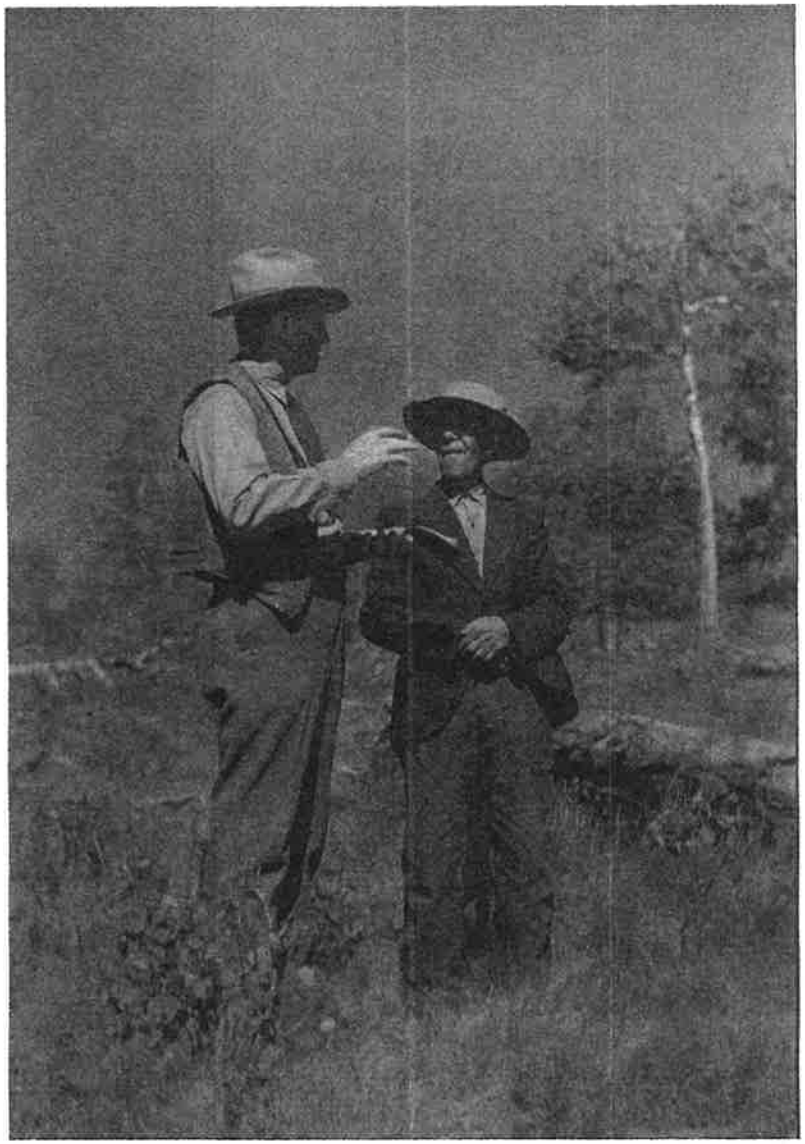

Fig. 16.1 This photograph was taken in the Carson National Forest in northern New Mexico in June 1939. The Forest Service captioned it "Sheep herder Damacio Lopez talking with Forest Ranger R.L. Grounds." By W.H. Shaffer. US Forest Service photograph 381785, National Archives and Records Administration, College Park, Maryland

lips pursed or just barely parted, while his eyes fix on Grounds's visage with a mixture of bemusement, forbearance, and anger, like a parent who sees through a child's story. He looks as though he has heard such talks before and has learned the wisdom of pretending to listen respectfully, even if it requires disciplined self-restraint. Lopez had probably been herding sheep in those mountains since before Grounds was born, as his ancestors had done for some 200 years before that, and he very likely disputed the legitimacy of the Forest Service's possession of the land around them. He may have lacked written notes—indeed, he may have been illiterate—but chances are he knew a great deal about sheep, grazing, and local plants. In this chapter, I hope to explain the dispositions visible in photograph 381785, in particular, the insouciant hubris of Grounds, by examining the origins of range science, from which he derived his authority as an expert.

