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### Aims

*Pastoralism* is an interdisciplinary and peer-reviewed journal on extensive livestock production systems throughout the world. Pastoralists rely on rangelands and livestock for their livelihoods, but exhibit different levels of mobility and market involvement, and operate under a variety of different land tenure regimes. *Pastoralism* seeks to influence public policy, to improve the welfare of these people and better conserve the environments in which they live. The journal aims to keep policy makers, practitioners and pastoralists communicating with scientists and researchers and aware of each other's concerns..

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# Transhumance and pastoralist resilience in the Western United States

LYNN HUNTSINGER, LARRY C. FORERO, and  
ADRIANA SULAK

*Two case studies and a review of the literature show that ranches in the western United States manifest characteristics of pastoral systems, including transhumance, subject to forces akin to those driving a loss of pastoral mobility worldwide. Ranches typically depend on montane summer range where tenure is shared, insecure, and declining. Distinguishing between ranchers and pastoralists must rely less on any single feature, or a point on a continuum, than on the relative abundance and coherence of a mutually reinforcing complex of pastoral features that shift in relative visibility as pastoral systems, inherently flexible and opportunistic, adapt to environmental, political, demographic and economic variability.*

**Keywords:** Forest Service, USA, grazing, ranching, pastoral mobility, tenure

## Introduction

Commercial cattle ranching in the United States offers an archetype against which traditional pastoralism can be broadly contrasted. It has been used internationally as a template for 'development' of non-Western pastoral societies that has resulted in the destruction of traditional systems and the loss of natural resources. With origins in the political and economic forces that drove the conquest and settlement of the arid lands of the western continent, American cattle production is now an industry stratified into multiple layers including retail, processing, feedlot and ranch or farm. On ranches, brood herds commonly owned by households are grazed on rangelands and produce calves that are sold into the next, more often corporate, layer of the production system.

Two California case studies and a review of the literature reveal that, at the ranch level, characteristics of traditional pastoral societies are manifest,

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including transhumance that is subject to forces and conflicts similar to those driving the loss of pastoral mobility worldwide. Greater restrictions on transhumance can be attributed to insecurity of land tenure, and changes in land use and vegetation, often undergirded by a narrative of ecological degradation. We will argue that many of the characteristics, and problems, of transhumant ranchers, including a decline in mobility, resonate with those of more traditional pastoral societies, and that the origins of this decline and some of the possible mitigations are also similar. Definitions of pastoralists often invoke mobility, both as response to environment and shaper of culture, and it remains to be seen whether the other 'pastoral characteristics' of ranchers will survive its loss.

Government-owned summer range is part of the production cycle of more than 5,000 transhumant ranchers in the US. Archival research and two field studies allow us to examine who transhumance ranchers are, the pastoral characteristics that it may be argued they maintain, and the factors affecting transhumance and hence pastoral practice in the western US. We begin with a brief history of the development of cattle transhumance in the American West, examine the concept of cattle ranchers as 'pastoralists', outline general trends in the management of summer range by the US Forest Service, and then, for ground-truthing, turn to two California case studies of ranchers using Forest Service summer range.

### **Development of transhumance in the Western United States**

Transhumance in what is now the United States began with Spanish, Mexican, and Native American livestock in the south-west. At its most simplified characterization, much of the West is lowland desert broken up by mountain ranges that are snowy in the winter and rich in meadows and water in the summer. Complementing the winter supply of palatable grasses and shrubs on the deserts, the mountains provide the richest forage of the year, summer range that stimulates milk production and fattens lambs and calves. The Navajo obtained sheep and other livestock from Spanish colonists in the seventeenth century, and were able to incorporate a mobile herding lifestyle into their traditional culture, making use of highlands and lowlands seasonally (Bailey 1980). At the same time and for the next 200 years, Spanish and Mexican land grants, thousands of hectares in size, were given to individuals and communities and traditionally included valleys and uplands for grazing in seasonal patterns.

In the mid-19<sup>th</sup> century when Arizona and New Mexico were annexed by the US, and settlers were moving rapidly into the arid western territories, American land allocation policies were implemented. Community and individual grants fell to clever entrepreneurs and lawyers, to the federal government for back taxes, or rarely, remained in the hands of grantees. In most if not all cases the high elevation ranges wound up in the hands of national

land management agencies (de Buys 1985). Ranchers throughout the West adopted traditional south-western patterns of transhumance or created patterns of their own, moving stock from arid lowlands in the winter to montane meadows in the summer. Periodic droughts encouraged stock driving into the mountains, creating and reinforcing transhumance patterns.

Restrictions on land claim sizes, and deferment of the cost of owning large areas of rough country, left most western montane and desert range in the nationally held 'public domain'. A strategy of 'control of the range by control of the water' emerged. Settlers focused on acquiring lowland areas with arable lands and water, grazing their livestock on the surrounding open range. In ranching communities, informal rules and practices evolved that helped control grazing, including legal fencing of private home properties, illegal fencing of public domain range, grazing agreements among members of a community, and extra-legal threats and pressures to fend off outside intruders (Nelson 1995). Sayre describes an informal 19<sup>th</sup> century rule in Arizona that the owner of a water source had the rights to graze the public domain halfway to the next water source (2002). Common gathers where livestock were sorted, with reciprocal labour and herding, and brands to monitor cattle ownership, reflected a nascent pastoral culture as well as *hispano* influence (Farquhar 1930). In 1885, the US Congress compelled the removal of fencing on public lands, enforcing the open access character of the resource at the time and contributing to battles over pasture use with 'outsiders' such as widely roaming shepherds and speculative cattle enterprises (Nelson 1995).

In the late nineteenth century, an influx of speculative money, funded by industrial wealth and family fortune, often from distant shores, drove the rapid development of a commercial livestock industry based on access to low-cost, uncontrolled land, with few ties to local communities. Profiteering from running cattle crashed toward the end of the century with overstocked ranges, inadequate and badly placed fences, and a few brutal winters. The government asserted control over this range in the early twentieth century. Most summer range was reserved out of the public domain into the National Forests, and now is under the jurisdiction of the United States Forest Service (USFS). Most lowland ranges eventually came under the jurisdiction of the United States Bureau of Land Management (BLM). First priority for allocation of government rangeland, or 'public lands', went to those owning land with a home ranch nearby. 'Grazing allotments', areas of land individuated to households whenever possible, were then allocated and a fee set for grazing on a per head basis. Emphasis on ownership of nearby private property meant that transhumant and sedentary cattle producers had the advantage over shepherds and others who did not own proximate land.

