Land resources data developed for the 2020 Resources Planning Act (RPA) Assessment[1,2] and related efforts. These data can be used to understand land cover and land use patterns—land use describes the social and economic intent for which land is used while land cover describes the vegetation, exposed land surfaces, water, and artificial structures covering the land surface at a given time—and how these patterns are changing over time[3]. These data can be used for numerous applications by private and public land management and research constituents. Examples include improving Land Management Plan Revisions, justifying management decisions, and improving stakeholder communication. Datasets of the Current and Recent Past are listed first and subdivided into Land Cover Based Datasets and Land Use Based Datasets; second are Future Projections that are all Land Use Based Datasets. Information about the wildland-urban interface is available in a separate guide.

DATA DESCRIPTION	UNITS	SPATIAL EXTENT	SPATIAL RESOLUTION	TEMPORAL DOMAIN	POTENTIAL USE*
Current and Recent Past					
			Land Cover Based Datasets		
NLCD[4] Land Cover Status and Change[†,5]	km^2 *area in NLCD classes and converted between NLCD classes*	Conterminous U.S.	County	2001, 2006, 2011, 2016 *four csv files*	National to Broad-level applications. Describes how land cover has changed over time. Can evaluate overall changes as well as area conversions between specific land cover classes (water; barren; developed (low intensity); developed (high intensity); forest; shrub; grassland/herbaceous; pasture/hay; cultivated crops; and herbaceous wetlands). The csv files contain transition matrices by county, showing status and transitions of all areas among NLCD land cover classes. There is one file for the transition matrix from 2001 to 2016, and three additional files for each of the periodic intervals (2001-2006, 2006-2011, 2011-2016).
Forest Cover Fragmentation[†,5] *Fragmentation categories derived from measurements of forest area density in five neighborhood sizes: 4.41, 15.21, 65.61, 590.49, and 5,314.41 ha*	km^2 *area in six fragmentation categories*	Conterminous U.S.	County	2001, 2006, 2011, 2016 *one csv file*	National to Broad-level applications. Examines the degree of forest cover fragmentation through forest area density which measures the amount of forest in a neighborhood surrounding a given forest area. csv file summarizes forest area by county, year, and neighborhood size in 6 fragmentation categories (core, interior, dominant, transitional, patchy, and rare). Can be used to examine trends in forest fragmentation from 2001 to 2016.

DATA DESCRIPTION	UNITS	SPATIAL EXTENT	SPATIAL RESOLUTION	TEMPORAL DOMAIN	POTENTIAL USE*
Landscape Cover Mosaics[†,5] *Landscape mosaic classification model evaluated in 65.61-ha neighborhood*	km^2 *total area, and forest area, in landscape mosaic classes and converted between landscape mosaic classes*	Conterminous U.S.	County	2001, 2016 *two csv files*	National-level to Broad-level applications. The landscape mosaic classifies a given location by the relative proportions of agriculture, developed, and natural (i.e., all other) land cover in a surrounding neighborhood, based on NLCD land cover classes. Can be used to explore an area's landscape context (surrounding land cover classes), landscape dominance (primarily agricultural, developed, or semi-natural[6]), and interface zones (a significant mixture of agriculture, developed, and/or natural land cover). One csv file provides transitions (gross change in area) among landscape mosaic classes by county from 2001 to 2016. An additional csv file provides transitions of forest area among landscape mosaic classes by county and transitions to and from forest land cover from 2001 to 2016.
Land Use Based Datasets					
Land Use Base Map[†,7]	Land use classes (map) *water, developed, forest, other/natural (including rangeland), pasture, and crop* Pixel counts (csv file) *to obtain area, multiply number of pixels by: 2.001554 for acres or 0.81 for hectares*	Conterminous U.S.	90 m (map) & County (csv file)	2020 *Static*	National-level to Base-level applications. Provides a land use base map derived from NLCD, forest land use, and rangeland extent[8] that has been harmonized with 2016 FIA forest area estimates for consistency. Changes in land use are important drivers of change in ecosystems and the resulting natural resources. Analyzing land use in an area and surrounding areas provides important context to potential pressures an area is experiencing (e.g., from development). This is the starting point for generating the "Downscaled Land Use Maps" (see datasets in the Future Projections below). County-level summaries are pixel counts by land use; area by land use can be obtained using the provided conversions.

