administrative and operational sites such as dams, nearly all Federal land is open and available to the public for recreation.

More than 92 percent of U.S. Federal land is located in the West, 36 percent in Alaska alone. Nearly 70 percent of all Federal land is either property of the Bureau of Land Management or the Forest Service, U.S. Department of Agriculture. Not counting Alaska, the proportion of Federal land that belongs to these two agencies rises to 84 percent. An additional 27 percent of Federal land in all 50 States is in the National Park Service and U.S. Fish and Wildlife Service. About 3 percent of Federal property is managed by water-resource agencies including the Bureau of Reclamation, Tennessee Valley Authority, and the U.S. Army Corps of Engineers. Nearly all Bureau of Reclamation land is in the West, but all of the Tennessee Valley Authority land and about 70 percent of U.S. Army Corps of Engineer areas are in the East.

Private Lands in the United States

In the following invited paper, the authors use the results of existing research to examine current patterns of land ownership as well as past, current, and projected future patterns of private land use. First, the authors examine the spatial pattern of public and private ownership in the contiguous United States. Next, they describe the uses of private land within U.S. regions, with emphasis on the distribution of undeveloped rural land uses (i.e., forest, crop, and rangeland). Then, they identify trends in non-Federal rural land area and past transitions among rural land uses. Finally, the authors discuss past patterns of urbanization of rural lands and projections of conversion in the coming decades.

INVITED PAPER

Private Lands in the United States—Their Ownership and Use

Eric M. White, Ralph J. Alig, and Anita T. Morzillo[1]

The lands of the United States are a combination of differing ownerships and land uses. Generally, the uses (e.g., forests, development) and area of public land are stable with only minor changes over time. However, although the area of the private land base is also stable over time, both land use and the types of private ownership (e.g., commercially owned lands versus land owned by individuals) change frequently. From the private land base, society receives a variety of goods (e.g., food and timber) and services (e.g., clean water and recreation). Recognizing the dynamic nature of the private land base is important in considering the uses, policies, and management of forests, rangelands, and other natural resources on both private and public land.

Ownership patterns—The land area of the contiguous 48 United States is approximately 1.9 billion acres. The Federal Government owns about 400 million of these acres. A mixture of private individuals, other private entities, State and local governments, and Native American tribal governments own the remaining 1.5 billion acres. Private lands account for the vast majority (about 85 percent) of the contiguous U.S. non-Federal land base (Lubowski and others 2006). At the State level, private lands are most common in Kansas, Nebraska, and Iowa, and least common in Nevada and Arizona (table 2.4). On average across the country, private lands constitute about 77 percent of State land area.

Table 2.4—Percent of land area in private ownership by State for the 48 contiguous United States

State	Percent	State	Percent
Alabama	97	Nebraska	98
Arizona	17	Nevada	13
Arkansas	90	New Hampshire	72
California	47	New Jersey	74
Colorado	57	New Mexico	44
Connecticut	87	New York	84
Delaware	90	North Carolina	90
Florida	74	North Dakota	89
Georgia	93	Ohio	96
Idaho	28	Oklahoma	94
Illinois	97	Oregon	44
Indiana	95	Pennsylvania	84
Iowa	98	Rhode Island	81
Kansas	99	South Carolina	91
Kentucky	94	South Dakota	69
Louisiana	92	Tennessee	92
Maine	82	Texas	96
Maryland	82	Utah	22
Massachusetts	81	Vermont	85
Michigan	78	Virginia	86
Minnesota	75	Washington	54
Mississippi	95	West Virginia	90
Missouri	93	Wisconsin	90
Montana	59	Wyoming	57

Source: National Association of State Park Directors. 2009 Annual Information Exchange. The 2009 AIX reports data from July 1, 2008, to June 30, 2009. Percent change is from Annual Information Exchange for the period July 1, 2001, to June 30, 2002. Natural areas include environmental education sites and areas classified as scientific sites. Other areas include forests, fish and wildlife areas, and other miscellaneous State park system sites.

