FiniteCarbon

Offset Project Data Report

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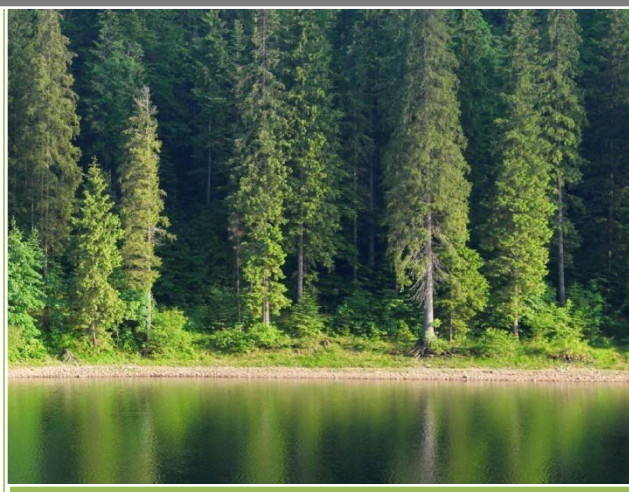
CONNECTING FORESTRY AND CARBON FINANCE

# "Finite Carbon – The Forestland Group CT Lakes" (ACR199/CAFR5034)

## CA EPA Air Resources Board Compliance Offset Protocol U.S. Forests Projects: Improved Forest Management

Adopted: October 20, 2011

Initial/Annual OPDR for Reporting Period: 07/08/2013 – 01/07/2014



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# 1. Introduction

California's Cap and Trade Regulation ("Regulation") took effect on January 1, 2012, with amendments to the Regulation effective September 1, 2012. The enforceable compliance obligation began on January 1, 2013. The Air Resources Board (ARB) has developed and implemented a compliance offset program as part of Cap and Trade Program. Covered entities may use a limited number of ARB offset credits to fulfill up to 8% of their compliance obligation. Offset credits are tradable compliance instruments that represent verified greenhouse gas (GHG) emission reductions or removal enhancements made in sectors and sources not covered by the Cap and Trade Program.

The ARB U.S. Forest Projects Compliance Offset Protocol adopted on October 20, 2011 ("Forest Offset Protocol"; "Protocol"; COP; or FOP) provides requirements and methods for quantifying the net climate benefits of activities that sequester carbon on forestland. The protocol provides offset project eligibility rules; methods to calculate an offset project's net effects on GHG emissions and removals of CO2 from the atmosphere (removals); procedures for assessing the risk that carbon sequestered by a project may be reversed (i.e. released back to the atmosphere); and approaches for long term project monitoring and reporting. The goal of this protocol is to ensure that the net GHG reductions and GHG removal enhancements caused by an offset project are accounted for in a complete, consistent, transparent, accurate, and conservative manner and may therefore be reported as the basis for issuing ARB or registry offset credits. The protocol is built off of The Climate Action Reserve's Forest Project Protocol Version 3.2.

Finite Carbon is a forest carbon offset project developer specializing in the creation and monetization of forest carbon offsets. Combining unparalleled project development experience with extensive carbon market knowledge, Finite Carbon offers the most comprehensive forest carbon project development and commercialization service in the United States. With an in-house team of forest carbon experts, Finite Carbon provides all the expertise and resources for successful implementation of forest carbon inventories, project design, verification management and monetization of carbon offsets.

This document is the Offset Project Data Report (OPDR) for *Finite Carbon – The Forestland Group CT Lakes* ("CT Lakes" or the "Project"), assigned by the American Carbon Registry (ACR), which is an ARB approved Offset Project Registry (OPR), as Project ID: ACR199. The OPDR and all other project documentation and reports that reference carbon stocks has been prepared and submitted by Tim McAbee, SAF Certified Forester (No. 3789). Additional oversight of forestry documentation and modeling practices was provided by John Steward, who is a current New Hampshire Licensed Professional Forester (LPF) operating under license No. 91 (see Figure 1) and satisfies the professional forester requirements[1] outlined in the FOP, section 9.1. In addition, certain appendices referenced throughout the OPDR document have been made proprietary and are removed for purposes of protecting private information. These appendices serve as supplemental documentation for verification purposes. The appendices that have been removed are F, H, J, M and N and are also designated in the Table of Contents under the List of Appendices with the word "Supplemental Proprietary" at the end of the document title. The geodatabase of the project area is also not included as it is in a GIS format.

CT Lakes is an Improved Forest Management (IFM) project developed and implemented using the ARB FOP. The project is located in Northern New Hampshire in the United States of America (Figure 2).

[1] The project is located in a jurisdiction with a Professional Forester law; accordingly oversight by a NH LPF has been employed to maintain professional standards and project quality.


**Figure 1. Registered Forester Certification**


**Figure 2. Project Location**

The primary goal of the project is to generate carbon offset credits by maintaining and increasing additional forest carbon stock in a manner consistent with the objectives of the forest owner, Connecticut Lakes Realty Trust (CLRT or "Forest Owner"). The Forest Owner is the Offset Project Operator (OPO) and is also the owner in fee for the Project area (see Listing Form 'Attachment A' demonstrating OPO fee ownership in OPR project account as well as Appendix N. ACR199 OPO Fee Ownership Documentation Proprietary.pdf). The Project commenced on July 8, 2013 when the forest owner began a forest carbon inventory for the purposes of developing an offset project. The Forest Owner has retained Finite Carbon as the project developer consultant.

**Table 1. Offset Project Operator Summary**

| | |
|---|---|
| **Offset Project Name/OPR Project ID:** | Finite Carbon – The Forestland Group CT Lakes/ACR199 |
| **Offset Project Commencement Date:** | 07/08/2013 |
| **First Reporting Period Start Date:** | 07/08/2013 |
| **First Reporting Period End Date:** | 01/07/2014 |
| **OPO Contact Person Name and Person Completing Report:** | Kaarsten Turner Dalby |
| **OPO Name & Mailing Address:** | Connecticut Lakes Realty Trust<br>(c/o The Forestland Group)<br>PO Box 9162<br>Chapel Hill, NC 27515 |
| **OPO Contact Email Address:** | kaarsten@forestlandgroup.com |
| **OPO Contact Phone Number:** | 919-929-2497 |
| **OPO's CITSS ID#:** | CA1577 |
| **ARB Project ID:** | CAFR5034 |
| **Original Submittal Date of OPDR:** | 24 Feb 2014 06:59 PM |
| **Date of Last Full (On-Site) Verification:** | March 2014 |

There is no Authorized Project Designee. This report IS being submitted for a verification year which is also its initial reporting year for an Improved Forest Management project.

## 1.1 Project Area Description

The project area is located in Coos County in the State of New Hampshire and consists of 141,062.25 acres. It is bordered by Canada to the north, Vermont to the west and Maine to the east. It is situated only a few miles from the Town of Pittsburg, and approximately 48 miles (traveling by car) north of the Town of Lancaster which is also the county seat. The Project occupies area on both the east and west sides of US Highway 3. Major towns and roads are shown in a map as Appendix A. ACR199_Map_TownsRoads.pdf.

The Project area is located in the upper Connecticut River watershed and in the Connecticut Lakes subsection of the Northern Appalachian/Acadian ecological region, a region that extends from the western Adirondacks in New York to northern and eastern Maine and adjacent portions of the Canadian Maritime Provinces. Watercourses present within the Project area include the headwaters of the Connecticut Lakes and Connecticut River, the upper Dead Diamond River watershed, and the Indian Stream corridor. A map of the major watercourses is provided as Appendix B. ACR199_Map_Watercourses.pdf.

The topography varies from broad valleys to low mountains. The terrain features are generally not severe and the property ranges in elevation from 1,400 feet to 3,400 feet above mean sea level. Overall, topography plays a minimal role in limiting forest operations. A map showing topography across the project area is provided as Appendix C. ACR199_Map_Topography.pdf.

The project falls in an area which is not part of the Public Land Survey System. CT Lakes is located in the townships of Pittsburg, Clarksville and Stewartstown. A map of the surrounding counties and townships are provided in a map as Appendix D. ACR199_Map_CountyTwnshp.pdf.

## 1.2 Land Cover and Land Use: Past and Present

The property is one of the largest privately-owned, forested properties in the State of New Hampshire and has been managed by industrial forest owners for at least 50 years. It has produced significant volumes of timber,

pulpwood and other forest products providing substantial employment opportunities and contributing to the forest products economy, a major component of the region's economy, for more than 100 years.

In 2003, the Connecticut Lakes Realty Trust took ownership of the ~146,400 acre property concluding a two-year process which began when International Paper Company sold its entire 171,500 acre New Hampshire property to The Trust for Public Land (TPL). In the subsequent years, a cooperative effort between TPL, CLRT, and the State of New Hampshire resulted in a 25,000-acre Natural Area to be owned by the State of NH, a recreational plan, a road maintenance agreement, identified special management areas, and a working forest conservation easement. In June of 2009, CLRT was purchased by Heartwood Forestland Fund IV managed by The Forestland Group, LLC. While CLRT was purchased by Heartwood Forestland Fund IV, the property is still owned by CLRT.

The subject property and the surrounding area is predominantly forested and has been historically managed for timber production and outdoor recreation with approximately 5,302 acres that are considered non-forested of which 2,212 acres occupy road surfaces. CT Lakes current forest management activities focus on generating pulpwood and high-quality sawtimber logs. Timber harvests use a combination of conventional logging, mechanized logging and cut-to-length systems depending on the season and site conditions to implement a variety of silvicultural methods including shelterwoods, small-patch clear cutting, and small-group selection harvests.

The property contains outstanding recreational values as a result of a long history of multiple use management including nationally significant cold water fisheries, approximately 150 miles of groomed snowmobile trails and opportunities for other activities including hunting, hiking, snow-shoeing, and motorized recreation. Seasonal recreational camps are a long standing tradition on the property and help define the unique culture and history of the Northern Forest region within which the Project is located.

