



# Land Use and Planning Report

Colorado  
State  
University

Extension

Department of Agricultural and Resource Economics, Fort Collins, CO 80523-1172  
<http://dare.colostate.edu/pubs>

## COLORADO GRASSLAND TRENDS

Andrew Seidl,<sup>1</sup> Neal Wilkins,<sup>2</sup> Larry Van Tassell,<sup>3</sup> and Richard Conner<sup>2</sup>

- *Colorado's non-federal Rangelands represent about 37% of the state's total land base.*
- *Farms and ranches account for about 80% of all non-federal rural lands in the state.*
- *From 1982 to 1997, Eastern Colorado experienced a loss of 713,700 acres of grazinglands.*

Colorado's grasslands extended across approximately 41.34 million acres prior to settlement, about 64% of which was shortgrass prairie (Figure 1). Colorado's native grasslands once accounted for approximately 21% of all shortgrass prairie in the US. Non-federal ownerships occupy about 61% of Colorado's 66.62 million acres of total land area. Most federal ownerships are in the western half of the state – including most of Colorado's Western Grasslands. Most of the Colorado's remaining Central Plains' grasslands, including substantial acreage of short- and mixed-grass prairie, are in non-federal ownerships in the eastern one-half of the state (Figure 2).

### Present status

As of 1997, approximately 25.79 million acres of Colorado's non-federal lands were in native rangeland

or introduced pasture grasses (grazinglands). Of Colorado's nonfederal grazinglands, about 95% are native rangelands (NRI 2000, Table1). These non-federal rangelands represent about 37% of the state's total land base, and approximately 61% of all non-federal rural land in the state (Figure 2).

Private farms and ranches account for about 80% of all non-federal rural lands in the state; and the accounting of grazinglands on private farms and ranches represents approximately 77% of that reported for all non-federal grazinglands in the state (Tables 1 & 2 and Figure 3). Grazinglands on farms and ranches account for 19.9 million acres, representing 61% of Colorado's total farm and ranch acreage and roughly 30% of the state's total land area (Table 2).

### Recent land use trends

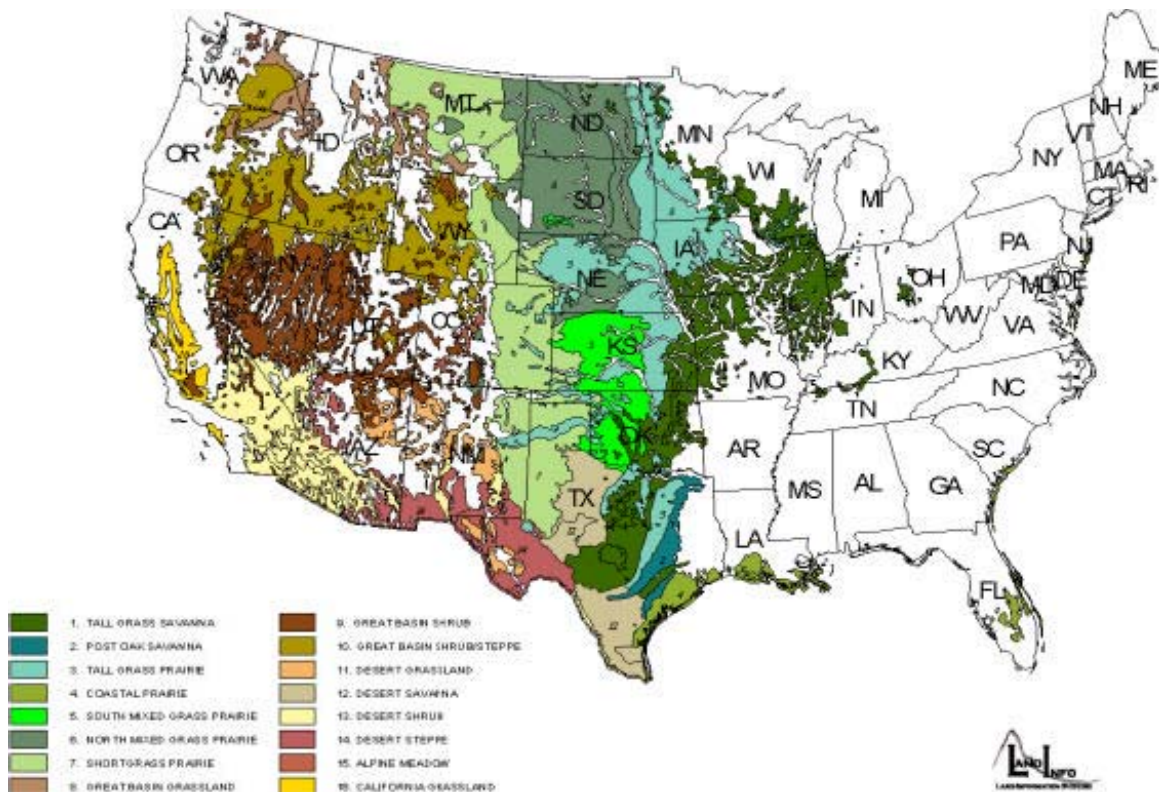
In the 15 years prior to 1997, Colorado lost about 1.35 million acres of its non-federal native rangeland (~5%), about 22% of which was transferred to federal ownership (Tables 1 & 2). Of the remaining 1,052,900 acres, roughly 60% was converted to cultivated crops, with an additional 166,600 acres being lost to urban expansion. While urban expansion only accounted for about 10% of rangeland conversion, conversion of

