Grazing for conservation on public lands in urban California: rancher and manager perspectives on the prospects for partnership

Prepared by

Gareth Fisher

Master's Student – Range Management

Department of Environmental Science, Policy, and Management

University of California, Berkeley

for the

Central Coast Rangeland Coalition

-in partnership with-

Midpeninsula Regional Open Space District

March 18, 2012

How am I supposed to know when I've done a 'good job' [with my public grazing allotments]? We don't know collectively what we're all trying to achieve, so how can we decide if we're doing the right thing?

–Bay Area rancher

It's a golden age [in agency grazing administration].

–Bay Area agency manager (in a different district from the rancher)

Once considered antithetical to conservation values, livestock grazing is now widely accepted as a valuable vegetation management tool in the annual grasslands of California (Fisher and Barry 2011). Both scientific investigation and management experience have shown that grazing, properly carried out, can reduce fire fuels, restore native plants, promote biodiversity, and enhance wildlife habitat, especially habitat for special-status species (Sulak and Huntsinger 2007; Barry et al. 2007; Barry 2011). In some quarters, grazing is now considered such an important factor that it is treated as an integral part of the ecosystem. The shared realization that livestock are able to bring about desired changes in the structure and composition of vegetation in rangeland ecosystems has reinforced the belief that conservation and profitable enterprise are not necessarily at odds: ranchers and conservation agencies can work together towards shared goals. Working landscapes are built on this concept that ranchers and farmers can play a critical role in keeping land healthy, and that land should be maintained in agricultural production (Barry and Huntsinger 2002). In this paper, the prospects for building public and private partnerships for grazing to meet conservation goals in Central California is examined from the perspectives of agency managers and grazing permittees.

In the San Francisco Bay Area, ranchers and the conservation agencies that lease grazing land to them face unique challenges in discovering where their goals align and how best to simultaneously achieve business success and conservation effects. A number of groups with different agendas value Bay Area rangelands and compete to have their voices heard on how these lands should be managed.

Cattlemen covet these rangelands for their highly productive forage that is green when most of the West is dry or snow-covered; a community of environmental activists treasure them for their beauty and biodiversity; hikers and other recreationists value these lands as some of the few large open spaces left on the edges of a large urban area. Moreover, Bay Area rangelands are owned to a large degree by public land agencies or conservation organizations seeking to protect open space, whether for recreation, clean water, or wildlife.

This latter fact is of particular salience for this study: because Bay Area ranching operations depend largely on leased land for their operations—81 percent of rangeland is leased from either public agencies or private owners (Sulak et al. 2008)—the lease agreements that exist between ranchers and conservation agencies are a primary determinant of how grazing is implemented in Bay Area rangelands. The various arrangements set out in these lease agreements, in turn, are shaped by the goals that lessors and lessees share—or believe they share—in common.

Complicating the whole picture, a complex web of politics and personality, science, and beliefs about how land should be managed is laid over top of and interacts with a natural system that is defined in large part by its dynamism. As ecosystems, rangelands operate on a timescale that can be foreign to written contracts between landlords and lessees. Conservation agencies and their grazing tenants in the San Francisco Bay Area share a relationship that can be layered with a complexity that is rarely understood by the general public. On its face, there is inherent tension in any relationship where one party has direct regulating power over the primary resource that another party depends upon for its business success. Layers of public and scientific opinion, institutional bureaucracy, a dynamic forage resource, and live animals that are subject to vicissitudes unknown to inanimate commodities all play a role in insuring that issues other than shared goals sometimes direct the process of negotiating how Bay Area rangeland will be used.

This project sought to discover, through a literature review and conversations with more than a dozen ranchers and conservation agencies in the San Francisco Bay Area, what grazing and leasing arrangements exist, how these arrangements are decided, and how shared goals can be successfully

integrated into the relationships between grazing tenants and landlords. Nine ranchers, four agency managers, and two others closely connected with Bay Area grazing were interviewed in the San Francisco Bay area in 2011; more casual conversations and interactions were also informative in this research. The interviews were unstructured and centered on themes that continued to develop throughout the sampling period. Initial themes were generated by a literature review and discussion with members of the Central Coast Rangeland Coalition (the literature review is stored in an EndNote database and available upon request). The interviews were evaluated qualitatively, as this approach allows ideas to continue to arise throughout the study, allows interviewees to frame issues in their own terms, and provides more depth than any other approach (Sayre 2004).

There are dozens of public agencies and numerous private owners that lease land for grazing in the Bay Area. Unfortunately, it has been documented that many of them do not have adequate consultation on how to write or manage grazing leases (Sulak pers. comm.). While this paper cannot address this issue directly, it does examine what experienced grazing managers and lessees have learned from working together. We begin with a review of what is known about the conservation effects of grazing and the historical context for agency-grazier relations on California's oak woodland and annual grassland ranges, and then report the results of interviews.

Valuing the conservation effects of grazing

The conservation benefits of livestock grazing have been articulated in the framework of *ecosystem services* (ES), which has become a widespread means of assessing the societal benefits provided by natural and working landscapes. The Millennium Ecosystem Assessment (Carpenter et al. 2006) suggested dividing ecosystem services into four categories: *provisioning* (food, fresh water, fuel wood), *regulating* (climate, disease, flooding, and erosion), *cultural* (spiritual, recreational, or aesthetic), and *supporting* (soil formation, nutrient cycling, and primary production). An attempt to put an aggregate value on the earth's ecosystem goods and services was attempted by Costanza et al. (1997), and a comprehensive review of the various methods used in ES valuation was completed by Mendelsohn et al.

(2009). More local efforts in California (Kroeger et al. 2010) have looked at the financial value of habitat conservation on rangelands and ranchers' willingness to participate in programs that would compensate them for ecosystem services produced by their management practices (Cheatum et al. 2011). Drilling down in one focused area, Chaplin-Kramer et al. (2011) sought to put financial value on the pollination services offered to agricultural fields through adjacent rangelands.