Throughout the West, though ranches are of course a function of the culture of settlers and the details of the local environment (Starrs 1998), a typical cattle ranch evolved to have a ranch house and private 'deeded acres' located on water or a water development (Figure 1). On the deeded land is found irrigated pasture, used in some parts of the livestock production cycle,

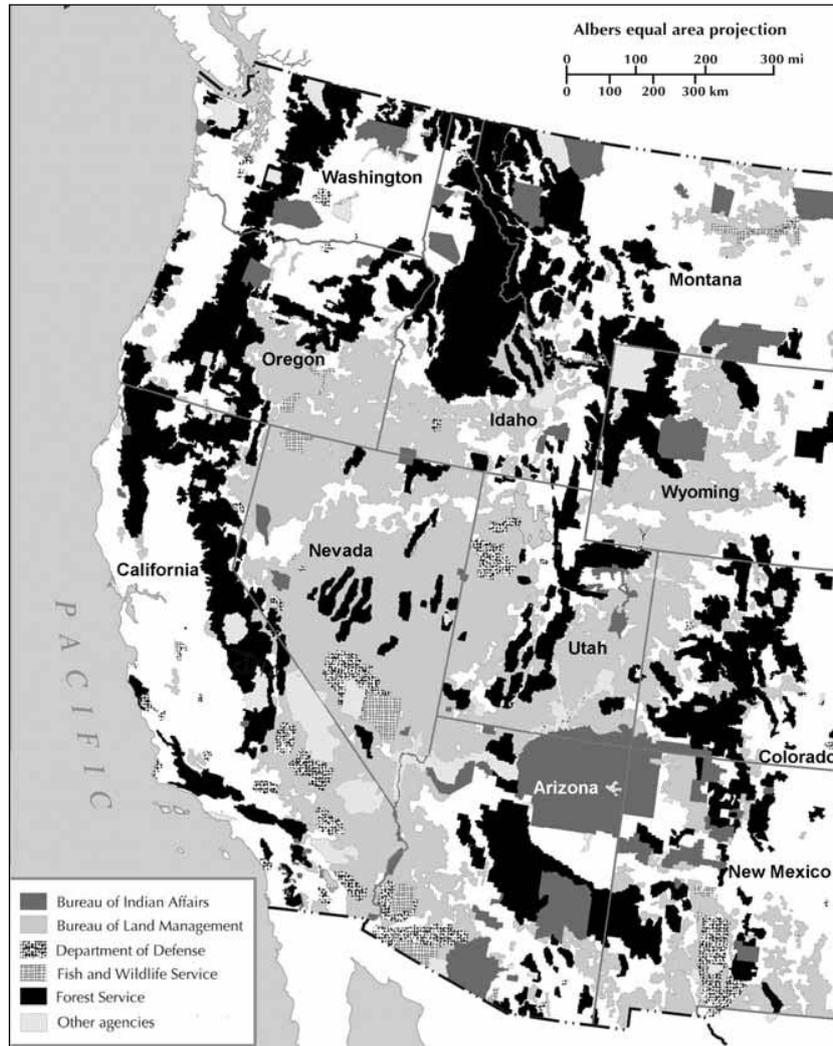


Photo: P. Stairs

**Figure 1.** A desert steppe ranch in Western Nevada. High elevation range is leased from the Forest Service, desert steppe from the BLM. The 700 private hectares are used as irrigated pasture, hay fields, and crop lands. The ranch haystack is visible in the mid-ground, as is the barn and ranch compound that includes stone corrals, housing for the owners, and a bunkhouse for workers. Throughout the desert steppe country, patches of trees often signify a ranch, past or present. Ranches are often located near or on alluvial fans where subsurface water can be tapped, or rises naturally to the surface to create, as in this case, a 'sub-irrigated' meadow.

hay fields, and sometimes, crops. The summer ranges, if the ranch has them, are up in the mountains at elevations from 1,000 to 3,000 metres and under the jurisdiction of the Forest Service or sometimes, timber companies and other public and private ownerships. Lowland ranges, desert, steppe, or in California, Mediterranean annual grassland, if not under the jurisdiction of the BLM, may belong to Native American tribes, the military, public utilities, states, and local districts and municipalities.

Part of the original mandate of the BLM and the USFS was the furtherance of settlement and development of the West by protecting resources for settler use, including timber and rangeland. Allotment grazing permits stipulate grazing periods, numbers allowed, and so on – all adjudicated by local agency representatives and ultimately subject to the vagaries of national politics. The Forest Service controls approximately 78 million ha (<http://www.fs.fed.us/aboutus/>), and the BLM controls 106 million ha in the western US (<http://www.blm.gov/nhp/index.htm>) (Figure 2). As examples, California, with good water supplies, more arable land, swamp restoration lands, and Mexican and Spanish land grants, is approximately 50 per cent private land, while the



**Figure 2.** Public lands in the United States. White areas are privately owned  
 Source: Adapted from the National Atlas of the United States, March 5, 2003, <http://nationalatlas.gov>

adjacent state of Nevada, with extensive, highly arid, cold desert steppe, is more than 90 per cent government land. One arguable simplification would be to say that the cost of owning rangeland far outstrips its value in more of Nevada than in California.

Having ‘enough forage on the home ranch to support the herd when not on the public lands’, was a criterion for the original allotment of grazing permits

to ranchers, a system very similar to that described by Netting (1981) for a Swiss Alpine community's allocation of commons grazing rights. Other similarities to this and other transhumant systems can be seen: families, members of the family, or hired hands travel up to the mountains in the summer and stay in a 'line camp', which is generally a summer cabin or sometimes a tent on Forest Service land. Rinschede (1984) does a thorough job of describing American transhumance in various western regions (Figure 3).

Transhumance in the West is a journey not just from biome to biome, but also from ownership to ownership, each with its attendant formal and informal rules. It also is a journey from autonomy to tenancy, as the rancher, in journeying to upland range, acquires a huge federal bureaucracy for a landlord. The rancher has no authority to determine when or how these ranges are grazed, or to carry out land or vegetation management practices without government permission. The complex patterns of landownership in

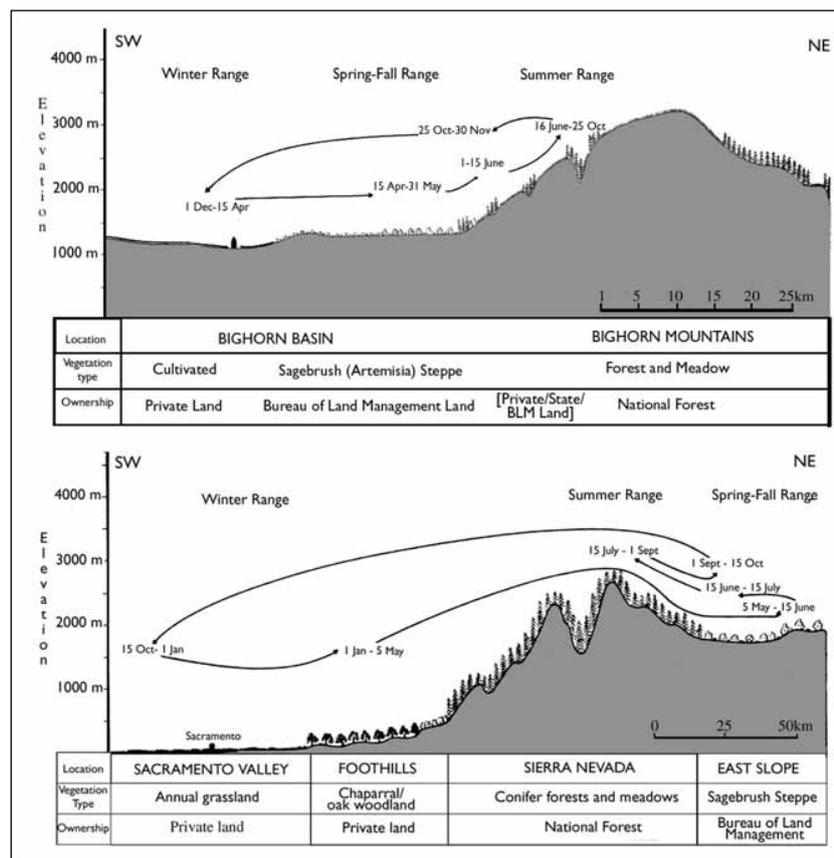


Figure 3. Transects of transhumance by livestock producers in Wyoming (upper), and in California (lower).

