Integrating Agriculture and Other Land Use Statistics: the U.S. Experience[1]

Cindy Nickerson, PhD
USDA-ERS
1800 M Street, NW, Room S4029
Washington, DC 20036
cnickerson@ers.usda.gov

ABSTRACT

Land use changes have important economic and environmental implications for a host of policy issues, including commodity production and trade, soil and water conservation and open space. A first step in the study of land use changes is developing consistent sets of land use statistics over time. Also, emerging data requirements related to global warming, biofuel production and other issues require that land use statistics from all major land uses within a country – including agriculture, forestry, urban and other uses – be systematically collected and reported over time. Yet typically, federal agencies develop statistics that tend to focus on a single type of land use to meet own-agency needs. These agency-specific estimates can be based on different collection criteria and widely varying definitions of land use. The result is that individual agencies may develop land use statistics for particular sectors that collectively, do not sum to the total land in the U.S.

The U.S. Department of Agriculture's Economic Research Service (ERS) has served as a source of major land-use estimates in the United States for over 50 years. The major land use series is the only consistent inventory of all major uses of land in the U.S., including both publicly held and privately held land. These land use statistics are used in a number of official US Government Reports, including the Economic Report of the President and the Statistical Abstract of the US. They are also used in analyses examining trends in land, water and biological resources and in reports on the condition of natural resources in the agricultural sector. They are also source data for a variety of economic analyses, including those that examine evidence on the relationship between agricultural land-use changes, soil productivity, and indicators of environmental sensitivity, and in studies explaining the forces driving changes in land use patterns.

This paper explains the various sources of data, and the methods, that ERS uses to develop its major land use estimates. The challenges faced in using different data sources on agricultural land use to develop these statistics, as well as challenges in reconciling data from different survey agencies, are described. Strategies for addressing those challenges are also identified.

[1] The views expressed here are those of the author, and may not be attributed to the Economic Research Service or the U.S. Department of Agriculture.

I. Introduction

Land use changes have important economic and environmental implications for a host of policy issues, including commodity production and trade, soil and water conservation, and open space. While understanding land use patterns and managing the impacts of land use changes has been a longstanding interest of policymakers, the last two decades in particular have witnessed more attention devoted to land use. The increased interest stems in part from the promotion of biofuel and other policies that can have significant environmental impacts arising from direct and indirect land use changes.

A necessary step in the study of land use changes and resulting impacts is developing consistent sets of land use statistics over time. Also, existing and emerging data requirements related to global warming, biofuel production and other issues require that land use statistics from all major land uses within a country – including agriculture, forestry, urban and other uses – be systematically collected and reported over time. Yet typically, federal agencies develop statistics that tend to focus on a single type of land use to meet own-agency needs . This agency-specific estimates can be based on different collection criteria and widely varying definitions of land use. The result is that individual agencies may develop land use statistics for particular sectors that collectively, do not sum to the total land in the U.S.

The U.S. Department of Agriculture's Economic Research Service (ERS) has produced estimates of land in major land use categories in the United States for over 50 years. The major land use series is the only consistent accounting of all major uses of land in the U.S., including both publicly held and privately held land. These land use statistics are used in a number of official US Government Reports, including the Economic Report of the President and the Statistical Abstract of the US. They are also used in analyses examining trends in land, water and biological resources and in reports on the condition of natural resources in the agricultural sector. They also are source data for a variety of economic analyses, including those that examine evidence on the relationship between agricultural land-use changes, soil productivity, and indicators of environmental sensitivity, and in studies explaining the forces driving changes in land use patterns.

Few sentences on how the MLU effort supports the 3 pillars to the global strategy (mainly the first one, establishing a minimum set of core data)

This paper provides background on land use trends in the U.S. over the last 50 plus years, and explains the methods and sources of data ERS uses to develop its major land use estimates. The challenges faced developing these statistics are described. Recent advances in satellite imagery and scope of coverage suggest these remote sensing data could provide a single comprehensive source of data for land use estimates, but using land cover to estimate land uses has tradeoffs and these limitations are described. Strategies for addressing challenges are also identified.