A well-developed internal road system has been built across the Project area over the past several decades. International Paper Company undertook major road upgrades in the 1990s. Generally, the result is a very high quality road system. The roads were designed for timber harvesting purposes. Though many roads function adequately for recreational access as well, they were not designed for that purpose. Access is very good for logging purposes and legal access to the Project area for forest management purposes is well established.

Currently, timber harvests and overall forest management activities are certified to the Forest Stewardship Council (FSC). Future use of the property will consist of commercial forestry practices as well as recreation and wildlife habitat management.

## 1.3 Forest Types, Flora and Fauna

From a regional perspective, based on the Society of American Foresters (SAF) Forest Cover Types of the United States and Canada (Eyre, F.H., 1980), the Project area is considered part of the Eastern Forests of the United States and constitutes forests which are further classified as being part of the Northern Forest region. The predominant forest cover groups that exist in the Project area are Northern hardwoods and Spruce-FIr.

The Northern hardwoods group is comprised of the Sugar maple-Beech-Yellow birch forest cover type. The major species in this type are typically sugar maple, American beech and yellow birch. Other associated species are red maple, balsam fir, red spruce, and paper birch among others. Commonly found in the floor vegetation is striped maple, witch-hobble, viburnums, and serviceberry as well as hay-scented fern, bracken and woodsorrel.

There are two Spruce-Fir types: Red spruce-Balsam Fir and the mixed wood type of Red spruce-Yellow Birch where there is more of a dominant hardwood component.

Red spruce and balsam fir make up a majority of the stocking in the Red spruce-Balsam fir type and either species, if not equal, may be more prevalent than the other based on site conditions and past disturbances. The spruce and fir may also be mixed in varying degrees with its associated species that include but are not limited to white spruce, eastern white pine, eastern hemlock, paper birch, yellow birch, red maple and striped maple. Aside from

mosses, mountain holly, low sweet blue berry and other shrubs and herbs, the ground vegetation is usually empty because the overstory is so dense.

In slight contrast, the majority of the stocking of the Red spruce-Yellow birch type is none other than red spruce and yellow birch. Typical associated species in different mixtures are balsam fir, red maple, paper birch, sugar maple and striped maple. Undergrowth vegetation consists of woodsorrel and bunchberry as well as mosses.

The Project area contains significant wildlife habitat including lowland Spruce-Fir forest important for deer wintering areas; early successional hardwood forest important to moose, black bear, American woodcock and ruffed grouse; high elevation Spruce-Fir forest important for many species including the rare Bicknell's Thrush and the Black-Backed Woodpecker; and extensive riparian areas along streams, brooks and tributaries important for both aquatic and terrestrial species. However, there are no threatened or endangered species known to occupy the Project area.

# 2. Project Definition and Requirements

## 2.1 Project Type

CT Lakes is an *Improved Forest Management* project type and the Forest Owner declares:

1. The Project area takes place on forestland that has greater than 10 percent tree canopy cover. In 2013-2014, the Project area was estimated to have 69 percent tree canopy cover. Percent Canopy Cover (PCC) is the percentage of the ground area that is directly covered with tree crowns and was computed from inventory data for each stratum[2]. Also please see Appendix O. ACR199 Canopy Cover v1.0.pdf.
2. The Project employs natural forest management practices as defined in Section 3 of the FOP.
3. The Project does not employ broadcast fertilization.
4. The Project area has never been part of a previously registered Forest Carbon Project.
5. The Project takes place on private lands.

## 2.2 Forest Owner

The only Forest Owner is Connecticut Lakes Realty Trust. The fee owner of the property is also Connecticut Lakes Realty Trust and as such is the sole owner of the Project area. Furthermore, no other entity besides Connecticut Lakes Realty Trust has control over the project area or forest management. Connecticut Lakes Realty Trust is also the Offset Project Operator and as such is responsible for undertaking, listing, and verifying this Forest Project. All information submitted to ARB or an Offset Project Registry shall reference the Offset Project Operator and all Forest Owner(s) who are ultimately responsible for the accuracy and completeness of the information submitted.

[2] Dixon 2002 and Crookston and Stage 1999

# 3. Eligibility Rules and Other Requirements

## 3.1 Additionality

The Project yields surplus GHG emission reductions or removal enhancements that exceed any GHG reductions or removals otherwise required by law or regulation, or any GHG reduction or removal that would otherwise occur in a conservative Business-As-Usual Scenario and according to ARB's legal requirement and performance tests. The project is not being implemented and conducted as the result of any law, statute, regulation, court order, or other legally binding mandate.

### 3.1.1 Legal Requirement Test

The project only asserts claims on emission reductions and removals that are above and beyond all laws, regulations and legally binding mandates for purposes of additionality. A comprehensive review was conducted as part of the legal requirement test. Table 2 lists all rules and regulations that were reviewed and considered as part of quantifying GHG removals and reductions and ensuring legal additionality.

**Table 2. Evaluation of Rules and Regulations subject to the Project Area**

| Rule/Regulation | Description | Notes |
|---|---|---|
| Conservation Easement | The easement is considered a working forest conservation easement with the primary purposes being conservation of the productive forests on the Property; sustain traditional forest uses including forest management activities and permitted recreational activities; conserve water resources, biological diversity, fish and wildlife habitat, and rare plants and animals; and conserve the unusual natural habitat type known as the "high elevation mountain spruce-fir forest" which supports rare animals and pockets of mature forest stands located above 2,700 feet in elevation; guarantee permitted public access to the Property to recreate in designated areas; to retain property as an economically viable and sustainable tract of land, conducive to ownership by a private timberland owner or timberland investor for the production of timber, pulpwood and other forest products. | The conservation easement was recorded more than 1 year before the Project commencement date, and therefore is required to be considered a legal restriction in the baseline as well as the Project forest management activities. |
| Endangered Species Act (ESA) | The Endangered Species Act (ESA) provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead federal agencies for implementing ESA are the U.S. Fish and Wildlife Service (FWS) and the U.S. National Oceanic and Atmospheric Administration (NOAA) Fisheries Service. The FWS maintains a worldwide list of endangered species. Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. | Habitat protection considerations are applied in both the baseline and project scenarios for the purposes of meeting conservation easement objectives; however, there have been no observed or detected endangered species in the Project area that would require any restrictions on forest management activities as a result of the ESA. |
| Clean Water Act (CWA) of 1972<br><br>&<br><br>BMP for Erosion Control on Timber Harvesting Operations in | The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.<br><br>The New Hampshire BMP publication is primarily a reference and training tool designed to help foresters and loggers become better informed about the best management practices for reducing soil erosion and | Water quality protection is applied in both the baseline and project forest management activities, primarily through adherence to the guidelines published in "Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire" and provisions set forth by the conservation easement which designates riparian special management areas. |

| | | |
|---|---|---|
| New Hampshire (2004) | controlling sedimentation from timber harvesting activities. | |
| National Wild & Scenic Rivers Act | The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. | There are no nationally designated wild and scenic rivers in the Project area, or close enough to have a direct impact on forest management activities.<br><br>www.rivers.gov/ |
| Basal Area Law (RSA 227-J:9) | This law says that no more than 50 percent of the basal area may be cut or otherwise felled each year, leaving a well distributed stand of healthy, growing trees:<br><br>Within 150 feet of:<br>• any great pond, which is a standing body of water 10 acres or greater in area<br>• any fourth order or higher stream<br>• public highway<br><br>Within 50 feet of:<br>• any other stream, river, or brook that is not a fourth order or higher stream which normally flows throughout the year.<br>• any standing body of water less than 10 acres associated with a stream, river or brook, which normally flows throughout the year. | This law is followed in the baseline and project forest management activities.<br><br>http://nhdfl.org/fire-control-and-law-enforcement/timber-harvest.aspx |
| Coos County, NH Timber Harvest Ordinance | In Coos County, lands above 2,700 feet in elevation, or with slopes in excess of 60% over 10 acres are Protected District 6 zones (PD6). Timber operations require a permit from the Coos County Planning Board. | These areas are designated in the GIS and no harvesting occurs in these areas in the baseline and project forest management activities. Otherwise, a permit is assumed. |
| Other Local Ordinances | n/a | There are no local ordinances or regulations in the towns or counties of the project area that affect timber harvesting. |

As a result of the legal requirement test, the legal requirement which has the greatest impact on forest management is the conservation easement. Both the baseline and the project must comply with all legal requirements identified before it voluntarily yields surplus emission reductions.

**Conservation Easement**

A conservation easement encompassing the entire property was granted to the State of New Hampshire (the "Easement Holder") and recorded in Coos County on October 10, 2003. A summary of the purposes of the conservation easement include the conservation of the productive forests on the Property; sustain traditional forest uses including forest management activities and permitted recreational activities; conserve water resources, biological diversity, fish and wildlife habitat, and rare plants and animals; conserve the unusual natural habitat type known as the "high elevation mountain spruce-fir forest" which supports rare animals and pockets of mature forest stands located above 2,700 feet in elevation; guarantee permitted public access to the Property to recreate in designated areas; and to retain property as an economically viable and sustainable tract of land, conducive to ownership by a private timberland owner or timberland investor for the production of timber, pulpwood and other forest products. The conservation easement calls for forest management activities to be guided by generally accepted BMPs as described in "BMP for Erosion Control on Timber Harvesting Operations in New Hampshire" and

the “Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire” published by New Hampshire.

**Clean Water Act**

The objective of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), is to restore and maintain the chemical, physical, and biological integrity of the nation's waters by preventing point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands.

Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water.

These pollutants include:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas
- Oil, grease, and toxic chemicals from urban runoff and energy production
- Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks
- Salt from irrigation practices and acid drainage from abandoned mines
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems
- Pollutants resulting from atmospheric deposition and hydromodification.