DATA DESCRIPTION	UNITS	SPATIAL EXTENT	SPATIAL RESOLUTION	TEMPORAL DOMAIN	POTENTIAL USE*
Future Projections					
Land Use Based Datasets					
Total Land Use and Gross Land Use Change†,7 *(non-Federal lands only)*	100s of acres	Conterminous U.S.	County	2014 – 2070 *2-year timestep*	National-level to Broad-level applications. Describes how land use is projected to change over time in 5 land use classes (forest, developed, crop, pasture, rangeland). Projected land use changes track transitions among land use classes on non-Federal lands, simulated over two-year time steps starting with the base year of 2012 (based on the NRI[9]). These data can be used to examine transitions or changes to/losses from a specific use (e.g., amount of new forest gained from agricultural use or forest lost to development). These data can also be used to calculate net land use change for each specific land use type by tracking land use area at each ending period (e.g., total forest area through time). Data are available as transition probability matrices in Rdata format, providing county-level total land use and gross changes on non-Federal lands for each time step and RPA scenario-climate future[10].
Downscaled Land Use Maps†,11,12 *Spatial Realizations of Total Land Use*	Land use classes (map) *water, developed, forest, other/natural (including range), pasture, and crop* Pixel counts (csv file) *to obtain area, multiply number of pixels by: 2.001554 for acres or 0.81 for hectares*	Conterminous U.S.	90 m (map) & County (csv file)	2030 – 2070 *10-year timestep*	National-level to Broad-level applications. Describes how land uses are projected to change over time by providing downscaled spatial allocations of county-level gross land use change for each time step and RPA scenario-climate future. Projections originate from the "Land Use Base Map" described above. County-level summaries are of pixel counts by land use; area by land use can be obtained using the provided conversions (and will correspond to data from "Total Land Use and Gross Land Use Change" with the addition of public and Tribal lands). Each of 4000 rasters has an unzipped size of approximately 1.6GB.

DATA DESCRIPTION	UNITS	SPATIAL EXTENT	SPATIAL RESOLUTION	TEMPORAL DOMAIN	POTENTIAL USE*
Forest Use Fragmentation† *Fragmentation categories derived from measurements of forest area density in three neighborhood sizes: 7.29, 65.61, and 590.49 ha*	Pixel counts *to obtain area, multiply number of pixels by: 2.001554 for acres or 0.81 for hectares*	Conterminous U.S.	County	2020 – 2070 *10-year timestep*	National-level to Broad-level applications. Describes projected trends in forest fragmentation. Examines the degree of forest use fragmentation in both the "Land Use Base Map" and the "Downscaled Land Use Maps" by providing forest area density (the amount of forest in a neighborhood surrounding a given area) at each time step. Data are provided as csv files summarizing forest area in five fragmentation categories (interior, dominant, transitional, patchy, rare) by county, year, and neighborhood size. Different files are used for each RPA scenario-climate future and specific realization. Results represent the number of 90 m pixels in a fragmentation category; area can be obtained using the provided conversions.
Landscape Use Mosaics† *Landscape mosaic classification model evaluated in three neighborhood sizes: 7.29, 65.61, and 590.49 ha*	Pixel counts *to obtain area, multiply number of pixels by: 2.001554 for acres or 0.81 for hectares*	Conterminous U.S.	County	2020 – 2070 *10-year timestep*	National-level to Broad-level applications. The landscape mosaic classifies a given location in both the "Land Use Base Map" and the "Downscaled Land Use Maps" by the relative proportions of agriculture, developed, and natural (i.e., all other) land cover in a surrounding neighborhood, based on NLCD land cover classes. Can be used to explore an area's landscape context (surrounding land cover classes), landscape dominance (primarily agricultural, developed, or semi-natural[6]), and interface zones (a substantial mixture of natural land with agriculture and/or developed). Data are provided as csv files summarizing the landscape context in 19 landscape mosaic categories by county, year, and neighborhood size. Different files are used for each RPA scenario-climate future and specific realization. Results represent the number of 90 m pixels in a given category; area can be obtained using the provided conversions.