II. MLU estimates: what they reveal about US land use trends

The U.S. has a land area of about 2.3 billion acres. The MLU estimates identify how this land is allocated among a variety of uses. The vast majority of land in the U.S. is in rural land uses, including forest uses, grassland pasture and range, and cropland (figure 1). In 2007, about 29 percent of the land area (657 million acres) was in forest uses, 27% (613 million acres) in grassland pasture and range, and 18% (408 million acres) in cropland uses.

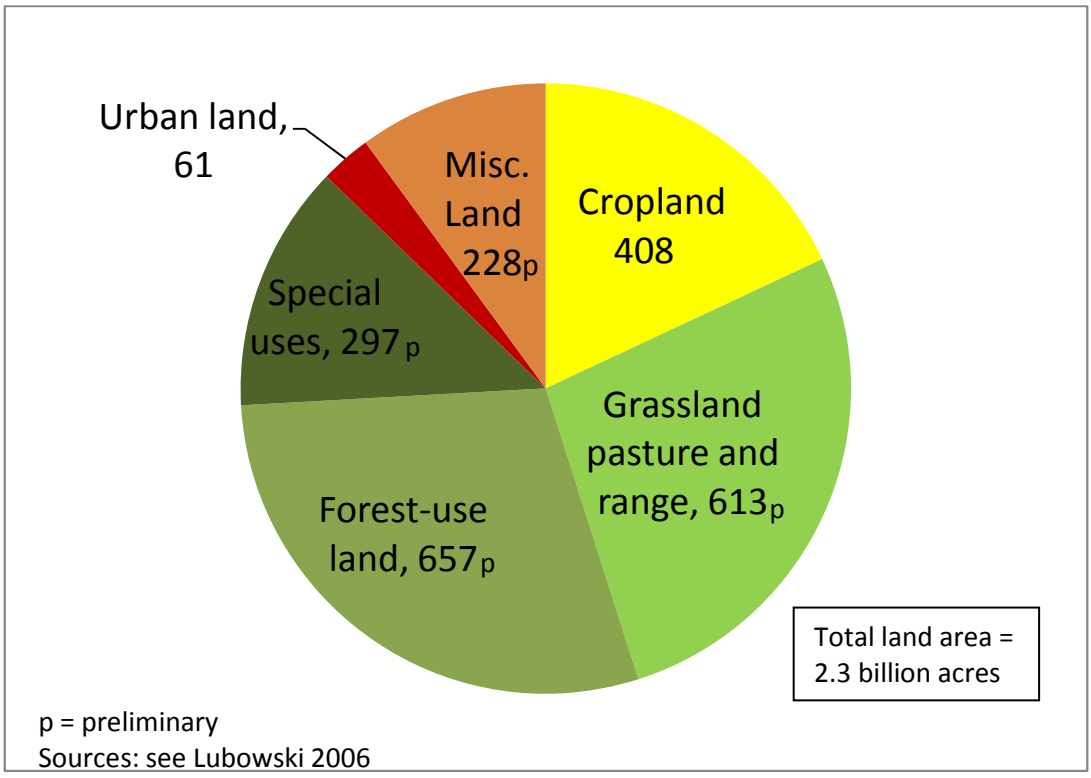

Figure 1. Major Uses of Land in the U.S., 2007 (million acres)

Although the farming sector's contribution toward U.S. GDP has averaged roughly 1.3 percent of GDP over the past ten years, a significant portion of the land base is devoted to farming. In 2007, land used for agricultural purposes – cropland, grassland pasture and range, grazed forest land and special uses (land in farmsteads and farm roads) – totaled over 1.16 billion acres, representing about 51% of total U.S. land area.[2] Land in an agricultural use has declined slightly since 1982, when it comprised 54% of total U.S. land area (table 1).

