Chapter 5.5

Conservation on Private Grazing Lands

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Grazing lands provide forage for a significant share of the U.S. animal sector, as well as other economic and ecological services. The preservation and stewardship of private grazing lands has emerged as an important conservation priority, with expanded policy emphasis and funding under USDA farm programs.

Introduction

USDA has provided technical assistance for grazing systems since the 1930s. An expanded focus on preservation and stewardship of private grazing lands in recent years reflects a growing awareness of their importance to the Nation's environmental health and economic well-being. Achieving USDA conservation objectives for grassland and rangeland resources will involve public/private partnerships in support of sustainable grazing systems.

Private Grazing Lands

Grazing lands are vegetative land area that can be used for the feeding of domestic animals on growing grass, legumes, and other herbaceous plants. Grazing lands encompass a broad range of land types defined by climatic zones, terrain, vegetative cover, and primary land use. Lands used for grazing may include rangelands, grazed forest lands, native grasslands, naturalized and cultivated pasture, and crop and hay lands.

Private grazing land defies easy definition, due to the diversity and multi-use nature of lands used for grazing, distinctions in private ownership and lease arrangements, and land-capability and land-use distinctions across primary sources of grazing land data. Private grazing lands generally include all privately owned, fee-title land used for grazing purposes. Grazed acreage on tribal lands and public lands under State and local jurisdiction, which may be eligible for USDA program assistance, are often subsumed under working definitions of private grazing lands.

Extent and Location of U.S. Grazing Lands

Nearly 35 percent of the total U.S. land area, or 788 million acres of combined Federal and non-Federal lands, was potentially usable for livestock grazing in 1997 (Vesterby and Krupa, 2001). This includes 580 million acres of permanent grassland pasture and rangeland, 68 million

Contents

Chapter 1: Land and Farm Resources

Chapter 2: Water and Wetland Resources

Chapter 3: Knowledge Resources and Productivity

Chapter 4: Agricultural Production Management

Chapter 5: Conservation and Environmental Policies

- 5.1 Conservation Policy Overview
- 5.2 Land Retirement Programs
- 5.3 Compliance Provisions for Soil and Wetland Conservation
- 5.4 Working-Land Conservation Programs
- **5.5 Conservation on Private Grazing Lands**
- 5.6 Farmland Protection Programs
- 5.7 Federal Laws Protecting Environmental Quality

Appendix: Data Sources

acres of cropland pasture, and 140 million acres of forested rangeland (see Chapter 1.1, "Land Use").

Non-Federal grazing lands—including privately owned land, State and local publicly owned lands, and tribal lands—accounted for 577 million acres in 2002 (fig. 5.5.1) (USDA, 2005c). Over 488 million acres of private land were used for grazing purposes in 2002 (table 5.5.1), including pastureland and rangeland (395.3 million acres), forested land used for pasture (31.1 million acres), and cropland (61.8 million). Private grazing lands are located in all States, with heavy concentrations in the Mountain and Plains regions. In the more humid Eastern States, cropland pasture represents a significant share of acreage grazed.

In the West, public lands are used for livestock grazing in designated areas. Federal grazing leases administered by the Bureau of Land Management (U.S. Department of the Interior) and USDA's Forest Service covered 160 million and 95 million acres in 2002 (USDI, 2002; USDA, 2003).

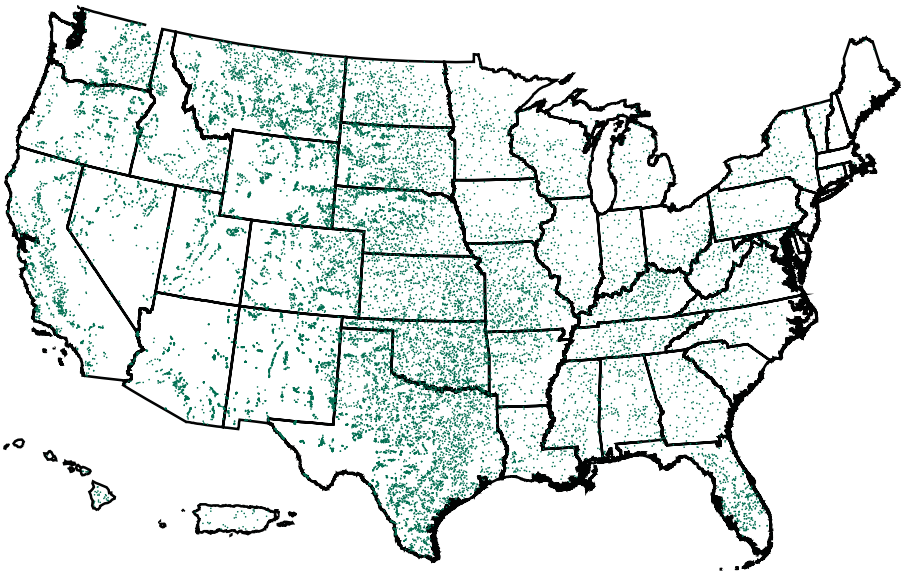
Significance of Grazing Lands for the U.S. Animal Sector