Through a variety of programs (including, as appropriate, non-regulatory or regulatory programs), states assist and encourage producers to use best management practices to reduce or prevent instances of nonpoint source pollutants migrating into waters. Accordingly, the State of New Hampshire developed a set of guidelines that timber harvest plans are encouraged to consider in terms of the protection of water resources. This is known as, “Forest Management in Riparian Areas.”

> *Riparian areas should be managed to protect water quality, streamflows, fish and wildlife habitat and scenic values.*

These restrictions and how they are emulated in the baseline model are further described in section 6.2.1 Estimating Baseline Onsite Carbon Stocks – Private Lands. Figure 3 shows the location forest management activity restrictions designated as a result of the conservation easement.

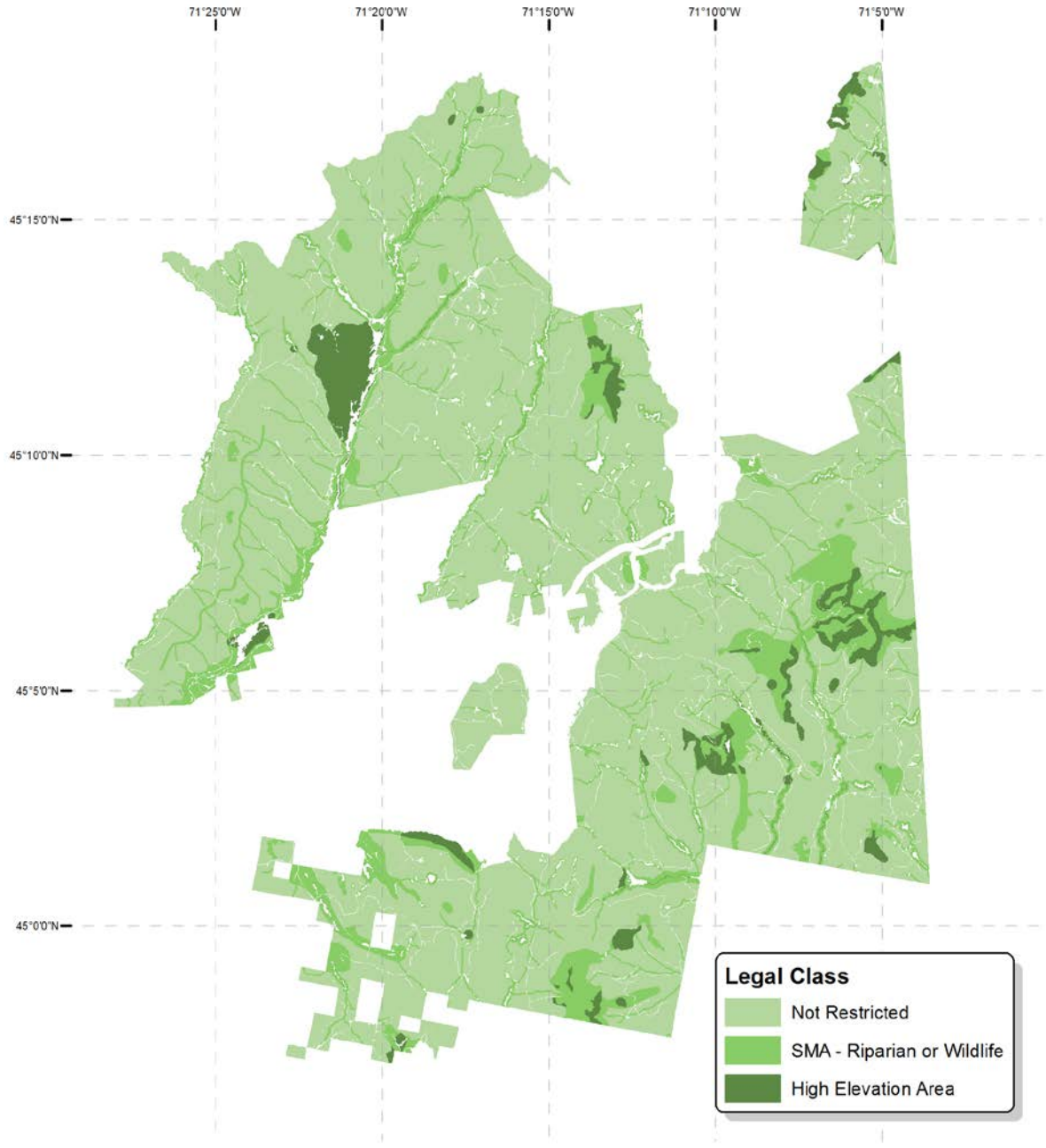



**Figure 3. Conservation Easement Legal Constraints Relative to Project Area**

These legal constraints are reflected in the project's modeled baseline carbon stocks, as required in section 6.2 of the FOP. The Forest Owner has also signed all of the attestations in Part XI of the Application For Listing An Improved Forest Management U.S. Forest Offset Project, indicating the project is in compliance with all laws and

has been voluntarily implemented. The Forest Project and associated Project lands have met and been in compliance with all local, state, and federal regulatory requirements during the reporting period.

#### 3.1.2 Performance Test

Since the project is an Improved Forest Management project, it automatically satisfies the performance test.

## 3.2 Project Commencement Date

An Improved Forest Management project's offset project commencement date must be linked to a discrete, verifiable action that delineates a change in practice relative to the Forest Project's baseline. Any one of the following actions denotes an Improved Forest Management project's offset project commencement date:

• Recordation of a conservation easement on the Project Area. The date the easement was recorded is the Forest Project's offset project commencement date.

• Transferring of property ownership (to a public or private entity). The offset project commencement date is the date of property transfer.

• Submitting the offset project listing information specified in Section 9.1.1. Offset project commencement is the date of submittal of listing information, provided that the offset project completes verification within 30 months of being submitted. If the offset project does not meet this deadline, the listing information must be resubmitted under the latest version of the protocol.

Adequate documentation denoting the offset project commencement date must include where applicable, deeds of trust, title reports, conservation easement documentation, dated forest management plans, and/or other relevant contracts or agreements.

The project commencement date has been identified as July 8, 2013 when the forest owner began a forest carbon inventory for the purposes of developing an offset project. The discrete, verifiable action identifying the project commencement date for this project is the "boots on the ground" starting date of the forest carbon inventory. The first plots were installed on July 8, 2013. The OPO has uploaded verifiable evidence to the OPR project account (see ACR199_StartDate_Docs v1.1.zip) and to the verifier demonstrating the date the forest carbon inventory began in the field.

Additionally, no GHG reductions or GHG removal enhancements associated with the Project lands have ever been listed or registered with, or otherwise claimed by, another registry or program, or sold to a third party prior to listing, including;

a. No lands within the Project Area have ever been listed or registered with an offset project registry or program in the past.
b. No greenhouse gas emission reductions or removal enhancements associated with Project lands within the Project area have been credited or claimed for the purpose of greenhouse gas mitigation or reduction goals, whether in a voluntary or regulatory context.

## 3.3 Crediting Period

The crediting period for offset projects using the FOP is 25 years. This means that after a successful initial verification, a Forest Project will be eligible to receive Offset Credits for GHG reductions and/or removals quantified using this protocol, and verified by ARB-approved verification bodies, for a period of 25 years following the offset project's commencement date. A project may be renewed for subsequent crediting periods, subject to approval at that time and use of the quantification methods in the most recent approved version of the Forest Offset Protocol at the time of renewal. The baseline for any Forest Project under this version of the Forest Offset Protocol is valid for the duration of the Project Life following a successful initial verification where the offset project receives a Positive Verification Statement.

The crediting period for the Project starts July 8, 2013 and ends no later than July 7, 2038, a period equal to 25 years.

## 3.4 Project Life and Minimum Time Commitment

The project will monitor and verify forest carbon stocks for a period of 100 years following the last year of the issuance of any ARB offset credits or registry offset credits.

## 3.5 Use of Qualified Conservation Easement

The Project does not employ a qualified conservation easement at this time as defined in the FOP.

## 3.6 Project Location

The project is located in the United States of America on privately held land. Furthermore, the offset project does not occur on any of the following categories of land:

a. Land that is owned by, or subject to an ownership or possessory interest of a Tribe;
b. Land that is "Indian lands" of a Tribe, as defined by 25 U.S.C. §81(a)(1); or
c. Land that is owned by any person, entity, or Tribe, within the external borders of such Indian lands.

Specifically, it is situated in and under the governing jurisdictions of Coos County, in the State of New Hampshire (see Appendix D. ACR199_Map_CountyTwnshp.pdf). The approximate geometric center of the project area is 45.1370° latitude, -71.2690° longitude.

## 3.7 Regulatory Compliance

The forest owner attests that the project is in material compliance with all applicable laws relevant to the project activity and as described in section 3.1.1 Legal Requirement Test.

## 3.8 Sustainable Harvesting and Natural Forest Management Practices

This project will employ natural forest management practices as described below as well as sustainable harvesting practices for conducting commercial harvesting.

### 3.8.1 Sustainable Harvesting Practices

Commercial harvesting is currently planned in the project area for the near and long term. The Forest Owner elects to demonstrate sustainable long-term harvesting practices on all of its forest landholdings, including the project area, using the forest certification option. The Forest Owner and the Project Area is currently certified in good standing to the Forest Stewardship Council (Certificate Code: RA-FM/COC-000092; License Number: FSC-C018151). The license was issued on 4/26/2010 and is not up for renewal until 4/25/2015. The license can be validated on the FSC Public Certificate Search website (https://us.fsc.org/fsc-certificate-database.311.htm). The Forest Owner does not hold any other forest lands besides CT Lakes. The Forest Owner has not made any new acquisitions during the reporting period.