1 Assistant Professor Extension Economist—Public Policy. B312 Clark Bldg, CSU-DARE, Colorado State University, Ft. Collins, CO, 80523-1172. T: 970-491-7071. E: [Andrew.Seidl@colostate.edu](mailto:Andrew.Seidl@colostate.edu). F: 970-491-2067.

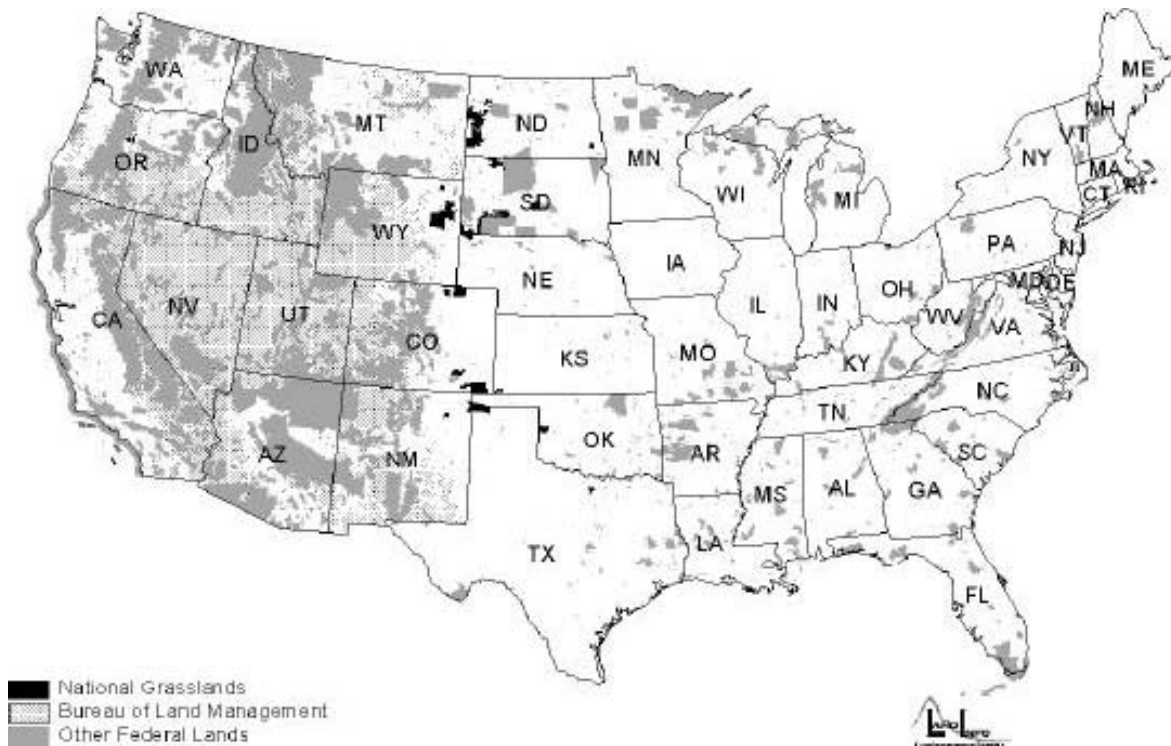
2 Texas A&M University, College Station, TX;

3 University of Idaho, Moscow, ID.

Extension programs are available to all without discrimination.