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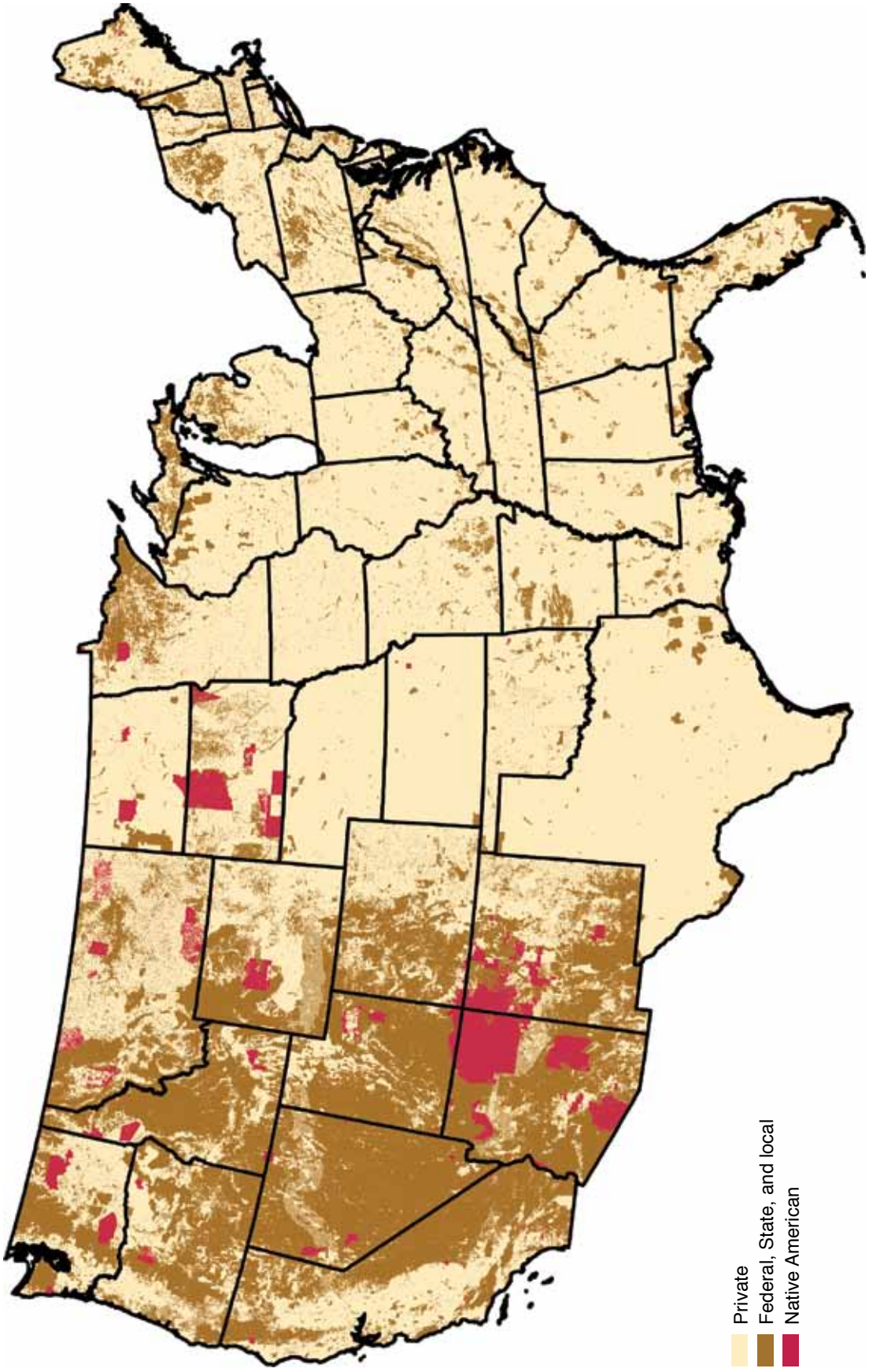

Figure 2.3—Land ownership in the contiguous United States. Data source: Protected lands of the continental U.S. (CUS_UPPT_100). Unpublished dataset, 2007. On file with D.M. Theobald, Forestry 245, Colorado State University, Ft. Collins, CO 80523.