[2] The term 'agricultural land' includes all land uses, regardless of ownership. This includes more land than the concept of 'land in farms' used by USDA's National Agricultural Statistics Service. Land in farms consists primarily of agricultural land used for crops, pasture, or grazing. It also includes woodland and wasteland not being used for agricultural purposes (crop cultivation or grazing) as long as it was part of a farmer's total operation, as well as idled cropland (land used for cover crops or soil improvement, and land in conservation programs such as the Conservation Reserve Program and the Wetlands Reserve Program). Agricultural land includes these land uses, as

Table 1. Agricultural uses of land, 1982 and 2007

	1982	2007
	Acres (millions)	
Cropland	469	408
Grassland, pasture, and range	597	613p
Forest Land grazed	158	134p
Special Uses (farmsteads, farm roads)	8	11
Total	1,232	1,166p

Note: includes all 50 US States. Cropland includes all land in crop rotation, including cropland used for crops (82% of total cropland in 2007), cropland used for pasture (9% of total cropland), and idle cropland (9% of total cropland).
p = preliminary

Sources: agricultural land uses are based largely on the Ag Censuses (USDA/NASS), Forest Inventory Analysis (USDA/FS), and data from DOI (NPS, FWS, BLM), DOT (BTS, FAA, FHWA, FRA), GSA and Census Bureau. See sources in Lubowski et al 2006.

While land in every use occurs in all regions of the country, some uses are more concentrated in some regions than in others. Because the MLU estimates are constructed at a state level they are useful for identifying state and regional trends (figure 2). Regions with the largest cropland acreage are the Northern Plains, Corn Belt, and Southern Plains. Grassland pasture and range is concentrated in the Mountain and Southern Plains regions. Acreage in forest use, special and miscellaneous other uses is highest in the Mountain region.

well as land that is owned by the government and used for grazing under government permits on a per-animal head basis, and an estimate of grazing on forested Federal and non-Federal land that is not in farms.

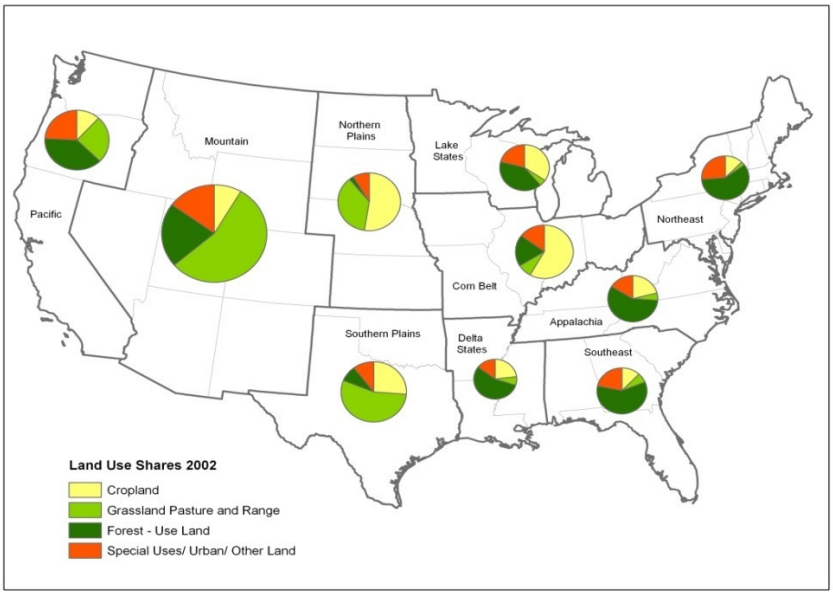

Figure 2. U.S. Land Use Shares by Region, 2002

A significant benefit of the MLU estimates is the length of the time series. The MLU estimates date back to 1945, providing a much longer time series than other sources such as USDA's National Resources Inventory (NRI). The NRI began in 1982, and estimates changes in privately owned land uses for the 48 contiguous States (it excludes Alaska and Hawaii, as well as (in all States) Federal land).[3] The length of the time series can influence the conclusions about land use trends. For example, the NRI data estimates that cropland declined about 30 million acres from 1982 to 2007, compared with the MLU estimates (for just the 48 contiguous States) which suggest the decline was about 61 million acres over the period. However, the Major Land Use data show different trends for earlier years (Figure 3).

[3] The NRI uses a probability based sampling design to sample individual points on the landscape and collects a range of information on soil and other land characteristics. Between 1982 and 1997, the NRI repeatedly sampled the same points every 5 years, which allows the construction of land use transition matrices. Since the 1997 survey, the NRI has sampled a smaller number of points on an annual basis. Based on the new annual sample, NRCS provides annual estimates of national land use and summary information on selected land-use transitions. The NRI is the official source of data on all land uses on non-federal lands for purposes of monitoring greenhouse gas inventories for Intergovernmental Panel on Climate Change purposes.