**Figure 1.** Coverage of pre-settlement grasslands in the contiguous US, by type. Adapted from Kuchler (1975).



**Figure 2.** Federal ownership of lands in the contiguous US.

**Table 1.** Changes in land cover/use between 1982 and 1997, Colorado.

Land cover/use in 1982	Land cover/use in 1997												1982 total
	Cultivated cropland	Non-cultivated cropland	Pastureland	Rangeland	Forest land	Minor land uses <sup>a</sup>	Urban build-up	Rural transportation	Small water <sup>b</sup>	Census water <sup>c</sup>	Federal land	CRP <sup>d</sup>	
Cultivated cropland	6,619.8	342	206.6	262.7	0.0	43.8	89.6	5.3	1.5	0.6	11.6	1,831.5	9,415.0
Non-cultivated cropland	229.7	705.4	128.6	53.6	1.0	15.4	21.3	0.9	2.2	0.3	25.0	5.1	1,188.5
Pastureland	45.0	85.7	819.1	147.3	3.8	10.9	34.8	0.8	1.0	0.0	7.3	9.0	1,164.7
Rangeland	632.1	38.2	33.4	23,704.0	42.8	73.6	166.6	12.6	5.5	3.8	296.7	44.3	25,053.6
Forest land	0.7	1.4	4.3	252.5	3,358.1	17.8	79.9	2.0	0.5	1.0	38.8	0.0	3,757.0
Minor land use	15.4	4.8	2.3	34.9	0.6	790.3	12.9	0.8	0.6	0.0	13.4	0.0	876.0
Urban build-up	0.0	0.0	0.0	0.0	0.0	0.0	772.7	0.0	0.0	0.0	0.0	0.0	772.7
Rural transportation	3.5	0.4	0.0	6.7	1.1	0.6	2.1	449.4	0.0	0.0	0.0	0.0	463.8
Small water	0.7	1.0	0.1	2.3	0.2	0.0	0.0	0.0	136.2	0.0	0.0	0.0	140.5
Census water	1.2	0.5	0.0	8.6	0.0	0.0	0.0	0.0	0.0	175.6	0.0	0.0	185.9
Federal land	19.3	22.7	16.6	101.5	34.1	11.6	0.0	0.0	0.0	0.0	23,401.0	0.0	23,606.8
CRP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1997 total	7,567.4	1,202.1	1,211.0	24,574.1	3,441.7	964.0	1,179.9	471.8	147.5	181.3	23,793.8	1,889.9	66,624.5

<sup>a</sup> Minor land uses includes farmsteads and other farm structures, field windbreaks, barren land, and marshland.

<sup>b</sup> Small water consists of streams < 660 feet wide and water bodies < 40 acres.

<sup>c</sup> Census water consists of streams >= 600 feet wide and water bodies >= 40 acres.

<sup>d</sup> CRP = Conservation Reserve Program

Source: USDA, NRCS.

This table contains both the 1982 and the 1997 land cover/use and the change in acreage that occurred between the two. For example, the 1982 total for rangeland acreage (1,000 acres) was 25,053.6 and the 1997 total was 24,574.1, with 23,704 acres that did not change classification during the time period. Reading along the rangeland row gives the number of acres that were removed from rangeland between 1982 and 1997. Reading along the rangeland column gives the number of acres that were converted to rangeland between 1982 and 1997.

**Table 2.** Colorado farms and ranches holding grazinglands (i.e., pastureland/rangeland) according to Census of Agriculture, 1978-1997.

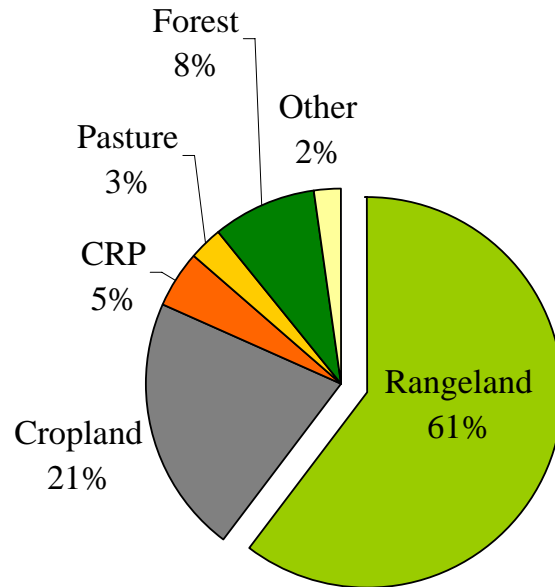
	1997	1992	1987	1982	1978	% change	
						1978-97	1982-97
Total Area (ac)	19,943,701	21,314,825	21,173,673	21,194,052	22,725,732	-12.2	-5.9
No. Operations	12,952	11,949	11,875	11,872	12,685	2.1	9.1
Avg Size (ac)	1540	1784	1783	1785	1792	-14.1	-13.7

rangelands accounted for about 41% of the urban expansion.