### 3.8.2 Natural Forest Management

The evaluation worksheet provided in Table 3.2 of the FOP was used to determine that the project fully meets or is making progress towards the criteria and requirements for the establishment and maintenance of native species and natural forest management. The test results are summarized in Table 3 below.

**Table 3. Evaluation Criteria for Native Species and Natural Forest Management**

| *Criteria* | *Response* |
|---|---|
| **Native Species** | |
| Project consists of at least 95% native species based on the sum of carbon in the standing live pool. The assessment shall be conducted using estimates of stems per acre for Reforestation Projects and basal area per acre for Improved Forest Management and Avoided Conversion Projects. | Basal area per acre by species (standing live) was calculated for all strata using inventory data and then weighted by area (i.e. total project area). Native tree species accounted for 100 percent of the tree observations in the forest carbon inventory and thus, encompasses 100 percent of the standing live carbon pool (Table 4). |
| **Composition of Native Species** | |
| **Improved Forest Management and Avoided Conversion Projects**<br><br>Where the Project Area naturally consists of a mixed species distribution, no single species' prevalence, measured as the percent of the basal area of all live trees in the Project Area, exceeds the percentage value of standing live carbon shown under the heading 'Composition of Native Species' in the Assessment Area Data File maintained on the ARB's website. | The Assessment Area Data File (part of FOP Appendix F. and published on the ARB website) requires that no single species in the White Mountains Northeast Spruce-Fir assessment area constitute more than 60 percent of prevalence as measured by basal area of all live trees in the project area. The forest carbon inventory (Reporting Period 1) shows balsam fir having the highest percent composition at 38.10 percent for this assessment area (Table 5).<br><br>The Assessment Area Data File (part of FOP Appendix F. and published on the ARB website) requires that no single species in the White Mountains Northern Hardwoods assessment area constitute more than 70 percent of prevalence as measured by basal area of all live trees in the project area. The forest carbon inventory (Reporting Period 1) shows sugar maple having the highest percent composition at 39.51 percent for this assessment area (Table 5) |
| **Distribution of Age Classes/Sustainable Management** | |
| All forest landholdings owned or controlled by the Forest Owner are currently under one of the following:<br><br>1. Third party certification under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System, whose certification standards require adherence to and verification of harvest levels which can be permanently sustained over time, or<br><br>2. Operating under a renewable long-term management plan that demonstrates harvest levels which can be permanently sustained over time and that is sanctioned and monitored by a state or federal agency, or<br><br>3. The Forest Owner must employ uneven-aged silvicultural practices and canopy retention averaging at least 40 percent across the forest, as measured on any 20 acres within the entire forestland owned by the Forest Owner, including land within and outside of the Project Area. (Areas impacted by Significant Disturbance may be excluded from this test.) | The Forest Owner elects to demonstrate sustainable long-term harvesting practices using the forest certification option (1). The Forest Owner and the Project area is currently certified in good standing to the Forest Stewardship Council (Certificate Code: RA-FM/COC-000092; License Number: FSC-C018151). The license was issued on 4/26/2010 and is not up for renewal until 4/25/2015. The license can be validated on the FSC Public Certificate Search website (https://us.fsc.org/fsc-certificate-database.311.htm). The Forest Owner does not own or have any real interest in any other forest lands in addition to the Project area. |
| On a watershed scale up to 10,000 acres (or the project area, whichever is smaller), all projects must maintain, or make progress toward maintaining, no more than 40 percent of their forested acres in ages less than 20 years. (Areas impacted by Significant Disturbance | Overall, the Project Area holds about 10.2 percent of its forested acres in ages less than 20 years. The location and a table of acres and percent by age class are shown in Figure 4. |

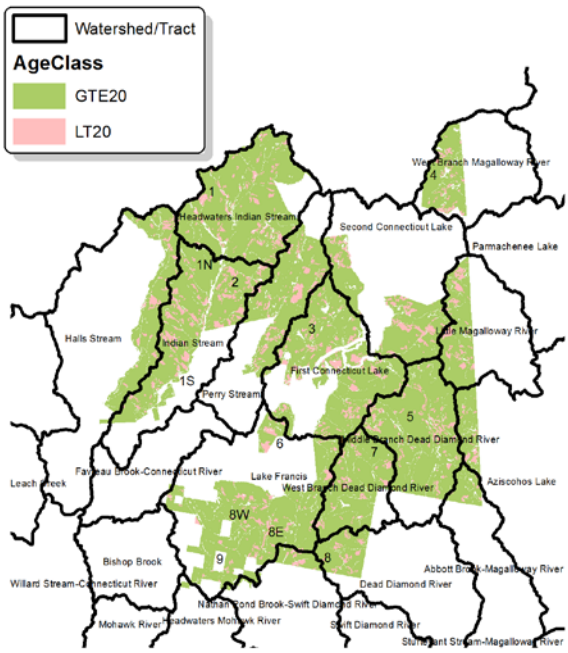
| | |
|---|---|
| may be excluded from this test.) | |
| **Structural Elements (Standing and Lying Dead Wood)** | |
| Forest Owners must ensure that lying dead wood is retained in sufficient quantities, as described below.<br><br>**For portions of the Project Area that have not recently undergone salvage harvesting:**<br><br>If a verifier determines that the quantity of lying dead wood is commensurate with recruitment from standing dead trees (i.e. there is no evidence that lying dead wood has been actively removed), the Forest Owner must maintain (or demonstrate ongoing progress toward) an average of at least:<br><br>• one (1) metric ton of carbon (C) per acre; or<br>• 1% of standing live carbon stocks, in *standing* dead wood, whichever is higher.<br><br>If a verifier determines that the quantity of lying dead wood is **not** commensurate with recruitment from standing dead trees (i.e. it appears lying dead wood has been actively removed), the Forest Owner must maintain (or demonstrate ongoing progress toward) an average of at least:<br><br>• two (2) metric tons of carbon (C) per acre; or<br>• 1% of standing live carbon stocks, in *standing* dead wood, whichever is higher,<br><br>Standing dead wood may be evenly or unevenly distributed throughout the portion of the Project Area unaffected by salvage harvesting, as long as the appropriate minimum average tonnage per acre requirement is met. | As of Reporting Period 1, the actual onsite carbon for standing dead wood is 0.64 metric tons of carbon per acre (equivalent to 3.12% of standing live carbon). While the Forest Owner maintains more than 1% of standing live carbon stocks in standing dead wood, it does not meet the higher of one (1) metric ton of carbon (C) per acre. However, this does not render the Project ineligible. The Project has specific components in the conservation easement objectives to demonstrate progress towards maintaining and increasing structural elements in standing dead wood.<br><br>For example, the Forest Owner does not have policies or implement timber harvesting treatments which actively remove standing or lying dead wood. The forest owner maintains a commitment and demonstrates ongoing progress toward adequately recruiting snags, and subsequently down dead wood, through the easement (e.g. deliberate silviculture objectives which provide for critical and diverse wildlife habitat) and their FSC Forest Management Plan.<br><br>FSC also requires the forest owner to provide adequate habitat for species associated with large and/or decaying trees and dead wood. Some stands may take some time to develop these structural elements. Evidence of ongoing progress includes measurable goals (e.g., progress reports assessed at annual easement holder meetings and planning for. Long-term passive approaches are also used to develop snags and coarse down and dead woody material by allowing retention trees (e.g., large live decay trees) to die naturally, rather than girdling and/or felling trees specifically for that purpose.<br><br>While species selected for retention should be generally representative of the species found on the site, flexibility in the proportions of species retained may be based on ecological and financial objectives.<br><br>These mesures, over time, will increase the standing dead pool to a sufficient level required by the FOP. |

**Table 4. Standing live basal area and percentage by species**

| Species ID | Common Name | Scientific Name | BA (sqft/ac) | Percent |
|---|---|---|---|---|
| 012 | Balsam Fir | *Abies balsamea (L.) Mill.* | 23.65 | 24.53% |
| 371 | Yellow Birch | *Betula alleghaniensis Britton* | 20.52 | 21.28% |
| 318 | Sugar Maple | *Acer saccharum Marsh.* | 19.88 | 20.62% |
| 097 | Red Spruce | *Picea rubens Sarg.* | 14.82 | 15.37% |
| 316 | Red Maple | *Acer rubrum L.* | 5.80 | 6.02% |
| 375 | Paper Birch | *Betula papyrifera Marsh.* | 5.66 | 5.87% |
| 531 | American Beech | *Fagus grandifolia Ehrh.* | 2.22 | 2.30% |
| 315 | Striped Maple | *Acer pensylvanicum L.* | 1.28 | 1.33% |
| 998 | Other Live/Dead Hardwood | *Other hardwood* | 0.75 | 0.78% |
| 761 | Pin Cherry | *Prunus pensylvanica L. f.* | 0.45 | 0.47% |
| 743 | Bigtooth Aspen | *Populus grandidentata Michx.* | 0.44 | 0.46% |
| 095 | Black Spruce | *Picea mariana (Mill.) Britton, Sterns & Poggenb.* | 0.35 | 0.36% |
| 241 | Northern White-Cedar | *Thuja occidentalis L.* | 0.19 | 0.20% |
| 543 | Black Ash | *Fraxinus nigra Marsh.* | 0.12 | 0.12% |
| 951 | Basswood Spp. | *Tilia L.* | 0.10 | 0.10% |
| 762 | Black Cherry | *Prunus serotina Ehrh.* | 0.08 | 0.08% |
| 094 | White Spruce | *Picea glauca (Moench) Voss* | 0.05 | 0.05% |
| 298 | Other Live/Dead Softwood | *Other softwood* | 0.02 | 0.02% |
| 261 | Eastern Hemlock | *Tsuga canadensis (L.) Carrière* | 0.02 | 0.02% |
| 129 | Eastern White Pine | *Pinus strobus L.* | 0.01 | 0.01% |
| | | **Total Native** | 96.41 | 100.00% |
| | | **Total** | 96.41 | 100.00% |