the western US, as well as equally complex policies for land allocation, and human ingenuity in dealing with both, mean that there are also ranches that do not use public lands, and that do not engage in off-ranch mobility. The ranches that are the focus of this study use Forest Service rangelands for part of a transhumant cycle of production and are in the majority family-owned operations of limited profitability (Gentner and Tanaka 2002), some of which have persisted from early homesteads and land grants in previous centuries. Typically they graze 200–300 cows.

### **Ranchers as pastoralists**

In 2004 the African Conservation Centre initiated a project 'seeking to unite two groups with unexpectedly similar problems and goals from across the globe to allow them to learn from their common yet never before shared experiences' (Klinkenborg 2001). The project sponsored a trip of Maasai herdsman to the south-western United States to visit with the ranchers of the Malpai Borderlands Group, a grassroots group dedicated to preserving ranching culture and rangeland productivity on public and private range.

The biggest problems faced by both groups are pasture deterioration and land subdivision. Despite obvious major differences, they shared a common sense that their culture, traditional management, and use of the natural environment is widely misunderstood. All were deeply concerned about land tenure, including the loss of rangelands to alternative land uses, development, and political forces that called for exclusion of grazing from traditional pastures (ACC 2006).

Pastoralists have been defined in numerous ways, most having to do with a mode of life centred on extensive livestock production, and characterized by some form of mobility, including transhumance (Fernandez-Gimenez and Le Febre 2006). One definition states that pastoralist households are those with at least 50 per cent of their gross income from livestock or livestock-related activities (Swift 1988). For Khazanov, the development of a unique, livestock-oriented society, distinguished from farming societies, is important (1994). For others, an economy based on subsistence is crucial (Galaty 2004). Control over land as well as animals, and commodified inputs and outputs, are key components distinguishing ranching from pastoralism in Ingold's view (1980). Ingold described ranching and pastoral culture as opposing forces, with ranching destructive of indigenous cultures. Sayre points to a continuum between the two, concluding that where pastoralism ends and ranching begins has not been well addressed (2002). Sheridan (2007) opts for the use of the 19<sup>th</sup> century term 'grazier' to refer to ranchers using rangelands to graze their stock.

In fact, even the most traditional pastoralists are changing, challenging fixed or narrow notions of what pastoralism is, as they begin to supplement their subsistence economies with market enterprises, and opt on occasion to

purchase livestock feeds or acquire land (Davies 2008). Transhumant ranchers in the western US are not subsistence oriented, are integrated with the larger society, own at least some private land, and buy and sell feeds and animals in the marketplace. Many make less than 50 per cent of their household income from ranching, though the amenity values and social status associated with ranching can be seen as 'non-commodity' products. Despite these differences, it can be argued that transhumant ranchers do share many of the attributes that have been identified as characteristics of traditional pastoralists.

Though American ranches are oriented to market sales, many remain household enterprises that do not generate surplus income. Despite some huge ranches and corporate owners, there are still significant numbers of families with small herds – the average beef cow herd in the US is 40 head, but operations with 100 or more beef cows comprise only nine per cent of all beef operations and 51 per cent of the beef cow inventory (USDA-ERS 2005). Ranchers have, for at least several decades, been price takers rather than price setters, because of competition from calf producers using low-cost agricultural residues and alternate forage sources, the economic domination of the feeding and packing operations, and the tendency of ranchers to subsidize ranches with off-ranch income (Smith and Martin 1972, Torell et al. 2000).

Available national statistics about ranching are complicated by the definition of 'ranch', which in agricultural surveys can be anyone with livestock. Focusing on transhumant ranchers helps distinguish backyard steer keepers, and farmers with a few cattle on the side, from a family whose lifestyle, like that of traditional pastoralists, is more deeply engaged with a herd of stock. However, statistics about this group are not formally collected. Studies that have singled out rangeland graziers have shown that US ranchers gain much social capital from ranching, and that this is consistent throughout the West and over time. They highly value being ranchers, including living on the ranch, environmental amenities, leaving the ranch to their children, and their autonomy in the production of livestock (Bartlett et al. 1989, Gentner and Tanaka 2002, Grigsby 1980, Huntsinger et al. 1997, Liffmann et al. 2000, Rowe et al. 2001, Smith and Martin 1972, Sulak et al. 2004, Torell et al. 2001). Despite the opportunity to increase cash flow by selling land or changing professions, ranchers are often characterized as clinging rather stubbornly to what some see as an outmoded way of life. A common statement attributed to cowhands and ranchers is that one reason they like ranching is that 'the work is different every day', because ranchers perform diverse tasks, including accounting, construction, herding, marketing of livestock, land and ecosystem management, and game management. Autonomy in decision-making is often mentioned as characteristic of pastoralists (Blench 2001).

Like pastoralists, ranchers are known to have distinctive traditions that vary by region and primary herd type (Marshall and Ahlborn 1981, Grigsby 1980, Yung and Belsky 2007, Rowan and White 1994, Starrs and Huntsinger 1998), similar to pastoralists around the globe. Ranching subcultures of shared practices, ideologies, dress, behaviours, and regional histories, etc, are

well described (Jordan 1981, Starrs 1998, Marshall and Ahlborn 1981). In terms of social organization, ranchers in the US have always been 'embedded in the surrounding sedentary culture' (Barfield 1993) and part of the national politic. A general belief that society is somewhat hostile toward them and their activities, and a mistrust of governmental authority (Liffmann et al. 2000, Yung and Belsky 2007) is widespread, as is the belief that they know how to manage their stock and land better than outsiders, and that outsiders do not understand them.

Other characteristics of US ranchers are also considered broadly pastoral: reciprocal social relations and dependence on peers (Yung and Belsky 2007, Ellickson 1991, Liffmann et al. 2000, Grigsby 1976, 1980) are familiar attributes of rangeland ranchers. While ranchers value their 'independence' (Grigsby 1980), it is commonly acknowledged that peer pressure is the most effective way to influence rancher behaviour, that they get most of their information and advice from other ranchers, resolve disputes among themselves rather than turn to legal options (Ellickson 1991), follow informal rules unique to their community (Yung and Belsky 2007) and rely on each other for help at certain points in the production cycle. They celebrate their interdependence with gatherings centred on events like branding of calves.