About 870,100 acres that were not rangeland in 1982 were reclassified as native rangelands by 1997 – about 12% of which was transferred from federal ownership.

Discounting federal lands, roughly 34% of this “new” native rangeland came from cultivated croplands; another 19% came from lands that were formerly classified as non-native pastures, while the remainder came largely from lands formerly classified as forestland. When considering the net change over the

**Colorado's Non-federal Rural Lands = 40.85 million acres**



**Figure 3.** Major land use classes for non-federal rural lands in Colorado, 1997 (Source: NRI, *Revised 2000*).

15-year period, the result was a reduction of 479,500 acres of native rangeland in Colorado.

**Regional distribution**

The 29 Colorado counties east of the eastern edge of the Rockies contain one of the largest single remaining expanses of southern shortgrass prairie. The total grazinglands on farms and ranches in these counties exceeds 14.3 million acres, and represents roughly 70% of total farm and ranch grazinglands in the state (USDA Census of Agriculture). When all non-federal ownerships are considered, the major river drainages in eastern Colorado hold about 17.9 million acres of grazinglands, again representing approximately 70% of the total nonfederal grazinglands in the state (Table 3, Figure 4).

From 1982 to 1997, those watersheds draining the short- and mixed-grass prairies of eastern Colorado experienced a cumulative loss of about 713,700 acres of grazinglands, representing a 3.8% net loss (Table 3). The greatest losses were in the South Platte and Upper Arkansas River drainages. Meanwhile, those watersheds draining the Western grasslands experienced a cumulative gain of 280,500 acres of grazinglands, representing a 3.7% net gain. At the scale of large water-

sheds, the only substantial net loss of non-federal grazinglands across Colorado's Western Grasslands appeared in the Colorado Headwaters (Table 3, Figure 4).

**Trends in farm and ranch enterprises**

According to the US Census of Agriculture, the total area of grazinglands on farms and ranches in Colorado declined by 5.9% from 1982 to 1997, while the number of grazingland based enterprises increased by about 9% (Table 2). The resulting change was a 13.7% decrease in average size of operation. These trends varied across the state according to the differences in the cumulative landowner response to economic pressures, demographics, and agricultural policies.

The actual rate at which grasslands were lost, gained, or experience a change in ownership is apparent at different scales of resolution. For example, between 1982 and 1997 the statewide change in non-federal grazinglands in Colorado suggests a net loss of only 1.6% (Table 3). When viewed in the perspective of changes across large river basins (Table 3, Figure 4), it is apparent that most losses were generally focused in those basins east of the Continental Divide and in the Colorado Headwater basin (along the Interstate-70).

**Table 3.** NRI pastureland and rangeland in Colorado (6-digit hydrologic units) and percentage change from 1982 to 1997.

Hydrologic unit	1982	1987	1992	1997	1982-97
	(1,000 acres)				(% change)
101800 North Platte	372	369	369	369	-0.8
101900 South Platte	5303	5133	5058	5058	-4.6
102500 Republican	2062	2017	2010	1992	-3.4
102600 Smoky Hill	223	218	205	211	-5.3
110200 Upper Arkansas	10125	9791	9745	9786	-3.4
110300 Middle Arkansas	87	71	71	71	-18.6
110400 Upper Cimarron	833	806	785	801	-3.8
110800 Upper Canadian	2	2	2	2	11.8
130100 Rio Grande Headwaters	1629	1618	1612	1618	-0.7
130201 Upper Rio Grande	53	49	49	49	-7.6
140100 Colorado Headwaters	1053	1095	1041	1038	-1.4
140200 Gunnison	895	895	909	920	2.8
140300 Upper Colorado-Dolores	484	461	487	504	4.3
140401 The Green River Basin	67	67	67	67	0.0
140500 White-Yampa	1803	1853	2002	2022	12.2
140600 Lower Green	8	8	8	8	0.0
140801 Upper San Juan	920	933	942	945	2.7
140802 Lower San Juan	302	305	304	326	8.0
<b>Total</b>	<b>26,218</b>	<b>25,689</b>	<b>25,664</b>	<b>25,785</b>	<b>-1.7</b>

