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# A Profile of Land Use

Selected Geographies:  
Lewis and Clark County, MT

Benchmark Geographies:  
U.S.

Produced by  
**Economic Profile System**  
**EPS**  
April 10, 2018

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## About the Economic Profile System (EPS)

EPS is a free, easy-to-use software application that produces detailed socioeconomic reports of counties, states, and regions, including custom aggregations.

EPS uses published statistics from federal data sources, including Bureau of Economic Analysis and Bureau of the Census, U.S. Department of Commerce; and Bureau of Labor Statistics, U.S. Department of Labor.

The Bureau of Land Management and Forest Service have made significant financial and intellectual contributions to the operation and content of EPS.

See [headwaterseconomics.org/EPS](http://headwaterseconomics.org/EPS) for more information about the other tools and capabilities of EPS.

For technical questions, contact Patty Gude at [eps@headwaterseconomics.org](mailto:eps@headwaterseconomics.org), or 406-599-7425.



**Headwaters Economics** is an independent, nonprofit research group. Our mission is to improve community development and land management decisions in the West.



[www.blm.gov](http://www.blm.gov)

**The Bureau of Land Management**, an agency within the U.S. Department of the Interior, administers 249.8 million acres of America's public lands, located primarily in 12 Western States. It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.



[www.fs.fed.us](http://www.fs.fed.us)

**The Forest Service**, an agency of the U.S. Department of Agriculture, administers national forests and grasslands encompassing 193 million acres. The Forest Service's mission is to achieve quality land management under the "sustainable multiple-use management concept" to meet the diverse needs of people while protecting the resource. Significant intellectual, conceptual, and content contributions were provided by the following individuals: Dr. Pat Reed, Dr. Jessica Montag, Doug Smith, M.S., Fred Clark, M.S., Dr. Susan A. Winter, and Dr. Ashley Goldhor-Wilcock.

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**Note to Users:**

This is one of fourteen reports that can be created and downloaded from EPS Web. You may want to run another EPS report for either a different geography or topic. Topics include land use, demographics, specific industry sectors, the role of non-labor income, the wildland-urban interface, the role of amenities in economic development, and payments to county governments from federal lands. Throughout the reports, references to online resources are indicated in parentheses. These resources are provided as hyperlinks on each report's final page. The EPS reports are downloadable as Excel, PDF, and Word documents. For further information and to download reports, go to:

[headwaterseconomics.org/eps](http://headwaterseconomics.org/eps)

## What is the breakdown of land ownership?

This page describes the land area (in acres) and the share of the area that is private and that is managed by various public agencies.

### Land Ownership (Acres)

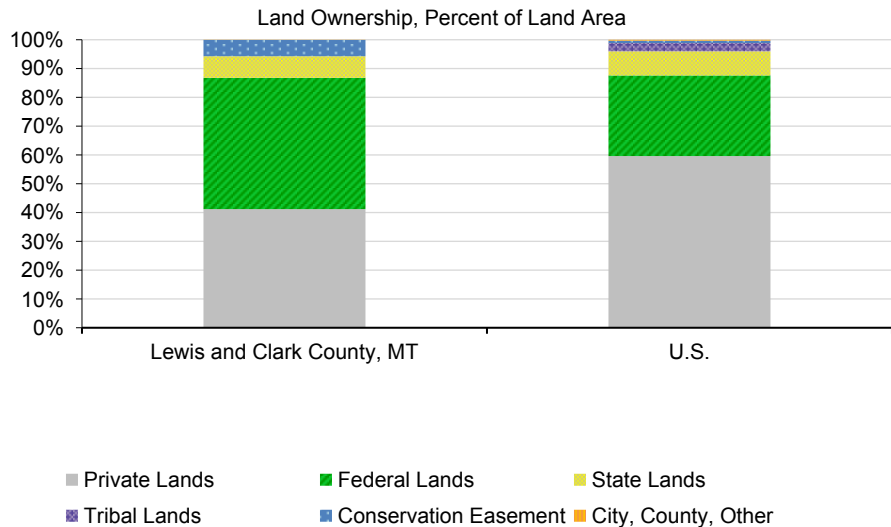
	Lewis and Clark County, MT	U.S.
<b>Total Area</b>	2,238,444	2,301,106,907
<b>Private Lands</b>	977,332	1,383,075,581
Conservation Easement	134,315	19,026,854
<b>Federal Lands</b>	1,081,932	649,455,740
Forest Service	996,857	192,507,338
BLM	73,162	242,951,818
National Park Service	0	78,773,678
Military	5,849	22,945,136
Other Federal	6,064	112,277,770
<b>State Lands</b>	177,552	194,258,469
State Trust Lands*	133,499	46,116,200
Other State	44,053	148,142,269
<b>Tribal Lands</b>	0	66,666,114
<b>City, County, Other</b>	1,629	7,650,993

### Percent of Total

<b>Private Lands</b>	43.7%	60.1%
Conservation Easement	6.0%	0.8%
<b>Federal Lands</b>	48.3%	28.2%
Forest Service	44.5%	8.4%
BLM	3.3%	10.6%
National Park Service	0.0%	3.4%
Military	0.3%	1.0%
Other Federal	0.3%	4.9%
<b>State Lands</b>	7.9%	8.4%
State Trust Lands*	6.0%	2.0%
Other State	2.0%	6.4%
<b>Tribal Lands</b>	0.0%	2.9%
<b>City, County, Other</b>	0.1%	0.3%

\* Most state trust lands are held in trust for designated beneficiaries, principally public schools. Managers typically lease and sell these lands for a diverse range of uses to generate revenues for the beneficiaries.