While the ES approach reflects the aspiration of creating self-sustaining markets for ecosystem services that will provide economic incentives to motivate ranchers to carry out practices with recognized societal benefits, Bay Area grazing lessors and lessees have created their own means of negotiation for encouraging societal (and agency) benefits from grazing and grazing leases. Most land management agencies find grazing important for fire hazard management—when grazing has been removed in this area, it has historically and currently caused concern to local neighborhoods (Fried and Huntsinger 1998; Roberts 2011). As a result, one of the criteria for the awarding of many grazing leases is how responsive the prospective permittee is to the needed management practices. The Muir Heritage Land Trust in Martinez initially excluded grazing from their preserve, but then found that grazing was essential for producing the wildflower blooms desired by the public and managers, and began leasing again to lessors who would help to further this aim. East Bay lessors often rely on a combination of "payment for ecosystem services"—in the form of rent reductions, opening land to grazing, or preferential leasing—and the land stewardship ethic of ranchers themselves to meet their land management goals. While a stewardship ethic is well-documented for private ranch lands (Smith and Martin 1972; Huntsinger et al. 2010) there is good evidence that this stewardship can extend to leased lands, with ranchers stating that they protect the land they rent and make considerable investments in labor and materials even when this is not a condition of the lease (Barry et al. 2012).

There is progress in taking stock of what research can tell us (and not tell us) about how to most effectively manage rangelands. Recent collaborative work on the Conservation Effects Assessment Project led to the publication of a comprehensive assessment of rangeland management practices that details what works and what still requires research (Briske et al. 2011). Pointing to work by Kremen and

Ostfeld (2005), the authors of the chapter on social and economic benefits of rangeland practices suggest that the primary gap in ES valuation is the lack of knowledge of production functions for rangeland practices—that is, knowing how much and what quality of given inputs are needed to produce a desired quantity or quality of output. However, ES valuation is reflected in the negotiations between tenants and public land lessors: one approach to putting a dollar and cents value on the common conservation effects generated by grazing leases would be to calculate the value of the incentives used by the agencies to achieve such effects.

Nevertheless, despite the apparent lack of conclusive information about and formal markets for ecosystem services, ranchers and agency managers in the Bay Area are constantly making assessments of their goals and how to accomplish them through livestock grazing, and are assessing the value of these goals in a variety of ways. Even if society hasn't yet decided whether or how it should compensate ranchers for grazing practices that reduce fuel loads, help restore native plants, promote biodiversity, and enhance wildlife habitat, the effects themselves have substantive influence on the success of grazing programs on conservation agency land around the Bay Area. Public grazing leases here are not often framed in terms of a simple exchange of access to land for money. If agencies don't offer specific compensation for services, they at least set a minimum baseline of conservation effects that they expect a grazing lease to accomplish—for example, the reduction of fuel load. Granting access to public grazing land in the Bay Area is not a simple financial transaction.

The historical context for public-private partnerships in grazing management

Those who were around decades ago point out that it used to be unheard of for a cattle rancher and the public land agency from which he leased forage to work together on a lengthy list of conservation goals. Some of those interviewed said that while relationships between some specific agency employees and ranchers at this time might have been based on more complex goals, there was agreement that on a broad scale many land agencies and ranchers were not explicitly working for conservation goals beyond fuels reduction. Just as likely, say some who have been around for a while, the process of establishing

lease agreements used to be rife with glad-handing and even outright corruption. Conversations with ranchers indicate that those land agencies not charged primarily with administering grazing leases were happy to receive the highest bidder as their new tenant. Added value might have been a primary goal and conservation objectives were far down the list of priorities, if they were mentioned at all. To suggest that livestock grazing could have any benefit to conservation goals was a risky public statement as attempts to remove cattle from public lands gained traction. The science showing the many benefits of well-managed grazing animals had simply not been done (nor had the collaboration needed to implement this science in management).

So to have some of these processes set out for much of the public to see—to have introduced a process of meritocracy in the assessment of grazing applications, looking for a tenant who can best achieve a specific set of conservation objectives—represents a substantial change from the past. As a relatively new model, it both frustrates and gives great satisfaction to ranchers and agency managers alike when asked about the challenges of public lands grazing management. The responses of agency managers and ranchers can be organized around the following five themes: measurement and management of grazing effects; public perceptions of grazing; conservation of threatened and endangered species; communication for building partnerships; and, costs to ranchers.

Measurement and management of grazing effects

Almost all of the ranchers interviewed suggested that they were challenged, at least some of the time, to reconcile some management recommendations promoted by the agencies with their experiences on the ground. Very common among rancher comments was the belief that recommended levels of residual dry matter (RDM) were unrealistically low for the production goals of ranchers, who said that stocker cattle in particular would lose valuable body weight by the time their pastures had reached recommended RDM levels. While the desired functions of the land would remain intact according to the scientific literature, animal production could suffer as a result of strictly adhering to these numbers. This disjunction between theory and practice can lead to a distrust of scientific information. As one rancher

said, "I don't know what science to trust when decisions that are supposedly based in science are impractical when applied on the ground."

Still, the interaction between agency policy and actual grazing management seems neither clear-cut within agencies nor consistent across agencies. Some ranchers were frustrated that agencies used the RDM measurement as a fixed indicator and were inflexible about the timing of animal movement. Others believed there was enough flexibility in their leases to allow cattle to be moved off before they started to lose weight; still others used the general public as a litmus test of sufficient grazing use, moving their cattle or starting to feed hay at a point when they felt that the general public might begin to perceive overgrazing. If RDM measurements were taken in these cases of flexibility, it was felt that they were being taken more out of adherence to procedure than for productive livestock management. Generally, agency managers were familiar with RDM and felt that it was a good baseline for their management.