However, when similar data are viewed at the county level, the variability among counties yields a different perspective. For example, in the Arkansas River basin, the adjacent counties of Pueblo and Las Animas experienced somewhat different fates with respect to grasslands. From 1982 to 1997, Pueblo County lost over 160,000 acres of grazinglands, while experiencing a 26% increase in the number of farms and ranches with grazinglands – the result was a 36% decrease in average ownership size. In contrast, neighboring Las Animas County increased its grazinglands on farms and ranches by over 54,000 acres while remaining relatively stable in ownership numbers. Statewide and basin-level averages tend to mask these local dynamics

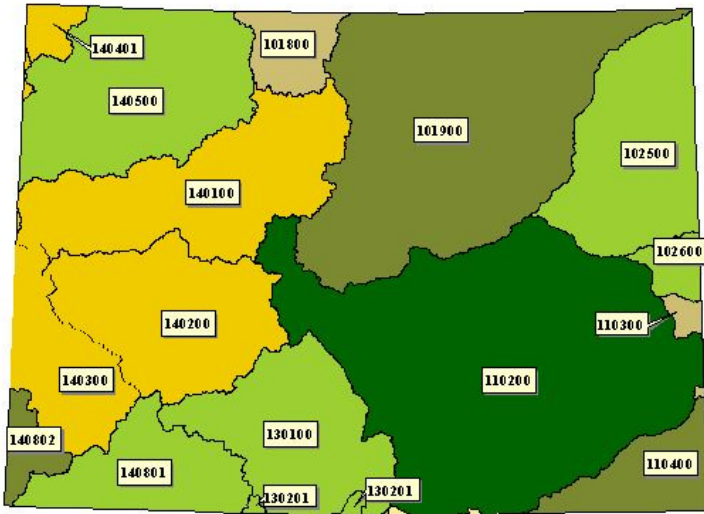
#### Ecological status and trends

The continued loss of shortgrass prairie is among the most pressing ecological issues for native grasslands in Colorado. Based on remote sensing data, about 11.2

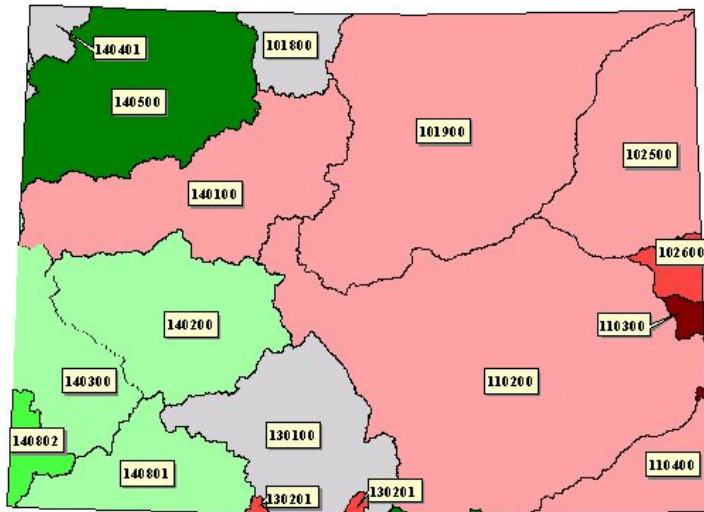
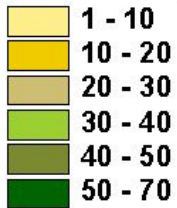
million acres of native short- and mixedgrass prairie remains in eastern Colorado; approximately 19% of which occurs on state and federal lands (EDAW 2000). This figure represents about 41% of the pre-settlement coverage by these grassland types. While much of this shortgrass prairie remains, much of what remains is of a different character and productivity than that which has been converted to cropland. Nevertheless, the remaining shortgrass prairie in Colorado continues to support important native plant and animal communities.

Many of the populations of endemic grassland birds that are typical of shortgrass prairies have shown declining trends. According to breeding bird surveys, grassland birds exhibiting the greatest declines in Colorado include Cassin's sparrow and the lark bunting. Cassin's sparrow, for example, is threatened by continued degradation and loss of grassland habitats

<sup>4</sup> Because the county-level statistics from the USDA Census of Agriculture are somewhat variable in their reporting area, comparisons among years for individual counties are not as reliable as the cumulative statistics for the state or multi-county sub-regions.



