

# Management Plan Guidance Supplement for Carbon Sequestration

## Why Carbon Storage as a Management Consideration?

### Climate change concerns

There is increasing concern about the buildup of greenhouse gases in the atmosphere. Greenhouse gases are emitted by the combustion of fossil fuels, including energy production (gas, oil, coal), manufacturing, and transportation (cars, planes). As these gases are produced, they go into the atmosphere where they trap the heat from the sun. This process is believed to be leading to changes in the earth's climate. Actions are being taken at the State, Regional, National, and International levels to reduce these emissions, but organizations are also focused on ways to remove greenhouse gases that are already in the atmosphere. In addition to the efforts of governments and policy makers, private companies are increasingly interested in helping to address this problem. In order to reduce greenhouse gas buildup in the atmosphere two types of efforts are needed:

1. Releasing less greenhouse gases to the atmosphere and
2. Finding ways of removing the greenhouse gases that are already present in the air

One option for removing carbon dioxide (a major greenhouse gas) from the atmosphere is growing trees and managing forests.

During photosynthesis, trees take carbon dioxide from the air and use it to make carbohydrates (sugars) which they use to make wood fiber, roots, needles, etc. Every part of a tree (or any other plant for that matter) is made up of carbon. The amount of carbon varies slightly by tree component, but approximately 50% of a tree is made up of carbon.

A tree's ability to remove carbon dioxide from the air is the reason for interest in forest carbon offsets. There are organizations willing to pay to help grow trees for this purpose. In 2009, over 140 million carbon offsets were sold in the US with a value of \$2.4 billion dollars. Of these, forestry offsets were approximately 12% of the offset market.

## Can Carbon Be a Part of Your Overall Management Plan?

There are a variety of forest management activities that can enhance carbon storage on forestland. In general, the class of carbon project most applicable to forest landowners is a type called "Improved Forest Management" or IFM. IFM carbon projects typically involve the following kinds of strategies (many of which you may already be doing as part of your management plan).

- 1) Extending the Rotation Age of the Forest
  - Typically a 5 to 10 year extension of rotation age
- 2) Converting Low Productive Forests to High Productive Forests

-Activities include: improving stocking density with higher value timber species, increase crown cover, and/or reducing the frequency of disturbance events (like wildfire).

### **How Can You Measure Carbon in Your Forest?**

Measuring the carbon in a forest is very similar to measuring for forest volume. The primary differences are:

- a. Carbon inventory sampling can be more intensive than inventories for sawtimber volume
- b. Everything in a forest that is growing (merchantable and non-merchantable species) can potentially qualify for carbon crediting.

Traditional forest inventory approaches are usually sufficient (prism plots) as long as they are intensive enough to achieve an average tree carbon stock estimate of +/-10% at the 90% Confidence Interval. If you are thinking of selling your carbon through a carbon registry a more intensive inventory may be required. Please consult with your forester if you decide to go this route.

The typical sampling unit for a carbon inventory is the forest stand. To begin, a landowner will need to map the management area at the stand level. Landowners will need to keep in mind that if they ever decide to sell their stored carbon to a carbon registry, a third party will be checking to verify your work before a project activity can qualify for carbon crediting. Therefore, reference trees, flagging, pacing, sample procedures, GPS points, grid intensity, etc will all have to be well documented in the inventory report to facilitate third party verification. The basic guiding principle for your carbon inventory is “if you can’t prove it, you can’t take credit for it”

Some of the key variables that should be measured during the carbon inventory include:

- **Tree Status:** Record the data sample type (Live tree or snag)
- **Tree Species:** Record the species of every sampled tree
- **Tree Count:** Record the number of sampled trees represented by each line of tree data. Record growth sample trees and site trees individually. Trees <5.0 inches dbh (not Radial Growth sample trees) may be group tallied by height classes
- **DBH:** Measure Diameter at Breast Height (dbh) at 4.5 ft above the ground line on the uphill side of the tree
- **Height:** Record tree height, in feet, from ground line on the uphill side to the uppermost tip. If the top is broken or missing, record the height to the break, and record the appropriate damage/severity code. Tree heights are required for all:
  - Site Trees

- Growth Sample Trees
- Trees <5.0 inches DBH
- All trees with broken or missing tops
- All snags
- **Age (Recommended):** Record the tree age in years. Age is used to characterize stand condition, and growth sample tree age/height pairs are used to calibrate a growth and yield model.
- **Age Code (Recommended):** If age is recorded, record age code. That identifies the suitable application of age data recorded:
  - Site and radial growth sample tree
  - Radial growth sample tree only
  - Stand age tree only
- **Radial Growth (Recommended):** Record the radial growth increment for Growth Sample Trees >3.0 dbh, to the nearest 1/20<sup>th</sup> of an inch.

For more information on carbon stocks and growth rates for forest landowners, see the US Forest Service site: *Tools for carbon inventory, management, and reporting* (<http://nrs.fs.fed.us/carbon/tools/>)

### **Can You Sell Your Forest's Stored Carbon?**

The market for carbon offsets is currently at a low because of policy uncertainty and economic conditions. However, if you are interested in participating in carbon markets that will provide income for forest management activities, the following basic steps are necessary.

#### *Step 1: Determine if you are eligible*

Most carbon registries require enrollment in a sustainable forest management program (American Tree Farmer, Sustainable Forestry Initiative, or the Forest Stewardship Council). If you decide to participate in the carbon market, you may need to enroll in one of these programs.

#### *Step 2: calculate the number of acres that you believe will qualify for carbon crediting*

Calculate the total forest acres of your property, but remove acres that will not qualify because of legal restrictions (streams, buffers, roads, endangered species habitat, etc)

*Step 3: complete a preliminary inventory of your potential project area*

Before going through the time and expense of a complete carbon inventory, a landowner should minimize investment by having some inventory data in which to evaluate the carbon opportunity. Basic forest inventory information like species, dbh, stems per acre, and average height will be sufficient at the preliminary assessment stage. In addition, your management plan and long term harvest schedule should be considered.

*Step 4: Decide what kind of carbon contract period you are comfortable with*

The price of carbon varies by carbon contract commitment. Programs that require 100 year contracts are valued higher in the marketplace, than ones that are less lengthy. Before a calculation of carbon value can be made, the landowner should have an idea of contract length that they are comfortable with. Carbon prices for 100 year contracts may be double what they are for contracts only 20 years in length.

*Step 5: Contact a local consulting forester, forest extension agent, or carbon project developer for assistance with providing a carbon estimate of your project area.*

After the landowner has information on existing carbon stocks and project acreage, an analysis of carbon potential from an Improved Forest Management strategy would need to be conducted. Forest carbon project developers typically can do this analysis for free or at low cost.

*Step 6: Contact a buyer*

Depending on the carbon registry, carbon credits can be marketed to a variety of offset buyers. Either a project developer or a consulting forester can help you identify buyers that will offer you payment for your offsets.

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Woodlands Carbon Company (WCC), initiated under a grant from the American Forest Foundation, is a wholly owned subsidiary of the Oregon Small Woodlands Association. WCC assists landowners with the management and sale of short term carbon storage projects.