Some agency managers and ranchers, however, expressed strong reservations about the value of using RDM as management parameter. They went so far as to mostly dismiss RDM as a concept, suggesting that its use removed the possibility of restoring native grasslands through intensive rotational grazing. They also felt that RDM ignored complexities such as soil health and the morphology of individual plants during the growing season and how well-timed grazing might have the effect of increasing plant production. To them, RDM was a concept that limited further research on the effects of grazing management—even as some research is beginning to show that the effects of management can explain at most 30% of rangeland conditions on the semi-arid grasslands of California (Bartolome pers. comm.).

Finally, lessees sometimes found it difficult to separate local, pasture-specific management from the overall impacts on the grazing cycle and the landscape. As one lessee commented, "range scientists and managers have different views of grass. Are we looking at the individual plant, or are we considering the impact of grazing on a landscape level?" Lessees saw grass as part of a cycle, something that would return each year and that fit into a year-round forage calendar and a landscape-wide

distribution of resources available at any given time. Some of them were also especially interested in how individual plants were responding to grazing impact, and how these effects would be multiplied across the landscape.

Public perceptions of grazing

Every rancher and employee in these conversations was keenly aware of his or her role as a manager in a very public context and how being in the public eye brought additional work. Few people working on Bay Area rangelands lack stories of curious yearlings "chasing" pet dogs, of fresh calves being "abandoned" by their mothers and picked up by well-intentioned but ignorant animal lovers, and of people cornered in the brush for hours while a mother cow tries to get to its calf. Gates are left open by hikers and cattle get out. Cars run off the road and break through fences. Yearlings crawl through fences and on to the pavement in the middle of the night. People offer strong feedback about encountering fresh cow pies on their hiking trails.

While not itself a matter of conservation, public perceptions of cattle grazing have far-reaching effects on land use. Bay Area conservation agencies and grazing tenants have a strong orientation towards productive interactions with the general public. Hiking trails are routed with seasonal livestock use in mind, to minimize conflicts with people. Signage is used to keep the public informed about current grazing practices and their benefits. In many cases, grazing allotments are closed to public access—whether to protect a water supply or for lack of funding for patrol and maintenance.

At least one rancher has offered personal phone calls and gift certificates as apologies when his livestock have caused any trouble for public users, saying that "public relations in managing public lands is essential. If the public owns the ranch, they need to know what we're doing with it and have all of their questions answered."

The conservation of threatened and endangered species

Even though surveys of US ranchers have shown them to be strongly interested in wildlife and motivated to undertake "wildlife habitat improvement" practices (Ferranto et al. 2011; Liffmann et al. 2000; Rowe et al. 2001; Kreuter et al. 2006), an array of state and federal laws regulates any actions or practices they undertake that may affect certain species and their habitats. The most significant of these laws is the Endangered Species Act of 1973 (ESA). Because of its breadth and reach—it covers listed species on private as well as public land—the ESA strongly influences relations between ranchers and wildlife today.

Under the ESA, the federal government protects species designated as endangered and threatened and the habitats upon which they depend. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened, with over 1,200 species currently listed. The Act makes it unlawful for a person "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" a listed animal without a permit—an act referred to as "taking" a listed animal or plant. Through regulations, the term "harm" is defined as "an act which actually kills or injures wildlife" and may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." Listed plants are not protected from taking although it is illegal to collect or maliciously harm them on federal land (US Department of the Interior Fish and Wildlife Service 2011).

Two-thirds of federally listed species have at least some habitat on private land, and some species have most of their remaining habitat there. The federal government has developed an array of tools and incentives to encourage management activities that benefit listed and other at-risk species. Habitat Conservation Plans, an option added by a 1982 amendment to the Endangered Species Act, may be used by landowners, including private citizens, corporations, tribes, states, and counties, to develop

property that is inhabited by listed species. Landowners may receive a permit to take such species incidental to otherwise legal activities, provided they have developed an approved plan. The plan must include an assessment of the likely impacts on the species from the proposed action, the steps that the permit holder will take to avoid, minimize, and mitigate the impacts, and the funding available to carry out the steps. The idea is that such planning may benefit not only landowners but also species by securing and managing important habitat while allowing economic development that is planned to provide species conservation.

Safe Harbor Agreements were initiated in the 1990s to provide regulatory assurance for non-federal landowners who voluntarily aid in the recovery of listed species by improving or maintaining wildlife habitat. An agreement allows such landowners to carry on their usual activities without fear of being punished for take that is incidental to their ordinary management activities.

Conservation banks are lands that are permanently protected and managed as mitigation for the loss elsewhere of listed and other at-risk species and their habitat. Credits are supplied by landowners who enter into a Conservation Bank Agreement with the government that commits them to protecting and managing their lands for one or more species. Developers and others who need to mitigate for adverse impacts to those same species may purchase conservation bank credits from willing sellers to meet their mitigation requirements (US Department of the Interior Fish and Wildlife Service 2011). Use of conservation banks is common in Habitat Conservation Plans, and the plan is supposed to consider the proportion and distribution of lands set aside as conservation banks within the planning area and how that will affect wildlife conservation.

California has a disproportionately high percentage of threatened or endangered species compared to other states, and the majority of these occur on private lands (Scott et al. 1995; Dobson et al. 1997). One of these is the California tiger salamander (*Ambystoma californiense*). In the San Francisco Bay Area, most of the salamander's native habitat has been eliminated by urban expansion. Of the 155 California tiger salamander locality records in the eastern San Francisco Bay Area (Alameda and Contra Costa counties) where the wetland type was identified, 85% (131 sites) were stock ponds (US

Department of the Interior Fish and Wildlife Service 2004). Stock ponds have been created over the last 100 years by developing springs or blocking small waterways with dams that hold water into the dry season are common on both public and private lands. Some East Bay ranchers have been able to take advantage of the market for mitigation easements for the California tiger salamander and other species, with one remarking that "these salamanders are the most valuable livestock I've ever raised." While such benefits are available on private lands, they are not available to lessees on public lands. Instead, lessees must work with agencies to meet their obligations for habitat conservation.