**Table 5. Composition of Native Species by Assessment Area**

| Species ID | Common Name | Scientific Name | BA (sqft/ac) | Percent |
|---|---|---|---|---|
| **Assessment Area: Northeast Spruce-Fir (SDI: 60 percent)** | | | | |
| 012 | Balsam Fir | *Abies balsamea (L.) Mill.* | 43.19 | 38.10% |
| 097 | Red Spruce | *Picea rubens Sarg.* | 25.35 | 22.36% |
| 371 | Yellow Birch | *Betula alleghaniensis Britton* | 20.03 | 17.67% |
| 375 | Paper Birch | *Betula papyrifera Marsh.* | 7.31 | 6.45% |
| 318 | Sugar Maple | *Acer saccharum Marsh.* | 6.46 | 5.70% |
| 316 | Red Maple | *Acer rubrum L.* | 6.36 | 5.61% |
| 998 | Other Live/Dead Hardwood | *Other hardwood* | 0.94 | 0.83% |
| 315 | Striped Maple | *Acer pensylvanicum L.* | 0.85 | 0.75% |
| 095 | Black Spruce | *Picea mariana (Mill.) Britton, Sterns & Poggenb.* | 0.73 | 0.64% |
| 531 | American Beech | *Fagus grandifolia Ehrh.* | 0.56 | 0.50% |
| 743 | Bigtooth Aspen | *Populus grandidentata Michx.* | 0.40 | 0.36% |
| 241 | Northern White-Cedar | *Thuja occidentalis L.* | 0.39 | 0.34% |
| 761 | Pin Cherry | *Prunus pensylvanica L. f.* | 0.35 | 0.31% |
| 951 | Basswood Spp. | *Tilia L.* | 0.17 | 0.15% |
| 543 | Black Ash | *Fraxinus nigra Marsh.* | 0.13 | 0.12% |
| 298 | Other Softwood (old code) | *Other softwood* | 0.05 | 0.04% |
| 762 | Black Cherry | *Prunus serotina Ehrh.* | 0.05 | 0.04% |
| 129 | Eastern White Pine | *Pinus strobus L.* | 0.02 | 0.01% |
| 094 | White Spruce | *Picea glauca (Moench) Voss* | 0.01 | 0.00% |
| Total | | | 113.36 | 100.00% |
| **Assessment Area: Northern Hardwood (SDI: 70 percent)** | | | | |
| 318 | Sugar Maple | *Acer saccharum Marsh.* | 32.03 | 39.51% |
| 371 | Yellow Birch | *Betula alleghaniensis Britton* | 20.97 | 25.86% |
| 012 | Balsam Fir | *Abies balsamea (L.) Mill.* | 5.96 | 7.35% |
| 316 | Red Maple | *Acer rubrum L.* | 5.30 | 6.53% |
| 097 | Red Spruce | *Picea rubens Sarg.* | 5.29 | 6.53% |
| 375 | Paper Birch | *Betula papyrifera Marsh.* | 4.17 | 5.14% |
| 531 | American Beech | *Fagus grandifolia Ehrh.* | 3.72 | 4.59% |
| 315 | Striped Maple | *Acer pensylvanicum L.* | 1.66 | 2.05% |
| 998 | Other Live/Dead Hardwood | *Other hardwood* | 0.57 | 0.71% |
| 761 | Pin Cherry | *Prunus pensylvanica L. f.* | 0.55 | 0.68% |
| 743 | Bigtooth Aspen | *Populus grandidentata Michx.* | 0.47 | 0.57% |
| 762 | Black Cherry | *Prunus serotina Ehrh.* | 0.12 | 0.15% |
| 543 | Black Ash | *Fraxinus nigra Marsh.* | 0.10 | 0.13% |
| 094 | White Spruce | *Picea glauca (Moench) Voss* | 0.08 | 0.10% |
| 951 | Basswood Spp. | *Tilia L.* | 0.04 | 0.05% |
| 261 | Eastern Hemlock | *Tsuga canadensis (L.) Carrière* | 0.04 | 0.05% |
| 241 | Northern White-Cedar | *Thuja occidentalis L.* | - | 0.00% |
| 298 | Other Softwood (old code) | *Other softwood* | - | 0.00% |
| Total | | | 81.08 | 100.00% |




| Reporting Period 1 | | < ------ Acres by Stand Age ------ > | | | < ------ Percent ------ > | | |
|---|---|---|---|---|---|---|---|
| *Watershed* | *Tract* | > 20 yrs | ≤ 20 Years | Total | > 20 yrs | ≤ 20 Years | Total |
| Abbott Brook-Magalloway River | 5 | 512.68 | 58.35 | 571.03 | 89.8% | 10.2% | 100.0% |
| Abbott Brook-Magalloway River | 7 | 1,017.21 | 51.13 | 1,068.35 | 95.2% | 4.8% | 100.0% |
| Aziscohos Lake | 5 | 2,441.58 | 268.23 | 2,709.81 | 90.1% | 9.9% | 100.0% |
| Bishop Brook | 8 | 3.37 | - | 3.37 | 100.0% | 0.0% | 100.0% |
| Dead Diamond River | 8 | 3,065.47 | 328.24 | 3,393.71 | 90.3% | 9.7% | 100.0% |
| Favreau Brook-Connecticut River | 8 | 35.42 | 5.47 | 40.89 | 86.6% | 13.4% | 100.0% |
| First Connecticut Lake | 3 | 6,636.71 | 813.05 | 7,449.76 | 89.1% | 10.9% | 100.0% |
| First Connecticut Lake | 5 | 4,725.68 | 708.28 | 5,433.97 | 87.0% | 13.0% | 100.0% |
| First Connecticut Lake | 6 | 601.58 | 67.53 | 669.10 | 89.9% | 10.1% | 100.0% |
| First Connecticut Lake | 7 | 2,601.72 | 402.20 | 3,003.92 | 86.6% | 13.4% | 100.0% |
| Halls Stream | 1 | 7,303.43 | 688.54 | 7,991.97 | 91.4% | 8.6% | 100.0% |
| Headwaters Indian Stream | 1 | 7,896.61 | 734.69 | 8,631.30 | 91.5% | 8.5% | 100.0% |
| Headwaters Indian Stream | 2 | 8,947.45 | 750.87 | 9,698.31 | 92.3% | 7.7% | 100.0% |
| Headwaters Mohawk River | 9 | 87.65 | - | 87.65 | 100.0% | 0.0% | 100.0% |
| Indian Stream | 1N | 5,354.89 | 710.01 | 6,064.89 | 88.3% | 11.7% | 100.0% |
| Indian Stream | 1S | 4,776.50 | 687.89 | 5,464.38 | 87.4% | 12.6% | 100.0% |
| Indian Stream | 2 | 3,914.04 | 845.78 | 4,759.82 | 82.2% | 17.8% | 100.0% |
| Lake Francis | 6 | 893.91 | 297.82 | 1,191.73 | 75.0% | 25.0% | 100.0% |
| Lake Francis | 7 | 1,346.80 | 175.20 | 1,522.00 | 88.5% | 11.5% | 100.0% |
| Lake Francis | 8E | 6,503.77 | 600.81 | 7,104.57 | 91.5% | 8.5% | 100.0% |
| Lake Francis | 8W | 6,839.25 | 420.34 | 7,259.58 | 94.2% | 5.8% | 100.0% |
| Lake Francis | 9 | 2,350.25 | 68.59 | 2,418.84 | 97.2% | 2.8% | 100.0% |
| Little Magalloway River | 5 | 4,956.08 | 773.57 | 5,729.65 | 86.5% | 13.5% | 100.0% |
| Middle Branch Dead Diamond River | 5 | 7,798.09 | 648.13 | 8,446.22 | 92.3% | 7.7% | 100.0% |
| Middle Branch Dead Diamond River | 7 | 6,246.25 | 525.55 | 6,771.80 | 92.2% | 7.8% | 100.0% |
| Nathan Pond Brook-Swift Diamond River | 8 | 1,082.05 | 190.21 | 1,272.26 | 85.0% | 15.0% | 100.0% |
| Nathan Pond Brook-Swift Diamond River | 9 | 215.06 | - | 215.06 | 100.0% | 0.0% | 100.0% |
| Perry Stream | 2 | 3,831.74 | 346.73 | 4,178.47 | 91.7% | 8.3% | 100.0% |
| Perry Stream | 3 | 4,673.04 | 831.49 | 5,504.52 | 84.9% | 15.1% | 100.0% |
| Second Connecticut Lake | 3 | 2,424.39 | 317.49 | 2,741.88 | 88.4% | 11.6% | 100.0% |
| Second Connecticut Lake | 4 | 3.63 | - | 3.63 | 100.0% | 0.0% | 100.0% |
| Second Connecticut Lake | 5 | 5,100.50 | 922.16 | 6,022.66 | 84.7% | 15.3% | 100.0% |
| West Branch Dead Diamond River | 7 | 4,213.94 | 366.45 | 4,580.39 | 92.0% | 8.0% | 100.0% |
| West Branch Dead Diamond River | 8 | 4,150.15 | 245.92 | 4,396.06 | 94.4% | 5.6% | 100.0% |
| West Branch Magalloway River | 4 | 4,186.60 | 474.08 | 4,660.68 | 89.8% | 10.2% | 100.0% |
| **All** | | **126,737.47** | **14,324.77** | **141,062.25** | **89.8%** | **10.2%** | **100.0%** |

**Figure 4. Project Area Age Classes relative to Watersheds**

### 3.8.3 Promotion of the Onsite Standing Live Carbon Stocks

Since the project commencement date, the Project's monitoring reports do not indicate a decrease in the standing live carbon stocks over any 10 year consecutive period.