- Lewis and Clark County, MT has the largest share of federal public lands (48.3%), and the U.S. has the smallest (28.2%).
- The U.S. has the largest share of state public lands (8.4%), and Lewis and Clark County, MT has the smallest (7.9%).
- The U.S. has the largest share of private lands (60.1%), and Lewis and Clark County, MT has the smallest (43.7%).



## Study Guide and Supplemental Information

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### What is the breakdown of land ownership?

#### What do we measure on this page?

This page describes the land area (in acres) and the share of the area that is private and that is managed by various public agencies.

#### Why is it important?

Decisions made by public land managers may influence the local economy, particularly if public lands represent a large portion of the land base. Agency management actions that affect water quality, access to recreation, scenery (as well as other quality of life amenities), and the extent and type of resource extraction are particularly important in areas where much of the land is managed by public agencies.

With a mix of land ownership, often across landscapes that share basic similarities, there is the potential for a mix of management priorities and actions. Federal and state land managers, private land owners, and others are constrained in different ways by laws and regulations that dictate how different lands can be managed. This can lead to adjacency challenges and opportunities.

In addition, where a large portion of land is owned and managed by federal agencies, local governments may rely heavily on PILT ("Payments in Lieu of Taxes") and revenue sharing payments (e.g., Forest Service Secure Rural Schools and Community Self-Determination Act or BLM Taylor Grazing Act payments).

#### Methods

No publicly available federal database contains statistics on the area of land by ownership. The data presented in this report were calculated using Geographic Information System (GIS) tools. Two primary GIS datasets were utilized to make the calculations: U.S. Census Bureau's TIGER/Line County Boundaries: [census.gov/geo/maps-data/data/tiger-line.html](https://www.census.gov/geo/maps-data/data/tiger-line.html) (1) and U.S. Geological Survey's Protected Areas Database (PADUS): [gapanalysis.usgs.gov/padus/](https://gapanalysis.usgs.gov/padus/) (2).

Although every attempt was made to use the best available GIS land ownership dataset, the data sometimes has errors or becomes outdated. Please report any inaccuracies to [eps@headwaterseconomics.org](mailto:eps@headwaterseconomics.org).

#### Additional Resources

For more information on payments made to counties from federal public lands, see the [EPS Federal Land Payments report](#).

If accurate measurements of water surface area are needed, the U.S. Geological Survey's national hydrography dataset can be used: [nhd.usgs.gov](https://nhd.usgs.gov) (3).

#### Data Sources

U.S. Geological Survey, Gap Analysis Program. 2016. Protected Areas Database of the United States (PADUS) version 1.4; Rasker, R. 2006. "An Exploration Into the Economic Impact of Industrial Development Versus Conservation on Western Public Lands." *Society and Natural Resources*. 19(3): 191-207

What are the different types of Forest Service lands?

This page describes the size (in acres) and share of different Forest Service land designations.

U.S. Forest Service Land Types (Acres), 2009

	Lewis and Clark County, MT	U.S.
<b>Total Area</b>	2,238,444	2,301,106,907
<b>Forest Service Lands</b>	994,708	192,750,310
Unspecified Designated Area Type	503,804	146,630,207
National Wilderness	490,904	36,155,579
National Monument	0	3,661,327
National Recreation Area	0	2,950,660
National Game Refuge	0	1,198,099
National Wild River	0	568,059
National Recreation River	0	398,207
National Scenic River	0	289,617
National Scenic Area	0	230,459
Primitive Area	0	173,762
National Volcanic Monument	0	167,427
Special Management Area	0	164,707
Protection Area	0	45,051
Recreation Management Area	0	43,900
National Scenic and Wildlife Area	0	39,171
Scenic Recreation Area	0	12,645
National Botanical Area	0	8,256
National Scenic and Research Area	0	6,637
National Historic Area	0	6,540

Percent of Total

<b>Forest Service Lands</b>	44.4%	8.4%
Unspecified Designated Area Type	22.5%	6.4%
National Wilderness	21.9%	1.6%
National Monument	0.0%	0.2%
National Recreation Area	0.0%	0.1%
National Game Refuge	0.0%	0.1%
National Wild River	0.0%	0.0%
National Recreation River	0.0%	0.0%
National Scenic River	0.0%	0.0%
National Scenic Area	0.0%	0.0%
Primitive Area	0.0%	0.0%
National Volcanic Monument	0.0%	0.0%
Special Management Area	0.0%	0.0%
Protection Area	0.0%	0.0%
Recreation Management Area	0.0%	0.0%
National Scenic and Wildlife Area	0.0%	0.0%
Scenic Recreation Area	0.0%	0.0%
National Botanical Area	0.0%	0.0%
National Scenic and Research Area	0.0%	0.0%
National Historic Area	0.0%	0.0%

County specific acreages for Forest Service National Game Refuges are not available for the following states: Arkansas, Florida, Georgia, Louisiana, North Carolina, South Carolina, and Tennessee.