Over the last two decades, as grazing has been removed from more areas in California annual grasslands, examples of cases where removal of grazing has had the opposite of the intended effect have accumulated (Barry 2011). These examples involve detrimental effects on a variety of organisms including endangered butterflies (Weiss 1999), Burrowing Owls (Nuzum 2005), insects (Dennis et al 1997), kit fox (Balestreri 1981), kangaroo rats (Kelt et al 2005; US Department of the Interior Fish and Wildlife Service 1997), flowers (Barry 2011), and a host of rare flora and fauna associated with vernal pools (Marty 2005; Pyke and Marty 2005). In many cases, grazing is a positive force for such species because it helps control the non-native grasses that otherwise overwhelm plant species or change the habitat conditions for animal species.

While habitat conservation is a central piece of the conversation about California rangelands, many interviewees spoke with frustration about their ability to make needed improvements or conduct normal ranch business where endangered species were found. In spite of the growing body of evidence showing the benefits of grazing for endangered species habitat (Barry 2011), many ranchers felt hindered in their ability to clean out stock ponds, grade roads, or even fill in dangerous squirrel holes in working corrals. They suggested that state oversight was sometimes in conflict with federal oversight and this led to costly construction delays and sometimes a more degraded resource due to neglect. Research in the Southwest has shown that public lands grazing lessees generally support endangered species conservation and are willing to work with the federal government, but do not perceive reciprocity from this cooperative spirit. They are also much more willing to accept information and potential changes

coming from other permittees than from the government (Conley et al 2007)—lending additional support to some Bay Area land agencies' decisions to hire managers with livestock experience.

Interviewees felt that experienced Bay Area managers were aware of some of the benefits of livestock grazing, as well as the fact that grazing often has little to no impact on wildlife or plant species. However, concern has been voiced in the past that in some cases agencies with oversight jurisdiction may not be aware of these dynamics on California rangelands, as pointed out by one grazier on a tour of his ranch:

> *I sold an easement for the protection of a stock pond I have that has salamanders in it. This pond was built by my grandfather, and was excellent for watering cattle. After I sold the easement, the representative from the wildlife agency came out to have a look. He said, "well, let's talk about where to put the fence to keep the livestock out." Now this pond had been grazed for decades, and the salamanders were quite plentiful. It was a long struggle to convince them to not fence.*

Communication for building partnerships

Ranchers and agency managers alike suggested in interviews that they often found themselves, as one agency manager put it, "speaking two different languages." At their most basic levels, one is a language of regulation driven by the demands of a bureaucracy, and one is a language of use and innovation, driven by the demands of running a business. Ranchers said that some agency managers do not know what the life cycle of a cow is, nor the broad principles affecting what will make or break a ranching operation. For their part, some agency managers said that ranchers are frequently unaware of all of the work managers do in their jobs aside from administering grazing leases and that ranchers do not fully appreciate the degree to which managers are constrained by bureaucracy. Said one manager: "I want to keep my job, and that requires a lock-step allegiance with upper-level management, and restricts what I can try."

That ranchers and agency managers were sometimes talking past each other suggests that in these cases, either fundamentally different worldviews were standing in the way of a productive

relationship or the process of collaborative goal-setting had failed or had never been undertaken. Understanding rangelands as dynamic resources influences perceptions of rangeland condition, which can vary strongly according to the viewer. Around California, it's the classic case of the stock pond: what represents a denuded landscape to one observer may well appear very healthy to another, depending on their values. As one well-respected ranch manager (not operating in California grasslands) put it with barely-concealed euphemism, it might be wise to "hammer the heck" out of a riparian area, with the belief that short term grazing impact might lead to long-term creek functionality. Whether or not he had the science to support his decision was less important than the empirical evidence of his own that heavily grazing a riparian area for a brief period during the growing season would lead to long-term change and restoration.

Working to understand the ways ranchers and agency managers privilege these multiple "ways of knowing" is useful. Morris (2006) and others point to the way in which farmers' beliefs about how their operations should be run are based on information from a wide range of sources—including science, government, and practical experience. In addition to consulting scientific literature, incorporating local knowledge in the planning process might be essential in creating healthy landlord–tenant relationships and potentially filling in gaps in scientific knowledge with adaptive management. It's often assumed through a so-called knowledge-deficit model that if the constituents of scientists, managers, and policy makers simply knew more or had more information they might be able to make better decisions. Research on *cultural cognition* has shown instead that people tend to make decisions based on their own cultural biases, the identity of the person delivering the information, and the degree to which that information upholds their values (Kahan 2010). Around the world and in the United States, the value of traditional ecological knowledge has begun to receive attention (Fernandez-Gimenez 2000; Knapp and Fernandez-Gimenez 2009) and could be critical to making better resource management decisions on Bay Area rangelands.

Interestingly, to some degree every rancher interviewed recognized the value of this knowledge and felt that it had or could have a significant influence on the management and conservation agendas.

Often at planning meetings ranchers found themselves to be the only people in the room with even rudimentary knowledge about livestock. They had what they considered the privilege and competitive advantage of explaining the basics of ranching and how it could be used to accomplish conservation goals. One rancher said, "I'm proud to be a representative of the cattle industry in planning groups that have no knowledge of it."

Who are the agency range managers, and what are their backgrounds? Who are the ranchers, and what is their experience? Some conservation agencies have hired managers with livestock experience, believing greater collaboration can develop between people with common experience. Weeks and Packard (2007) suggest that resource users (in their case, ranchers and fishermen) will be more receptive to the delivery of scientific information from people who are local, with whom they have relationships of trust, and who are perceived to be working in the best interests of producers. As once rancher said, referencing a recent blow-up at an agency–rancher meeting, "why didn't they just get a rancher to explain it?" In short, the messenger matters—and this is apparent in agency grazing leases.