DATA DESCRIPTION	UNITS	SPATIAL EXTENT	SPATIAL RESOLUTION	TEMPORAL DOMAIN	POTENTIAL USE*
Tree and Impervious Cover[13]	Percent	Conterminous U.S.	County	2020 and 2070	National-level to Broad-level applications. Investigates spatial and temporal projections of changes in tree and impervious cover in the "Downscaled Land Use Maps," using three RPA scenario-climate futures (average, maximum and minimum). Can be used to identify areas at greatest risk to changes in tree and impervious cover.

* A description of FS business applications by spatial scales is available in Table 1-1 of the Existing Vegetation Classification, Mapping, and Inventory Technical Guide, v2.0
† Denotes corresponding datasets exist in both the *Current and Recent Past* and *Future Projection* sections of the table

References and Footnotes:

[1] Riitters, Kurt; Coulston, John W.; Mihiar, Christopher; Brooks, Evan B.; Greenfield, Eric J.; Nelson, Mark D.; Domke, Grant M.; Mockrin, Miranda H.; Lewis, David J.; Nowak, David J. 2023. Land Resources. In: U.S. Department of Agriculture, Forest Service. 2023. Future of America's Forest and Rangelands: Forest Service 2020 Resources Planning Act Assessment. Gen. Tech. Rep. WO-102. Washington, DC: xxx-xxx. Chapter 4. https://doi.org/10.2737/WO-GTR-102-Chap4.

[2] The RPA website provides links to current and past RPA Assessments, as well as supporting data, technical reports, and webinars: https://www.fs.usda.gov/research/inventory/rpaa

[3] Nelson, Mark D.; Riitters, Kurt H.; Coulston, John W.; Domke, Grant M.; Greenfield, Eric J.; Langner, Linda L.; Nowak, David J.; O'Dea, Claire B.; Oswalt, Sonja N.; Reeves, Matthew C.; Wear, David N. 2020. Defining the United States land base: a technical document supporting the USDA Forest Service 2020 RPA assessment. Gen. Tech. Rep. NRS-191. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 70 p. https://www.fs.usda.gov/treesearch/pubs/59691

[4] The National Land Cover Database (NLCD) is created and available from USGS. More information: https://www.usgs.gov/centers/eros/science/national-land-cover-database

[5] Riitters, Kurt, H. 2023. County-level land cover patterns for the conterminous United States for the 2020 RPA Assessment. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2023-0017

[6] Semi-natural lands are defined as lands that are neither agriculture nor developed, including the following NLCD classifications: water, perennial ice/snow, barren land, forest, shrub/scrub, grassland/herbaceous, woody wetlands, and emergent herbaceous wetlands.

[7] Mihiar, Christopher M.; Lewis, David J.; Coulston, John W. 2023. County-level land-use projections for the conterminous United States, 2020-2070, used in the 2020 RPA Assessment. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2023-0026

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[9] Transition probabilities are estimated using observed land use conversions in the National Resources Inventory (NRI) from the USDA Natural Resources Conservation Service. More information on NRI is available here: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/nri/

[10] Langner, Linda L.; Joyce, Linda A.; Wear, David N.; Prestemon, Jeffrey P.; Coulson, David; O'Dea, Claire B. 2020. Future scenarios: A technical document supporting the USDA Forest Service 2020 RPA Assessment. Gen. Tech. Rep. RMRS-GTR-412. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 34 p. https://doi.org/10.2737/RMRS-GTR-412

[11] Brooks, Evan B.; Coulston, John W.; Riitters, Kurt H.; Wear, David N. 2023. Spatial realizations of county-level land use projections. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2023-0015

[12] Brooks, E.B.; Coulston, J.W.; Riitters, K.H.; Wear, D.N. 2020. Using a hybrid demand-allocation algorithm to enable distributional analysis of land use change patterns. PLOS One. 15(10): e0240097.

[13] Greenfield, Eric J., and Nowak, David J. 2023. Percent tree and impervious cover for 2020 and projected in 2070 for three RPA scenarios (average, maximum and minimum) for the 2020 RPA Assessment. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2022-0085