Driven by the rangeland aridity and climatic unpredictability that defines rangelands globally, American ranchers, like pastoralists, engage in ecological opportunism and need flexibility and reliability in forage sources (White and Conley 2007, Gripne 2005, Rowe et al. 2001, Sayre 2001, Starrs 1998). Ranchers are reliability-seeking (Roe et al. 1998) in that they have access to and make use of diverse forms of forage and feed, lobby for programmes that protect prices and provide feed during drought, and maintain information networks that monitor market conditions closely. Like pastoralists, US ranchers have also been described as risk averse (Grigsby 1980). Many consider the value of their property, and land appreciation, an important financial 'back up' and source of emergency cash, because they can sell off small parcels from time to time for a financial boost or to liquidate at retirement. On the other hand, at the herd level they have traded the stability of mixed herds for the efficiency of uniform production, with most ranchers relying on cattle alone.

Like pastoralists around the world, ranchers rely on extensive grazing land. US ranchers almost always own some private land, fitting them to some degree into Ingold's categorization of ranchers as those with control over their land. However, the transhumant ranchers of this study use public range for a significant part of their production cycle, and although it is theoretically 'allotted' to them, in fact over much of that land their tenure is insecure, shared, and declining. As we will demonstrate in the case studies, many of these ranchers also use land leased from governmental or private entities during the rest of the year.

On public land ranges US ranchers have been subjected to some of the same pressures to individuate grazing as pastoralists in traditional societies.

One resonant example of this mobility-restricting approach happened as part of The Vale Rangeland Rehabilitation Program in eastern Oregon. This domestic rangeland development project was initiated in 1962 (Huntsinger and Heady 1988) with heavy government investment via the Bureau of Land Management. Ranchers in this area had a history of using large government allotments in common. A premise of the development programme was that many of these areas should be fenced into individual allotments. Considerable investment was made in water developments, as many subdivisions had no natural water. Ultimately, an aircraft had to be leased to fly the area to make sure that the propane-driven wells and pipeline systems were functioning, because in at least one case numerous cattle died when a well ceased operating. The entire system became more labour and energy intensive. The same phenomenon is known elsewhere, especially when land re-allocation takes once-large land areas and divides them up for individual landowners who then need to maximize production on land insufficient to buffer drought and other unpredictable changes in productivity.

Individuated or not, ranchers share grazing allotments with other public users, including hunters and recreationists. Agencies like the Forest Service are generally not obligated to allow grazing to any particular level, and in many cases have found other uses for the land. Rules for the timing and amount of grazing lack flexibility. Ranchers using government land must work with bureaucratic entities that they may have more or less skill at negotiating with, and must contend with competing public interests in public lands. This can lead to agency-stipulated grazing management, timing, and rest periods that are driven by goals that have little to do with what is thought necessary for grazing ecology or supporting ranch households.

In the US the major land management agencies each have their own processes and requirements for the management and monitoring of grazing while stock are on their lands. In addition, ranchers, agency, and public tend to have quite different perceptions of rangeland conditions (Huntsinger and Heady 1988), and even within the agencies themselves there is a lack of consensus about livestock grazing, particularly as young, urban-educated recruits replace retirees with a more rural background (Richards and Huntsinger 1994). Increasing public interest in using rangelands for recreation and nature reserves has stimulated policy change and grazing reductions. Meanwhile, the ideas of traditional graziers about how land and vegetation should be managed have been largely ignored, a common problem for pastoralists globally.

### **Forest Service management in the Western United States**

The Forest Service (USFS) controls most of the montane summer range in the western US. Changes in USFS goals and practices over time have been researched at great length, and it is not our intention to repeat those findings here (Rowley 1985, Nelson 1995, Young and Sparks 1985). However, it

is important to note that what was once seen as a land reservation for the protection of resources to further the economic development of the West is now seen by many as land set aside for recreation and nature preservation. As Blench (2001) comments in his overview of contemporary pastoralism, 'the marginal lands that have previously been the province of pastoralists are increasingly coming into focus as reserves of biodiversity. Their very inaccessibility has permitted the survival of species eliminated in high-density agricultural areas'. In the US, as this reconstruction has evolved, land uses that result in market products seem to have become synonymous in the minds of many with exploitation and abuse. Agency goals have shifted away from managing for production of commodities such as livestock and timber. The efforts of advocacy groups to remove grazing from public lands ebb and flow as a part of the political landscape.

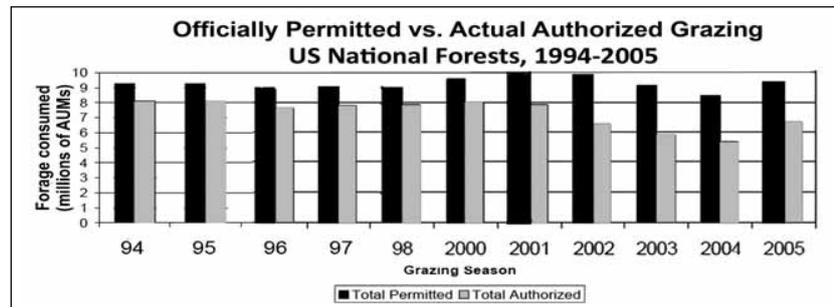
Attempts to make management of government ranges scientific in the 20<sup>th</sup> century (Nelson 1995, Fernandez-Gimenez and Sayre 2003) have also led to reductions in grazing on USFS land. The application of theories of equilibrium ecosystem dynamics to the assessment and monitoring of government rangelands, which implies that removing grazing can reverse ecological changes brought about by grazing, drove reductions and the pursuit of a fixed 'carrying capacity'. The ecological impacts of North American livestock grazing, given its relatively recent origins, is beyond our scope. However, the reductions in grazing that have followed the development of a dominant narrative about grazing as degrader of ecosystems, and the mixed results ecologically, economically, and socially, resonate with the pastoralist experience elsewhere (Davis 2007, Ellis and Swift 1988). As is the case in many pastoral systems (Behnke and Scoones 1991), disequilibrium dynamics are now believed to be a more appropriate framework for the management of the rangelands of the arid west, yet the infrastructure and institutions for carrying out such management remain poorly developed.

In 1992, an average Forest Service grazing permit allowed a rancher to use about 4,300 ha to graze a little over 1,000 'animal-unit-months' (AUMs or head-months) of forage (GAO 1993). As the typical transhumance ranch has 200 to 300 head, a likely scenario would be grazing 333 cows for a three month summer season, using around 4 ha to support each cow for a month. A standardized but rough measurement, an AUM is the amount of forage consumed by a typical cow (or cow with small calf) in one month, or about 750–850 lbs, depending on forage characteristics. A 300 cow ranch would need 3600 AUMs to feed the herd year-round. In a survey of ranchers using public lands throughout the West, Gentner and Tanaka (2002) found that all except those owning large ranches primarily for status and recreational reasons (sometimes termed 'trophy ranches') reported that a mean of approximately 47 per cent of their income came from using summer range. The relative scarcity of summer range, and its superior quality to many lowland ranges, can make its value disproportionately high.

