



U.S. Forest Service Climate Change Advisor's Office Briefing Paper

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Topic: Baseline estimates of carbon stocks in forests and harvested wood products for National Forest System units

Issue:

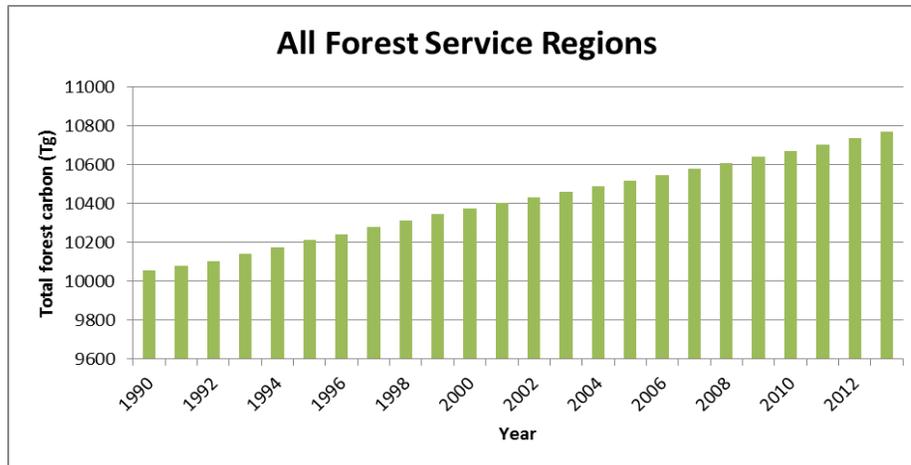
Carbon management and associated greenhouse gas emissions are an increasingly important consideration in forest management. A carbon assessment framework has been developed for the National Forest System (NFS) to deliver mid- to broad level forest carbon information for every region and individual national forest. The agency has finalized the first component of that framework – assessments of baseline forest carbon stocks and carbon stored in harvested wood products.

Summary/Key Points:

- Baseline stocks and trends of forest carbon have been developed for every region and individual National Forest from 1990 to 2013 (and 2005 to 2013, i.e., truncation of the longer baseline) based on Forest Inventory and Analysis (FIA) inventories.
- These stocks are contained in seven different forest ecosystem carbon pools and in harvested wood products and landfills.
- Uncertainties are calculated for each national forest for the 5 year periods at the beginning and end of the time series.
- Carbon stock and trend information, in conjunction with companion assessments on forest carbon disturbances (*currently being developed*), will enable forest managers and the public to consider the relationships between carbon storage and the aggregate influences of management, disturbance and climate.
- The methodology and models used to develop the data are well documented. The carbon inventory [methodology](#) is consistent with that used for the EPA's U.S. Greenhouse Gas Inventory (USGHGI).
- The methods and information gathered will support other tools needed for more detailed consideration of forest carbon management implications at regional and local unit scales.

Data Summary and Implications:

- Total NFS carbon (forest and HWP) in 2013 was 10,770 Tg which is 24% of total carbon stocks.
- For the baseline period 1990 to 2013, net NFS carbon stock change (forest and HWP) is estimated at 31.00 Tg carbon/year which is 13% of total stock change. For the baseline period 2005 to 2013, net NFS carbon stock change (forest and HWP) is estimated at 31.79 Tg carbon/year which is 13.5% of total stock change. Therefore, the NFS forest carbon resource is growing.
- Carbon density is an estimate of forest carbon stocks per unit area and varies greatly by Region and Forest.



Background:

Climate Change Performance Scorecard Element 9 (Carbon Assessment and Stewardship), and the 2012 Planning Rule require NFS units to identify baseline carbon stocks and to consider this information in management of their forests. The Climate Change Advisor’s Office has funded and facilitated work by Forest Service Research & Development to develop a nationally consistent carbon assessment framework and to deliver forest information for every NFS unit. This framework is designed to deliver mid- to broad level (i.e., unit and Region) carbon stock and stock change information on NFS lands. The framework’s first component provides baseline carbon stocks and trends for seven different forest ecosystem carbon pools for the period 1990 to 2013 (and 2005 to 2013, i.e., truncation of longer baseline) based on FIA data and builds upon the foundation established by an earlier report ([Heath et al. 2011](#)). It also provides estimates of carbon stored in harvested wood products (HWP). This directly supports NFS units in making measurable progress on Climate Change Performance Scorecard Element 9, while helping forests meet assessment requirements of the 2012 Planning Rule.

Carbon Assessment Whitepapers:

These whitepapers provide baseline carbon stocks and trends (for the time periods – 1990 to 2013, and 2005 to 2013) for seven different forest ecosystem carbon pools, uncertainties associated with carbon estimates for each unit, and estimates of carbon stored in HWP over longer time periods depending upon availability.

1. **Forest ecosystem carbon** – Carbon stocks are calculated for the seven ecosystem carbon pools - above-ground live tree, below-ground live tree, understory, standing dead trees, down dead wood, forest floor, and soil organic carbon – in each national forest within each state/sub-state each year from 1990 through 2013.
2. **Uncertainty** – Uncertainties are calculated for carbon stocks and stock changes for each national forest to better understand the precision of the carbon estimates. Sampling, measurement and model error were accounted for to calculate uncertainty, which is provided as 95% confidence intervals. This means that there is a 95% probability that actual carbon stocks and stock change are within this range.
3. **Harvested wood products** – The reports use the IPCC production accounting [approach](#) to estimate cumulative HWP carbon storage in each region. This approach tracks the entire cycle of carbon from harvest to timber products to primary wood products to end use to disposal. The

estimates include carbon that is not emitted to the atmosphere – that is, carbon contained in wood products that are still being used, and discarded products in landfills.

Next Steps:

- Carbon stocks are affected by disturbances such as wildfires, insect activity, timber harvesting and forest management, and weather events. Companion assessments are being completed to understand these influences and to grasp a more complete picture of forest carbon dynamics.

Location of Whitepapers:

- Climate Change Advisor's [website](#) – Whitepapers with one baseline period chosen by regional climate change coordinators and regional FIA staff with rationale for baseline choice available here.
- FIA [website](#) – Whitepapers with both baseline periods available here.

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