Grazing lands provide essential forage for the U.S animal sector. In 1997, roughly 57 million animal-units (AUs)[1] were raised, in part, on forage from grazing lands, accounting for more than 60 percent of AU production on U.S. farms (table 5.5.2). Cow-calf/feeding operations are the dominant grazers, with lesser acreages used for sheep, goats, horses, ponies, mules, burros, donkeys, bison, and llamas.

[1]An animal-unit, defined here as 1,000 pounds of live animal weight, serves as a common unit for aggregating over livestock types.

Figure 5.5.1

Non-Federal grazing land in the United States, 1997



• 1 dot = 25, 000 acres of non-Federal grazing land, which includes pastureland, rangeland, and grazed forest land.

NRI does not collect data for Alaska.

Source: 1997 NRI.

Table 5.5.1

Private grazing lands used by livestock producers, by region, 2002[1]

Region[2]	Pasture, cropland[3]		Pasture woodland		Other pasture and rangeland		Pasture all types
	Million acres	*Percent[4]*	*Million acres*	*Percent[4]*	*Million acres*	*Percent[4]*	*Million acres*
Northeast	1.5	41	0.7	19	1.5	40	3.6
Appalachian	7.2	42	3.4	20	6.3	38	16.8
Southeast	3.6	26	3.6	26	6.5	47	13.8
Lake States	1.9	34	1.5	26	2.2	39	5.6
Corn Belt	7.3	37	3.8	19	8.6	44	19.6
Delta States	3.6	35	2.0	20	4.6	45	10.2
Northern Plains	8.2	10	0.9	1	70.5	89	79.5
Southern Plains	18.5	15	5.8	5	99.1	80	123.5
Mountain	7.2	4	5.7	3	166.7	93	179.6
Pacific	2.8	8	3.7	11	27.7	81	34.3
Alaska/Hawaii	0.0	3	0.0	3	1.6	94	1.7
All U.S.	61.8	13	31.1	6	395.3	81	488.2

[1]Includes farm and ranch operations with $1,000 in annual sales.

[2]Regions are: Northeast (ME, NH ,VT, MA, RI, CT, NY, NJ, PA, DE, MD), Appalachian (VA, WV, NC, KY, TN), Southeast (SC, GA, FL, AL), Lake States (MI, WI, MN), Corn Belt (OH, IN, IL, IA, MO), Delta States (MS, AR, LA), Northern Plains (ND, SD, NE, KS), Southern Plains (OK, TX), Mountain (MT, ID, WY, CO, UT, NV, AZ, NM), Pacific (WA, OR, CA), and Alaska/Hawaii (AK, HI).

[3]Reported Census acres of cropland used for pasture were adjusted to reflect the share of animals not raised on farms, as defined by the Census (personal correspondence, Marlow Vesterby, ERS).

[4]Percent indicates the share of each region's grazing land by pasture type.

Source: 2002 Census of Agriculture, NASS, USDA.

Table 5.5.2

Number of animal units[1], total and unconfined, by operation size, 1982 and 1997

Farms by number of AUs	1982 All animals	Unconfined animals	Percent share unconfined	1997 All animals	Unconfined animals	Percent share unconfined
	Mil. AUs			*Mil. AUs*		
< 25	7.3	6.7	92	5.4	5.2	96
25 -< 50	9.5	7.5	79	7.3	6.4	87
50 -< 150	29.0	17.5	60	21.5	14.9	69
150 -< 300	17.1	10.3	60	16.0	9.9	62
300 -< 1,000	16.9	10.9	65	20.3	12.1	60
1,000 +	15.8	7.2	46	24.9	8.8	35
Total	95.6	60.1	63	95.3	57.3	60

[1]Animal-unit numbers by farm size were calculated based on beef and dairy cattle, swine, and poultry. Other animal types that are typically pastured—including sheep, goats, horses, ponies, mules, burros, and donkeys—represent an additional 3.5 million AUs.