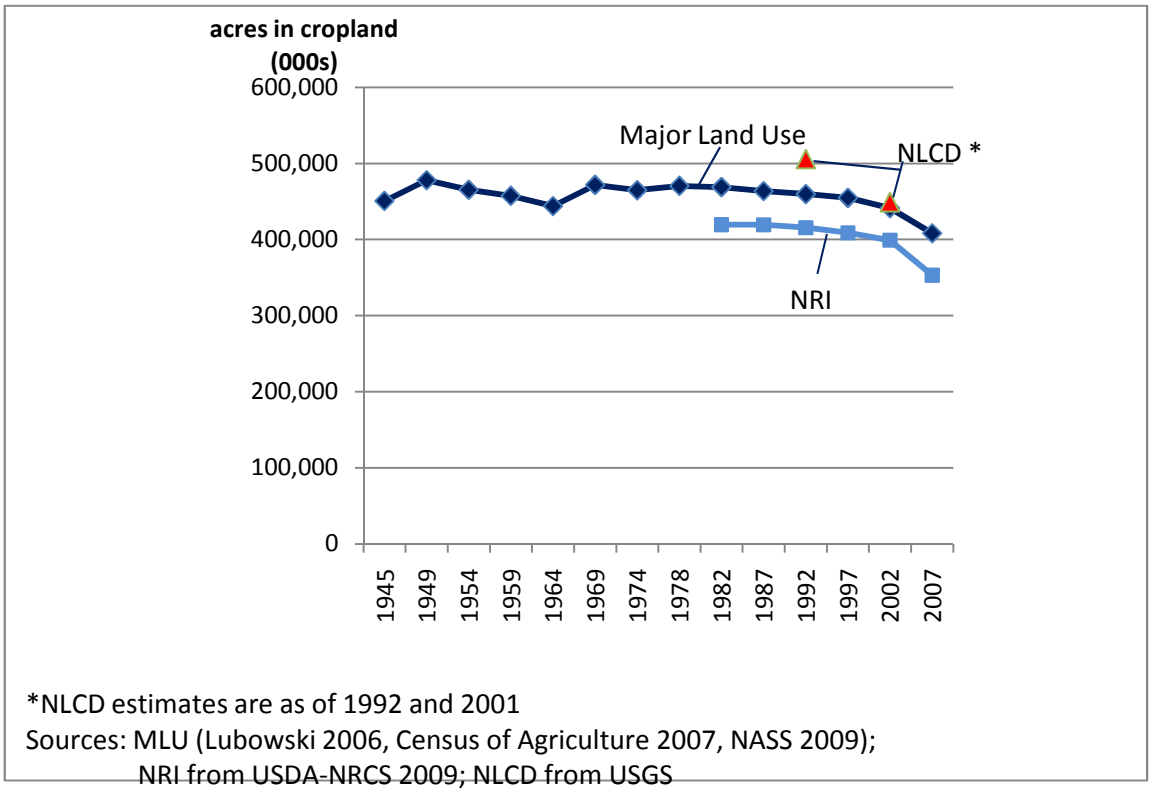

Figure 3. U.S. Land in Cropland Uses in the continental (48) States, 1945 - 2007

National trends do not always mirror regional trends, and regional patterns over the 25 years 1982-2007 do not always follow the trend in earlier periods. The MLU estimates reveal that cropland in the Northeast region has decreased dramatically since 1945, while cropland in the Mountain region has increased (table 2). Urban pressures and a comparative disadvantage in many crops have resulted in the conversion of Northeast cropland to other uses. Conversions from grassland, pasture, and range have primarily accounted for the increase in cropland in the Mountain region. Overall, the Eastern United States has tended to lose cropland, while the Western United States has tended to gain cropland.