## Study Guide and Supplemental Information

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### What are the different types of Forest Service lands?

#### What do we measure on this page?

This page describes the size (in acres) and share of different Forest Service land designations.

Note: All acreages on this page were reported by the U.S. Forest Services' Land Areas Report 2009. The total acreage of Forest Service land on this page may differ from that reported on previous page due to differences in values reported by the data sources.

#### Why is it important?

These data allow the user to see the range and scale of Forest Service land designations. This information is a useful way to see whether any Forest Service lands have special designations that may affect management considerations. Different types of designation may impact the economic value and uses of associated lands.

#### Methods

County specific acreages for Forest Service National Game Refuges are not available for the following states: Arkansas, Florida, Georgia, Louisiana, North Carolina, South Carolina, and Tennessee.

#### Additional Resources

A copy of the most recent Forest Service Land Areas Report, including detailed tables, is available at: [fs.fed.us/land/staff/lar/2009/lar09index.html](https://fs.fed.us/land/staff/lar/2009/lar09index.html) (4).

Forest Service Land Areas Report definitions of terms are available at: [fs.fed.us/land/staff/lar/definitions\\_of\\_terms.htm](https://fs.fed.us/land/staff/lar/definitions_of_terms.htm) (5).

#### Data Sources

USDA, FS - Land Areas Report 2009, Oracle LAR Database

What are the different types of federal lands?

This page describes the size (in acres) and share of federal public lands managed for various purposes under differing statutory authority (see study guide text for more details on federal public land management classifications). For purposes of this section, federal public lands have been defined below as Type A, B, or C in order to more easily distinguish lands according to primary or common uses and/or conservation functions, activities, permitted transportation uses, and whether they have a special designation (often through Congressional action).

**Type A:** National Parks and Preserves (NPS), Wilderness (NPS, FWS, FS, BLM), National Conservation Areas (BLM), National Monuments (NPS, FS, BLM), National Recreation Areas (NPS, FS, BLM), National Wild and Scenic Rivers (NPS, FS, BLM), Waterfowl Production Areas (FWS), Wildlife Management Areas (FWS), Research Natural Areas (FS, BLM), Areas of Critical Environmental Concern (BLM), and National Wildlife Refuges (FWS).

**Type B:** Wilderness Study Areas (NPS, FWS, FS, BLM), Inventoried Roadless Areas (FS).

**Type C:** Public Domain Lands (BLM), O&C Lands (BLM), National Forests and Grasslands (FS).

NPS = National Park Service; FS = Forest Service; BLM = Bureau of Land Management; FWS = Fish and Wildlife

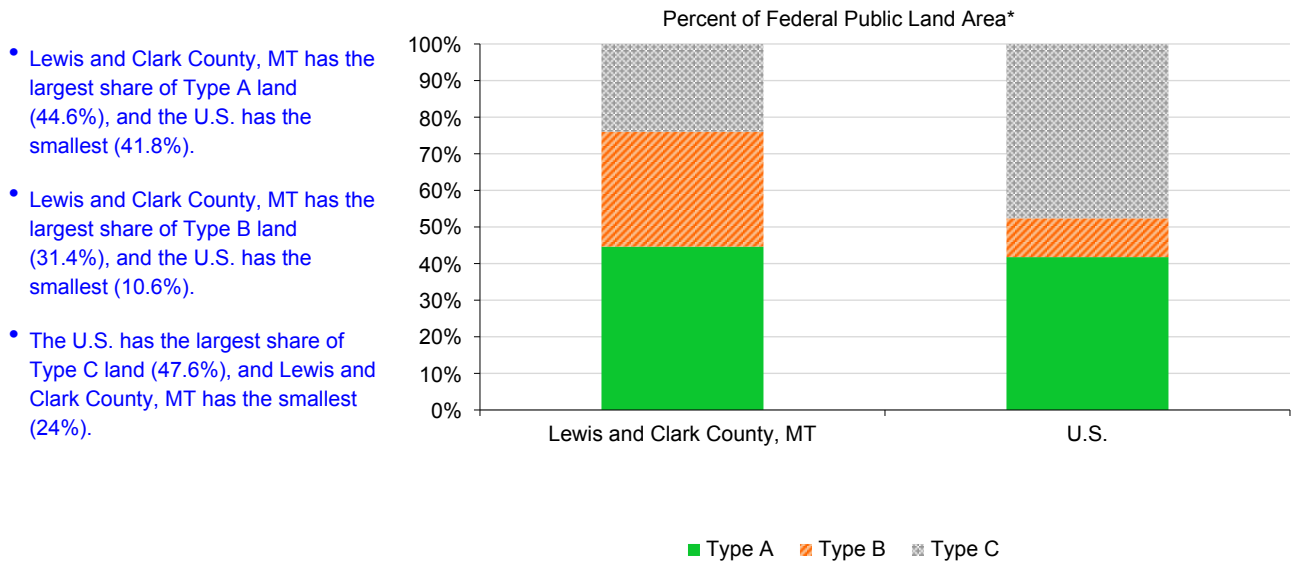
Relative Management Designations of Federal Lands (Acres)\*

	Lewis and Clark County, MT	U.S.
Total Area of Type A, B, and C	1,077,023	623,478,537
Type A	480,759	260,397,439
Type B	337,884	66,039,395
Type C	258,380	297,041,703

Percent of Total

Type A	44.6%	41.8%
Type B	31.4%	10.6%
Type C	24.0%	47.6%

\* Year for data varies by geography and source. See data sources below for more information.