Ultimately, the effectiveness of communication is determined by the relationship among the communicating parties. Many managers have striven to build relationships with ranchers in which trust overcomes differences in perspective. "The relationship of trust I've built with my lessees," said one manager, "has made it possible to do my job better." Another manager commented: "clear, constant communication is essential. This has helped to build great relationships."

Costs borne by ranchers

How much uncertainty or risk a rancher can tolerate varies. Added costs can be risky for a livestock business, so it is interesting to consider the transaction costs associated with Bay Area public leases. A common comment among ranchers is that they attend planning meetings with no compensation, while agency managers are paid to be in meetings. For many of the ranchers interviewed, this seems to be a false dichotomy, however: they might conceive of their attendance at meetings and the so-called "hassle factor" involved in grazing management on agency leases to be part of their costs. Ranching enterprise

budgets don't often include categories for meetings and planning. The transaction costs associated with leasing land from conservation agencies in the Bay Area appear to be substantial, but there is no published research to shed light on precisely how much time ranchers are spending on the administrative costs, though work is underway (Barry et al. 2012). However, one lessee commented that "bureaucratic hassle might cause me to stop leasing a public grazing allotment" and, indeed, previous research has found this to be a factor in the abandonment of public leases (Forero, L. PhD dissertation; Huntsinger et al. 2010). Substantial inconsistencies between different agencies could make doing business "at least three times more difficult" between one agency and another.

The famously competitive process of securing livestock grazing leases does provide significant motivation to lessees to hang on to leases whenever possible (Sulak and Huntsinger 2007). Managers may not realize the level of impact that losing a lease can have on the ranching operation. In a local survey ranchers indicated that they would take significant losses if they lost their leases (Sulak and Huntsinger 2007). The challenge of finding and keeping leases in the San Francisco Bay Area is often attributed to local factors: the quality of the landlord-tenant relationship, the terms of the lease, and the shrinking resource of parcels that are of suitable size and with sufficient infrastructure to support a ranching operation. Regional, national, and global factors are also at play as commodity prices break record highs and costs increase, as weather patterns bless some years with abundant and well-timed rainfall and curse others with unceasing drought, and as society's ideas about how land should be used change.

Bay Area ranchers often use several leases, both private and public, to feed their herds through the year (Huntsinger and Sulak 2007). Lessors vary in their motivations for leasing, their interest in or knowledge about grazing and grazing leases, and what they want from lessees. As one rancher commented, "regulations and standards vary between agencies, making it challenging to do business." On some lands, "public lands management has set a standard that's virtually impossible for a private landowner to follow and stay in business." Finding employees or ranch hands who can herd cattle, work with agency employees, and attend to the ecosystem as requested by agencies is a challenge. "Good

employees who can manage cattle and rangelands at the same time are hard to find" was a common lament.

Even though one manager commented that "innovation is a challenge in the face of regulation," innovative solutions to potential or perceived problems caused by livestock grazing have been one significant mark of Bay Area public grazing leases and signal attempts to retain stability in the face of regulatory pressure. In response to concerns about *Cryptosporidium* infecting drinking water supplies for the City of San Francisco, for example, a multidisciplinary team used the same risk mitigation strategy that was developed by NASA for astronaut food safety. Broadly, the team identified and controlled hazards to drinking water as far upstream as possible; in this case, it meant implementing specific range and livestock monitoring procedures and range improvements and readjusting the calving season, as well as controlling feral pigs (Barry et al. 1998). On tours of their operations, Bay Area ranchers proudly demonstrate some of the innovations they've developed to help make their livestock operations more compatible with habitat conservation. One rancher invented a swinging gate that he installed in a fenceline where elk had been traveling through, replacing contractor-engineered elk passages had been placed in less logical locations; another developed a salamander trap that he buried across a road at a gate to catch any ambitious salamanders and funnel them back to the right side of the fence, keeping them out of designated salamander-free development land.

The costs of such innovations for the operators may factor into the decision to engage in conservation practices broadly. When there is a clear positive feedback on a livestock business or broader industry the benefits are seen to outweigh the costs and the decision to implement management practices is easy. Such is the case, for example, in limiting the impacts of yellow starthistle on forage production (Eagle et al. 2007). When the feedback between management and landscape-level change is less clear—for example, in the case of recent research on the potential impacts of climate change on California rangelands (Shaw et al. 2011)—the drive for managers to adopt new practices might be less.

As successful as public land acquisitions have been, some ranchers express concern about the growing proportion of rangeland in public ownership. They commented about the importance of private

land in sustaining ranching operations, and expressed general wariness about how public grazing leases could be mismanaged or misappropriated. Public agencies are not necessarily unsympathetic to this view: one agency manager felt that "the administrative costs of managing public land are exorbitant." There was a general feeling from many that the pace of public land acquisition was unacceptably disproportionate to the agencies' ability to fund management, and that this cost of management was being passed on to the grazing tenants in different ways. In some cases, ranchers felt that agencies might be filling in their budget gaps by taking advantage of ranchers' eligibility for cost-share programs to construct range improvements.

Without long-term leases, ranchers aren't inclined to make capital investments in improvements from which they can benefit. And yet they are motivated to put out great effort to acquire and retain grazing leases, in some cases without any long-term contract. At its worst, this effort (the transaction cost plus the work on a cost-share program) surpasses the value gained from the lease when a grazier is asked to leave based on a month-to-month contract. Even if verbal commitments suggest otherwise, a short-term contract creates an imbalance of risk between the landlord and tenant. Indeed in the literature this concept is spelled out in terms of provision of inputs: contracts that are annual are less likely to have durable inputs (e.g. fencing) offered by the tenant, and contracts that are multi-year are more likely to see the tenant make long-term investments in these costly improvements (Yoder et al 2008).

Conclusions

When elephants fight, the grass is trampled.