Table 2. Cropland, by region for contiguous 48 States

							Change		
	1945	1964	1974	1982	1992	2007	1945-82	1982-07	1945-07
					million acres				
Northeast	25.0	19.2	17.3	17.0	14.3	13.0	-8.1	-4.0	-12.1
Lake States	46.2	45.0	44.1	45.0	42.5	40.6	-1.1	-4.5	-5.6
Corn Belt	92.2	94.8	100.5	100.4	99.6	91.0	8.2	-9.4	-1.2
Northern Plains	95.5	98.8	105.0	107.0	106.6	97.6	11.5	-9.4	2.1
Appalachian	35.0	28.9	30.7	30.4	29.1	22.7	-4.7	-7.7	-12.4
Southeast	27.0	18.9	20.7	20.3	18.1	12.5	-6.6	-7.9	-14.5
Delta States	22.2	20.2	25.1	25.0	23.7	18.2	2.8	-6.7	-4.0
Southern Plains	51.8	49.4	53.8	54.6	55.1	46.9	2.7	-7.6	-4.9
Mountain	32.4	43.2	42.8	43.8	46.7	43.9	11.5	0.0	11.5
Pacific	23.4	25.5	24.8	25.4	23.9	21.9	2.0	-3.5	-1.5
48 States[1]	450.7	443.8	464.7	468.9	459.7	408.3	18.2	-60.6	-42.4

[1] Distribution may not add to totals due to rounding.

Sources: Estimates for the 48 contiguous States based on data from ERS, 1992; Vesterby and Krupa, 2001; NASS, 2004a, 2005, 2009.

III. Land Cover versus Land Use

Increasingly, estimates of land cover are being developed based on satellite imagery. While these sources are providing estimates of cover for recent years, historical data are obviously lacking. The National Land Cover Dataset is a land-cover dataset covering all land types in the contiguous 48 States, that is based primarily on Landsat Thematic Mapper Imagery with a 30 meter spatial resolution. First conducted in 1990, the NLCD land cover mapping effort was done under the auspices of the Multi-Resolution Land Characteristics Consortium, a group of several U.S. Federal agencies. A second initiative led to an update to the NLCD as of 2001. The NLCD estimate of cropland uses as of 1992 and 2001 was 505 million and 449 million acres respectively, compared to the MLU estimates in 1992 and 2002 of 460 million and 442 million acres, respectively (figure 3 above).

While remote sensing data capture views from space that may be suitable for estimating land *cover*, such data may not always map easily to land *use* categories – particularly those that identify agricultural uses. For example, it is more difficult for satellite imagery to distinguish hayland (a cropping activity) from pastureland. This difficulty helps explain why the NLCD cropland estimates in figure 3 (above) are higher than the MLU estimates, because NLCD estimates include both uses (NLCD does not distinguish between pasture and hay uses). Also it is generally not possible to identify forest land that is grazed (i.e., an agricultural use of forest covered land), because forest cover is usually defined on the basis of tree canopy density.

Grazed forest land represented over 20 percent of all forest use land in 2002, so grazing is not an insignificant use of forestland. Aside from differences arising from distinguishing amongst categories, *changes* in land cover may not represent changes in land use. Changes in land cover can occur from physical processes that do not represent changes in landowner decisions. Tree canopy on pasture land may get sufficiently dense that satellite data indicates an area has "changed" land cover from grazing land to forest, when in fact the landowner still grazes livestock on the land and the land *use* has not changed. For these reasons, the U.S. MLU estimates do not rely solely on satellite imagery, though satellite data do contribute to the estimates agencies develop that ERS uses to construct the MLU estimates.

IV. MLU estimates: sources and methods for estimating land in different use categories

The MLU estimates are produced using a variety of sources that vary by land use type. Estimates of land in various uses prepared by various agencies are taken as inputs into the process, and are used to estimate the land area in six broad categories. The methods and data sources for each of the categories are described below.

Cropland. The 408 million acres of cropland in 2007 includes three main components: 335 million acres of cropland used for crops, 36 million acres of cropland pasture (pasture considered to be in long-term crop rotation), and 37 million acres of idle cropland (see Appendix 1 for definitions). The estimate of total cropland in 2007 includes total cropland as reported by the 2007 Census of Agriculture survey (USDA/NASS, 2009) plus an upward adjustment to conform to data on principal crops harvested as reported by the National Agricultural Statistics Service for 2007 (USDA/NASS, 2009).[4] Idle cropland includes land enrolled (idled) in the Federal Conservation Reserve Program (CRP) and Wetland Reserve Program (WRP) and are estimated using Census of Agriculture data and Farm Services Agency administrative data. These sources represent the most comprehensive sources of data on U.S. cropping uses. Because they are based on survey data supplemented with satellite imagery as well as administrative data on farm program enrollments, they represent a reliable source of cropland estimates.