Because of settlement patterns, Eastern U.S. lands are primarily privately owned (fig. 2.3). Publicly owned lands (primarily in Federal ownership) are a prominent fixture of the Western States. The contiguous Western States contain about 8.5 times the Federal land of the Eastern States (White and others 2010). The West also contains the majority of the American Indian tribal lands. Many of the western Federal lands are remnants of land settlements gained by treaty from foreign governments. The aggregate areas of land in both Federal and non-Federal ownership have remained stable since 1982 (USDA Natural Resources Conservation Service 2007).

Private land use—Approximately 7 percent of the non-Federal land base of the United States is used for urban and developed land uses (USDA Natural Resources Conservation Service 2007). In this research, developed land includes large and small urban and built-up lands as well as rural transportation lands (USDA Natural Resources Conservation Service and Iowa State University Statistical Laboratory 2000). Urban and developed lands are most common in the South and North regions—15 and 14 percent of non-Federal lands, respectively. New Jersey is the most developed State (42 percent of the non-Federal land base) and Montana is the least developed (2 percent of non-Federal land area).

Although developed land is common, crops, rangeland, and forest account for the vast majority of non-Federal land area in each U.S. region. These undeveloped rural land uses are most common on non-Federal land in the Great Plains, Intermountain, and South Central regions (fig. 2.4). In the Great Plains and North Central regions, crop land is the most common land use. In the Intermountain region, rangeland is the most prevalent land use. In the Northeast and Southeast, the regions with the smallest non-Federal rural land base, the majority of undeveloped rural land is forest.

Rural land use transitions—The national area of non-Federal rangeland and forest has remained relatively stable since 1982 at a little more than 400 million acres each (fig. 2.5). Even though private forest area has increased in recent decades, that increase has been slight (Smith 2009). Since 1982, the area of crop and pasture land has declined from about 550 million to about 509 million acres in 2007. The decline in crop and pasture land has remained fairly steady. For the most recent periods for which we can quantify region-level trends in rural land area, the Southeast, Northeast, South Central, and North Central regions have experienced the greatest aggregate reductions in land in crops and pasture (table 2.5). The area of land in range declined most precipitously in the Great Plains and Intermountain regions. Forest area gained in aggregate in the North Central and South Central regions, but remained generally steady or declined elsewhere.

Knowing the acreage of aggregate trends in rural land uses (e.g., fig. 2.5) is useful, but it masks underlying land use transitions involving forests, crop, pasture, and rangeland. For example, although total forest area has remained stable, some forest has been lost to urbanization, while some new forest has been gained from other rural land uses. These underlying transitions are important because many of the goods and services provided by rural lands are location specific. The addition of forest in one location may not offset the goods and services lost when forest in another location is converted to other land uses. In the Eastern States, between 1982 and 1997 (the latest year for which sub-national land conversion data are available), nearly 3 percent of forest area was converted to developed land uses and about 1 percent of forest area was converted to pasture (White and others 2010). At the same time, new forests were added from former pasture and crop lands. In the Western States, about 3 percent of forest area was converted to rangeland, and 1 percent of forest area was converted to developed uses (White and others 2010). Forests in the Western United States gained some acreage from pasture land during the same time period.

Loss of rural land to development—Between 1982 and 2003, developed land in the contiguous United States increased by nearly 57 percent. This expansion resulted in the conversion of more than 40 million acres of undeveloped non-Federal rural lands to developed uses. Between 1982 and 2007, forests provided the greatest number of acres for new development with more than 17 million acres converted, followed by crops, pasture, and range land (fig. 2.6). More than one million acres of other rural lands, which includes farmsteads, barren land, and marshland, were converted to developed uses.

Projections of developed land area expansion—The expansion of developed land is spurred in large part from demands for new housing and commercial space from increasing populations, from the desire of many to live in natural amenity-rich environments, and from many other factors. A projected population increase to more than 360 million individuals by 2030 is projected to require about 44 million more housing units (White and others 2009). Previous modeling efforts have estimated that each additional housing unit equates to about 1.2 acres of newly developed land for residential, commercial, transportation, and industrial purposes. Based on a simulation model of rural land development in the United States (White and others 2009), a projected 4 percent of the current non-Federal rural land base will be converted for developed uses by 2030. The Southeast region is projected to have the greatest percentage of non-Federal rural lands converted to developed uses, followed by the Northeast region (table 2.6). The Great Plains and Rocky Mountains regions are projected to have the smallest percentages of non-Federal