–African proverb

We need to treat each other with respect. Good treatment as a human being can ultimately make for healthy land.

–Bay Area rancher

How the standards for public grazing leases are set—and thus which operators will be qualified to manage these leases in the future—depends on the broader dialogue that society has about ranching and conservation. Regardless, it may take a "new" type of rancher to operate successfully under increasing management demands (Brunson and Huntsinger 2008). One agency manager noted that he had the best working relationships with ranchers who had spent time away from their families' operations, seeing new places and ideas, with ranchers who'd formerly been agency employees, or with "those who are brand new to ranching and don't have preconceived notions about what ranching is."

It has been suggested that ranchers grazing on public land in other states are more likely to engage in conservation practices based on a sense of social responsibility. Most interestingly, it has also been suggested that reinforcing private property rights to alleviate landowner concerns about the erosion of such rights could be important for increasing landowner willingness to adopt land management practices that enhance the delivery of ecosystem services on privately owned rangelands (Kreuter et al. 2006). So in addition to the likely importance of public grazing leases for private land conservation (Sulak et al. 2008), there could be an interactive effect between how private landowners are influenced by policies such as the Endangered Species Act and requirements to register stock ponds and how they manage their public grazing leases.

As these interviews have shown, there isn't a simple linear relationship between the success of a lease agreement and the standards set by agencies, nor is the future of ranching a question of only the

supply of and the demand for ranchers. Well-established best practices for land management interact with public opinion and policy, a growing body of science, the competence of individuals, commodity markets worldwide, and greatly variable precipitation to affect management of agency grazing leases. These complex interactions are an accepted part of the uncertain enterprise of ranching. Replying to a question about coming up with more reliable "systems" that could "manage certainty" in to a livestock operation, one rancher put it succinctly: "As soon as you're in to a system, you're out of business."

Assuming the primary goal of ranchers remains the same—that is, to produce a healthy, saleable commodity—livestock grazing leases in a region might become untenable in three scenarios: (1) The goals of the agencies change to the extent that livestock grazing is no longer the best tool with which to accomplish these goals, or livestock are no longer considered to be part of a healthy ecosystem. (2) The standards set by agencies for their grazing lessees change to the extent that the supply of ranchers with the ability to manage according to these standards is substantially diminished (in other words, while many seem happy with their leases and are willing to work hard to keep them, some ranchers wonder how they will be able keep up with the demands of managing public grazing leases unless the terms change and the operators get fee reductions for conservation services). (3) There is no longer enough private, home ranch property locally to provide forage or feeding areas for animals when they are not desired on public rangelands.

Currently land agency programs emphasize acquisition of private land. However, some people in the larger ranching community find this of concern. A home ranch is where cattle need to go when they are removed to meet agency goals. Though animals can be trucked some distance, this also increases costs. As one rancher put it in a recent symposium panel:

> *The cattle have to go somewhere. Now I am spending money and contributing to carbon emissions by trucking my animals long distances from season to season, because government managers don't want them here in the summer. Is that green?*

For agency managers, rapid acquisition of land brings its own problems. "Land is being acquired faster than we can write and implement management plans," noted one manager; another employee said

that land is acquired when "we don't even have the funding to even find out where the fences, water, and resources we are supposed to manage are." In such a setting collaboration with a lessee might offer each party significant benefits, if a relationship of mutual trust and respect has been built. One agency manager commented that "finding a good grazing tenant is like finding a good employee." Though it is likely that lessees would prefer to be thought of as partners, this comment still reflects the very concrete benefits of a good lessee-lessor relationship.

The HCP process has also come under criticism by the ranching community, again because of the failure to recognize rangelands as agricultural lands, rather than "open space," and the coincident failure of the HCP process to consider landscape and ecosystem components that would help preserve the grazing industry in an area. The principles for wildlife conservation at the landscape scale and those for grazing have many common points, but grazing also requires attention to the supply of ranchlands under private management and availability of a sufficient community to support ranching infrastructure and labor needs. This is an additional perspective from which it might be concluded that the goals of wildlife and habitat conservation are better served by strategies such as conservation easements than by land acquisition.

In conversations with many people connected with livestock grazing on public lands in the Bay Area, the signs of dedication, hard work, and innovation are hard to ignore. For as much as agency managers and ranchers pointed out places for improvement, it should be made clear that there was not a sense from most people that the system was fatally flawed. The most significant concerns were related to the mounting administrative costs for ranchers (including dealing with permitting) and the gap in some grazing management plans between practice and theory. As one operator put it during a panel discussion at the CCRC meeting, "cattle can't be put on a shelf when you don't need them." Practical knowledge of ranching appears to be invaluable in agency managers and others writing and administering grazing plans. Many agencies have recognized and acted on this in their hiring. The challenges of managing livestock are apparent, but in a highly urban region known for innovation,

livestock grazing on conservation lands has been used to achieve an impressive array of goals that might not be on the table in more rural areas.

Finally, we would do well to remember that the conservation agencies have chosen a community of ranchers to help them accomplish their goals. There is not a fixed point at which lessees will find a grazing lease to be unfeasible for their operations, but there is the ever-present possibility that the demands of grazing leases will become too great to be feasible for ranchers, and they will begin to look elsewhere for forage. While cattle prices are currently in record high territory, so too are the input costs of a livestock operation. New goals and values can create new regulations, and ranchers can respond with innovative adaptations to these regulations. They will do a lot to keep their leases. Managers and ranchers should be mindful of these dynamics while recognizing that they have only limited agency within a natural system. That it takes more than a year from when a calf is conceived to when it is weaned for sale, and up to two more years (less by adding concentrated feed) before it is ready for sale as the end product of beef, and that it takes perhaps four or five calves to completely pay off the debt against a financed cow, demands that livestock producers and agency managers alike take a long-term view of their operations and remember that they can only steer the ship when the wind blows. And perhaps most important – but rarely formally acknowledged – is that it takes a long time for ranchers, their cowboys, and their cattle to get to know the country. Ranchers agree that years are needed for a mother cow to adjust to her surroundings. As with cattle, human practical knowledge of the land is learned only through repetition. Ranchers and their employees spend untold hours on the land. The value of knowing every cow trail, seep and spring, road and fence, and watching the grass and wildlife through the seasons – this is knowledge gained only through experience.