Data Sources: U.S. Geological Survey, Gap Analysis Program. 2016. Protected Areas Database of the United States (PADUS) version 1.4; Rasker, R. 2006. "An Exploration Into the Economic Impact of Industrial Development Versus Conservation on Western Public Lands." Society and Natural Resources. 19(3): 191-207.



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### What are the different types of federal lands?

#### What do we measure on this page?

This page describes the size (in acres) and share of federal public lands managed for various purposes under differing statutory authority. For purposes of this section, federal public lands have been defined below as Type A, B, or C in order to more easily distinguish lands according to primary or common uses and/or conservation functions, activities, permitted transportation uses, and whether they have a special designation (often through Congressional action).

Type A lands tend to have more managerial and commercial use restrictions than Type C lands, represent smaller proportions of total land management areas (except within Alaska), and have a designation status less easily changed than Type B lands. In most other respects Type B lands are similar to Type A lands in terms of activities allowed. Type C lands generally have no special designations, represent the bulk of federal land management areas, and may allow a wider range of uses or compatible activities -often including commercial resource utilization such as timber production, mining and energy development, grazing, recreation, and large-scale watershed projects and fire management options (especially within the National Forest System and Public Domain lands of the BLM).

As more popularly described: Type A lands are areas having uncommon bio-physical and/or cultural character worth preserving; Type B lands are areas with limited development and motorized transportation worth preserving; and Type C lands are areas where the landscape may be altered within the objectives and guidelines of multiple use.

#### Why is it important?

Some types of federal lands, such as National Parks and Wilderness, can be associated with above average economic growth. These lands by themselves do not guarantee economic growth. But when combined with other factors, such as an educated workforce and access to major markets via airports, they have been shown to be statistically significant predictors of growth.

#### Methods

The classifications offered on this page are not absolute categories. They are categories of relative degrees of management priority, categorized by land designation. Lands such as Wilderness and National Monuments, for example, are generally more likely to be managed for conservation and recreation, even though there may exist exceptions (e.g., a pre-existing mine in a Wilderness area or oil and gas development in a National Monument). Forest Service and BLM lands without designations such as Wilderness or National Monuments are more likely to allow commercial activities (e.g., mining, timber harvesting), even though there are exceptions.

Land defined as either Type A, B, or C includes areas managed by the National Park Service, the Forest Service, the Bureau of Land Management, or the Fish and Wildlife Service. Lands administered by other federal agencies (including the Army Corps of Engineers, Bureau of Reclamation, Department of Agriculture, Department of Defense, Department of Energy, and Department of Transportation) were not classified into Type A, B, or C. Therefore, the total acreage of Type A, B, and C lands may not add to the Total Federal Land Area reported on page 1. Private lands and areas managed by state agencies and local government are not included in this classification. These definitions (Type A, B, and C) of land classifications are not legal or agency-approved, and are provided only for comparative purposes. A caveat: The amount of acreage in particular land types may not be the only indicator of quality. For example, Wild and Scenic Rivers may provide amenity values far greater than their land acreage would indicate.

#### Additional Resources

Studies, articles and literature reviews on the economic contribution of protected public lands are available from: [headwaterseconomics.org/land/reports/protected-lands-value](http://headwaterseconomics.org/land/reports/protected-lands-value) (6).

See also: Lorah, P. and R. Southwick. 2003. "Environmental Protection, Population Change, and Economic Development in the Rural Western United States" *Population and Environment*. 24(3): 255-272; and Holmes, P. and W. Hecox. 2002. "Does Wilderness Impoverish Rural Areas?" *International Journal of Wilderness*. 10(3): 34-39.

For an analysis on the effect on local economies, in particular on resource-based industries, from Wilderness designations, see: Duffy-Deno, K. T.. 1998. "The Effect of Federal Wilderness on County Growth in the Intermountain Western United States." *Journal of Regional Science*. 38(1): 109-136.

For the results of a national survey of residents in counties with Wilderness, see: Rudzitis, G. and H.E. Johansen. 1991. "How Important is Wilderness? Results from a United States Survey." *Environmental Management*. 15(2): 227-233.

For analysis of the role of transportation in high-amenity areas, see: Rasker, R., P.H. Gude, J.A. Gude, J. van den Noort. 2009. "The Economic Importance of Air Travel in High-Amenity Rural Areas." *Journal of Rural Studies*. 25(2009): 343-353.

#### Data Sources

U.S. Geological Survey, Gap Analysis Program. 2016. Protected Areas Database of the United States (PADUS) version 1.4; Rasker, R. 2006. "An Exploration Into the Economic Impact of Industrial Development Versus Conservation on Western Public Lands." *Society and Natural Resources*. 19(3): 191-207

What is the breakdown of forest, grassland, and other land cover types?

This page describes the size (in acres) and share of various land cover types.