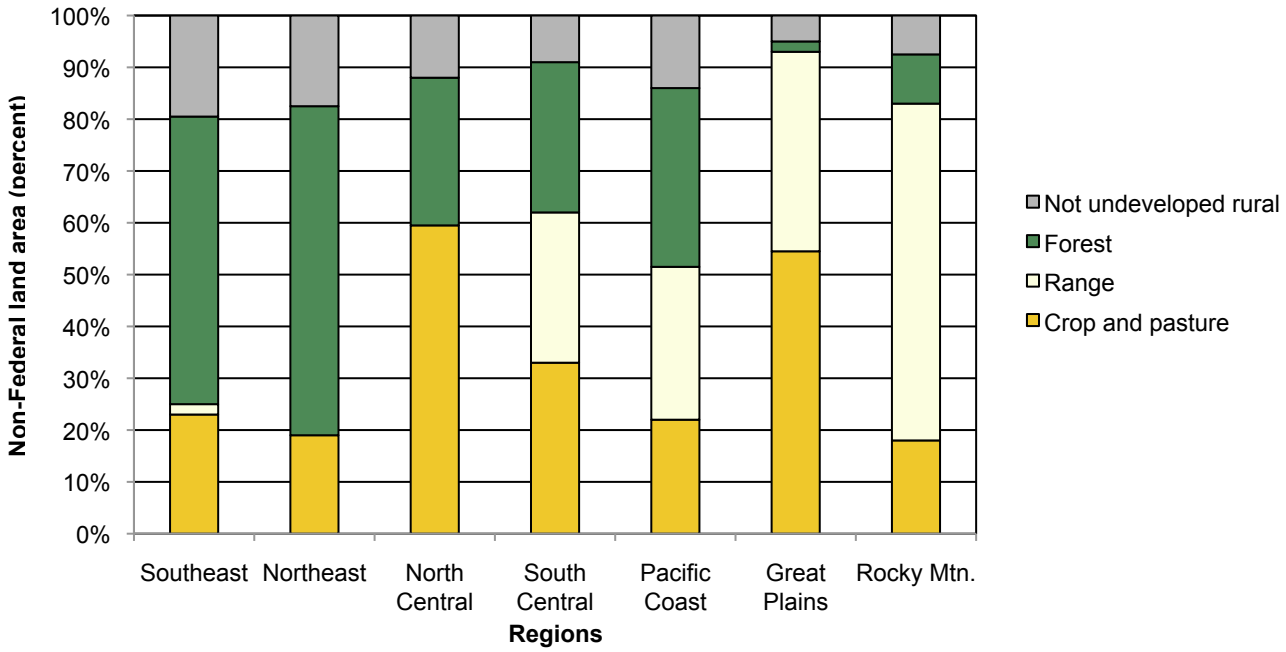

Figure 2.4—Undeveloped rural land use on non-Federal lands by U.S. region. Data source: USDA Natural Resources Conservation Service (2007).