Source: Adapted from Kellogg et al., 2000, and Kellogg, 2002, based on agricultural census data for 1982 and 1997.

An estimated 707,365 animal farms had mostly pastured livestock in 1997, representing 54 percent of all farms with animals (Kellogg, 2002).[2] These farms accounted for $17.2 billion in livestock sales, or 17 percent of U.S. livestock sales in 1997. Most are small operations (less than $10,000 in annual sales) that raise primarily livestock. However, a significant minority raise large numbers of animals; 10 percent of these farms had livestock sales of more than $40,000 (Kellogg, 2002).

Other farms may also use grazing lands. Farms with few animals—raised primarily for home consumption or local markets—are likely to depend on pasturing for feed needs. Pastured livestock are more common on operations of fewer than 50 AUs (table 5.5.2). Some confined livestock farms (predominantly cattle feedlot and dairy operations) may depend on forage grazing for some animals over part of the year, and may have large numbers of pastured livestock.[3] An increasing concentration of unconfined animals on larger operations (greater than 300 AUs) over 1982-97 (table 5.5.2) mirrors a similar trend in confined animal production (Kellogg, 2002).

[2]Farms with mostly pastured livestock were defined to include operations with: (1) fewer than 4 AUs of any combination of animals typically maintained in confined conditions (fattened cattle, milk cows, swine, chickens, and turkeys); (2) 8 or more AUs of cattle other than milk cows and fattened cattle; (3) 10 or more horses, ponies, mules, burrows, or donkeys; or (4) 25 or more sheep, lambs, or goats.

[3]USDA estimates assume that confined livestock may be pastured for up to 45 days a year (Kellogg et al., 2000).

Additional Benefits of Grazing Lands

Grazing lands support other activities in addition to livestock production that contribute to rural economies, such as hunting and fishing, wildlife viewing, and other ranch-based recreation. Fees generated from these uses supplement income for some animal producers and may help sustain operations. Grazing lands are also regarded as an integral part of the cultural heritage and identity of many rural communities.

Grazing lands, where properly managed, provide important ecological functions. Grazing lands help to maintain habitat and migration corridors for wildlife, supporting a rich biodiversity of plant and animal species. As grazing lands account for large acreages in many U.S. river basins, they are important in hydrologic processes involving streamflow, aquifer recharge, and water filtration. In addition, grazing lands sequester substantial amounts of atmospheric carbon. Potential gains from cropland conversion to grassland have been considered in the context of U.S. policy on climate change mitigation (Follett et al., 2001).

Conservation Policy Concerns

Two broad areas of policy concern involve the loss of private grazing land area and resource degradation on grazing lands.

Area Loss

Conversion of grassland for crop production and developed uses has reduced the extent of native grasslands in the U.S. by roughly 50 percent, with significant fragmentation of remaining grassland resources (Conner et al., 2001). Losses have been greatest in the historic savanna and tall-grass prairies of the Midwest and Central Plains, and relatively less in the arid West where nonirrigated cropping potential is limited and much of the land is publicly owned. While the rate of loss has slowed in recent decades, area in grasslands and other grazing land resources continues to decline. From

1982 to 2002, acreage in non-Federal grazing lands fell by 5 percent according to USDA's Natural Resources Conservation Service—from 611.0 to 577.7 million acres—including reductions in pastureland (13.7 million acres), rangeland (10.2 million acres), and grazed forestland (9.5 million acres) (fig. 5.5.2).

Cropland expansion has fueled much of the grassland conversion, particularly in years of strong crop demand. More recently, increases in population and income have driven substantial exurban development in grasslands (Conner et al., 2001). Reductions in grazing land resources nationwide, however, may mask variability in land-use coverage over time. In marginal cropping areas, cropland conversions (and reconversion to grassland) may be influenced by relative returns to crop and livestock production and changes in agricultural policies (see Chapter 5.2, "Land Retirement Programs"). In some locations, Federal cropland retirement initiatives have resulted in increased grassland area, which may be grazed under specified conditions.

