

Business Case and Strategy: Restructuring Land Use/Land Cover Categories and Definitions

October 1, 2013

Critical to the Conservation Delivery Streamlining Initiative (CDSI), land use delineation establishes the baseline data that is needed to derive systemic effects resulting from conservation execution from a legislative, policy, program, and resource conservation and effects modeling perspective. Currently there are 15 conservation planning land use designations defined in NRCS directive, Title 180, National Planning Procedures Handbook (NPPH). Several of the current land use designations are—

- Unclearly defined or difficult to apply.
- Unable to represent the planning scenario accurately.
- Competing definitions for planning units when the land use has multiple purposes.
- Rarely used and unable to provide a clear purpose.

Gaps exist in the current land use designations. For example, confined animal feeding operations are included in the headquarters land use even though such facilities may be located at a site away from the headquarters of the operation, and there are issues with consistently identifying a land use for aquaculture systems. Moreover, land use designation processes and insufficient controls in the Customer Service Toolkit have resulted in scores of irregular planner-derived land use designations. This is problematic because summaries and reports become unnecessarily cluttered with outlying data. By formalizing the land use designation categories and adequately defining them, NRCS planners will be able to consistently append the most appropriate and logical land use designation to the area of consideration. This consistency will enable accurate reporting and support analysis and conservation effects modeling efforts.

Background

NRCS relies on land use designations to help customize and clarify a conservation plan. Conservation planners reference land use to provide a consistent frame of reference when assessing site conditions and developing alternative conservation systems. Additionally, land use designations support other NRCS functions such as nationwide resource inventories, watershed-level assessments, program ranking and funding decisions, and modeling and analysis efforts (e.g., the Conservation Effects Assessment Project (CEAP)).

The NPPH recognizes land use in its description of NRCS's planning process and associated outputs. The NPPH defines land use as "*a term used by NRCS to identify the intent of the client with regard to the purpose to which a land unit is to be put. The two designations of land use are the official NRCS designation and the client land use designation agreed-to by the client and planner.*" Potentially, there is a discrepancy between the land use the client references and the official land use that NRCS assigns to the planning area under consideration. To standardize land use designation, clients and planners must use the same designations. This will promote consistency for both planners and clients.

Land use management directly affects resource conditions and capabilities. By knowing the client's land use designation, planners are provided with a resource conservation framework that enables them to proceed with assessments, analysis, alternative formulation, and client interaction using a common language. NRCS relies on

accurate land use designations for capturing progress, collaborating with partners, and assessing impacts of conservation treatments at both field and watershed levels.

Currently, there are several land use classification systems in use:

- NRCS land use list in Customer Service Toolkit¹
- NRCS 180-NPPH² (December 2006)
- National Resource Inventory (NRI) land use designations³
- APEX (Agricultural Policy/Environmental eXtender)
- Farm Service Agency (FSA) naming conventions (10, see table below)
- Anderson's Land Use Classification System (closely mirrored by U.S. Geological Survey)⁴
- Others, such as conservation partners, environmental markets, and international governing bodies

NRCS's need for a comprehensive land use list is markedly different from other aforementioned organizations. NRCS associates land use with all facets of conservation planning and modeling, including—

- Determining resource conditions (preplanning).
- Performing conservation activities, such as inventory and analysis.
- Performing specific resource assessments and procedures.
- Identifying resource concerns and planning criteria.
- Determining adequate resource treatments (planning criteria).
- Formulating client-based alternatives.
- Calculating and describing conservation effects and outcomes related to land use designations.
- Watershed-scale modeling.

Strategy for Change

CDSI has developed a three-tier land use and land cover hierarchy that can be used effectively by planners and modelers at the field and landscape level. The need to associate what is specifically being grown on the land is needed to run assessment tools and models in the future. Land use and land covers will be integrated as much as possible with assessment tools such as APEX, Revised Universal Soil Loss Equation (RUSLE) II, and National Agricultural Statistics Service (NASS), for example, so one simplified land cover list can be used, as appropriate, in the future.

The proposed changes are sensitive to legacy land use descriptions; however, unclear or competing land use designations have been removed. CDSI proposes the use of a land use modifier to more accurately define the land's actual management. For example, wildlife is eliminated as a land use, but it can be used as a modifier when a land use, such as forest, is actively managed for wildlife.

Land Use and Land Cover Levels

Because what is grown within a land use is needed to run assessment tools and models in the future, NRCS is adopting the portions of the Federal Geographic Data Committee (FGDC) land cover system that are needed for conservation planning.