### 3.8.4 Balancing Age and Habitat Classes

A variety of silvicultural practices may be employed in the Project Area during the course of a Forest Project though the protocol does not endorse any particular practice. To ensure environmental integrity, Forest Projects must meet a minimum set of standards in the use of any such practices. For projects that employ even-aged management practices, harvesting must be limited to stands no greater than 40 acres. Stands adjacent to recently harvested stands must not be harvested using an even-aged harvest until the average age of the adjacent stand is at least 5-years old, or the average height in the adjacent stand is at least 5 feet. On a watershed scale up to 10,000 acres, all projects must maintain, or make progress toward maintaining, no more than 40 percent of their forested acres in ages less than 20 years. Areas impacted by a Significant Disturbance are exempt from this test until 20 years after reforestation of such areas.

Since the project commencement date, no harvesting has occurred in stands that qualify as "even-aged management" to the extent where the residual stand was less than 5 years old and less than 5 feet in height. Additionally, all harvest units from reporting period 1 are adjacent to stands that are at least 5 years old or 5 feet in height.

All harvesting since the project start date is quantified and described in the Verified Mill Report by year, size and harvest type as well as a map titled, “Map Showing Location of Timber Harvests for Reporting Period 1” (all provided to the verifier under separate cover for verification purposes). Harvest units from reporting period 1 which qualify as “even-age management” are all less than 40 acres.

Based on the harvest types used since the project commencement date and because the residual stands in all cases were greater than 5 years old or 5 feet in height, the project is in compliance with the stand size threshold for even-aged management practices and the age and height adjacency requirements as described above. Furthermore, as shown in Figure 4, no more than 40 percent of the project acres by watershed (up to 10,000 acres) are in age classes less than 20 years old.

The project’s commitment and environmental integrity to management practices with respect to balancing age classes and habitat structure is also strengthened through its enrollment in third-party forest certification (i.e. adherence to Forest Stewardship Council Principles and Criteria). In addition, the entire property is subject to a “working forest conservation easement” held by the State of New Hampshire which is monitored on a continual basis.

# 4. Identifying the Project Area

The methodology used to determine the project area boundaries and area (calculated GIS acres) is described by Equation 1 below. The equation was applied using the following steps:

1. The equation to determine the Project area is:

$$PROJAREA = GRSOWNAREA - \sum_{h=1}^{L} EXCLAREA_h \quad (\mathbf{1})$$

Where:

PROJAREA = Total acres in project area

GRSOWNAREA = Total acres in gross ownership area (includes fee simple lands; there are no non-fee lands)

*L* = Number of exclusion areas

$EXCLAREA_h$ = Size of area in exclusion area *h*

2. Determine Gross Ownership Area (GRSOWNAREA)

    a. The Forest Owner provided a shapefile called 'Stands'; this shapefile maps the authoritative, managerial and operational boundaries under Connecticut Lakes Realty Trust land and timber right holdings in the Project area; the shapefile was imported into the project geodatabase as a feature class and renamed 'Stands_Baseline'; the data was reviewed and summarized to determine the values in Equation 1.

    b. The acres were calculated for all polygons in the 'Stands_Baseline' feature class:

    c. GRSOWNAREA = 146,434.93 acres

3. Determine Non-forest (i.e. Ineligible land-use classes) ($EXCLAREA_1$)

    a. A land-use class field was identified for each polygon in 'Stands_Baseline'; this field is titled 'LandUse'; the land-use classes are summarized in Table 6.

**Table 6. Gross Ownership by Land Use**

| Land Use Code | Land Use Name | Acres |
|---|---|---|
| AL | ALDER | 1,487.98 |
| BG | BOG | 238.39 |
| EX | DEVELOPED | 3.99 |
| FL | FLOWAGE | 888.25 |
| GP | GRAVEL PIT | 52.77 |
| CL | LANDING | 192.79 |
| LG | LEDGE STEEP | 16.15 |
| MW | MIXED WOOD (Project Area) | 31,112.50 |
| NP | NON PRODUCTIVE | 2.04 |
| NH | NORTHERN HARDWOOD (Project Area) | 74,038.45 |
| OP | OPEN | 1.31 |
| RD | ROAD | 2,211.98 |
| SF | SPRUCE FIR (Project Area) | 35,911.30 |
| WA | WATER | 206.81 |
| FW | WETLAND | 70.21 |
| Total | | 146,434.93 |

b. There are 5,372.68 acres for non-forest (ineligible areas) within the gross ownership area.

c. The $EXCLAREA_1$ = 5,372.68 acres. These lands are symbolized in Figure 5.

4. Using Equation 1, the project area is 141,062.25 acres. These lands are colored green in Figure 5.

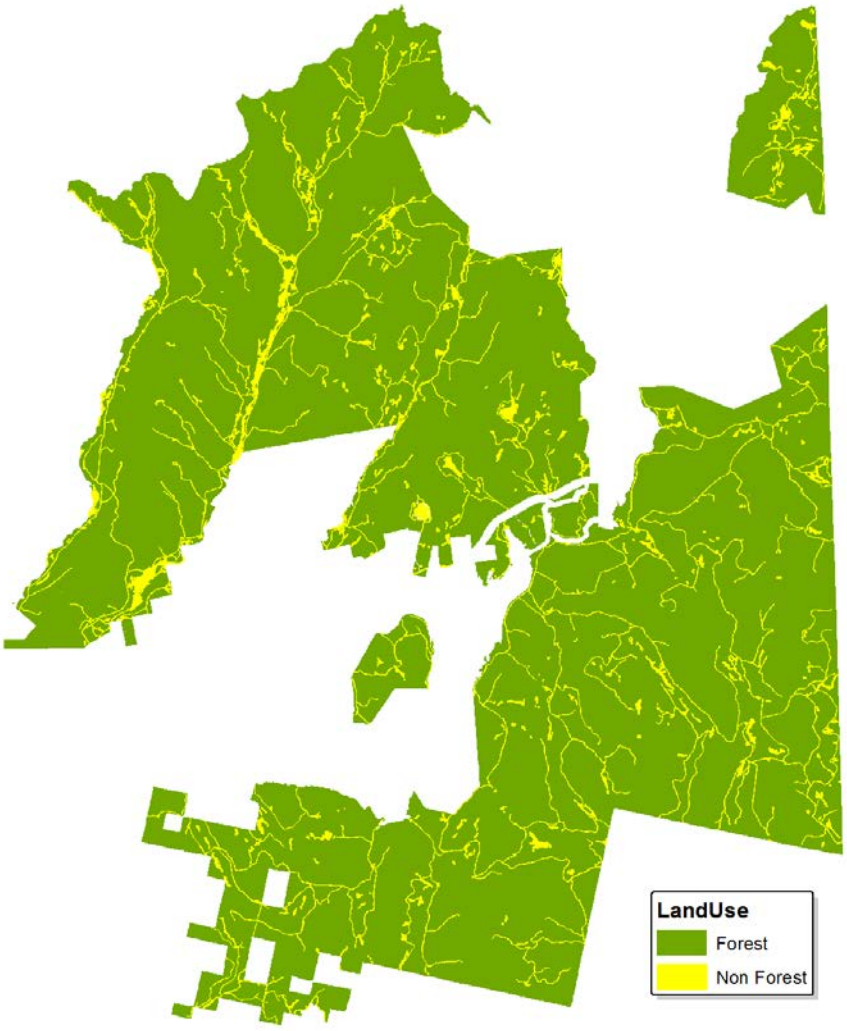



**Figure 5. Ineligible Areas relative to Project Area**

# 5. Defining the Project's GHG Assessment Boundary

Table 7 was adapted from the FOP, Table 5.2 and describes the project's GHG assessment boundary.

**Table 7. Sources, Sinks, and Reservoirs**

| SSR | Description | Type | Gas | Quantification Method | Justification/Explanation |
|---|---|---|---|---|---|
| **Primary Effect Sources, Sinks, and Reservoirs** | | | | | |
| IFM-1 | Standing live carbon (carbon in all portions of living trees) | Reservoir / Pool | CO2 | **Baseline:** Modeled based on initial field inventory measurements<br>**Project:** Measured by field measurements and updating forest carbon inventory | Increases in standing live carbon stocks are likely to be the largest primary effect of Improved Forest Management Projects. |
| IFM-3 | Standing dead carbon (carbon in all portions of dead, standing trees) | Reservoir / Pool | CO2 | **Baseline:** Modeled based on initial field inventory measurements<br>**Project:** Measured by updating forest carbon inventory | Improved Forest Management Projects may significantly increase standing dead carbon stocks over time. |
| IFM-7 | Carbon in in-use forest products | Reservoir / Pool | CO2 | **Baseline:** Estimated from modeled harvesting volumes<br>**Project:** Estimated from measured harvesting volumes | Included because many Improved Forest Management Projects may significantly change carbon storage in in-use forest products relative to baseline levels. Treated as a "source/sink" because forest product carbon is quantified according to the change in harvesting volumes, relative to baseline levels, in each year. Of this change (increase or decrease), only the average amount of carbon expected to remain stored for 100 years is included in the final quantification of annual net GHG removals/emissions. This approach accounts for CO2 emissions from decomposition or disposal of wood products (see SSR #IFM-17). |
| IFM-8 | Forest product carbon in landfills | Reservoir / Pool | CO2 | **Baseline:** Estimated from modeled harvesting volumes<br>**Project:** Estimated from measured harvesting volumes | Because of significant uncertainties associated with forecasting the quantity of forest product carbon that will remain stored in landfills, landfill carbon is excluded from quantification in years when project harvesting volumes exceed baseline volumes. Landfill carbon is included, however, in years when project harvesting volumes are below baseline levels. This case-dependent exclusion or inclusion is necessary to ensure that total GHG reductions and removals caused by the Forest Project are not overestimated. |
| **Secondary Effect Sources, Sinks, and Reservoirs** | | | | | |
| IFM-9 | Biological emissions from site preparation activities | Source | CO2 | **Baseline:** N/A<br>**Project:** Quantified based on measured carbon stock changes in included reservoirs (SSR #IFM-6, where applicable) | Biological emissions from site preparation are not quantified separately, but rather are captured by measuring changes in included carbon reservoirs (soil carbon, where applicable). For other carbon reservoirs, changes are unlikely to have a |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | significant effect on total quantified GHG reductions/removals. |
| IFM-14 | Biological emissions/ removals from changes in harvesting on forestland outside the Project Area | Source / Sink | CO2 | **Baseline:** N/A<br>**Project:** Estimated using a default 20% "leakage" factor applied to the difference in harvest volume relative to baseline | Improved Forest Management Projects may either increase or decrease harvesting relative to baseline levels. If harvesting is reduced in the Project Area, harvesting on other lands may increase to compensate for the lost production. This "leakage" effect is included in the GHG Assessment Boundary. If harvesting is increased in the Project Area, harvesting on other lands may decrease in response to the increased production. The reduction in harvesting may lead to increased carbon stocks on other lands. Carbon stock increases on other lands are excluded from the GHG Assessment Boundary, however, because it is not possible to ensure their permanence. |
| IFM-17 | Biological emissions from decomposition of forest products | Source | CO2 | **Baseline:** Quantified as a component of calculating carbon stored for 100 years in wood products (SSR #IFM-7) and landfills (SSR #IFM-8)<br>**Project:** Quantified as a component of calculating carbon stored for 100 years in wood products (SSR #IFM-7) and landfills (SSR #IFM-8) | CO2 emissions from the decomposition of forest products are built into calculations of how much forest product carbon will remain in in-use wood products and in landfills, averaged over 100 years. |