Grassland pasture and range. The estimated 613 million acres in grassland pasture and range comprise all open land used primarily for pasture and grazing, including shrub and brush land types of pasture, grazing land with sagebrush and scattered mesquite, and all tame and native grasses, legumes, and other forage used for pasture or grazing. Because of the diversity in vegetative composition, grassland pasture and range are not always clearly distinguishable from other types of pasture and range. At one extreme, permanent grassland may merge with cropland pasture, or grassland may often be found in transitional areas with forested grazing land. The estimates in this report are composites of data from the Census of Agriculture, Bureau of Land Management, Forest Service, and several other Federal agencies. The land classed as grassland pasture and range in 2007 included 409 million acres in farms (USDA/NASS, 2004a). Also included are estimates of private grazing land not in farms and public, non-forested grazing land.

Forest-use land—The U.S. Forest Service (USFS) estimates that forest land used for all

[4] In recent years, USDA's NASS has used its Cropland Data Layer products, which are based on satellite data, as inputs into its official crop production estimates.

purposes totaled 751 million acres in 2007. The USFS estimate includes both privately and publicly held land that is at least 10% stocked by trees of any size. The ERS MLU estimate of 657 million acres in 2007 is an approximation of the land that may be expected to serve commercial forest uses, as opposed to an approximation of land having forest cover. The MLU estimate excludes an estimate of forest land in parks, wildlife areas, and similar special-purpose uses from the Forest Service's inventory of total forest land, using data from parks and recreation agencies. To eliminate all overlap with other uses that exist because of multiple use is not feasible, but the ERS estimate is a more realistic approximation of forest land use than forest cover. The ERS Forest-use land estimate includes forested grazing land. However, at any point in time, some forest-use land will always be unavailable for timber harvest – for example, some land may be economically inaccessible. In addition, private landowners may have objectives other than timber harvest. For example, Birch (1996) found that only 29 percent of the privately owned forest land is managed primarily for timber production.

Special-use areas--Special uses include areas in highway, road, and railroad rights-of-way and airports; Federal and State parks, wilderness areas, and wildlife refuges; and national defense and industrial areas. Eighty percent of special use land is in Federal and State Parks, wilderness and wildlife use. A variety of Federal and State government sources contribute to this set of estimates, including, but not limited to, USDA, Federal Aviation Agency, Department of Transportation, and Department of Defense. Individual States also own and manage large tracts of land as wildlife preserves and parks.

Urban area – Urban land area has quadrupled from roughly 15 million acres in 1945 to about 61 million acres in 2007. The Census Bureau reports that the U.S. population nearly doubled over this same period, so urban land area has increased at about twice the rate of population growth. The ERS 2007 estimate of 61 million acres in urban areas is based on data from the Census Bureau, U.S. Department of Commerce. The Census Bureau compiles urban area every 10 years, coincident with the Census of Population and the ERS uses those data; the estimates between the Census are a weighted function of urban area for the previous four decades. Urban areas includes "Urbanized areas," which are defined by the Census Bureau as densely settled areas within and adjacent to cities with 50,000 people or more, and populations of 2,500 or more that are outside of urbanized areas.

The urban area land use estimate does not include rural residential area, i.e., an estimate of the acres of land in rural areas used for housing. In 2002, ERS estimates about 94 million acres are devoted to rural residential housing. Given available data sources and the prevalence of large lots in rural areas, it is not possible to clearly distinguish rural land used for residential purposes from rural land in other uses. Rural residential land could be included in the forest, grassland pasture/range, or miscellaneous land categories.

Miscellaneous other land – This category includes other uses such as industrial and commercial sites in rural areas; cemeteries; golf courses; mining areas; marshes and swamps; sand dunes; bare rocks; deserts, tundra and other unclassified land.