Land Cover (Acres), 2006

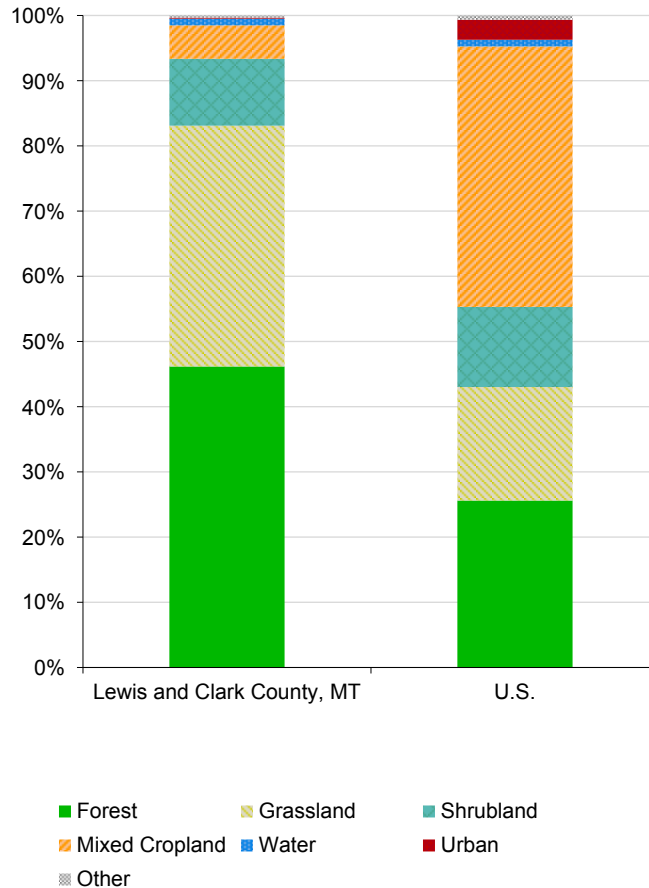
	Lewis and Clark County, MT	U.S.
Total Area	2,238,444	2,301,106,907
Forest	1,007,300	575,276,727
Grassland	805,840	391,188,174
Shrubland	223,844	276,132,829
Mixed Cropland	111,922	897,431,694
Water	22,384	23,011,069
Urban	3,457	69,033,207
Other	7,160	14,643,750

Percent of Total

Forest	45.0%	25.0%
Grassland	36.0%	17.0%
Shrubland	10.0%	12.0%
Mixed Cropland	5.0%	39.0%
Water	1.0%	1.0%
Urban	0.2%	3.0%
Other	0.3%	0.6%

Land Cover, Percent of Land Area, 2006

- Lewis and Clark County, MT has the largest share of forest cover (45%), and the U.S. has the smallest (25%).
- Lewis and Clark County, MT has the largest share of grassland cover (36%), and the U.S. has the smallest (17%).
- The U.S. has the largest share of shrubland cover (12%), and Lewis and Clark County, MT has the smallest (10%).



## Study Guide and Supplemental Information

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### What is the breakdown of forest, grassland, and other land cover types?

#### What do we measure on this page?

This page describes the size (in acres) and share of various land cover types.

The National Aeronautics and Space Administration's (NASA) Moderate Resolution Imaging Spectroradiometer (MODIS) Land Cover Type Classification identifies 17 classes of land cover. These classes were summarized into seven classes as follows:

Forest: This is an aggregate of the following NASA MODIS classes: Evergreen Needleleaf Forest, Evergreen Broadleaf Forest, Deciduous Needleleaf Forest, Deciduous Broadleaf Forest, and Mixed Forest

Grassland: This is an aggregate of the following NASA MODIS classes: Grasslands, Savannas

Shrubland: This is an aggregate of the following NASA MODIS classes: Closed Shrubland, Open Shrubland, and Woody Savannas.

Mixed Cropland: This is an aggregate of the following NASA MODIS classes: Croplands, and Cropland/Natural Vegetation Mosaic.

Water: This is the same in the original NASA MODIS classification.

Urban: This is Urban and Built-Up in the original NASA MODIS classification.

Other: This is an aggregate of the following NASA MODIS classes: Permanent Wetlands, Snow and Ice, Barren or Sparsely Vegetated, and Unclassified.

#### Why is it important?

The mix of land cover influences a range of socioeconomic and natural factors, including: potential and suitable economic activities, the potential for wildfire, the availability of different recreation opportunities, water storage, and other cultural and economic factors.

#### Methods

NASA's MODIS Land Cover Type data was selected because it is publicly available across the globe and has a relatively small number of general classes that were easily summarized.

#### Additional Resources

For more information about NASA's MODIS Land Cover Type data, see: [modis-land.gsfc.nasa.gov/](https://modis-land.gsfc.nasa.gov/) (7).

Landcover data is available from many sources. Other commonly used datasets in the United States are the U.S. Geological Survey's National Land Cover Dataset and state and regional GAP datasets available from the U.S. Geological Survey's National Biological Information Infrastructure. Information about these and many other land cover datasets can be viewed at [landcover.usgs.gov/landcoverdata.php](https://landcover.usgs.gov/landcoverdata.php) (8).

For information on wildfire, see the EPS Development and Wildland-Urban Interface report.