# 6. Quantifying Net GHG Reductions and Removals

## 6.1 Forest Inventory & Modeling Plan

### 6.1.1 Inventory Plan & Design

The baseline forest carbon inventory was planned by the OPO, and implemented and completed by LandVest (a regional forestry consulting group) between July 8, 2013 and January 7,2014. The primary land use for the region is forestry. Review of air photos and satellite images reveal a forest dominated landscape with minor agricultural uses in some areas. The forest project lies entirely in the 3b, 4a and 4b climate zones as shown on USDA FS mapping for the region (http://www.usna.usda.gov/Hardzone/hzm-sm1.html). The forest inventory will serve to directly estimate the IFM-1 and IFM-3 carbon pools described in Section 5. Defining the Project's GHG Assessment Boundary as well as indirectly estimate the remaining carbon pools required by the FOP for an IFM project.

The stratification used in the CT Lakes project was based on forest cover types using the species and vegetation community descriptions found in *Forest Cover Types of the United States and Canada* (Eyre, 1980). These forest cover types were subsequently mapped to the appropriate FOP Assessment Areas (i.e. forest vegetative communities) listed in the Assessment Area Data File for the project's Supersection. The tree species found in any particular stratum in the project area were also consistent with the species listed in the Assessment Area Data File. Forest cover type designations were estimated based on existing forest inventory data and geographic information systems (GIS), and validated in the field during the forest inventory conducted for the project. Final determination of the strata was based on species composition and current stocking according to the guidelines in the *Forest Cover Types of the United States and Canada* (Eyre, 1980) and the species listed in the Assessment Area Data File. The strata then ends up being a combination of the SAF forest cover type and FOP assessment area. The strata currently existing in the project area are listed in Table 8. As activities occur in the project, the strata will be updated using the stratification process described above. See Appendix H. ACR199 Project Inventory Specifications Proprietary v1.2.pdf for a more detailed description of the onsite forest carbon inventory methodology as well as Appendix F. ACR199 Data Management & Analytical Systems Proprietary v1.0.pdf and Appendix J. ACR199 Full Monitoring Plan Proprietary v1.1.pdf as it relates to each of the requirements in Appendix A, A.3, of the FOP.

The number of plots in each stratum, i.e. sampling intensity, was formulated based on precision targets of historical measures of variance of the property. The target statistical error was ±5 percent for onsite forest carbon at a 90 percent confidence interval. The sampling intensity was determined as 674 plots. Plots were allocated along a randomly placed grid within stratum delineations (i.e. polygons), with grid lines generally running along one of two perpendicular azimuths, north/south or east/west. All plots were assigned GPS coordinates and stored in the project geodatabase. The plot locations are shown in Figure 6.

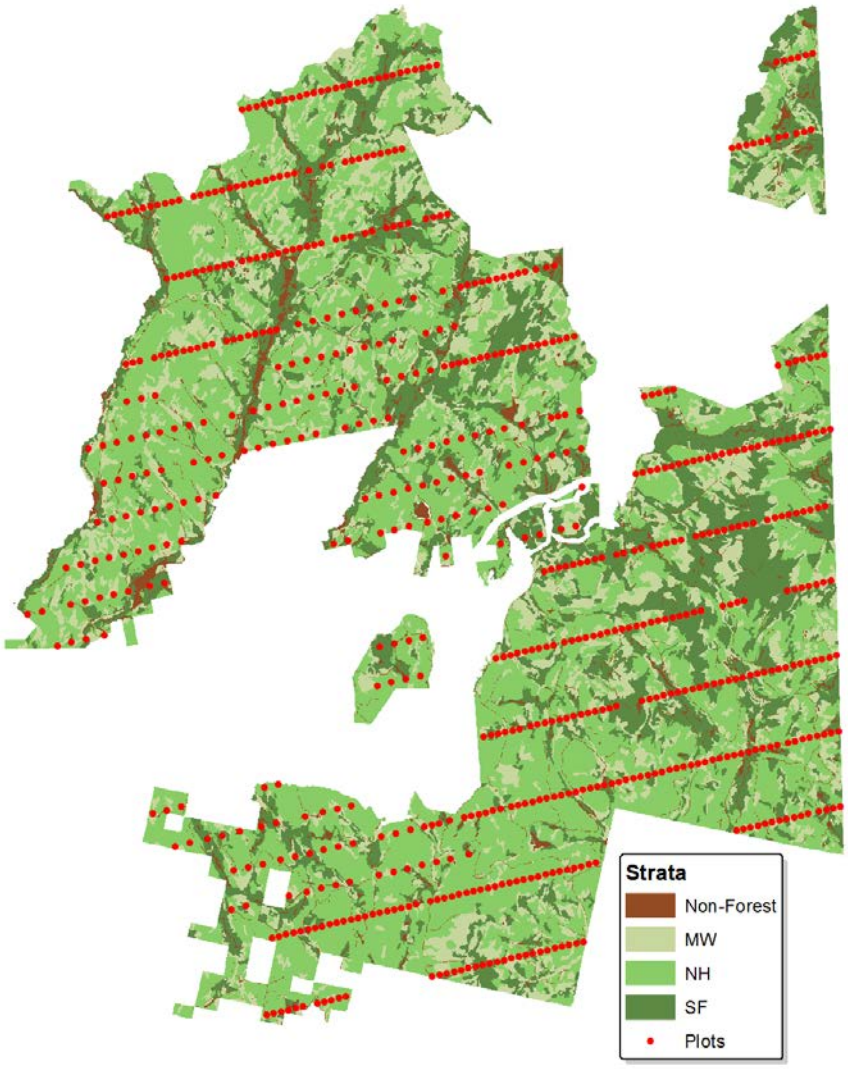



**Figure 6. Cruise lines and plots for baseline inventory**

### 6.1.2 Field Data Collection

All cruisers were provided with GIS developed base maps for the cruise. Each plot center was located using 3 to 5 meter accuracy GPS (WAAS enabled) units. Plot centers were permanently monumented with steel pipe, pins or rebar and paint. Cruisers also used GPS to locate or update base map features as well as ground-truth forest types and stand lines.

Tree data was then systematically collected using point sampling (i.e. variable radius plots) with a 15 Basal Area Factor prism for all stems 4.6 inches dbh and larger. A nested plot of 1/100$^{th}$ acre for trees below 4.6 inches dbh and greater than or equal to 1.0 inch dbh was also collected at the same plot center. All borderline trees were measured to the geometric center of the base of the tree using approved devices, including slope adjustments for slopes of 10% and greater in accordance with the USFS procedures laid out in the forest management field book 2008 edition.

The following data was collected for all standing live or dead trees in the plot starting with the first "in" tree immediately east of magnetic north from plot center:

- tree species;
- product code;
- diameter at breast height;
- height of each stem;
- soundness deduction; and
- decomposition class.

In order to verify the quality of the data collection, the contractor performed an internal audit of the data. This audit consisted of a minimum of 5% of the samples collected. Initially, audits addressed all cruisers equally. If however, individual cruisers were found to be consistently out of compliance, the auditor or audit team then focused on individuals in order to verify compliance with the specifications.

Audit reports were generated weekly throughout the inventory project and were submitted with per cruiser audit totals and results. Initially and periodically throughout the inventory, Finite Carbon joined the contract auditor on field verification of data. The final audit results were provided to Finite Carbon at the completion of the project and included audit dates, number of audited samples per cruiser including sample location identifiers, total audited samples vs. total samples as a percent, corrective actions per cruiser, any plots re-done due to non-compliance, and overall auditor's comments.

Corrective actions: Re-training non-compliant cruisers and correcting erroneous samples were the minimum corrective actions implemented. Based on the results of audits, if a cruiser repeatedly did not meet the quality standards for allowable error, all points for that cruiser were re-done by a new cruiser that met the quality thresholds.