The sustainability of leasing relationships on SF Bay Area public grazing lands is determined in large part by the goals shared in common between ranchers and agencies and how the leases are negotiated. The doors to goal-setting are being thrown open to the public with alliances like the California Rangeland Conservation Coalition (Barry et al. 2007) and Central Coast Rangeland Coalition.

With these goals coming from an ever-widening group of people, agency landlords may be beginning to mediate access to the ecosystem as much they mediate access to forage.

At its best, the potential for economically viable grazing operations to be entirely congruent with—and indeed, necessary for realizing—conservation goals is a binding force between land agencies and ranchers. For every mistake in communication or misunderstanding of knowledge, that bond seems to be weakened again and in need of repair. For every additional piece of science and information that emerges explaining the conservation benefits of livestock grazing, ranchers and the agencies that lease them land could find themselves moving in the same direction in their operations—resulting in a bond strengthened, a lease lengthened, and a threatened business made more robust by conservation.

Acknowledgements

This work was funded by a Resource Management Grant from the Midpeninsula Regional Open Space District for the CCRC's Manager and Scientist Forum on Rangeland Conservation. With many thanks for giving up so much of their valuable time to talk with me, I am indebted to the ranchers and agency employees I interviewed for their openness and information. More comments were received in interviews than this paper can include, but they will not be lost for the future. Thanks are due to Sheila Barry, Grey Hayes, Larry Ford, and especially my faculty advisor, Lynn Huntsinger—all of whom were helpful in this research. Final thankyous go to Eric Engles for his editorial assistance.

Literature Cited

Anderson, M.A., S.C. Blank, T. LaMendola, and R.J. Sexton. 2002. California's cattle and beef industry at the crossroads. California Agriculture 56: pp. 152-156.

Balestreri, A.N. 1981. Status of the San Joaquin kit fox at Camp Roberts, California. Unpublished report, US Department Army, Environmental, and Natural Resources Office. San Luis Obispo, CA: California Polytechnic State University.

Ballard, H.L., M.E. Fernandez-Gimenez, and V.E. Sturtevant. 2008. Integration of local ecological knowledge and conventional science: a study of seven community-based forestry organizations in the USA. Ecology and Society 13(2): p. 37.

Barry, S.J. 2012. Ranchers subsidize public lands through stewardship. Presentation at Society for Range Management annual meeting, Spokane, WA. January 30.

Barry, S.J. 2011. Current findings on grazing impacts: California's special status species benefit from grazing. California Cattlemen's Association Magazine June: pp. 18–20. http://www.carangeland.org/images/11-06_CCA_Mag_-_Current_Findings_on_Grazing_Impacts.pdf Accessed 11 March 2012.

Barry, S.J., E.R. Atwill, K.W. Tate, T.S. Koopmann, J. Cullor, and T. Huff. 1998. Developing and implementing a HACCP-based program to control Cryptosporidium and other waterborne pathogens in Alameda Creek Watershed: a case study. Conference Proceedings- American Water Works Association. Annual Conference Dallas, Texas 1998.

Barry, S., T.K. Schohr, and K. Sweet. 2007. The California Rangeland Conservation Coalition. Rangelands 29: pp. 31-34.

Barry, S. and L. Huntsinger. 2002. Will California's landscapes keep working? Rangelands 24:6-10.

Bradshaw, G.A. and J.G. Borchers. 2000. Uncertainty as information: narrowing the science-policy gap. Conservation Ecology 4(1): p. 7.

Brunson, M.W., and L. Huntsinger. 2008. Ranching as a conservation strategy: can old ranchers save the New West? Rangeland Ecology and Management 61: pp. 137-147.

Cheatum, M., F. Casey, P. Alvarez and B. Parkhurst. 2011. Payments for Ecosystem Services: A California Rancher Perspective. Conservation Economics White Paper. Conservation Economics and Finance Program. Washington, DC: Defenders of Wildlife. 48 pp.

Conley, J.L., M.E. Fernandez-Gimenez, G.B. Ruyle, and M. Brunson. 2007. Forest Service grazing permittee perceptions of the Endangered Species Act in southeastern Arizona. Rangeland Ecology and Management 60: pp. 136-145.

Costanza R., d'Arge R., de Groot R., Farber S., Grasso M., Hannon B., Limburg K., Naeem S., O'Niell R.V., Paruelo J., Raskin R.G., Sutton P., van den Belt M. (1997) The value of the world's ecosystem services and natural capital. Nature 387: pp. 253–260

Dennis, P., M.R. Young, C.L. Howard and I.J. Gordon. 1997. The response of epigeal beetles (Col. Carabidae, Staphylinidae) to varied grazing regimes on upland *Nardus stricta* grasslands. Journal of Applied Ecology 34: pp. 433–443.

Eagle, A.J., M.E. Eiswerth, W.S. Johnson, S.E. Schoenig, and G.C. van Kooten. 2007. Costs and losses imposed on California ranchers by yellow starthistle. Rangland Ecology and Management 60: pp. 369-377.

Fernandez-Gimenez, M.E. 2000. The role of Mongolian nomadic pastoralists' ecological knowledge in rangelands management. Ecological Applications 10: pp. 1318-1326.

Ferranto, S., L. Huntsinger, C. Getz, G. Nakamura, W. Stewart, S. Drill, Y. Valachovic, M. DeLasaux, and M. Kelly. 2011. Forest and rangeland owners value land for natural amenities and as financial investment. California Agriculture 65: pp. 184-191.