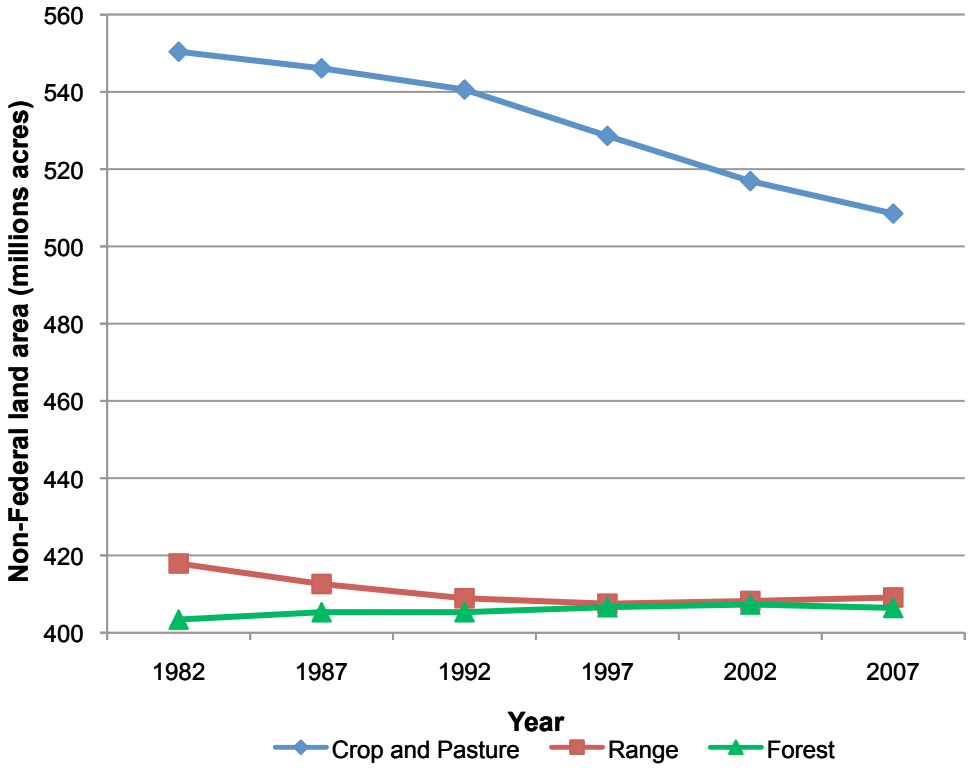

Figure 2.5—Area of non-Federal rural land in crop and pasture, range, and forest land uses, 1982–2007. Note: Crop and pasture includes Conservation Reserve Program land. Source: USDA Natural Resources Conservation Service (2009).

Table 2.5—Acreage trends for non-Federal rural land by U.S. subregion, 1982-2007 (thousands of acres)

Region	Year	Cropland	CRP land	Pasture	Range	Forest	Other rural land	Total rural land
Southeast	1982	23,830	na	13,666	4,388	77,195	5,453	124,533
	1987	21,983	550	13,890	4,060	77,001	5,431	122,915
	1992	20,113	1,210	13,967	3,524	76,333	5,420	120,567
	1997	18,695	1,179	13,470	3,212	75,656	5,650	117,861
	2002	18,106	719	12,604	2,881	75,381	5,637	115,327
	2007	17,103	683	12,331	2,636	74,908	5,794	113,455
South Central	1982	82,892	na	51,178	112,766	103,613	7,556	358,005
	1987	77,912	3,201	50,713	111,635	104,802	7,753	356,017
	1992	71,052	7,689	51,056	110,906	105,506	7,809	354,016
	1997	68,232	7,439	49,654	111,484	106,683	7,938	351,430
	2002	65,010	7,226	49,175	111,748	107,330	8,041	348,528
	2007	61,517	7,240	49,309	112,596	107,321	8,372	346,355
Northeast	1982	30,206	na	13,211	0	85,239	4,884	133,540
	1987	29,498	95	11,938	0	85,759	4,965	132,255
	1992	28,469	522	11,010	0	85,697	4,955	130,653
	1997	27,592	517	9,637	0	85,712	4,825	128,283
	2002	26,395	408	9,807	0	85,544	4,607	126,760
	2007	25,523	364	9,923	0	85,242	4,662	125,713
North Central	1982	123,630	na	32,777	129	67,363	9,351	233,250
	1987	121,530	3,120	30,334	92	67,999	9,269	232,344
	1992	116,956	7,550	29,027	88	68,526	9,223	231,369
	1997	116,836	6,975	27,240	78	69,497	9,173	229,797
	2002	115,866	6,189	27,048	78	70,251	9,159	228,592
	2007	114,423	5,955	27,566	83	70,258	9,315	227,600
Great Plains	1982	93,324	na	7,931	74,720	3,290	4,400	183,665
	1987	93,023	2,109	7,481	73,221	3,309	4,396	183,538
	1992	86,860	8,904	7,528	72,098	3,384	4,417	183,190
	1997	87,669	8,581	7,185	71,592	3,385	4,467	182,879
	2002	87,106	8,267	7,272	72,036	3,431	4,566	182,679
	2007	85,878	8,917	7,556	72,103	3,500	4,591	182,544
Intermountain	1982	43,126	na	7,453	191,146	25,984	10,405	278,113
	1987	40,240	3,762	7,561	189,299	25,843	10,523	277,228
	1992	37,413	6,484	7,962	188,687	25,605	10,943	277,094
	1997	37,069	6,328	8,323	187,677	25,794	11,157	276,348
	2002	34,815	7,319	7,937	188,407	25,521	11,225	275,222
	2007	33,023	7,631	8,197	188,862	25,465	11,205	274,382
Pacific Northwest	1982	12,108	na	3,324	15,619	25,843	1,403	58,296
	1987	11,185	860	3,359	15,424	25,756	1,385	57,970
	1992	10,513	1,556	3,355	15,340	25,619	1,390	57,772
	1997	10,387	1,500	3,201	15,215	25,441	1,521	57,265
	2002	10,229	1,689	2,783	15,302	25,398	1,563	56,965
	2007	10,067	1,887	2,615	15,308	25,326	1,584	56,788
Pacific Southwest	1982	10,431	na	1,357	19,132	14,854	3,791	49,564
	1987	10,174	118	1,447	18,843	14,867	3,822	49,270
	1992	10,066	181	1,115	18,275	14,625	3,909	48,171
	1997	9,659	173	1,072	18,285	14,428	4,018	47,635
	2002	9,573	174	1,156	17,757	14,402	4,134	47,196
	2007	9,489	174	1,120	17,532	14,390	4,118	46,823