**Non-federal grasslands (% cover), 1997**



**Change in non-federal grasslands, 1982-1997**



**Figure 4.** For Colorado, (a) percent Land cover by non-federal rangeland and pasture, and (b) change in cover of non-federal rangeland and pasture from 1982 to 1997, by major river drainages. NOTE: Six-digit label for each drainage corresponds to the hydrologic unit codes in Table 3 (Source: USDA /NRCS National Resources Inventory, unpublished data from NRI state coordinator).

with a shrub component (Ruth 2000). In Colorado, Cassin's sparrows appear to have declined by an average of about 5.4% per year from 1966-1999. This is a more rapid decline than that documented for any other state in the species range.

A substantial component of the loss of plant and animal diversity in short- and mixed-grass prairies may be related to declining prairie dog populations. A 2000 survey of prairie dog colonies in the grasslands of eastern Colorado established a database that included 5001 colonies across 314,114 acres (EDAW 2000). Of these, the 2000 field survey results suggest that about 52% were active, 28% were inactive or absent, and 20% were unknown. Once adjusted for sampling procedures, they estimated a minimum of 3,069 active colonies covered approximately 214,570 acres across the former range of the species in eastern Colorado. Active colony sizes ranged from 0.04 to 4,129 acres, with 92% of the colonies being <200 acres in size. The 214 prairie dog colonies >200 acres accounted for approximately 50% of the total known area in the state. Overall, these figures suggest that known prairie dog colonies in Colorado may occupy <3% of their current potential habitat, and <1% of their pre-settlement habitat. Also of interest was the fact that the rate of habitat occupancy (% of potential habitat with active towns) on private lands was virtually the same as that on public lands.

### Summary

In this fact sheet, we focus upon the physical and ecological trends in Colorado grasslands. We briefly present and discuss the current status of Colorado grasslands, recent grassland use trends, regional distribution within the state, trends in farm and ranch enterprises concerning grasslands and grazinglands, and Colorado grassland ecological trends and status. We note that grasslands are an important native land type in Colorado, that Colorado grassland acreages are in decline and their management is changing due to a number of factors, that these trends are concentrated in particular regions of the state, and that there are important ecological implications of these land use trends. A review of the drivers of change in Colorado grassland use, written by the same authors, can be found in the following companion document APR01-07 *Drivers of Change in Colorado Grasslands* at <http://dare.agsci.colostate.edu/extension/pubs.html>. Also by the same authors, a comprehensive overview of western regional grassland trends can be found at the following address <http://www.landinfo.org> under the title

*United States Grasslands and Related Resources: An economic and biological trends assessment.*

### Acknowledgements

Without implication, the authors would like to acknowledge the National Cattlemen's Beef Association, The Nature Conservancy, and Ducks Unlimited for financial support of this work. All errors of interpretation remain unintentional and our responsibility.

### Bibliographical References

- Conner, R., A. Seidl, L. Van Tassell, and N. Wilkins. 2001. United States Grasslands and Related Resources: An economic and biological trends assessment. <http://www.landinfo.tamu.edu>
- EDAW. 2000. Black-tailed prairie dog study of eastern Colorado. EDAW, Inc. Prepared for Colorado Department of Natural Resources. 31pp.
- Kuchler, A.W. 1975. Potential natural vegetation of the conterminous United States (map). American Geographical Society. New York. 1:7,500,000.
- Ruth, J.M. 2000. Cassin's Sparrow (*Aimophila cassinii*) status assessment and conservation plan. Biological Technical Publication BTP-R6002-1999. U.S. Department of the Interior, Fish and Wildlife Service, Denver, CO.
- Seidl, A. Wilkens, N., Van Tassell, L., and R. Conner. 2001. APR01-07 Drivers of Change in Colorado Grasslands, Agricultural and Resource Policy Report, Department of Agricultural and Resource Economics, Colorado State University, Ft. Collins, CO, 80523-1172. <http://dare.agsci.colostate.edu/extension/pubs.html>
- US Department of Agriculture, National Agricultural Statistics Service (USDA/NASS). 1997 Census of Agriculture, Volume 1: National, state, and county tables. <http://www.nass.usda.gov/census/census97/volume1/vol1pubs.htm>.
- US Department of Agriculture, National Resources Conservation Service (USDA/NRCS). 2000. Summary report: 1997 National Resources Inventory (revised December 2000). <http://www.nhq.nrcs.usda.bof/NRI/1997>. 91p.