Fisher, G. and S. Barry. 2011. Proceedings of the Bay Area Open Space Council *Almost Spring Gathering*: grazing and conservation. Presidio of San Francisco, CA.

Fried, J. and L. Huntsinger. 1998. Managing for naturalness at Mt. Diablo State Park. Society and Natural Resources 11(5): pp. 505-516.

Holechek, J.L. and J. Hawkes. 2007. Western ranching, trade policies, and peak oil. Rangelands 29: pp. 28-32.

Huntsinger, L., L.C. Forero, and A. Sulak. 2010. Transhumance and pastoralist resilience in the western United States. Pastoralism: Research, Policy, and Practice 1(1): pp. 1–15.

Kahan, D. 2010. Fixing the communications failure. Nature 463: pp. 296-297.

Kelt, D.A., E.S. Konno, and J.A. Wilson. 2005. Habitat management for the endangered Stephens' kangaroo rat: The effect of mowing and grazing. Journal of Wildlife Management 69(1): pp. 424–429.

Knapp, C.N. and M.E. Fernandez-Gimenez. 2009. Knowledge in practice: documenting rancher local knowledge in northwest Colorado. Rangeland Ecology and Management 62: pp.500-509.

Knight, K.B., T.P. Toombs, and J.D. Derner. 2011. Cross-fencing on private US rangelands: financial costs and producer risks. Rangelands 33: pp. 41-44.

Kremen, C., and R.S. Ostfeld. 2005. A call to ecologists: measuring, analyzing, and managing ecosystem services. Frontiers in Ecology and the Environment 3: pp. 540-548.

Kreuter, U.P., M.V. Nair, D. Jackson-Smith, J.R. Conner, and J.E. Johnston. 2006. Property rights orientations and rangeland management objectives: Texas, Utah, and Colorado. Rangeland Ecology and Management 59: pp. 632-639.

Kroeger, T., F. Casey, P. Alvarez, M. Cheatum and L. Tavassoli. 2009. An Economic Analysis of the Benefits of Habitat Conservation on California Rangelands. Conservation Economics White Paper. Conservation Economics Program. Washington, DC: Defenders of Wildlife. 91 pp.

Marty, J.T. 2005. Effects of cattle grazing on diversity in ephemeral wetlands. Conservation Biology 19(5): pp. 1626–1632.

Mendelsohn R. and Olmstead S. (2009) The economic valuation of environmental amenities and disamenities: methods and applications. Annual Review of Environmental Resources 34: pp. 325–347.

Morris, C. 2006. Negotiation the boundary between state-led and farmer approaches to knowing nature: An analysis of UK agri-environment schemes. Geoforum 37: pp. 113-127.

Nuzum, R.C. 2005. Report: Using livestock grazing as a resource management tool in California. Concord, CA, USA: Contra Costa Water District report. www.ccwater.com/files/LivestockGrazingFinal72005.pdf. Accessed 9 August 2006.

Pyke, C.R. and J.T. Marty. 2005. Cattle grazing mediates climate change impacts on ephemeral wetlands. Conservation Biology 19(5): pp. 1619–1625.

Rissman, A.R. and A.M. Merenlender. 2008. The conservation contributions of conservation easements: analysis of the San Francisco Bay Area protected lands spatial database. Ecology and Society 13(1): p. 40.

Roberts, C. 2011. Cows won't fight weeds in Walnut Creek. NBC Bay Area online publication. http://www.nbcbayarea.com/news/local. Accessed 13 July 2011.

Sayre, N. 2004. The need for qualitative research to understand ranch management. Journal of Range Management 57: pp. 668-674.

Shaw, M.R., L. Pendleton, D.R. Cameron, B. Morris, D. Bachelet, K. Klausmeyer, J. MacKenzie, D.R. Conklin, G.N. Bratman, J. Lenihan, E. Haunreiter, C. Daly, and P.R. Roehrdanz. 2011. The impact of climate change on California's ecosystem services. Climatic Change 109 (Suppl 1): pp. S465-S484.

Sulak, A. and L. Huntsinger. 2007. Public land grazing in California: untapped conservation potential for private lands? Rangelands 29: pp. 9-12.

Sulak, A., L. Huntsinger, S. Barry, and L. Forero. 2008. Public land grazing for private land conservation? In: Merenlender, Adina; McCreary, Douglas; Purcell, Kathryn L., tech. eds. 2008. Proceedings of the sixth California oak symposium: today's challenges, tomorrow's opportunities. Gen. Tech. Rep. PSW-GTR-217. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: pp. 7-18.

Toombs, T.P. and M.G. Roberts. 2009. Are Natural Resources Conservation Service range management investments working at cross-purposes with wildlife habitat goals on Western Untied States rangelands? Rangeland Ecology and Management 62: pp. 351-355.

Walker, R.A. 2007. The country in the city: the greening of the San Francisco Bay Area. University of Washington Press, Seattle.

Weeks, P. and J.M. Packard. 1997. Acceptance of scientific management by natural resource dependent communities. Conservation Biology 11: pp. 236-245.

Weiss, Stuart B. 1999. Cars, cows, and checkerspot butterflies: Nitrogen deposition and management of nutrient-poor grasslands for a threatened species. Conservation Biology 13(6): pp. 1476–1486.

Willcox, A.S. and W.M. Giuliano. 2011. Cattle rancher and conservation agency personnel perceptions of wildlife management and assistance program in Alabama, Florida, Georgia, and Mississippi. Wildlife Society Bulletin 35: pp. 59-68.

Yoder, J., I. Hossain, F. Epplin, and D. Doye. 2008. Contract duration and the division of labor in agricultural land leases. Journal of Economic Behavior & Organization 65: pp. 714-733.

Yu, J. and K. Belcher. 2011. An economic analysis of landowners' willingness to adopt wetland and riparian conservation management. Canadian Journal of Agricultural Economics 59: pp. 207-222.