Some land may fit more than one definition due to multiple uses. In determining how to classify multiple use land, the MLU estimates generally use the following decision criteria to assign land

to land use categories:

Cropland > forestland > urban area > special uses > grassland pasture/range > miscellaneous land

V. Challenges in Developing the MLU estimates

In maintaining the Major Land Uses series, ERS attempts to use a consistent methodology for measuring land use, but tradeoffs are sometimes necessary between consistency and accuracy. Several of the primary challenges faced in construction of the estimates are described below.

Variability in land use definitions and precision of estimates across sources. The greatest challenge faced in developing national land use estimates in the U.S. is the lack of complete coverage by any one data source. Merging land use estimates from various sources requires understanding each source agency's set of criteria for classifying land in different categories. It is particularly important to understand the classification of lands that conceivably fall into multiple use categories (i.e., pasture that is in crop rotation only in some years, and multiple use forest land). Also, individual agencies developing land use estimates tend to focus on particular land categories resulting in varying degrees of precision in the estimates for different categories. Taken together, these issues can give rise to substantial overlaps and gaps when comparing and merging the estimates from different sources. Estimates of grassland pasture and range have less reliable data sources than cropland and forest-use areas, in part because these lands generally are not enrolled in farm programs – so administrative data are not available against which to benchmark the estimates. Thus, this estimate is particularly subject to revision when other data sources improve their estimates. In general, more confidence should be afforded to broader land-use trends over decades rather than any particular fluctuation noted in the 5-year intervals.

Accommodating revisions to historically published estimates. Agencies are constantly improving data collection and processing methods over time. Ideally, when updates occur agencies do so in a way that allows updates to historically published data. In these cases, the MLU series can be updated historically to preserve usefulness of the estimates for trend analysis. When agencies change their methodology in ways that do not allow restatement of historical data, the only option is to note discontinuities in the text accompanying the MLU estimates (see for example, the discussion about U.S. Census Bureau changes in definitions of urban areas in Lubowski et al., 2006).

Treatment of Rural Residential Land. The use of Census data to estimate land in urban areas represent a very conservative estimate of land in urban *uses*. As previously mentioned, the Census estimates do not include some developed areas as small as 10 acres outside urban areas such as large lot developments. Because of difficulties identifying how the estimated 94 million acres (in 2002) have been classified by other data sources, ERS has not attempted to adjust estimates of other rural land use categories but has identified the issue in text accompanying the estimates. The impacts of not adjusting other rural land use estimates could be significant, however. If half of the estimated 94 million acres has been (incorrectly) classified as forested

land and the other half as grassland pasture or range, then the amount of land in those categories in 2002 was overstated by 7 and 8 percent, respectively.

In one study that examined the magnitude of the classification errors, Irwin and Bockstael compared the 2000 Census data (the most recent available) with data produced by the Maryland Department of Planning (MDP) (Irwin and Bockstael 2004). The MDP data used a combination of high altitude aerial photography and property tax assessment data that delineates every parcel by land use, including low density residential uses. They found that about 675,000 acres fell both within Census defined urban areas and MDP defined urban land, about 501,000 acres were considered urban by Census definitions but not MDP, and about 492,000 acres were considered urban by MDP but did not meet the Census definition of urban area. They also found that the less urbanized the county, the greater the amount of low density residential land that is missed by the Census definitions of urban area. While using state level data to groundtruth estimates may be feasible for small study areas, it is not feasible on a national scale – particularly since relatively few States have the advanced State-level mapping and classification capabilities and capacity that the MDP does.

Timeliness of access to underlying data sources. The ERS Major Land Use estimates are published every five years (on the same cycle as the U.S. Census of Agriculture). For most land use categories, estimates are available on the same schedule or are estimated more frequently. But some data sources are released in less frequent intervals – which necessitates tradeoffs. For example, the MLU estimate of urban areas relies on the Bureau of the Census urban area estimates developed every 10 years at the beginning of each decade, while the MLU estimate of urban area are constructed in different intervals (2002, 2007, etc.). Linear interpolations provide a means for estimating urban land uses between those updates.

When *potentially* useful land area estimates developed by other agencies are not released on a regular basis, they are less useful in developing the MLU estimates. For example, the U.S. Geological Survey's National Land Cover Database is national in scope and includes all land use types, but estimates are only available for 1992 and 2001 and those estimates were not available until well after the target year (2000 and 2008, respectively) (Yang 2008). Various reasons contribute to agency delays in releasing estimates and data, including additional time needed for groundtruthing and other data quality control efforts.