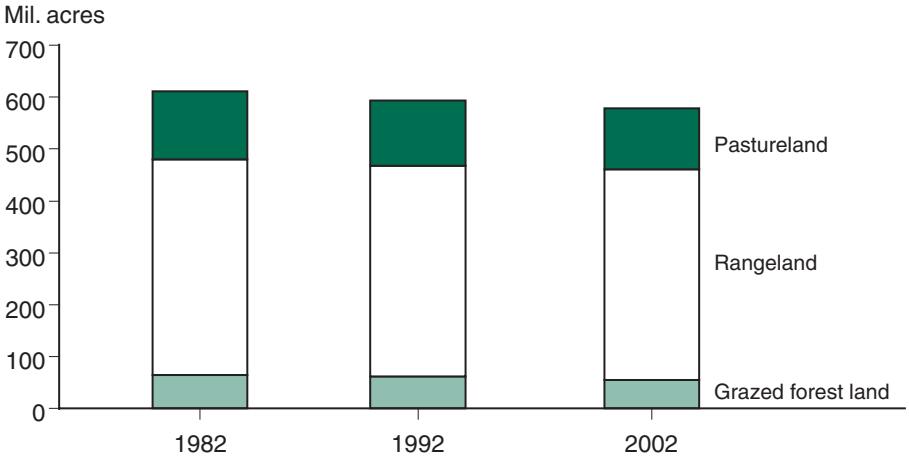
Resource Degradation

Of the remaining grassland resources in private ownership, much of this acreage has been degraded due to overgrazing, fire suppression, invasive species, and other factors (Conner et al., 2001). Degradation of the land resource is reflected in reduced forage productivity for livestock and environmental damages, both on and off the site.

Environmental effects of livestock grazing may include excessive foraging and trampling of vegetative cover, streambank erosion, and sediment/nutrient loadings to water bodies that may harm riparian and upland habitat. Livestock grazing has been cited as a factor in the decline of threatened and endangered species under the Endangered Species Act. Of 663 species identified as affected by agricultural activity (as of September 1995), livestock grazing was a factor in 171 listings (26 percent) (Lewandrowski and Ingram, 2002).

Figure 5.5.2

Trends in non-Federal grazing land, 1982-2002



Source: 2002 National Resources Inventory, NRCS (USDA, 2005c).

Considerable policy attention has focused on animal waste management in recent years, with new Federal regulations enacted in 2003 for the largest confined animal operations (see AREI Chapters 2.2 and 4.5). Waste from unconfined (pasture-based) operations remains largely unregulated, although it may impair local water quality. Roughly half of the manure nutrients produced on U.S. animal farms was generated by unconfined livestock in 1997 (fig. 5.5.3), including 3.3 million tons of manure nitrogen (51 percent) and 1.0 million tons of manure phosphorus (54 percent).[4]

Pathogen contamination from animal waste is an important public health issue. A recent USGS study examined water quality effects of fecal coliform bacteria from confined and unconfined animal operations. While loadings are largest in drainages downstream of confined operations (reflecting the volume of concentrated waste), manure from pastured animals contributes much more fecal coliform bacteria to streams per AU nationwide (Smith et al., 2004).

[4]These estimates likely understate the potential impact of manure nutrients on grazing lands, as (1) a share of animals on confined operations are pastured for a portion of the year; (2) recoverable manure from confined operations may be land-applied on pasture, either on or off the source farm; and (3) values do not reflect manure production from all animal types typically pastured.

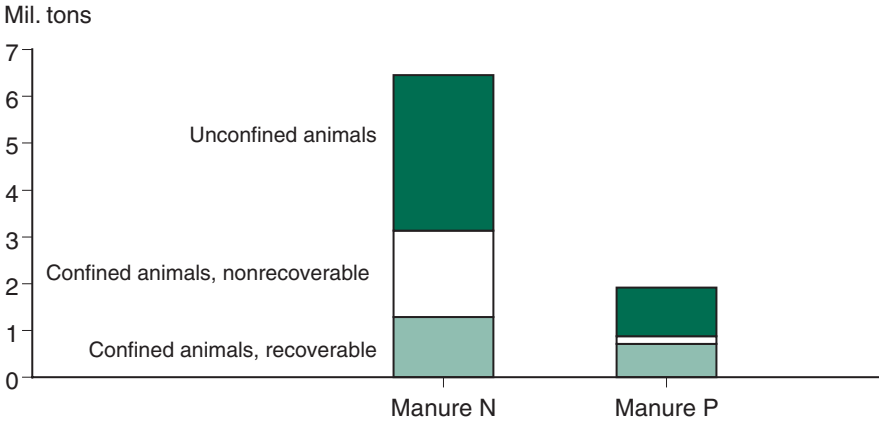
Improved Grazing Systems

Increased policy attention has focused on livestock grazing systems that are environmentally and economically sustainable. Field studies suggest that grazing lands can be managed to enhance forage productivity while preserving environmental quality (USDA, 2005a; AFGC, 2001). Practices undertaken as part of an improved grazing system include rotational grazing to allow grass rejuvenation; fencing to restrict livestock access in sensitive areas; watering facilities to remove livestock from riparian areas; windbreaks and shelterbelts to disperse herds; manure storage facilities for temporary confinement areas; filter strips to intercept runoff from heavy-use areas; improved grass and legume cultivars; improved nutrient management practices; and integrated pest management strategies.