It is difficult to follow changes in forage allocated for grazing by the Forest Service over time because documentation is difficult to find and assessment methods and boundaries have changed several times. For this reason the data presented are patchy. Historians of grazing on the National Forests (Rowley 1985) assert that grazing began to be monitored around 1905, and increased rapidly to its highest known point with pressures to increase agricultural production during WWI. The sharpest declines in stocking occurred from 1920 to 1950, followed by a slower decline up to the present. Duration of use has also declined over time. Between 1980, after reasonably comparable records are easily available, and 2005, forage consumed by cattle from the National Forests declined from 7.7 million to 4.6 million animal unit months, a decline of nearly 40 per cent, and the number of livestock owners reported to be using Forest Service lands (including sheep and horse graziers and some redundancy) declined from more than 16 thousand to less than 7 thousand, a decline of nearly 64 per cent (modified from Thomas, 2004). Data available for 1994–2005 shows a slight decline in the ‘permitted’ use of the land, and a far greater reduction in actual, or ‘authorized use’ (Figure 4) (USDA-FS 1994–2005) for all livestock graziers. This is largely due to drought, according to agency officials (GAO 2004), but may also reflect reductions due to temporary management or improvement activities on the allotment, or due to ‘voluntary non-use’, where a grazier voluntarily, for a variety of reasons, decides not to graze in the mountains in a particular year.

**California case studies**

Results of two California case studies of ranchers using Forest Service range provide an opportunity to corroborate and extend national-level trends in transhumant ranching using field-based site-specific research. The overall objective of the case studies was to evaluate linkages between the Forest Service and private lands in the region, because of conservation interest in the private lands.



**Figure 4.** Forage use allowed by permit versus actually authorized and consumed, US National Forests, 1994–2005

The characteristics of ranchers, ranches, and USFS management changes described for western transhumant ranchers apply to California. One difference that could factor into this discussion is that on the western side of the major mountain range used for transhumance, lowland ranges have a Mediterranean climate, and ranchers tend to own more lowland private range than do ranchers east of the Sierra Nevada. Ranchers in California are less likely to use BLM range. In this region also, because of the mild climate and burgeoning coastal urban centres, there is strong pressure for urban or suburban development. However, exurban sprawl is affecting huge areas of the West. Comparative studies have shown that Californian rancher attitudes, values, production practices, and economies are quite consistent with the rest of the West today (Sulak et al. 2004, Rowe et al. 2001, Bartlett et al. 1989).

In California, a major stimulus to transhumance was the Gold Rush in 1849, when thousands of prospectors took up residence in the Sierra. Familiarity with the mountains and a series of droughts, combined with the development of lowland pastures for crop production, fostered the development of transhumance grazing among ranchers (Burcham 1982). Competition for level crop lands gradually limited ranching to the foothills and Sierra thereafter (Burcham 1982). One author asserts that sheep began to be driven into the Sierra in 1864, in response to devastating drought, and that before that time, forage in the Central Valley area was sufficient (Gómez-Ibáñez 1967, 10). He points out that the well-known explorers Henry Brewer and Clarence King first noted the presence of livestock in the Sierra in 1864 (p. 36). Today, there are a total of about 700,000 brood cows in California (USDA-NASS 2005), most of them on rangelands for at least part of the year. About 71,000 of them use Forest Service rangelands under approximately 400 permits (USDA-FS 2005).

#### ***Case study I: West central Sierra foothills of California***

This survey research project was conducted in 2001–2 (Sulak and Huntsinger 2002, 2007, Sulak 2007), and assessed some of the forces affecting transhumant graziers. Ranchers in the west central Sierra foothills using National Forest (USFS) lands for summer range were interviewed (Figures 5 and 3), along with their neighbours who did not conduct transhumance.

Ranchers in the case study (n=37) had an average 692 ha of privately-owned oak woodlands at elevations ranging from sea level to 1,000 metres in the Sierra foothills. Forage supplies were an issue for them in both summer and winter. In almost every case, the private ranch alone could not support the herd through the winter, so ranchers supplemented their lowland range with leases from private owners, public utilities and other public owners, as well as by feeding hay. One transhumant interviewee used eleven different leases. Speculative ownerships in the lowland woodlands and forest fringe typically use grazing to reduce fire hazard and to qualify for agricultural tax relief while properties await development. This arrangement

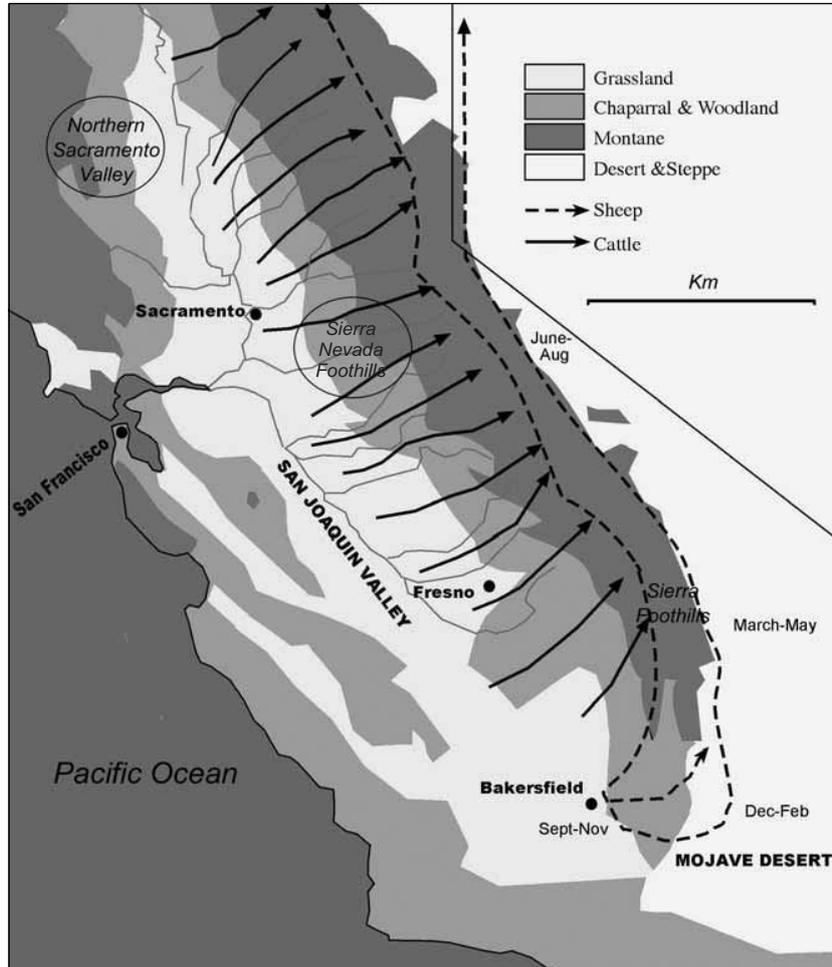


Figure 5. Transhumance in California and case study locations

provides a tenuous supply of leasing opportunities to local ranchers. Ranchers commented that it was getting harder every year to find the full calendar of forage needed, with some choosing to ship animals over 300 miles north to Oregon for summer pasture.