na = Not available.
Note: The Conservation Reserve Program (CRP) was established by Congress in 1985. Because of methodological differences, the forest area estimates in this table after 1997 may differ substantially from forest area estimated by another USDA source of data, the Forest Inventory and Analysis Program of the U.S. Department of Agriculture, Forest Service.
Source: USDA Natural Resources Conservation Service (2009).

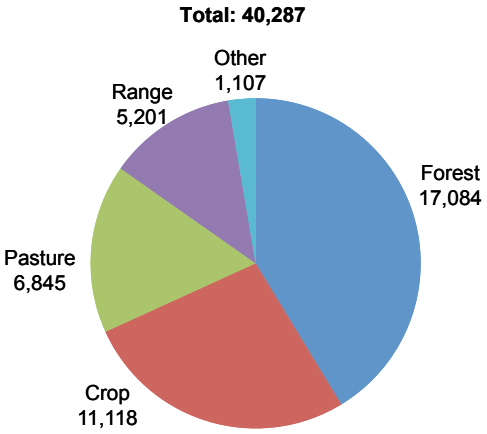

Figure 2.6—Area of non-Federal rural land in the contiguous United States converted to developed uses, 1982–2007 (thousands of acres). Note: The land use subtotals do not add to the national total of converted acres because about 1.07 million acres of developed land in 1982 were converted to other uses. Source: USDA Natural Resources Conservation Service (2009).

Table 2.6—Percent of rural land projected to be developed between 2000 and 2030 by U.S. region

Region	Percent
Southeast	15.1
Northeast	6.3
North Central	3.6
South Central	4.5
Pacific Coast	2.9
Great Plains	0.5
Rocky Mountains	1.8
Contiguous United States	4.0

Source: White and others (2009).

Scattered new houses are visible as development begins on a mountain side as seen from the Raggeds Wilderness Area on the White River National Forest in Colorado. (Photograph by Ken Cordell)

rural lands converted to developed uses. In the East, all else being equal, forest is projected to be the greatest provider of newly developed land. In the West, rangeland and cropland are projected to be the greatest providers of land for development.

In addition to reducing the area of undeveloped rural land, increases in developed land area can place remaining natural resource lands under increased pressure for provision of goods and services, such as timber production and recreation opportunities. The Southeast and South Central regions are projected to experience the greatest percentage increases in developed land area (fig. 2.7). In the West, projected percentage increases in developed land area are greatest in the Rocky Mountains region. Large projected increases in developed area in many Western States reflect both significant projected increases in population and the small relative amounts of existing developed land area.

End Invited Paper

Farm and Agricultural Land

Substantial acreages of rural land are privately owned and in use as farms and agricultural land (table 2.7). By the definitions used for the Census of Agriculture, agricultural land is that which is used mostly for crops, pasture, or grazing (USDA National Agricultural Statistics Service 2007). Also included are associated woodlands and wastelands not actually in cultivation, pasture, or grazing, but part of a farm operation. All grazing land, except government land, is included. Recreational access to these properties is typically limited to owners, their families, friends, or lessees. Table 2.7 shows that the number of farms has increased slightly since 1990, but that the average acreage per farm and total farm acreage of the United States have decreased substantially.