Producer returns may also increase from improved grazing practices. Benefits may include additional quantity and quality of forage; healthier livestock and lower veterinary costs; better monitoring of livestock, resulting in earlier

Figure 5.5.3

Manure nitrogen and phosphorus production in the U.S. animal sector[1], 1997



[1]Based on beef and dairy cattle, swine, and poultry.

Source: Adapted from Kellogg et al., 2000.

problem detection; higher weaning weights; and reduced problems with noxious weeds and other undesirable plant species. In many cases, however, public incentives will be required to encourage adoption of recommended grazing practices, particularly where benefits primarily occur offsite.

Federal Support for Conservation on Private Grazing Lands

The Federal Government provides conservation information and technical assistance for private grazing lands, primarily through USDA's Natural Resources Conservation Service (NRCS). Non-Federal grazing lands constitute about half of the total land on which NRCS provides technical assistance (USDA, 1997). According to NRCS, roughly 355 million acres of private grazing lands are in need of some form of conservation treatment (USDA, 2001). NRCS technical assistance is funded primarily through the Conservation Technical Assistance program, which allocated roughly $100 million toward grazing-related initiatives in FY2004 (USDA, 2005f). Development of soil surveys and ecological site descriptions for grazing lands, and approved conservation plans for grazing systems, will likely be emphasized in the coming years (USDA, 2005f).

Comprehensive nutrient management plans (CNMPs), designed to minimize water quality impairment from manure nutrients, are an important element of an overall conservation plan for many animal operations. Of an estimated 257,201 farms with confined animals that are likely to need CNMPs, roughly one-fourth had pastured animals as the dominant type (USDA, 2003).[5] Average annual CNMP costs per farm with pastured livestock were estimated at $1,450 (USDA, 2003).

[5]CNMPs are required for all concentrated animal feeding operations under EPA regulations, estimated to apply to 15,500 of the largest operations. However, USDA encourages all animal operations to develop CNMPs.

The Environmental Quality Incentives Program (EQIP), introduced in 1996 and extended under the Farm Security and Rural Investment Act of 2002 (2002 Farm Bill), provides technical and financial assistance to address natural resource concerns on working farms and ranches (see Chapter 5.4, "Working-Land Conservation Programs"). Cost-share and incentive payments under 5- to 10-year contracts are available for eligible practices in an approved conservation plan. Sixty percent of EQIP funding under the 2002 Farm Bill is targeted to livestock production, with improved grazing systems as an important element. In 2004, more than $95 million in EQIP cost-sharing was approved for practices involving unconfined livestock (USDA, 2005d) (table 5.5.3).

The 2002 Farm Bill includes several other programs that support conservation on grazing lands:

- The Grassland Reserve Program (GRP) targets grazing operations on private grasslands. The GRP, administered jointly by NRCS and the Farm Service Agency (FSA), was authorized by the 2002 Farm Bill. The program is designed to preserve grasslands for livestock grazing and other uses. Enrollment options include permanent and long-term (30-year) easements with a single upfront payment and long-term rental agreements (10, 15, and 30 years) with annual payments. An approved grassland resource management plan is required for all

Table 5.5.3

EQIP contracts, total expenditures, and cost-share payments for selected practices associated with livestock grazing, 1997-2003[1]

Conservation practice	Number of contracts	Total expenditures for practice	EQIP cost-share payments
		$ million	
Fencing	48,330	156.5	103.9
Prescribed grazing	38,721	56.9	44.9
Trough or tank	35,646	57.3	38.0
Pasture and hay planting	35,119	88.7	58.0
Brush management	18,849	85.5	51.7
Range planting	5,683	17.0	10.8
Spring development	4,908	9.5	6.5
Windbreak/shelterbelt establishment	3,627	6.0	4.1
Upland wildlife habitat management	1,989	1.7	1.3
Prescribed burning	1,733	2.3	1.7
Animal traits and walkways	1,616	5.7	4.1
Stream crossing	926	2.6	1.7
Riparian forest buffer	769	.9	.7
Animal use area protection	754	3.7	2.2
Grazing land mechanical treatment	443	1.1	.7
Windbreak/shelterbelt renovation	433	.9	.6
Planned grazing system	387	1.0	.7
Pasture and hayland management	330	.5	.3
Stream channel stabilization	164	.9	.6

[1]Based on NRCS conservation practices identified in EQIP contracts for producers reporting animals, 1997-2003.