It is well established that access to and use of natural resources in the United States have been systematically skewed along racial and ethnic lines since European settlement, and that the resulting patterns of inequality and discrimination persist into the present (Schelas 2002). But the roles of biophysical scientists and their knowledge in this history are obscure. Unlike social scientists who sought evidence of racial difference through methods such as anthropometry, natural scientists studied plants, animals, soils, climate, and so forth—everything *but* people. Accordingly, the knowledge range scientists produced was ostensibly about "nature," not society. One premise of Critical Physical Geography (CPG) is that science and politics are never so cleanly divided. Christine Biermann's analysis of the American chestnut blight, for example, demonstrates that "Progressive Era conservation melded together a nostalgic desire for cultural, racial, and environmental purity with a future-oriented project aimed at securing resources into an unknowable and dynamic future…[N]ature and the environment functioned as key sites through which ideas about race and nation circulated" (Biermann 2016, 213). Much the same could be said of the (concurrent) history of range science, as we will see, and this case provides a more specific account of how scientific practices and discourses articulated with race, gender, nation, and nature. Norms of experimental control and data collection ratified the exclusion of herders from research and ultimately rationalized the demise of herding. Additionally, Diana Davis's (2007) pioneering work has illuminated the colonial origins and influences of scientific theories about livestock grazing in arid environments. In the internal, settler-colonial context of the western United States, range science not only echoed European forestry's prejudice against mobile pastoralists, but it also generated a putatively scientific basis for an alternative

form of rangeland livestock production, one that was compatible with capitalist norms of property and governance: ranching (Ingold 1980). But by omitting any discussion of these norms, range science euphemized and legitimized the domination of Anglo livestock owners over western rangelands.

Botanical Nationalism

Complex issues of racial, ethnic, and national identity were unavoidable in the settlement of western rangelands. Spanish missionaries, soldiers, and settlers had preceded US citizens by as much as three and a half centuries in parts of what are now California, Arizona, New Mexico, and Texas—areas wrested by force from the sovereign nation of Mexico in 1848. Conquest and settlement of Texas was further inflected through the politics of slavery, as Southerners predominated among early westward migrants there (Perkins 1992). Contrary to Hollywood's later representations, African-Americans were numerous among early cowboys, so too were Mexicans and Native Americans (Jordan 1993). The core practices of range livestock production, moreover, descended not from Great Britain or New England but from Iberia and North Africa (Sluyter 2012). Throughout the west, of course, imperial expansion also involved violent dispossession of Native Americans, almost always rationalized through narratives of racial difference and civilizational "progress" (Brechin 1996, DeLuca and Demo 2001). Rangelands were where native tribes succeeded the longest in resisting US conquest: the Comanche and others in Texas until 1875, the Sioux in the northern Great Plains until 1881, and the Apache in Arizona and New Mexico until 1886. But most scientists engaged these landscapes only after "pacification" was complete, and how their activities might relate to the practices and ideologies of Manifest Destiny was neither preordained nor obvious.

The first biophysical scientists to study western rangelands were botanists sent by the US Department of Agriculture to collect and describe the plants found there.[1] One of the earliest and most famous, George Vasey, unabashedly framed his inquiries in terms of maximizing production in aid of settling the nation's "extensive territory." "Every thoughtful farmer realizes the importance of the production on his land of a good supply of grass for pasturage and hay," Vasey wrote in the opening lines of an early report. "He, who can produce the greatest yield on a given number of acres, will be the most successful man [*sic*]" (Vasey 1884, 5). Reporting on the grasses of Kansas, Nebraska, and Colorado, he articulated the widespread view that cultivation was invariably more productive than unaided nature:

> Man has learned to select those plants, grains, and grasses which are best adapted to his wants, and to grow them to the exclusion of others. This is the essence of agriculture. Nature shows her willingness even here to respond to the ameliorating influences of cultivation. No sooner is the ground plowed, and corn, sorghum, or millet planted, than a crop many times as heavy as that of the native soil is at once produced. (Vasey 1886, 10)

Vasey's patriarchal, post-lapsarian formulation was typical of his time and station: through the toil of cultivation, "man" improved a fecund, feminized, incomplete "nature" (Merchant 1980). And although *human* races appeared nowhere in Vasey's reports, races of *plants*—species, subspecies, and varieties—were very much at issue, arranged in a hierarchy which considered cultivated plants intrinsically superior. By an implicit transitive principle, the greater the improvements achieved, the greater the (type of) "man" and the more "advanced" the civilization.