Vegetation management differed between Forest Service and private ranges, with consequences for forage production. A common management activity undertaken by more than half of the ranchers on their own property was brush control or clearing to keep woodlands open for grazing. Deliberate and 'controlled' burning was employed when possible. In contrast, these activities were

rarely undertaken on public range. Comparing USFS summer range to other kinds of leased summer range, brush control was three times more likely to be undertaken on non-USFS summer range. Instead, on the USFS range fencing creeks and ponds to keep cattle out was a significantly more frequent activity, occurring twice as often on public summer range as on private summer range. The fencing of riparian areas has been an agency priority for about two decades nationwide, based on the narrative that livestock always pollute streams, cause erosion and damage riparian vegetation.

In similar fashion, starting about 1900 and until the 1980s, a default policy of fire suppression was followed on USFS lands. Lightning-caused, agricultural and indigenous burning, prevalent in much of the West in the nineteenth century, was suppressed. The regular fires graziers used to keep land open for grazing were criminalized and halted. Invasion of woody species, including trees, has become commonplace on such lands and the resultant catastrophic wildfires are well-documented (McKelvey et al. 1996). Interviewed ranchers reported that vegetation change was making it harder for them to use the range and reducing available forage, and contributed to the reduction in allowed use of ranges. Ranchers practising transhumance

**Table 1.** Sierra Nevada Case study I: Transhumant versus non-transhumant ranchers (study area is shown in Figure 5).

	<i>% transhumance ranchers with USFS grazing permits (n=23)</i>	<i>% ranchers without USFS grazing permits (n=14)</i>	<i>X<sup>2</sup></i>
My family began ranching in the Sierra foothills before 1900	74	43	.06
I want to pass this ranch on to my children	65	36	.08
An important reason that I ranch is that the ranch has been in my family for generations and I maintain it to carry on that tradition	74	39	.04
Family considerations have an important impact on my ability to use summer range	70	21	.01
I believe that ranching is a good way to make money	9	7	ns
I like ranch work	87	43	.00
Conflicts with other land users have an important impact on my ability to use summer range	44	7	.00
Changes in vegetation have an important impact on my ability to use summer range	52	14	.04
My management has been influenced by vegetation change	74	21	.00
The development of surrounding land is highly important in my management goals, decisions and practices	65	31	.05
In considering whether or not to sell my ranch, increasing public regulations are an important consideration	46	30	ns

using public lands were three times as likely to experience vegetation changes that reduced grazing capacity than were ranchers in the same area that did not practise transhumance (Table 1).

Another factor affecting the ability of ranchers to use summer range in the Sierra is land use change and residential development. More than half of the interviewed ranchers reported that they experienced conflicts with homeowners, and 43 per cent reported that roads and buildings make their access to summer range more difficult. Many resorted to using trucks to transport their animals to the high country. Transhumance practitioners were much more frequently affected by conflicts with other land users (Table 1). Loss of agricultural infrastructure is also important – a lack of nearby markets, veterinary services, or neighbours to help at crucial times in the production cycle affected transhumants more than others. The development of private lands surrounding the public lands adds further pressure for livestock exclusion as well – as surrounding lands are converted to housing and roads, there is even less habitat for local wildlife. This increases the need for public lands to serve as refugia for these species, and pressure to reduce grazing despite the fact that due to historical land allocation patterns, the public lands may be of innately lower wildlife habitat quality. Ranchers had seen many ranches nearby go to development, and said that as more and more were gone, they felt more likely to sell out too.

In addition to the surveyed ranchers, four ranchers who had given up a grazing permit since 1955 were interviewed. Two said a death in the family was the cause, because there was too much work to do without the deceased, and because of the added costs of estate disagreements. Inheritance issues have been previously identified as a crucial factor in ranch survival in the Sierra (Johnson 1997). Other reasons were increases in the fees charged on intermixed private lands, increased regulations and riparian fencing, loss of foraging areas between the home ranch and mountains for the cattle drive, and loss of a private lease used in conjunction with the public allotment. To compensate they had purchased more land, sometimes at a distant location. One reduced cattle numbers. Unfortunately ranchers that had quit ranching altogether were not locatable.

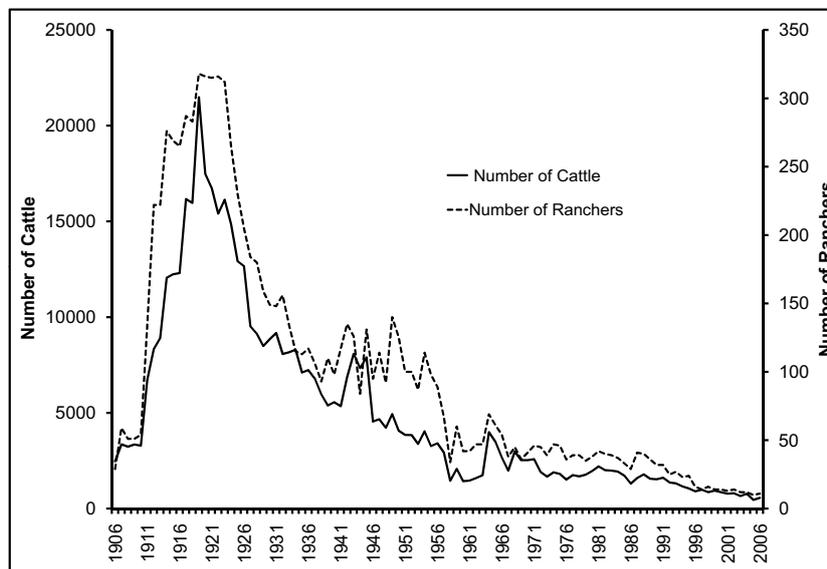
Rancher interviewees did not think they had many alternatives if they lost the ability to use the summer ranges entirely. Most wished to purchase or lease more land to replace their grazing allotments if possible, but they also said that they would be very likely to reduce their herd size. Ranchers attributed 40 to 50 per cent of their income to their summer range. If their grazing allotments were lost or reduced, most believed that any strategy for coping would result in less income. About 35 per cent reported that they would seriously consider selling all or part of their ranches if they lost access to summer forage on federal lands. Even so, the ranchers interviewed were committed to ranching on the land they owned for as long as possible.

Further comparing transhumance practitioners to those without USFS summer range showed that along with mobility as a pastoral characteristic,

they had a longer ranching history and a stronger commitment to and affection for the lifestyle than non-transhumant ranchers (Table 1). Some ranchers explained that because it was necessary for some family members to work off the ranch to support the ranch, it was sometimes difficult to spend as much time in the mountains as they needed to – hence the response about ‘family considerations’ (Table 1). Despite all this, three-fourths of all ranchers in the study believed that ranching could be saved in their area.