Source: USDA EQIP database.

enrolled lands, with compensation for the use of approved practices. Program funding of $254 million is authorized over FY 2002-07, with a total enrollment cap of 2 million acres nationwide.

- The Conservation Reserve Program (CRP), administered by FSA and NRCS since 1985, targets removal of environmentally sensitive lands from agricultural production under 10- to 15-year lease agreements (see Chapter 5.2, "Land Retirement Programs"). Much of the CRP enrollment involves marginal croplands in grassland areas of the Plains. Enrolled lands are planted to native grasses and other vegetative cover, and pasturing is permitted (subject to reduced CRP payments) as part of an approved conservation plan.

- The Conservation Security Program (CSP), administered by NRCS since 2002, provides financial and technical assistance to farmers and ranchers recognized as exemplary land stewards (see Chapter 5.4). Pasture and rangeland accounted for more than 30 percent of total acres approved for contracts in FY 2004 (USDA, 2005e).

- The Farm and Ranch Lands Protection Program (FRPP), administered by NRCS since 1996 (Farmland Protection Program prior to 2002), helps maintain working cropland and grazing lands by providing

matching funds to State, tribal, and local governments, as well as non-governmental organizations, for conservation easement acquisition (see Chapter 5.6, "Farmland Protection Programs").

The Grazing Lands Conservation Initiative (GLCI) is a nationwide collaboration of stakeholders—farm and ranch organizations, State and Federal entities, tribes, and environmental interests—working to complement conservation programs through research, education, and technical assistance. Program funding is supported by congressional appropriations, with $23.5 million in FY 2004 (USDA, 2005f).

USDA's Agricultural Research Service directs research on sustainable grazing systems through the Rangeland, Pasture, and Forages (RPF) National Program (USDA, 2005a). The RPF program encompasses a broad range of interdisciplinary research projects involving collaboration across Federal and State agencies and land-grant universities.

Factors Affecting Conservation Adoption on Private Grazing Lands

Returns to ranching in some areas may limit investment in conservation practices, particularly for smaller operations with limited capital.[6] Adoption incentives may be inadequate without increased livestock returns, as when measures are designed to protect habitat. Incentives may also be limited for lands grazed under a lease agreement or informal arrangement, where the operator does not capture long-term benefits (Lewandrowski and Ingram, 1999).

[6]Over 1998-2003, average returns above total costs for cow-calf operations in the U.S. were considerably less than returns to wheat production (USDA, 2005b).

USDA farm programs have historically supported returns to crop producers through price supports and mitigation of crop risk. Farm support payments have largely been decoupled from production since 1996, but certain payments (such as loan deficiency payments) continue to be linked to crop production. Where USDA programs enhance crop returns relative to livestock grazing in marginal cropland areas, program incentives may have the unintended consequence of encouraging grassland conversion to crop production and discouraging reversal to grasslands (Conner et al., 2001). ERS analysis suggests that Federal crop insurance has contributed to cropland development in marginal cropping areas, although acreage effects have been small (Claassen et al., 2005).

Policy mechanisms for conservation on private grazing lands are largely nonregulatory. While large confined animal operations are regulated as a point-source for waste discharge, onsite environmental effects of grazing are more diffuse and consequently less subject to mandatory controls. Adoption of conservation measures on grazing lands has relied largely on technical assistance and voluntary incentives, without regulatory or compliance mechanisms to ensure environmental standards.

The proliferation of ranchettes (subdivisions of large rural tracts) in many areas represents a further challenge for conservation policy. Conservation concerns can be particularly significant, as smaller land holdings may be overstocked with animals relative to carrying capacity and manure-nutrient uptake. As owners do not generally depend on livestock for income, finan-

cial incentives may be less effective in encouraging improved grazing systems. Effective strategies may require coordination of conservation activities across multiple landowners.

Many Western ranches use a mix of Federal, State, and private lands for livestock grazing over the course of a year. Access to public lands is often critical to providing private parcels adequate time to recover within a rotational grazing regime. For much of the West, the success of conservation measures on private grazing lands may be linked to grazing policies for public lands.

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