Land Use and Land Cover Level Hierarchy.—There are one to four land cover levels associated with each land use.

Example:

Land Use: Crop

Land Cover Level 1: Corn (011)

Land Cover Level 2: Sweet Corn

Modifiers

Because it is impractical to include all specific land uses in NRCS's service area, land use designations will be supplemented with "modifiers." Modifiers provide another level of specificity and in some instances help denote what the land is actually managed for. The proposed modifiers are as follows:

- **Irrigated.**—Applied when an operational system is present and managed to supply water.
- **Wildlife.**—Applied when the client is actively managing for wildlife, and this management is reflected in the conservation plan through the application of practices that are beneficial to wildlife.
- **Grazed.**—Applied when grazing animals impact how land is managed and influence the conservation plan.

The following CDSI land use designations are displayed for comparison in the following table that includes land use designations from efforts outside of NRCS conservation planning activities (NRI & APEX).

Additionally, the FSA list is included because many NRCS clients participate with FSA on production lands.

NPPH Land Use (12/2006)	APEX	NRI	FSA	CDSI Land Use	Comments
Crop	Cropland	Cropland	Cropland	Crop	
Forest	Forestland	Forestland	Forest	Forest	
Grazed Range	Rangeland	Rangeland	Rangeland	Range	
Grazed Forest					Covered by Forest with Grazed modifier
Hay	Pasture & Hayland	Noncultivated Cropland			Covered under Cropland Land Covers
Pasture	Pasture & Hayland	Pastureland		Pasture	
Mined			Mined		Covered by Other Rural Lands
Native / Naturalized Pasture					Covered by Pasture or Range
Natural Area				Designated Protected Area	
Headquarters				Farmsteads	
Recreation					
Urban	Urban/Built-up Land	Developed Land	Urban	Developed Land	
Water		Water Areas	Water Body	Water	
Watershed Protection					
Wildlife					Wildlife is now a modifier
			Other Agricultural	Associated Ag Land	
	Barren and Other Rural Land	Other Rural Land		Other Rural Land	

Land Use Definitions:

Land use.—The purpose of human activity on the land; it is usually, but not always, related to land cover (from the NRI glossary). (*See the table below for proposed land use definitions by type.*)

An examination of National Conservation Planning Database metrics indicates over 95 percent of all NRCS land use designations are currently associated with five categories:

- Crop
- Pasture
- Range
- Hay (included in cropland)
- Forest

CDSI Crop.—Land used primarily for the production and harvest of annual or perennial field, forage, food, fiber, horticultural, orchards, vineyards and energy crops.

NPPH.—Land used primarily for the production of field crops or orchard crops alone or in association with sod crops.

NRI.—A land cover and use category that includes areas used for the production of adapted crops for harvest. Two subcategories of cropland are recognized: cultivated and noncultivated. Cultivated cropland comprises land in row crops or close-grown crops and also other cultivated cropland, for example, hay land or pastureland that is in a rotation with row or close-grown crops. Noncultivated cropland includes permanent hay land and horticultural cropland.

CDSI Pasture.—Lands composed of introduced or domesticated native forage species that is used primarily for the production of livestock. They receive periodic renovation and/or cultural treatments, such as tillage, fertilization, mowing, weed control, and may be irrigated. They are not in rotation with crops.

NPPH.—Grazing lands composed of introduced or domesticated native forage species that are used primarily for the production of domestic livestock. They receive periodic renovation and/or cultural treatments, such as tillage, fertilization, mowing, weed control, and may be irrigated. They are not in rotation with crops.

NRI.—A land cover and use category of land managed primarily for the production of introduced forage plants for livestock grazing. Pastureland cover may consist of a single species in a pure stand, a grass mixture, or a grass-legume mixture. Management usually consists of cultural treatments: fertilization, weed control, reseeding or renovation, and control of grazing. For the NRI, includes land that has a vegetative cover of grasses, legumes, and/or forbs, regardless of whether or not it is being grazed by livestock.

CDSI Range.—Land used primarily for the production of grazing animals. Includes native plant communities and those seeded to native or introduced species, or naturalized by introduced species, that are ecologically managed using range management principles.

NPPH.—(Grazed Range) Rangeland that is used primarily for the production of domestic livestock. Includes native plant communities and those seeded to native or introduced species, or naturalized by introduced species, that are ecologically managed using range management principles.

