DEVELOPMENT OF FOREST CARBON STOCK AND STOCK CHANGE BASELINES IN SUPPORT OF THE 2004 CLIMATE ACTION PLAN FOR MAINE

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An overview of issues, data, assumptions, and results pertinent to the development of forest carbon baselines for Maine is presented. Forest carbon stocks and stock changes, including additional effects of land use change and long-term retention of carbon in some harvested wood products, were determined for the period from 1990 through the present. The analysis was compiled for the Agriculture and Forestry Working Group of the Maine Greenhouse Gas Initiative in early 2004.

Forests are the predominant land cover in Maine. These forest lands represent large reservoirs of organic carbon in live vegetation, dead woody materials, and in the soil. Growing forests are carbon sinks, which remove carbon dioxide from the atmosphere through photosynthesis and subsequent carbon reduction and incorporation into organic molecules. Alternatively, respiration and decay are mechanisms for emission of carbon from forests to the atmosphere. Carbon sequestered in plant biomass serves as a potential offset to the current net release of greenhouse gases in the U.S. Rates of sequestration or release of carbon to the atmosphere by forests can be affected by land use and forest management practices. Thus, estimates of recent trends in forest carbon serve as baselines for projecting outcomes of alternate mitigation options as presented in the Climate Action Plan. Current estimates indicate Maine forests are currently net carbon sinks.

Forest ecosystem carbon estimates are based on the simulation model FORCARB2, which develops inventory-based estimates of stocks according to discrete carbon pools. Stock change, or net annual flux, is based on the difference between two successive stocks divided by the number of years between surveys. Maine forest inventory surveys summarized by the USDA Forest Service for 1982, 1995, and 2002 serve to identify stocks; intermediate values and stock changes are based on interpolation and extrapolation of these stocks.

Land use change—either forest land becoming non-forest or non-forest land becoming forest—affects the change in total forest stocks between surveys principally through the addition or deletion of land included in a stock estimate. For purposes of the Maine Greenhouse Gas Initiative, carbon accounting on these changed-use lands was not transferred to another (non-forest) sector but rather the calculated forest stock change was modified to account for expected additional sequestration or emissions associated with the land use change. For example, forest land transferred to non-forest land use was assumed to emit two-thirds of tree carbon; the remaining carbon was included in the calculation of stock change. Carbon in harvested wood products can remain in products in use or in landfills for many years. Estimates of stock change are based on the model HARVCARB and on wood harvested and processed in Maine as well as imports, as reported in the annual Maine Wood Processor Reports.