Geographical provenance served as a second axis of difference, smuggling political divisions into botanical classification as either "native" or "foreign." Imported crop species were widely considered superior, even necessary, for successful Anglo-American settlement: they were the ones that settlers recognized and knew how to grow, and also the ones for which markets already existed. As Alfred Crosby (1986) has shown, exotic plants underwrote colonization of the Americas, aided by livestock and microorganisms that likewise hailed from overseas. One of the USDA's core activities was testing plants from around the world in greenhouses and experimental gardens for distribution to farmers across the nation (Kloppenburg 1988). Turkestan alfalfa, to take one example, was studied in 45 states as well as the District of Columbia and Indian Territory, with positive results reported in 237 of 466 trials (Kennedy 1900, 4). Old World crops, like Old World peoples, were considered naturally superior to their New World counterparts.

As Patricia Seed has shown, cultivation had long been understood in English language and law as the basis of private property. Planting a garden signified and performed possession; in the New World, replacing "wild" vegetation with "fruits and vegetables not indigenous to the country" was not only a way to provide food; it also "justified English title to the Americas" (Seed 1995, 29, 35). Western rangelands posed a challenge to this practice and its underlying prejudices, however. Without irrigation, farming west of the 100th meridian was impossibly unreliable, with catastrophic consequences during periodic severe droughts (Worster 1979). Moreover, bison and perennial grasses "formed a tight partnership" in the Great Plains, "fending off the

entry of any great number of exotic plants and animals," and thereby constituting "the most mysterious exception to the success story of Old World weeds in the Neo-Europes" (Crosby 1986, 290).

After the extermination of the bison opened an ecological niche for cattle, native plants soon proved superior to imported species for livestock production. This discovery, in turn, enabled nationalist sentiments to find oblique expression in the otherwise clinical prognostications of government scientists. H. L. Bentley, hired by the USDA's new Division of Agrostology[2] in the late 1890s, catalogued the numerous failures and frustrations of livestock producers in central Texas who had tried to use "forage plants not native to the country" to increase the productivity of their rangelands. "What stockmen need," Bentley insisted, "are hay meadows of *native* grasses that have shown in past years all the best qualities of the best hay grasses elsewhere, and that do not require any experimental work to determine their adaptability and general value" (Bentley 1898, 18, emphasis in original). The Division of Agrostology's first circular lamented that "Nearly all of our cultivated grasses and clovers are of foreign origin," whereas few native species had yet been studied for possible cultivation. "We want to know what plant will provide the greatest amount of the most nutritious forage in the shortest season at the least expense to the farmer...In short, we want the best, and we believe the best can be grown on American soil from native species" (Smith 1895, 2–3). Similarly, Bentley (1898, 18) asked, "why should stockmen look to foreign countries or even to other sections of Texas for grass seeds and hay?.... Let us take care of what we have and develop them. They are here now. They are here because the soil and climatic conditions are favorable. About the only question we have to determine is, Which of these are best for hay and which for grazing purposes?"

Ideologically, western rangelands were both threatening and promising. On the one hand, they challenged the transitive principle that valorized people in proportion to their power to remake nature. On the other hand, they afforded the possibility of endowing settlers with their own "native" status, grounded in the apparently natural fit between their imported livestock and the indigenous environment. "[N]ative grasses are by far the best for home use; they are suited to the climate and the climate is suited to them" (Bentley 1898, 21, emphasis in original). In retrospect, resolving this tension was made easier, socially and biophysically, by the fact that Native North Americans had not domesticated any grazing animals and therefore could not be seen as antecedents or rivals. To simplify: if cattle could occupy the niche previously held by bison, then the replacement of native tribes by Euro-American ranchers could be constructed as *both* natural *and* a step forward in the march of civilization. Early range scientists such as Bentley did not make any such claims

explicitly—they did not necessarily *think* them either—but they didn't really need to: the larger discursive field tacitly did it for them.

Blooded Stock

While botanists and early range scientists debated the merits of native versus foreign grasses, experts in the USDA's Bureau of Animal Industry, in concert with agricultural extension agents throughout the country, endeavored to convince farmers and ranchers to pay more attention to the breeding of their livestock. Especially in the west, most herds' lineages were indistinct and effectively unknown. Most cattle (including the famous Texas Longhorns) were descendants of animals imported from Spain long before, as were the sheep in the southwest. Some herds hailed from various other places and times, but in nearly all cases, they were deemed "unimproved" or "scrub" animals, the products of males and females breeding more or less by chance under whatever environmental and other conditions they happened to inhabit. Such mixing was viewed as the animal equivalent of miscegenation, and the "Mexican" breeds were not proper "breeds" at all but mongrels of little value—market value, that is—to their owners or to the nation. What was needed, according to the government experts, was "blooded" or "purebred" animals, especially bulls and rams, who would "improve" the nation's herds through carefully controlled crossbreeding.