Concluding Comments: Room for Improvement in the MLU estimates?

Producing national land use estimates that account for all land, and that are reported in a consistent fashion over a long time period helps inform on the changing patterns of land uses. Understanding how a country's estimates are constructed is critical for assessing causal factors of changes in land use trends. This paper explains the process and sources of data used by ERS to construct national land use estimates.

Advances in satellite imagery and geographic information system techniques suggest new capabilities to provide comprehensive coverage and unparalleled detail on the distribution and pattern of land uses, as well as aggregate land acreage statistics. Satellite data is particularly

useful for estimating land covers, and the limitations for using such data to estimate land uses are not insignificant: grazed forest land, an agricultural use of land that represented 20 percent of forest-use land in 2002, cannot be distinguished from forest uses using satellite cover. The benefit of developing estimates based on land uses as opposed to land cover are critical for discerning the impacts of policies affecting agriculture, forestry and the natural environment because impacts occur via their impacts on landowners' decisions about how to use the land.

Though estimating land uses as opposed to cover has its benefits it also has its challenges. This paper identifies several of the most significant challenges inherent in merging estimates from various sources to estimate land uses, including challenges with reconciling data collected by different sources using different methods, accommodating revisions to historically published data sources, and addressing variability in the timing of access to underlying data sources. A challenge that is likely to remain is the reliability of estimates of grassland pasture and range. These lands tend not to be enrolled in farm programs, so there is little data available against which to benchmark the estimates. Also, official cropland estimates are produced annually and forest estimates are mandated, and when those estimates are improved the difference is often accommodated by adjusting grassland estimates.

However, it may be possible to improve the MLU estimates with respect to urban and residential land uses. Improvements in data collection techniques by other source agencies could enable ERS to better identify the extent to which rural residential lands may be included with other land use categories. Rural residential land is not an insignificant amount of land – at an estimated 94 million acres in 2002, it exceeded the 60 million acres in urban areas and represents a growing proportion of total land in the U.S. (4 percent in 2002). Doing so would enable ERS to more accurately represent other agricultural land use categories such as forested and grassland pasture and range.

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Appendix 1. Components of U.S. Cropland estimates[5]

Cropland used for crops. Consists of cropland harvested, crop failure and cultivated summer fallow.

Cropland harvested includes row crops and closely sown crops; hay and silage crops; tree fruits, small fruits, berries, and tree nuts; vegetables and melons; and miscellaneous other minor crops. In recent years, farmers have double-cropped about 4 percent of this acreage.

Crop failure consists mainly of the acreage on which crops failed because of weather, insects, and diseases, but includes some land not harvested due to lack of labor, low market prices, or other factors. The acreage planted to cover and soil improvement crops not intended for harvest is excluded from crop failure and is considered idle. In recent years, crops have failed on about 2-3 percent of the acreage planted for harvest.

Cultivated summer fallow refers to cropland in subhumid regions of the West cultivated for one or more seasons to control weeds and accumulate moisture before small grains are planted. This practice is optional in some areas, but it is a requirement for crop production in the drier cropland areas of the West. Other types of fallow, such as cropland planted to soil improvement crops but not harvested and cropland left idle all year, are not included in cultivated summer fallow but are included as idle cropland.

Cropland pasture generally is considered to be in long-term crop rotation. However, some cropland pasture is marginal for crop uses and may remain in pasture indefinitely. This category also includes land that was used for pasture before crops reach maturity and some land used for pasture that could have been cropped without additional improvement. Cropland pasture and permanent grassland pasture have not always been clearly distinguished in agricultural surveys.

Idle cropland includes land in cover and soil improvement crops and cropland on which no crops were planted. Some cropland is idle each year for various physical and economic reasons. Acreage diverted from crops to soil-conserving uses (if not eligible for and used as cropland pasture) under Federal farm programs is included in this component. Cropland enrolled in the Federal Conservation Reserve Program (CRP) and Wetland Reserve Program (WRP) is included in idle cropland.

[5] Source: Lubowski (2006).