One of the most important uses of farm land is growing crops—occupying about 39 percent of total farm land (USDA Natural Resources Conservation Service 2009).

Table 2.7—Number and acreage of farms in 1990, 2000, and 2008

Item	Unit	1990	2000	2008
Number of farms	Thousands of farms	2,146	2,167	2,200
Land in farms	Millions of acres	987	945	920
Average per farm	Acres	460	436	418

Source: U.S. Census Bureau (2010b).

Hillside strawberry farming in 2000 in Monterey County, CA. (Photograph by Lynn Betts, USDA Natural Resources Conservation Service)

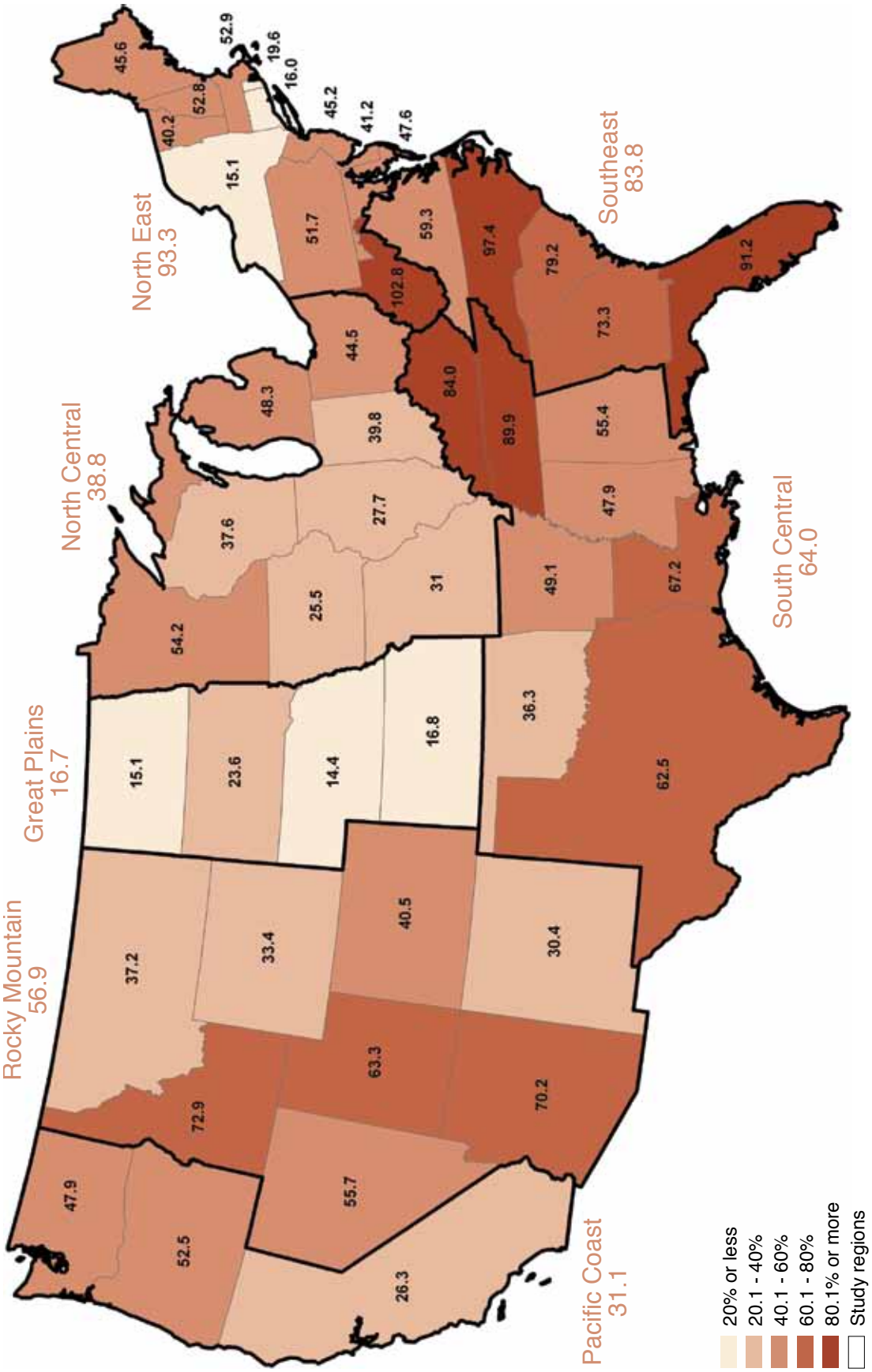

Figure 2.7—Percentage increase in developed land area projected for States and regions, 2000 to 2030. Source: White and others (2009).

Table 2.8—Acres of land in farms in the United States by type of agricultural use and RPA region, 2007

Type of agricultural use	North		South		Rocky Mountains		Pacific Coast		United States
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Total Acres
Cropland	143,851,909	35.4	99,549,664	24.5	140,675,207	34.6	22,348,129	5.5	406,424,909
Woodland	22,606,724	30.1	37,523,483	50.0	9,858,854	13.1	5,109,542	6.8	75,098,603
Permanent pasture and rangeland	17,257,624	4.2	127,498,795	31.2	235,401,232	57.6	28,674,465	7.0	408,832,116
Farmsteads, buildings, livestock, ponds, roads, etc.	9,724,442	30.6	9,199,658	29.0	10,208,203	32.2	2,607,909	8.2	31,740,212
Total land in farms	193,440,699	21.0	273,771,600	29.7	396,143,496	43.0	58,740,045	6.4	922,095,840

RPA = Resources Planning Act.
Note: Percentages sum across to 100.0.
Source: USDA National Agricultural Statistics Service (2007).

According to the National Resources Inventory by the U.S. Department of Agriculture, cropland acreage has declined from about 420 million acres in 1982 to 357 million acres in 2007. About half of this reduction is the result of enrollments of environmentally sensitive cropland in the Conservation Reserve Program of the U. S. Department of Agriculture.

Total land area in farms, based on the Census of Agriculture, is shown by region in table 2.8. The greatest acreage is in the Rocky Mountains, followed by the South and North regions. The Rocky Mountains region also has the greatest acreage of permanent pasture and rangeland, nearly 58 percent of the U.S. total. The North and Rocky Mountains regions each have about one third of the Nation's cropland, and the South has about half of the Nation's farm woodland.