The preferred cattle breeds—Shorthorns, Herefords, and Angus—all came from Great Britain, where pioneering breeders such as Robert Bakewell had created them over many generations, "fixing" specific characteristics or traits by mating like to like (inbreeding) and culling non-conforming individuals (Trow-Smith 1959). As Harriet Ritvo (1987) has shown, blooded stock not only reflected the British upper classes' obsession with human bloodlines but also legitimized their dominance by cloaking it in the guise of economic efficiency for national prosperity. In the United States, government scientists such as Charles Curtiss (1898), Director of the Iowa Agricultural Experiment Station, employed the same logic to appeal to ordinary citizen-farmers. Controlled breeding could indeed instill desired traits over the course of generations, but as a strategy for increasing profits, the argument was circular: "superior" breeds were those that middlemen and consumers would pay more for, and they would pay more because they had come to believe those breeds' traits were superior. As in Britain, then—though without (human) aristocrats—blooded stock euphemized market power as a function of breeding and descent (Sayre 2002). Judging from the persistence of government efforts

(e.g., Pickrell 1925), however, many Western livestock owners ignored the experts' admonitions, perhaps because they could not afford the high-priced animals or the fencing that controlled breeding required.

Issues surrounding the breeding of sheep were more complex, in part because the most highly valued breeds were the Merino and the Rambouillet, which originated in the royal flocks of Spain and France, respectively. These noble, Latin roots necessitated more intricate ideological work, but the outcome was the same as in the case of cattle. In 1892, the Bureau of Animal Industry published a comprehensive, two-volume *Special Report on the History and Present Condition of the Sheep Industry of the United States,* in which the racial homology of humans and livestock was conspicuous. The section on California, for example, opened with the observation that the first domestic sheep there were "of very low grade, both as to wool and mutton products... These sheep were of nearly all colors, indicative of carelessness in breeding for many generations." The very next paragraph stated that the gold rush had triggered the transition between "California under the rule of the Latin race and its Saxon successors" (Carman et al. 1892, 947), and that since that time steady improvements in the state's flocks had occurred. Mexicans had driven more than half a million sheep into the state from New Mexico in the 1850s, while Anglo-Americans had imported "a much better class of sheep" from the eastern United States, with breeds carefully chosen "with reference to improving the Mexican sheep" (Carman et al. 1892, 952). The report praised "the successful crossing of the Merino with the British breeds" in the counties north of San Francisco (Carman et al. 1892, 961). For Oregon, the report linked individual Anglo sheep owners with specific "improved" breeds: Hiram Smith had brought "pure-blood Merino rams from Ohio" in 1851, for example, while Martin Jesse's Australian Merinos, imported in 1858, "were certified as being pure descendants of Spanish Merino flocks of King George III of England" (Carman et al. 1892, 977). Other men imported British breeds: New Oxfordshires, Hampshire Downs, Southdowns, and New Leicesters. As one of the report's co-authors, John Minto (himself a prominent sheep breeder in Oregon [Rakestraw 1958]), wrote ten years later, the combination of these various pure breeds, in a favorable climate, had made Oregon "the greatest Merino breeding station in the world at present" (Minto 1902, 242). The "American improved Spanish Merino" (Carman et al. 1892, 982) was constructed as the best breed of all, combining British and Spanish virtues, while erasing any aristocratic or Latin residues. As with cattle, then, sheep breeding could imbue American settlers with a kind of nativeness or autochthony via interlinked ideas about animals, race, and nature. At least it could under certain conditions.

