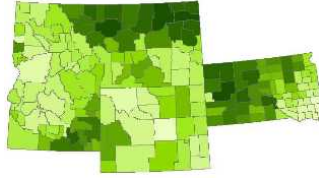


## Century Model Results



### Tags

greenhouse gases, carbon sequestration, land use, soil carbon

### Summary

Statewide estimates of agricultural soil carbon fluxes have been produced using the Century biogeochemical model, which was developed by Colorado State University Scientists and has been widely verified in Great Plains grassland and agricultural systems. Century is a point model that produces monthly or annual time-step estimates of soil carbon stocks.

### Description

Modeled sequestration capacities by land-use change scenario, by county. The model was constructed from 5 different scenarios: continuous tillage, grazing etc. Each scenario gets run in isolation, for each of 15+ soil texture classes, without reference to the affected land area (Century is a POINT MODEL). The derived rate per point is expanded by those estimates by using the actual (or potential) area of land in each land use. The different actual (or potential) land uses by county are summed to create the final result. Final results are represented in the Default, NoTill, CRP, CNT and GRAZE attributes.

Data Compilation and Sources: Changes in soil C due to agricultural management were estimated using soil, crop and management data compiled for the C-Lock program. Climate, soil and management files necessary for Century modeling were developed preliminary to conducting statewide agricultural source/sink potential estimates for Idaho, Montana, South Dakota and Wyoming.

All of the spatial data were compiled from national, public-domain databases. 100 years of climate data for reporting cooperative stations were obtained from the National Climate Data Center and averaged for each of up to 10 climate zones in each state, to produce zone-average files containing monthly max/min temperatures and precipitation since 1895. Generalized soil texture grids were developed based on the SSURGO or STATSGO soil databases. Land management data were extracted from the 1997 Census of Agriculture Land in Farms data, for total areas of harvested cropland and grazing (pasture) land, and from the Conservation Technology Information Center (CTIC) data for 2002 on land enrolled in the CRP and cropland under no-till management. The methodologies and confidence ranges for these data sources are well-documented.

The development of default management histories for the range of modeled crops was more subjective. Although statistical data on current and historical crop distributions are available from the National Agricultural Statistics Service, and fertilizer and irrigation rates may be estimated from a variety of national surveys, decisions about tillage, crop rotations and general management were necessarily based largely on expert opinion, anecdote and (for recent management) enterprise budgets compiled by agricultural economists.

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### Credits

Modeling completed by Big Sky Carbon Sequestration partners at the South Dakota School of Mines and Technology, January 2005.

**Appropriate use of these results:** The generalized nature of the underlying data produces modeling results that have only general applications. These results are most useful as rough indicators of (1) potential C sequestration rates in an area of interest given a range of management options (Conservation Reserve, no-till, grazing or conventional tillage of crops), and (2) total sequestration potential in a county, taking into account current and potential land uses. It would not be appropriate to base farm-specific or crop-specific estimates of C sequestration potential on these results. However, the maps may be useful in targeting agricultural sequestration efforts in certain areas of a state.