#### Data Sources

NASA MODIS Land Cover Type Yearly L3 Global 1km MOD12Q1, 2006

## What are the trends in residential land-use conversion?

This page describes the area (in acres) used for housing and the rate at which this area is growing.

Urban/Suburban: Average residential lot size < 1.7 acres.

Exurban: Average residential lot size 1.7 - 40 acres.

Total Residential: Cumulative acres of land developed at urban/suburban and exurban densities.

## Residential Development (Acres), 2000-2010

	Lewis and Clark County, MT	U.S.
<b>Total Private Land</b>	977,332	1,383,075,581
<b>Total Residential, 2000</b>	47,120	190,918,648
Urban/Suburban, 2000	7,804	31,001,465
Exurban, 2000	39,316	159,917,167
<b>Total Residential, 2010</b>	65,553	214,475,717
Urban/Suburban, 2010	9,346	37,816,640
Exurban, 2010	56,208	176,659,056
<b>Percent Change in Total Residential</b>	39.1%	12.3%

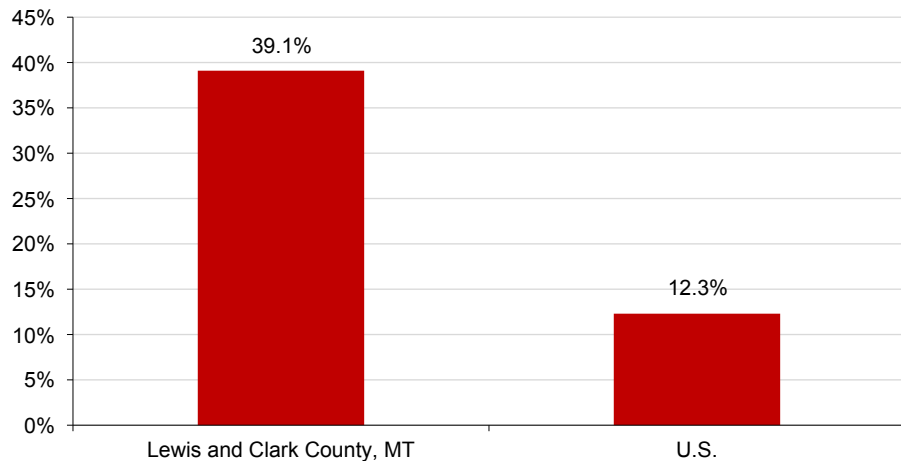
### Percent of Total\*

<b>Total Residential, 2000</b>	4.8%	13.8%
Urban/Suburban, 2000	0.8%	2.2%
Exurban, 2000	4.0%	11.6%
<b>Total Residential, 2010</b>	6.7%	15.5%
Urban/Suburban, 2010	1.0%	2.7%
Exurban, 2010	5.8%	12.8%

\* The percentages in this table represent the percent of private land developed at various housing densities, and should not sum to 100%.

Percent Change in Area, Total Residential Development, 2000-2010

- From 2000 to 2010, Lewis and Clark County, MT had the largest percent change in residential development (39.1%), and the U.S. had the smallest (12.3%).



## Study Guide and Supplemental Information

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### What are the trends in residential land-use conversion?

#### What do we measure on this page?

This page describes the area (in acres) used for housing and the rate at which this area is growing.

Comparisons in development patterns are made between 2000 and 2010. The data can also be used to draw comparisons between geographies. These are the latest published data available from the Decennial Census.

#### Why is it important?

In the past decade, despite the downturn in the housing market, the conversion of open space and agricultural land to residential development has continued to occur at a rapid pace in many parts of the U.S. The popularity of exurban lot sizes in much of the country has exacerbated this trend (low density development results in a larger area of land converted to residential development).

This pattern of development reflects a number of factors, including demographic trends, the increasingly "footloose" nature of economic activity, the availability and price of land, and preferences for homes on larger lots. These factors can place new demands on public land managers as development increasingly pushes up against public land boundaries. For example, human-wildlife conflicts and wildfire threats may become more serious issues for public land managers where development occurs adjacent to public lands. In addition, there may be new demands for recreation opportunities and concern about the commodity use of the landscape.

Geographies with a large percent change in the area of residential development often have experienced significant in-migration from more urbanized areas. Counties with a small percent change either experienced little growth or were already highly urbanized in 2000.

#### Methods

Statistics are provided for residential areas developed at relatively high densities (urban/suburban areas where the average residential lot sizes are less than 1.7 acres) and those developed at relatively low densities (exurban areas where the average lot sizes are between 1.7 and 40 acres). Urban/suburban areas, as shown here, combine "urban" housing densities (less than 0.25 acres per unit, and "suburban" housing densities (0.25–1.7 acres per unit). Urban and suburban are represented in one class because they often represent a small proportion of the land area within counties. Lot sizes greater than 40 acres are more typical of working agricultural landscapes and are not considered residential, and therefore are not discussed here.

#### Additional Resources

For an overview of past national land-use trends, see:

Brown, D.G., K.M. Johnson, T.R. Loveland, and D.M. Theobald. 2005. Rural land-use trends in the conterminous United States, 1950–2000. *Ecological Applications* 15: 1851–1863.