Anti-herder Chauvinism

Not surprisingly, opinions about the people involved in livestock production were comingled with opinions about the breeds of their livestock, and this was especially true in relation to sheep. Unlike cattle, sheep required constant human oversight to protect them from predators and to lead them to water and fresh pasture. "Domestication had given sheep...too great an inventiveness in finding ways to die. Although hardy and able to withstand drought, sheep could not live without shepherds" (White 1994, 239). "The occupation of a herder," Minto (1902, 238) wrote, "is that of a protector...a good herder has his flock within his sight every waking hour." Herders' work was tedious, lonely, and sometimes dangerous, and they endured both low wages and lowly status. Many hailed from Asia, Mexico, France, Spain or Portugal, and herding neither required nor instilled proficiency in English. The Bureau of Animal Industry's 1892 report complained that in southern California,

> a large proportion of the sheep and wool industry is in the hands of a foreign element called Basques. As a class they are described by their intelligent countrymen as 'very ignorant about anything except their special calling, few of them being able to read or write in their own language'... As a class, they occupy the same relation to English-speaking men engaged in sheep-raising that Chinese laborers held to white laborers on this coast before they were excluded by law. (Carman et al. 1892, 972–973)

The Basques were not the only sheep raisers to experience prejudice—Chinese, Mexicans, and Mormons were among the others (Perkins 1992). But the Basque case makes clear that such persecution was not simply ethno-racial; citizenship and nationalism were also involved. "A large proportion of the herders are of foreign birth" (Carman et al. 1892, 985). Reporting ten years later on the Northern Great Basin, the Bureau of Plant Industry's David Griffiths referred to "alien sheep interests. It is said that a very large proportion of the sheep in the region belong to Basques, who own no land, and who in many cases are not citizens" (Griffiths 1902, 23). In a country of immigrants, many of whom had only recently arrived, those willing to become US citizens were much less objectionable than "foreigners in the range country (generally with sheep), who are there only to gather wealth and go away with it. This evil is not as great in Oregon as it was ten years ago, and not nearly as bad as it is now in southern California" (Carman et al. 1892, 983).

How, then, to discern and shape the intentions of people who might or might not settle down permanently and help build the new nation? The

answer lay in property and land and therefore also in class. The Bureau of Animal Industry report made the link explicitly: "The peace and permanency of wool-growing, as the pursuit to which these lands are best adapted, requires that means to secure private control [of land] should be adopted as soon as possible," whether by lease, sale, or outright grant and "in such quantities as would enable a man of average industry to support a family from their use" (Carman et al. 1892, 983). Sheep could be markers of poverty and landlessness, especially by association with the herders who tended them day in and day out. But sheep could also be a ladder out of poverty and wage labor altogether. The costs of entry were low; H. A. Heath, another co-author of the 1892 report, estimated that "one-third the capital required to stock up with cattle is sufficient to start with sheep" (quoted in McGregor 1982, 28). "The very poorest men may, and often do, enter the business with their labor only, by undertaking to care for a flock purchased by the capital of others" (Carman et al. 1892, 982). Meanwhile, the rate of return was high, not so much from the sale of mutton but from wool: a non-perishable, readily transportable product in high demand, one which did not require the slaughter of any animals. A healthy, well-tended flock could more than double in number in a single year, twins being quite common, and part of a herder's wages was typically paid in lambs from the flock in his care. If things went well, a herder could amass a herd of his own in just a few years. In short, sheep could be a uniquely rapid means of socio-economic mobility. When cattle prices collapsed in the 1880s and 1890s, range sheep production boomed, with some "fifteen million sheep trailed eastward from the Pacific Slope during the last third of the nineteenth century, a movement of livestock five times larger than the fabled 'long drives' of cattle north from Texas after the Civil War" (McGregor 1982, 28).

Range livestock production was thus a means both of "naturalizing" European animals and of transforming immigrant people from wage laborers into capitalists; if they also chose to become naturalized Americans, they could metamorphose from larcenous foreigners into productive citizens. Published opinions about such mobility displayed a striking double standard, however. A herder who attained sheep owner status might be praised for diligence and hard work: "The best herders are…Americans, and generally have aspirations to become flock-owners or something else they prefer. The wealthiest men now in the business are Americans, many of whom started as herders for themselves or others" (Carman et al. 1892, 985). But Basque herders who did the same thing were condemned for their success, described as "suspicious, secretive," and clannish, "active, economical, and expert rivals for public range" (Carman et al. 1892, 972–974)—in other words, threatening.

Meanwhile, it was common to accuse other non-Anglo herders of "pure laziness" (Wooton 1908, 27), especially if they were Mexican or didn't speak English. In at least some times and places, meanwhile, the double standard was enforced by outright violence: "According to one estimate, between 1893 and 1903 in Wyoming alone, over twenty sheepherders and sheepmen were murdered, and at least five times that number maliciously wounded, for no other apparent reason than their association with the ovine species of livestock" (Perkins 1992, 1). Roughly 100,000 sheep were killed on the range in Wyoming in the 1890s and 1900s, and many more killings occurred in the wider western United States.