NRI.—A land cover and use category on which the climax or potential plant cover is composed principally of

native grasses, grass-like plants, forbs or shrubs suitable for grazing and browsing, and introduced forage species that are managed like rangeland. This would include areas where introduced hardy and persistent grasses, such as crested wheatgrass, are planted and such practices as deferred grazing, burning, chaining, and rotational grazing are used, with little or no chemicals or fertilizer being applied. Grasslands, savannas, many wetlands, some deserts, and tundra are considered to be rangeland. Certain communities of low forbs and shrubs, such as mesquite, chaparral, mountain shrub, and pinyon-juniper, are also included as rangeland.

CDSI Forest.—Land on which the primary vegetation is tree cover (climax, natural, or introduced plant community) and use is primarily for production of wood products and nontimber forest products.

NPPH.—Land on which the primary vegetation is forest (climax, natural, or introduced plant community) and use is primarily for production of wood products.

NRI.—A land cover and use category that is at least 10 percent stocked by single-stemmed woody species of any size that will be at least 4 meters (13 feet) tall at maturity. Also included is land bearing evidence of natural regeneration of tree cover (cut over forest or abandoned farmland) and not currently developed for no-forest use. Ten percent stocked, when viewed from a vertical direction, equates to an aerial canopy cover of leaves and branches of 25 percent or greater. The minimum area for classification as forest land is 1 acre, and the area must be at least 100 feet wide.

CDSI Other Rural Land.—Land that is barren, sandy, rocky, or that is impacted by the extraction of natural resources such as minerals, gravel and sand, coal, shale, rock, oil, or natural gas.

NPPH.—None

NRI.—A land cover and use category that includes farmsteads and other farm structures, field windbreaks, barren land, and marshland.

CDSI Associated Ag Land.—Land associated with farms and ranches that are not purposefully managed for food, forage, or fiber and are typically associated with nearby production and conservation lands. This could include incidental areas, such as idle center pivot corners, odd areas, ditches and watercourses, riparian areas, field edges, seasonal and permanent wetlands, and other similar areas.

NPPH.—None

NRI.—(Other rural land.) A land cover and use category that includes farmsteads and other farm structures, field windbreaks, barren land, and marshland.

CDSI Farmsteads.—Land used for facilities and supporting infrastructure where farming, forestry, animal husbandry and ranching activities are often initiated. This may include dwellings, equipment storage plus farm input and output storage and handling facilities. It also includes land dedicated to the facilitation and production of high intensity animal agriculture in a containment facility where daily nutritional requirements are obtained from other lands or feed sources.

NPPH.—Land used for dwellings, barns, pens, corrals, or other facilities used in connection with farm and ranch operations.

NRI.—(Other rural land.) A land cover and use category that includes farmsteads and other farm structures, field windbreaks, barren land, and marshland.

CDSI Water.—Geographic area whose dominant characteristic is open water or permanent ice or snow. It may include intermingled land, including tidal-influenced coastal marshlands.

NPPH.—A geographic area whose dominant characteristic is open water, but which may include a large proportion of intermingled land, including coastal marshlands

NRI.—A land cover and use category comprising water bodies and streams that are permanent open water.

CDSI Developed Land.—Land occupied by buildings and related facilities used for residences, commercial sites, public highways, airports, and open space associated with towns and cities.

NPPH.—Land occupied by buildings and related facilities used for residences, industrial sites, institutional sites, public highways, airports, and similar uses associated with towns and cities.

NRI.—(Urban and built-up areas). A land cover and use category consisting of residential, industrial, commercial, and institutional land; construction sites; public administrative sites; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures and spillways; other land used for such purposes; small parks (less than 10 acres) within urban and built-up areas; and highways, railroads, and other transportation facilities if they are surrounded by urban areas. Also included are tracts of less than 10 acres that do not meet the above definition but are completely surrounded by urban and built-up land. Two size categories are recognized in the NRI: areas of 0.25 acre to 10 acres, and areas of at least 10 acres.

CDSI Designated Protected Area.—Land or water used for the preservation, protection, and observation of the existing resources, archaeological or historical interpretation, resource interpretation, or for aesthetic value. These areas are officially designated by legislation or other authorities. Examples: legislated natural or scenic areas and rural burial plots.

NPPH.—Land or water used for the preservation, protection, and observation of the existing resources, archaeological or historical interpretation, resource interpretation, or for aesthetic value. Some of these may be officially designated by legislation or other authorities.

NRI.—None

¹ Customer Service Toolkit – Follows 180-NPPH but allows for customization, which has led to dozens of planner-spawned land use titles.

² 180-NPPH, Part 600, Subpart D, Section 600.31, “Conservation Plan”

³ http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/nri/?cid=nrcs143_014127

⁴ <http://landcover.usgs.gov/pdf/anderson.pdf>