**Case study II: North Sacramento Valley**

This research also examined the connections between Forest Service rangelands and private ranches (Forero 2002). The Shasta Trinity National Forest is on north end of the Sacramento Valley in California (Figure 5), where there is less development pressure than in case study I. Grazing patterns are similar, with ranchers using the USFS for summer grazing and annual grasslands and oak woodlands in the winter. Painstaking analysis of historic Forest Service (USFS) records enumerates the decline in grazing on the forest, a decline resulting from changes in available rangeland area, shortened grazing seasons, vegetation change and reductions in stocking rate as management emphasis has shifted away from livestock production (Figure 6). The grazing area is less than half of what was available for grazing in the early 20<sup>th</sup> century, as trees and shrubs have thickened, and a dam has put some areas underwater. Forest Service policies have also reduced grazing over time, partly as a result of the



**Figure 6.** Numbers of cattle and ranchers using the Shasta-Trinity National Forest, California, 1906–2006 (Forero 2002).

development of strategies to protect endangered species and improve 'range condition'. Archival records, historic maps and in-depth interviews with 15 current and 12 former ranchers using the Shasta-Trinity National Forest in the North Sacramento Valley of California were used to examine the causes of the decline in grazing on the forest (Forero 2002). Livestock grazing is now less than 10 per cent of what it was at its peak in 1920, reflecting the West-wide patterns in USFS forage allocations that have already been described. Currently, there are 18 permittees grazing the Shasta-Trinity National Forest.

The current boundaries of the Shasta-Trinity National Forest encompass roughly 850,000 ha. Elevation ranges from about 300 to over 4,000 m. According to the 1995 Shasta-Trinity National Forest Land and Resource Management Plan there are 26 allotments on the forest. Livestock grazing these allotments include 2,350 head of cattle, 45 horses and 2,120 sheep. In the last two decades, several allotments have become vacant or abandoned.

Archival records show that from the outset in 1906, when the Forest Service began administrating grazing on the National Forests, USFS personnel on the Shasta-Trinity National Forest actively pursued three major management initiatives that severely affected a pattern of transhumance that had existed in situ for decades: establishing grazing seasons, limiting livestock numbers and eliminating fire. Comparison of historic grazing atlases with the 1995 Shasta-Trinity Forest Plan reveal how vegetation management policies like fire suppression, managing for timber and reduced livestock grazing have changed vegetation. Interviewees said that woody vegetation has become denser and lands suitable for grazing rarer, an observation supported for significant parts of the Forest by a broad-scale comparison of historic and contemporary maps. Examining individual allotments, suitable range and stocking rate have declined severely. Canopy closure, and loss of forage supply, has been a significant factor.

As early as the very beginning of Forest Service grazing on the forest, rangers reported that the vegetation was thickening and becoming less suitable for grazing. An in-depth analysis of vegetation change data on one allotment revealed a reduction in per-acre forage harvested of more than 50 per cent from 1916 to 1996. The 1909 Summary of Grazing Condition on the Trinity National Forest reported the following:

The grazing areas on the Trinity are gradually coming to a timber growth and in some situations very rapidly...At lower elevations on the south and west slopes the young pines are, in a great many places, filling up the thinly wooded slopes...The forage crop throughout the forest is improving but the grazing land is on the decrease. Some of the stockmen take a very discouraging view of this.

Drift fences on this Forest would not seem to be of sufficient benefit to the Service to warrant construction at Government (sic) expense. The stockman show a reluctance to cooperate on fences of this character.... very few of them are able financially to put much outlay into fences, as

there is very little profit to most of the grazers [sic] on the Forest from their bands. Careless methods are responsible for this in some degree. With but few exceptions, however, the very small number to which each must be limited makes it only an assistance toward a living and not a business (USDA-FS 1909, 4).

Ranchers in the area burned to clear vegetation until the practice was outlawed throughout the West early in the twentieth century. Dick Hamilton (1999), a rancher and logger in Trinity County, recalled being on the Trinity Divide in the early 1960s and observing large fire-scarred ponderosa pine, little woody understory, and a forest floor dominated by grass. Stillwater Land and Cattle was a significant grazer between 1906 and 1920. At their peak, they were grazing over 1,000 cows across several allotments in the Squaw Creek area. Stillwater eventually lost their grazing permit over differences in fire-use philosophy. The USFS waged an active and constant campaign to prevent fire, accidental or otherwise. Fighting and preventing fire even became conflated with patriotism during the First World War (Pyne 1997). In 1918 the Shasta Trinity Forest Supervisor sent letters to local stockmen quoting President Wilson as follows:

Preventable fire is more than a private misfortune. It is a public dereliction. At a time like this of emergency and manifest necessity for the conservation of national resources, it is more than ever a matter of deep and pressing consequences that every means should be taken to prevent this evil (New York Times 1918).

The Forest Supervisor goes on to impute that the fact that WWI was going on made the crime of burning especially heinous. He states that it took the equivalent of 400 men working every day for four months to suppress man-caused fires, and these men were needed at the front. It was therefore the patriotic duty of the stockman to prevent fire (Morrow 1918).

Comparison of allotment maps throughout the management tenure of the Shasta-Trinity National Forest document that acreage allocated to grazing was reduced in 1946 and in 1964 because of the construction of two major dams and reservoirs. However, some ranchers gave up their permits voluntarily. Claude Baker stated in a letter circa 1952 that with increasing restrictions on how much and where he could graze, the costs of using his lease were simply too high, stating that 'it is with regrets that I give up my permit this year as I have come to those mountains for 40 years'. When current permit holders were asked why they might give up their grazing leases, the top two reasons were economics (40 per cent) and regulations (48 per cent).

Ranchers interviewed owned an average of around 600 ha of private property and owned about 135 cattle. On average, they considered themselves the third generation of ranchers in their families, and had owned their land since before the Forest Service came into being. A strong majority indicated that even if they only broke even on their ranching, they would continue to ranch, and find augmenting household income streams.

**Table 2.** Reasons former permit holders quit grazing on the Shasta Trinity National Forest (n=12)

<i>Economics</i>	<i>Regulations</i>	<i>Labour</i>	<i>Personal reasons</i>	<i>Not meeting production goals</i>	<i>Land trade</i>
8%	17%	8%	25%	8%	17%

When former permit holders were asked why they actually quit grazing on the Forest, answers were more diverse. Around a quarter ceased grazing the Forest for personal reasons, including family health issues, a death in the family, or economic reasons that did not have to do with the grazing permit (Table 2). Several former permit holders also noted poor livestock performance as among the reasons they ceased to graze National Forest Lands. Lower weaning weights, poorer reproductive performance, the need to run more bulls, and a higher percentage of dry cows were all mentioned. One producer reported threat to life and property was factored into their decision to cease their public land grazing. Illicit drug operations and marijuana cultivation in remote locations have been implicated in cattle shootings and the poaching of calves for human consumption.

Ranchers who no longer have grazing leases have had to find summer forage elsewhere. Interviews revealed that for ten of them, their ranches became smaller, with an average decline of 55 per cent in private land area. Ranches with permits retained more land than those who gave up permits, with an average decline of only 20 per cent. More former permit holders leased additional private land, compared with the current permit holders. Those with permits either increased their number of stock or remained stable, while those without permits either remained stable or had less stock over time. Two of the ranches that gave up their permits ceased operations.

Most permit holders stated that she or he had an average or better relationship with the USFS but feel the relationship could be improved through better communication. The lack of communication between permittees and the USFS is underscored by the fact the Aquatic Conservation Strategy, a set of standards and guidelines for managing grazing and water resources, is the framework used to manage the grazing programme on Shasta Trinity Forest lands and yet had not been heard of by 80 per cent of the ranchers interviewed. More than 85 per cent of all of the ranchers interviewed in this case study agreed that ranching on public lands did not have much of a future.