The precise motivations behind these attacks are unknown. The legendary "range wars" between cattlemen and sheepmen, cowboys and sheepherders, have long been prone to Hollywood hyperbole and pendulum-like revisionism among historians. No matter how extensive (or not) these conflicts were, the question remains unsettled: why were the two kinds of livestock considered incompatible? In a remarkable (and remarkably overlooked) article, John Perkins (1992) argued that anti-sheep violence and prejudice in the west was rooted in the attitudes of Southerners who migrated to Texas, adopted Spanish and Mexican range cattle production practices there, and then moved north and west as the harbingers of White American settlement. If they were racists with respect to non-White people, they were biased against sheep for political-economic reasons. Before the Civil War, northern and southern states had feuded in Congress over tariffs on wool, with the North in favor of levies to protect domestic production—which was concentrated in New England and supplied factories there—and the South opposed out of fear that Britain would retaliate with tariffs on cotton. An 1828 wool tariff "caused many in the South to question the benefits of remaining in the Union…It would be no exaggeration to say that for the typical Southerner, the sheep came to represent the detested 'Yankee' and the threat he posed to the existence of the South" (Perkins 1992, 9). The notion that sheep were uniquely potent agents of land degradation—on which more in a moment—may also have its origins in Southern sensibilities, as plantation owners sought to deflect blame for "soil exhaustion" away from cotton cultivation (Perkins 1992, 8).

The evidence presented above—linking botanical nationalism, blooded stock, and anti-herder chauvinism from Texas to Oregon—amounts to the exception that proves the rule for Perkins's thesis. Hispanic, Asian, Basque, and Mormon sheep producers experienced widespread prejudice and extralegal persecution, in which multiple axes of difference—ethnicity, language, religion, gender, nationality, property, and class—were alloyed in various combinations with racial categories and hierarchies. White, Protestant,

English-speaking, male, propertied, capitalist American citizens could and did succeed in the sheep business, especially in the Pacific Northwest, because they defined and occupied the niche where the privileged pole of all these axes intersected and reinforced each other. "In the end Americans made the best success, both as herders and flock masters. Not rarely a young man starting as herder ended as a wealthy sheep and land owning banker" (Minto 1902, 230). On western rangelands as a whole, however, sheep production would nonetheless be subordinate to cattle production, with sheep numbers plummeting and sheepherders effectively disappearing by the Second World War. In these developments, the Southerners' prejudices were transmuted into a suite of scientific knowledge claims that erased or euphemized racial issues.

Eliminating Herders Scientifically

The first scientific research on western range livestock production took place in central Texas in the late 1890s. Scientists in the USDA's Division of Agrostology (founded in 1895 and merged into the new Bureau of Plant Industry in 1902) were instructed to describe and measure the major forage plants, estimate the damage done by widespread overgrazing in the preceding decade, and determine how many livestock the range could support on an ongoing basis—the so-called carrying capacity of the land. In all this work, the livestock in question was cattle (Sayre 2017). But the most influential early range science experiment—so influential that it is sometimes erroneously described as the first—involved sheep, and it took place in eastern Oregon in 1907–1909, co-sponsored by the United States Forest Service and conceived by its founding chief, Gifford Pinchot. The goal of the Coyote-Proof Pasture Experiment was to demonstrate the advantages of grazing sheep in the absence of predators. Ironically, the experiment sought to reverse one of the very traits that had been selected for in the development of the Merino and Rambouillet breeds: the instinct to bunch and move together so that a herder could tend to them on unfenced rangelands. This "flocking instinct" was necessary for long seasonal migrations or transhumance, and it was as much a part of *being* Merino and Rambouillet as "large fleeces of fine-grade wool that commanded a premium in the marketplace" (McGregor 1982, 30). It was also why "if one sheep bolted the rest would follow," potentially endangering the entire flock and making a quality herder so "vitally important" (McGregor 1982, 84–85).