The following papers provide an overview of the ecological effects of residential development. The last two papers focus on the effects of land-use change on nearby protected landscapes:

Hansen, A.J., R. Knight, J. Marzluff, S. Powell, K. Brown, P. Hernandez, and K. Jones. 2005. Effects of exurban development on biodiversity: patterns, mechanisms, research needs. *Ecological Applications* 15:1893–1905.

Hansen, A.J., and R. DeFries. 2007. Ecological mechanisms linking protected areas to surrounding lands. *Ecological Applications* 17:974–988.

Gude, P.H., Hansen, A.J., Rasker, R., Maxwell, B. 2006. "Rates and Drivers of Rural Residential Development in the Greater Yellowstone." *Landscape and Urban Planning*. 77: 131-151.

For more information on development and wildfire, see the EPS Development and Wildland-Urban Interface report.

#### Data Sources

Theobald, DM. 2013. Land use classes for ICLUS/SERGoM v2013. Unpublished report, Colorado State University

## What are the trends in residential land-use conversion?

This page describes the per capita area (in acres) used for housing and the rate at which this area is growing on a per capita basis.

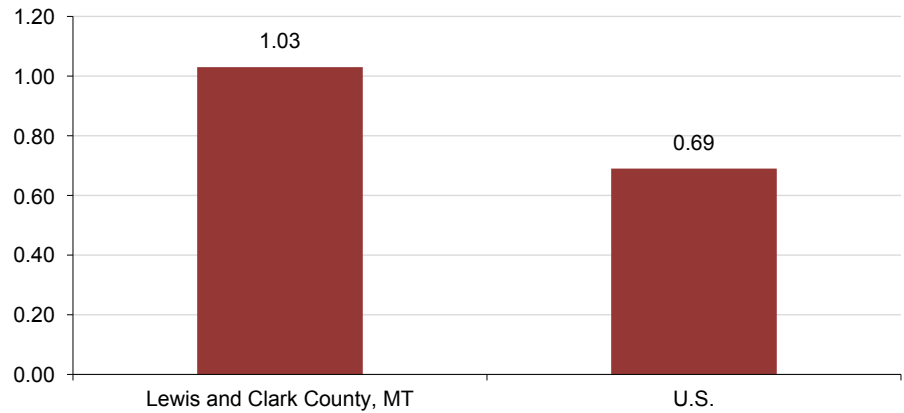
### Population Density, 2000-2010

	Lewis and Clark County, MT	U.S.
Residential Acres/Person, 2000	0.84	0.67
Residential Acres/Person, 2010	1.03	0.69
Change in Residential Acres/Person, 2000-2010*	0.19	0.02
Private Acres/Person, 2010	15.37	4.43

\* The percentages in this table represent the percent of private land developed at various housing densities, and should not sum to 100%.

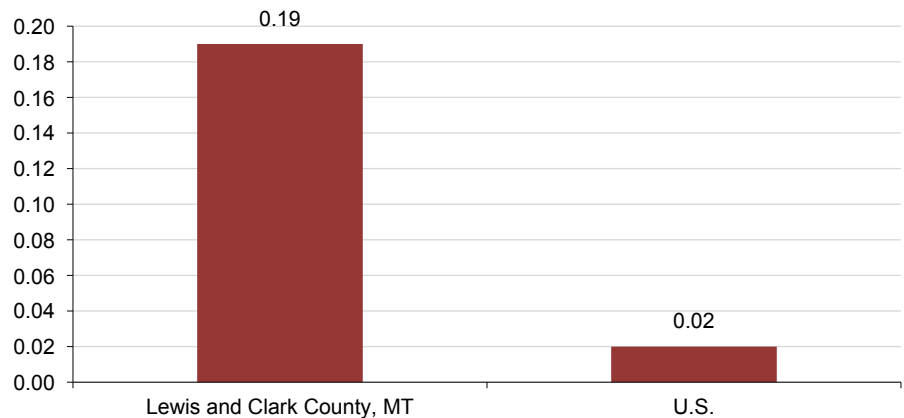
Average Residential Acres per Person, 2010

- In 2010, Lewis and Clark County, MT had the largest average acreage in residential development per person (1.03 acres), and the U.S. had the smallest (0.69 acres).



Change in Average Residential Acres per Person, 2000-2010

- From 2000 to 2010, Lewis and Clark County, MT had the largest change in average acreage in residential development per person (0.19 acres), and the U.S. had the smallest (0.02 acres).



## Study Guide and Supplemental Information

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### What are the trends in residential land-use conversion?

#### What do we measure on this page?

This page describes the per capita area (in acres) used for housing and the rate at which this area is growing on a per capita basis.

Per capita consumption of land used for housing is a measure of the pattern of development (i.e., denser or more sprawling). Comparisons in development patterns are made between 2000 and 2010. The data can also be used to draw comparisons between geographies.

Areas with negative values of change in residential acres/person were more densely developed in 2010 than in 2000. Large positive values of change indicate that an area was substantially more sprawling in 2010 than it was in 2000. This latter trend indicates that exurban development has increased. These are the latest published data available from the Decennial Census.