## Conclusions

If the similarities between pastoralists and ranchers are debatable, the reasons for their loss of mobility are uncannily alike. Ranching history and literature, and two field studies, reveal six factors behind the decline in transhumance: (1) a land management priority shift to recreation and nature preservation;

(2) regulations and management paradigms driven by the dominant society's perception of grazing and its relationship to the environment; (3) management practices that have reduced rangeland forage production; (4) competing land uses; (5) family demographics and (6) the persistently marginal economics of livestock grazing. Ranchers are leasing more private properties, purchasing feed, transporting animals to other regions, selling stock, and selling ranches to compensate. Sometimes the need to work in town, or a lack of interest by the younger generation (Brunson and Huntsinger 2008), limits the ability of the household to participate in transhumance or travel into the mountains to check on the herd. Transhumants have a longer history in ranching and a stronger commitment to the lifestyle than other ranchers, and yet are more strongly affected by vegetation change, regulation, and competition from other uses (Rowe et al. 2001). Transhumant ranchers West-wide generally attribute more than 40 per cent of income to Forest Service rangelands (Rowe et al. 2001, Bartlett et al. 1989, Gentner and Tanaka 2002).

Forest Service lands historically contributed to tenure stability on associated private lands by providing a relatively stable source of upland forage at a reasonable cost. Today transhumant ranchers using USFS land cannot predict the future productive capacity of ranching, because it could be curtailed at any time by changes in access to USFS land. A rancher dependent on USFS summer range, and in many cases, lowland public range, has limited control over the means of production or the future of their mobility.

Some environmental groups opposed to grazing are offering ranchers direct financial compensation to stop grazing allotments via a 'permit buyout' programme. Buyout payments are typically well above what an economist would calculate as the going rate. A nationwide analysis of the allotment buyout programme found that the difficulties of working with federal bureaucratic processes and rules was a critical reason why ranchers were willing to sell their permits, along with debt, an uncertain forage supply, and conflicts with other users (Steinbach and Thomas 2007). As one example, in the Grand Canyon area, the Conservation Fund paid a rancher to cease grazing his public allotment. The rancher felt that conflicts with motorized recreation made his use of the range unprofitable. He sold all his cattle and plans either to convert to a 'dude' (touristic) ranch, or to sell his private land, and use the sale proceeds and the buyout money to buy a ranch in a better setting (Reese 2005).

The need to cope with the increased difficulties of achieving traditional mobility has spawned grassroots efforts to recover flexibility and loss of access to forage, including collaborative grazing, leasing, feeding, new patterns of livestock movement, conservation contracting, the use of transitional lands on an opportunistic basis, and stabilizing land tenure, exhibiting the flexibility that is characteristic of pastoralists (Fernandez-Gimenez and Le Febre 2006). In one example, the Malpai Borderlands Group is collaborating with conservation organizations and government agencies to increase stability of land tenure through institutional innovation that makes the permanence of

conservation easements barring conversion of ranches dependent on continued public land access (Sayre 2005). Malpai and a variety of other groups including California's Central Coast Rangeland Coalition and New Mexico's Quivera Coalition are also working to demonstrate the ability to combine livestock herding and biodiversity conservation.

In some areas, ranches are beginning to work together to move stock to ranches with more forage during drought (Sayre 2007). Grassbanking is another method used to compensate for losses in mobility (White and Conley 2007, Gripne 2005). One definition states that 'a grassbank is a partnership that leverages conservation practices across multiple ownerships based on the exchange of forage for tangible conservation benefits' (Gripne 2005). Private ranches share forage, with one ranch or area of range that has conservation as a priority acting as a 'bank' for the other private enterprises, to be used during drought or to relieve other rangelands of grazing for a set amount of time. There are about 22 different grassbanking initiatives in the West (Harper 2002).

Some new forms of mobility are heavily energy dependent. Trucks and even planes are used to move animals seasonally and sometimes across large distances. There is considerable movement between states and across biomes. In an extreme example, about 17,000 young weaned cattle are shipped into California each year from Hawaii. They graze on California rangelands, or sometimes consume agricultural by-products, and then are shipped to another state to be fed grain. Typically they enter the state in the fall as the winter rains stimulate grass growth, and leave in the late spring as the grasses dry. Between 60,000 and 90,000 brood cow herds go into and out of California each year to graze on rangelands in the nearby states of Nevada, Idaho, and Oregon (Shields and Matthews 2001, Ashcraft 2005 pers. com). More than 115,000 steers came into the state from Mexico in 2004.

Selling one ranch and using the proceeds to buy another ranch further from urban expansion might be considered another form of mobility that was augmented by the pre-2008 real estate boom (Torell and Kincade 1996). This resolves numerous problems for the family: it provides capital that enables resolution of heirship disputes and debt; it allows the family to reside in an area with better infrastructure for ranch production and fewer conflicts with urban dwellers; and it may allow the purchase of a larger, better ranch (Liffmann et al. 2000).

There is more than just a forage base required for ranch production – a 'critical mass' is needed to maintain cultural and physical infrastructure (Huntsinger and Hopkinson 1996). A feedback loop is created as ranches are sold for development. Each ranch that disappears adds to the reasons for the next ranch to sell out, in an increasing rate of ranching decline fed by the growing impacts of suburban development. A tipping point has been posited for when a critical mass of ranches is lost and ranching loses viability in an area (Liffmann et al. 2000). Another way to describe this phenomenon

would be that a threshold is crossed when ranching community resilience is exceeded.

Strategies recommended for strengthening the resilience of pastoralism are similar to those promoted for ranches in the US. Surveying the status of pastoralism world-wide (2001), Blench argues that the elements likely to enable the persistence of pastoralists are the ability to produce niche products, integration of crop and livestock production, the development of interlocking strategies to link conservation of wildlife with pastoral production, and the expansion of low-volume tourism with pastoralists providing services. The 'working landscapes' movement in American ranching is an initiative that has grown greatly in the last decade, and stresses the compatibility of livestock production and nature conservation. Production of 'grass-fed' beef or other value-added products, provision of ecosystem services for society at large and for paying visitors and maintenance of the 'family farm' are also prominent goals.

Several of the papers we reviewed did not offer any clear definition of pastoralism. This is likely because many groups that would be widely accepted as pastoralists now fall outside of strict, structural definitions created before the widespread economic, population and environmental changes of the last two decades. Distinguishing ranchers and pastoralists may rely less on any single feature, or the identification of a point on a continuum, but rather be determined by the relative abundance and resilience of a complex of pastoral features that shift, with some elements taken up, cast off, or altered, as pastoral systems, inherently flexible and opportunistic, adapt in response to environmental, political and economic variability. To us it seems like determining whether or not ranchers 'are pastoralists' will depend largely on why it is desirable in any particular situation to make the distinction. The loss of pastoral mobility now experienced in the US may reduce the coherence of the pastoral elements that are part of Western ranching, causing a loss of many associated and mutually reinforcing pastoral characteristics, or ranchers may succeed through further adaptation in maintaining many features of pastoral practice and culture.

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