I have examined the Coyote-Proof Pasture Experiment in detail elsewhere and shown that its ulterior motive was to reduce or eliminate the need for herders (Sayre 2015, 2017). The experiment's "success" was measured and proclaimed in terms of the economic rate of return to constructing the necessary fence, understood as a capital investment that could be recouped through increased wool production, reduced sheep mortality, and reduced labor costs. But the flaws in the analysis were numerous and severe: the actual cost of the fence was arbitrarily reduced by nearly half, while the cost of a hunter, who was hired to patrol the fence and kill any predators he encountered, was omitted entirely; the ecological data from inside and outside of the fence were confounded and non-comparable. It is difficult to avoid the conclusion that the "successful" outcome was a foregone conclusion. Here I ask: can this be attributed to issues of race?

On first glance, evidence of racial bias in range science is vanishingly slim. The reports, scientific publications, and internal memos and notes of government range scientists contain no overt racism, nor any pejorative or derogatory language that might suggest racist attitudes. The scientist who oversaw the Coyote-Proof Pasture Experiment, Pinchot's close friend Frederick Coville, was if anything an advocate for sheepherders. At the request of the secretary of agriculture, Coville conducted extensive fieldwork on sheep grazing in the Cascade Forest Reserve in 1897 in the wake of a controversial National Academy of Sciences report that singled out "nomadic sheep husbandry" as a singular menace to the nation's forests: the sheep themselves were "hoofed locusts"[3] who ate grasses, shrubs and trees alike "to the ground"; their owners were "foreigners, who are temporary residents of this country"; and the herders were "dreaded and despised" in "every Western State and Territory" for setting fires that destroyed forests and unleashed erosion on downstream communities (National Academy of Sciences 1897, 18–19). Coville's report—"a model of fairness and thoroughness" (Rakestraw 1958, 377)—bluntly rejected all these accusations: "All the sheep owners in eastern Oregon appear to be American citizens," he wrote, and many "are prominent influential citizens of the highest character."

> A popular impression seems to prevail that sheep herders in Oregon, as elsewhere, represent a comparatively low class of humanity. This impression as applied to the majority of sheep herders many years ago was perhaps correct. At the present time, however, many bright and reputable young men have undertaken sheep herding in default of opportunities for more desirable work, and as a whole they probably average as well in character as the men engaged in any other branch of agricultural industry. (Coville 1898, 12)

The association of herders with forest fires was erroneous or exaggerated, Coville wrote, and the effects of sheep on vegetation and watersheds were modest and manageable. Echoing the Bureau of Animal Industry's 1892 report, he called for a system of leases or permits that would secure individual sheep owners' access to public rangelands.

For the scientists, the effects of herding took priority over the ethno-racial makeup of herders. In his official reports, the scientist who conducted the Coyote-Proof Pasture Experiment, James Jardine, showed no sign of *racial* prejudice against sheepherders. He did complain about herders' *skills*, however, in ways that invoked their nationalities and language skills. Damage to vegetation by sheep could be attributed, he wrote, to "poor herders, who were of French descent, unable to speak English" (Jardine 1909, 32). The specious implication suggests some sort of prejudice—neither language nor nationality has any necessary relation to herding ability—but quality herders were in high demand and hard to find. "Sheepmen of the Columbia Plateau, as well as woolgrowers in other western range areas, frequently complained about the shortage of good herders. Sloppy herding could be costly" (McGregor 1982, 85). One of the largest range sheep operations in the region, the McGregor Land and Livestock Company, relied for decades on French immigrant herders, whose skills were invaluable to the firm's success (McGregor 1982, 84).

If sheep owners hoped that fencing and predator control could reduce their labor costs, scientists hoped the same innovations could improve their experimental controls. Jardine, like Coville before him, recognized that herding could be done well or poorly, and that the differences would manifest both in the performance of the sheep—in weight gain, wool clip, survival, and mortality—and in the effects on vegetation. In the Coyote-Proof Pasture Experiment, they compared the sheep inside the pasture to flocks of sheep on the adjacent open range in terms of these variables. But the scientists could not control the herders of those sheep, let alone quantify and measure their skillfulness. Herders were a variable that threatened the "scientific" rigor of range science, *even if they were highly skilled.* In subsequent decades, the Forest Service and other government agencies spent millions of dollars building fences, exterminating predators, and thereby rendering herders obsolete throughout the West (Sayre 2017). Concurrently, the sheepherder/owner who lacked landed property—known at the time as "the coyote sheepman"—was driven out of business by state and federal laws. In the words of the *National Wool Grower* in 1907: "Like the coyote he was a vagrant and his extinction will not be regretted. Eventually he had to go and the industry will hereafter be on a permanent basis" (quoted in McGregor 1982, 110).