Unlike cropland, virtually all (99 percent) of which is in private ownership, rangeland has a substantial presence on public lands, especially on U.S. Forest Service and Bureau of Land Management lands. Almost 61 percent of "grassland pasture and range" is privately owned, with about one-fourth on Federal lands and the remainder on other public and American Indian lands (Lubowski and others 2006). The following invited paper by Reeves describes range land uses, ownership, ecosystem services, and benefits, among other concerns.

INVITED PAPER

Rangelands

Matt C. Reeves[2]

Rangelands are found in many ecoregions and are characterized by a diverse suite of vegetation. Shrublands; grasslands; alpine communities; oak, mesquite, and juniper woodlands; and deserts are all examples of rangeland. In general, rangelands are relatively remote areas where potential natural vegetation is comprised principally of grasses, forbs, grass-like plants, and shrubs, which are suitable for browsing or grazing, although the presence of herbivory is not a requisite for rangeland status. Though estimates vary, rangelands occupy approximately 662 million acres in the contiguous United States when defined using the Natural Resources Inventory definition (USDA Natural Resources Conservation Service 2009) (fig. 2.8) (Reeves and Mitchell, in press).

The majority of rangelands lie west of the 95th meridian (fig. 2.8). In the contiguous United States, roughly 662 million acres of rangelands occupy approximately 50 percent of the vegetated area, with 224 million rangeland acres occurring on Federal lands (table 2.9). The Bureau of Land Management administers roughly 139 million acres, the majority of Federal rangelands (fig. 2.9). The majority of U.S. rangelands overall, however, are privately owned (table 2.9). The U.S. rangeland base is currently quite stable, though roughly 33 percent of the historic rangeland extent has been permanently modified by human influence

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