#### Why is it important?

Population growth is often a key metric used to describe human effects on natural resources. However, in most geographies land consumption is outpacing population growth. In these areas, land consumption (the area of land used for residential development) is strongly related to wildlife habitat loss and the degree to which public lands are bordered by residential development. The impact of residential development on ecological processes and biodiversity on surrounding lands is widely recognized. They include changes in ecosystem size, with implications for minimum dynamic area, species–area effect, and trophic structure; altered flows of materials and disturbances into and out of surrounding areas; effects on crucial habitats for seasonal and migration movements and population source/sink dynamics; and exposure to humans through hunting, exotics species, and disease.

The degree to which development patterns have changed (becoming more or less dense) between 2000 and 2010 is shown in the table and figure on this page. It's important to note that a small change does not indicate that a county is not sprawling, but rather that the pattern of development has not changed substantially over the time period. Geographies with high positive values of change were more sprawled in 2010 than in 2000. In parts of the country where development was less dense in 2010 than in 2000, the primary reason is often the increasing popularity of exurban / large lot development. Outside of urban areas, development on exurban lots has increased sharply since the 1970s in many parts of the country.

The pattern of land consumption in 2010 shown in the top figure, Average Residential Acres per Person, is equally important as the change in land consumption shown in the bottom figure Change in Average Residential Acres per Person. Geographies where the average number of residential acres per person is greater than one acre have considerable sprawling development.

#### Methods

Land consumption is expressed as the average number of acres that each person uses for housing (the average lot size) within a geography. Importantly, these figures refer only to residential development and do not include farms or ranches greater than 40 acres. Population density is also displayed as the acres of private land per person.

#### Additional Resources

The following papers provide an overview of the ecological effects of residential development. The second paper focuses on the effects of land-use change on nearby protected landscapes:

Hansen, A.J., R. Knight, J. Marzluff, S. Powell, K. Brown, P. Hernandez, and K. Jones. 2005. Effects of exurban development on biodiversity: patterns, mechanisms, research needs. *Ecological Applications* 15:1893–1905.

Hansen, A.J., and R. DeFries. 2007. Ecological mechanisms linking protected areas to surrounding lands. *Ecological Applications* 17:974–988.

For more information on development and wildfire, see the EPS Development and Wildland-Urban Interface report.

#### Data Sources

Theobald, DM. 2013. Land use classes for ICLUS/SERGoM v2013. Unpublished report, Colorado State University

## Data Sources

The EPS Land-Use report uses national data sources to represent land cover and residential development. In an effort to report more accurate statistics for land ownership, a compilation of state level data was used. All the data in this report were the result of calculations made in Geographic Information Systems (GIS). The contact information for databases used in this profile is:

- **TIGER/Line County Boundaries 2012**  
Bureau of the Census, U.S. Department of Commerce  
<http://www.census.gov/geo/maps-data/data/tiger.html>
- **Protected Areas Database v 1.3 2012**  
U.S. Geological Survey, Gap Analysis Program  
<http://gapanalysis.usgs.gov/padus/>
- **Developed Areas 2000 and 2010**  
Theobald, DM. 2013. Land use classes for ICLUS/SERGoM v2013. Unpublished report, Colorado State University.
- **MODIS Land Cover Type 2006**  
National Aeronautics and Space Administration  
<http://modis-land.gsfc.nasa.gov/landcover.htm>
- **USDA, Forest Service**  
Land Areas Report 2009, Oracle LAR Database  
<http://www.fs.fed.us/land/staff/lar/2009/lar09index.html>

## Methods

EPS core approaches

EPS is designed to focus on long-term trends across a range of important measures. Trend analysis provides a more comprehensive view of changes than spot data for select years. We encourage users to focus on major trends rather than absolute numbers.

EPS displays detailed industry-level data to show changes in the composition of the economy over time and the mix of industries at points in time.

EPS employs cross-sectional benchmarking, comparing smaller geographies such as counties to larger regions, states, and the nation, to give a sense of relative performance.

EPS allows users to aggregate data for multiple geographies, such as multi-county regions, to accommodate a flexible range of user-defined areas of interest and to allow for more sophisticated cross-sectional comparisons.



# Links to Additional Resources

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## For more information about EPS see:

[headwaterseconomics.org/EPS](http://headwaterseconomics.org/EPS)

## Web pages listed under Additional Resources include:

Throughout this report, references to on-line resources are indicated with italicized numbers in parentheses. These resources are provided as hyperlinks here.

- 1 <https://www.census.gov/geo/maps-data/data/tiger-line.html>
- 2 [gapanalysis.usgs.gov/padus/](http://gapanalysis.usgs.gov/padus/)
- 3 [www.nhd.usgs.gov](http://www.nhd.usgs.gov)
- 4 [www.fs.fed.us/land/staff/lar/2009/lar09index.html](http://www.fs.fed.us/land/staff/lar/2009/lar09index.html)
- 5 [www.fs.fed.us/land/staff/lar/definitions\\_of\\_terms.htm](http://www.fs.fed.us/land/staff/lar/definitions_of_terms.htm)
- 6 [headwaterseconomics.org/land/reports/protected-lands-value](http://headwaterseconomics.org/land/reports/protected-lands-value)
- 7 <http://modis-land.gsfc.nasa.gov/>
- 8 [www.landcover.usgs.gov/landcoverdata.php](http://www.landcover.usgs.gov/landcoverdata.php)