Conclusion

Range science transmuted the private economic risk that bad herders posed for sheep owners into a condemnation of herding itself as a public threat to the nation's rangelands, forests, and watersheds. In the process, range scientists simultaneously embraced and euphemized a complex set of interconnected ideas about plants and animals, land and property, efficiency and national progress. "Even with the best herders it is impossible to handle large bands of sheep with the same grazing efficiency as is secured in the fenced pastures of the eastern United States, and when one considers the large percentage of herders who are not skilled or who have a greater regard for their own comfort than for the interests of the owner of the sheep or for the permanent welfare of the range, the aggregate waste can be regarded in no other light than as a matter of serious public concern" (Jardine 1908, 5–6). Thus were issues of race and class both "etched and elided" (DeLuca and Demo 2001, 542) in (to) range science: etched because herders were wage laborers and often non-Anglo Saxon, widely "othered" and sometimes violently persecuted; elided because the ostensibly ecological evaluation of grazing that range scientists developed erased human agency and its attendant political issues altogether.

A CPG of range science, one that "investigate[s] material landscapes, social dynamics, and knowledge politics together, as they co-constitute each other" (Lave et al., this volume), has potentially far-reaching implications for how rangelands are managed today. The ideal to which early range science and government policy aspired was one in which fences replaced herders, predators were exterminated, and livestock achieved a "natural" balance with forage growth. Just over a century later, this vision is viewed as fundamentally mistaken. Fences fragment rangelands and impede the mobility of livestock and wildlife (Galvin et al. 2008); predators may play outsized, "keystone" roles in ecosystems (Marris 2014); static carrying capacities cannot be determined for many rangelands (Behnke, Scoones and Kervin 1993); the "balance of nature" is a chimera (Wu and Loucks 1995). In light of these new—or rather, recently rediscovered—eco-social insights, there is every reason to conclude that *good* herders may be the most economical and ecologically sustainable means of producing livestock—cattle as well as sheep—on western rangelands (Meuret and Provenza 2014).

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Notes

1. By this, I mean the first to study rangelands as such, rather than incidental to other kinds of research and exploration, such as geological investigations and surveys for railroad routes.
2. "Agrostology," from the Greek root *agrōstis*, is the botanical study of grasses. As the name of a government agency, it seems never to have caught on, requiring a parenthetical definition "(Grass and Forage Plant Investigations)" in official publications.
3. The phrase appeared in quotation marks in the report, presumably alluding without attribution to John Muir. Muir was not a member of the Academy's National Forestry Committee, which wrote the report, but he was closely and publicly associated with it. Five years later, John Minto (1902, 233, emphasis in original) pithily wrote, "The epithets used [to disparage sheep] are the *worn coin* of the half insane but charming Carlylian writer on mountains and forests, John Muir."

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17

Coffee, Commerce, and Colombian National Soil Science (1929–1946)

Greta Marchesi

In 1940, Juan Pablo Duque, director of the Technical Department of the National Federation of Colombian Coffee Growers (*Federación Nacional de Cafeteros Colombianos* or FedeCafé) prepared a detailed presentation for the Commission on Plant Sanitation in the Department of Caldas announcing an unconventional shift in his organization's field research program.

Through the decade previous, local planters had been plagued by *la gotera*, or coffee rust, prompting a new technical campaign in 1938 to improve plant health. After two years of observations, FedeCafé technicians had concluded that the health of the industry lay not in the trees themselves but rather in the vitality of plantation ecosystems, and most specifically in the soil. Soil degradation rather than insects or disease, Duque attested to the planters who gathered to hear field results, was the central ecological injury from which all other coffee ailments sprung. Going forward, the Federation's research campaigns would be reoriented from plant canopies to roots and soils.

> The symptoms of decline that I encounter, each time more accentuated and with variable intensity through the whole of the country, have convinced me over the past three years that the gravest problem of our industry is not disease or infestations nor is it problems of cultivation. Rather, there is an *original sin* that obeys the topography of hillsides and patterns of rainfall in our coffee-growing region. The devastations of erosion follow a veritable chain of maladies that increase the vulnerability of plants to disease. (Duque 1940: 2615) (translation and all subsequent translations by author)

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