### 6.1.3 Inventory Plot Statistics

A statistical analysis of the onsite carbon stock was conducted. The onsite carbon stock for each plot was determined using the ARB published cubic foot volume and biomass equations for projects in the states outside of California, Washington, and Oregon as referenced by species in Table 12. The mean, standard error and 90 percent confidence interval for onsite carbon stock were then calculated for each stratum from their respective plot carbon stocks. The confidence interval was determined as the product of the standard error and 1.645. Percent error by stratum was determined by dividing half of the width of the confidence interval by the mean. The percent error for $tCO_2e$ per acre for all actual onsite carbon stocks combined was calculated by strata at a 90 percent confidence level (Table 8). The total project uncertainty (sampling error) is 4.12 percent.

**Table 8. Summary of Percent Error by Strata and Project Total (Reporting Period 1 $tCO_2e$/acre, all portions)**

| Strata/Assessment Area | IFM1 & IFM3 per Acre | Percent Error (PE) |
|---|---|---|
| MW: Red Spruce-Yellow Birch/Northeast Spruce-Fir | 81.76 | 7.92% |
| NH: Maple-Beech-Birch/Northern Hardwoods | 77.38 | 5.95% |
| SF: Red Spruce-Balsam Fir/Northeast Spruce-Fir | 74.81 | 8.09% |
| **Project Total** | 77.69 | **4.12%** |

### 6.1.4 Growth & Yield Model

Forest inventory field data was transferred to Finite Carbon in a database, along with all relevant GIS files. A project geodatabase serves as the central data repository. The inventory data was then reformatted for input to the Forest Vegetation Simulator (Crookston 2003). The Forest Vegetation Simulator (FVS) is a family of forest growth simulation models supported and maintained by a special unit of the USDA Forest Service (www.fs.fed.us/fmsc/fvs/). Since its initial development in 1973, it has become a system of highly integrated analytical tools. These tools are based upon a body of scientific knowledge developed from decades of natural resources research. The FVS growth model is an approved ARB growth model (FOP, Appendix B, Section B.1).

The FVS is an individual-tree, distance-independent growth and yield model (Dixon 2002). It has been calibrated for specific geographic areas (variants) of the United States (Figure 7). FVS can simulate a wide range of silvicultural treatments for most major forest tree species, forest types, and stand conditions. The Northeast (NE) Variant (Keyser 2008) has been used for the CT Lakes project.

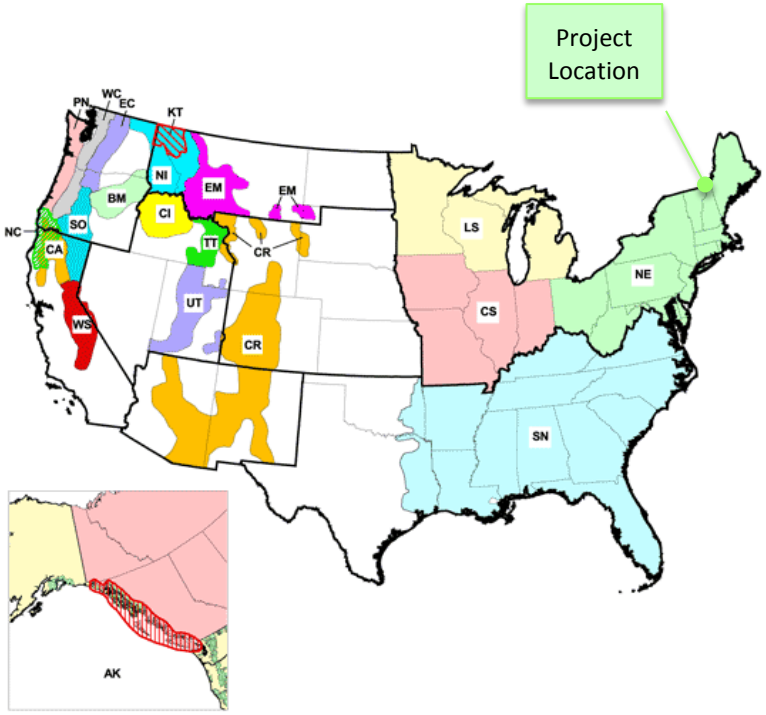



**Figure 7. FVS Variants Map**

Tree data is entered directly into the model with the inventory sampling design in order to grow the stands and perform simulated management activities in both the baseline and project scenario. FVS outputs a tree list with

tree level attributes which are used to apply the appropriate cubic foot volume and biomass equations by species for the respective ARB Supersections for projects located outside of California, Washington or Oregon as published on the ARB's website. The calculated results, in both wood volume and forest carbon, were summarized at the strata level to create yield tables based on just growth or harvest treatment type. A full description of the data management and analytical systems is provided in Appendix F. ACR199 Data Management & Analytical Systems.

## Model Calibrations

The variant ("NE") and project location code (indicating the closest National Forest – in this case, White Mountain National Forest ) were input to the model along with the inventory design parameters for proper calibration. Default site index values were modified based on a site specific, FIA average site index condition analysis by querying FIA data (FIADB, 2014) specific to the project area region (detailed explanation of the method and results were provided under separate cover for verification purposes). The modifications, for major species where site index condition was available, are shown in Table 9 below. Other species in the project where FIA site index data was not available were calibrated by FVS default transformations (Keyser, 2008).

**Table 9. Site Index Calibration Summary**

| FIA Spp. | Spp. Name | FVS (NE) SI Default | Average SI Condition (FIA) |
|---|---|---|---|
| 012 | balsam fir | 52 | 51 |
| 094 | white spruce | 50 | 56 |
| 097 | red spruce | 50 | 43 |
| 129 | eastern white pine | 65 | 63 |
| 316 | red maple | 56 | 62 |
| 318 | sugar maple | 56 | 52 |
| 371 | yellow birch | 56 | 57 |
| 375 | paper birch | 56 | 60 |
| 541 | white ash | 59 | 73 |
| 746 | quaking aspen | 60 | 65 |
| 833 | northern red oak | 58 | 53 |

## Modeling Plan

A description of the all silviculture methods modeled in the baseline can be found under "Baseline Activities" in Section 6.2.1 Estimating Baseline Onsite Carbon Stocks – Private Lands including a description of trees harvested/retained, harvest frequency and regeneration assumptions. A description of how legal constraints affect forest management and the silviculture methods used to ensure the constraint is respected can be found under "Baseline Legal Constraints" in Section 6.2.1 Estimating Baseline Onsite Carbon Stocks – Private Lands. A description of the site indexes used for each species and an explanation of the source of the site index values used can be found in Table 9. Site Index Calibration Summary and in the worksheet calculations file submitted under separate cover for verification purposes. Modeling outputs are shown in Appendix K. ACR199 Baseline Inventory, Growth and Harvest by Year v1.0.pdf and Figure 10.

*The following section numbers reference those of section 6.2 in the FOP for Improved Forest Management projects.*

## 6.2.1 Estimating Baseline Onsite Carbon Stocks – Private Lands

**Step 1 – Determine the Common Practice Carbon Stocks for the Project's Assessment Area**

The entire project area is situated in the *White Mountains* ARB Supersection (Appendix E. ACR199_Map_AssessmentAreas.pdf).

The project area was further classified into Assessment Areas by associating the corresponding species composition from the FOP Appendix F Assessment Area Data File with that of the forest cover types mapped for each stratum and stand based on aerial photography analysis and field validation during the forest carbon inventory in 2013. There were three forest cover types identified which mapped to two Assessment Areas in the project area: Northern Hardwoods and Northeast Spruce-Fir (see Table 10 as well as Appendix E. ACR199_Map_AssessmentAreas.pdf).

**Table 10. Common Practice Assessment Area Data**

| Supersection | Assessment Area | Associated Species | Site Class | Board Feet | Basal Area (Square Feet per Acre) | Common Practice - Above Ground Carbon Mean (Metric Tonnes CO2-equivalent) | Compostion of Native Species |
|---|---|---|---|---|---|---|---|
| White Mountains | White Mountains Northeast Spruce-Fir | Aspen, birch, balsam fir, black spruce, eastern hemlock, gray birch, northern white cedar, paper birch, red spruce, balsam fir, tamarack, white spruce | Low | 1,729 | 89 | **40** | 60% |
| White Mountains | White Mountains Northeast Spruce-Fir | Aspen, birch, balsam fir, black spruce, eastern hemlock, gray birch, northern white cedar, paper birch, red spruce, balsam fir, tamarack, white spruce | High | 2,883 | 107 | **51** | 60% |
| White Mountains | White Mountains Northern Hardwood | Black cherry, cherry, white ash, yellow poplar, hard maple, basswood, maple, beech, birch, red maple, sugar maple, yellow birch | High | 3,323 | 100 | **66** | 70% |
| White Mountains | White Mountains Northern Hardwood | Black cherry, cherry, white ash, yellow poplar, hard maple, basswood, maple, beech, birch, red maple, sugar maple, yellow birch | Low | 3,179 | 92 | **68** | 70% |

For Assessment Areas where data are attributed for high and low site classes, Forest Owners must further stratify the Project Area and identify the acreage that falls within each site class. For site class stratification purposes, a high site class means a Timber Site I or II (Forest Service Types I, II, and III). A low site class means a Timber Site III, IV, or V (Forest Service Types IV – VII). Landowners must determine the portion of the Project Area that is in each site class for each Assessment Area using soils data from a state or federal agency, direct site class data from a state or federal agency, attestation from a state forester, or through field analysis. Soil survey data from NRCS for Coos County, New Hampshire (Soil Survey Staff, 2013) indicate that the Project area is predominantly Forest

Service Types IV – VII. Based on this analysis, the total common practice carbon stock is 7,705,465.62 $tCO_2e$. The weighted average common practice carbon stock on a per acre basis is 54.62 $tCO_2e$ (Table 11 and Figure 8).

**Table 11. Common Practice Carbon Stocks**

| Supersection | Strata/Assessment Area | Site Class | Project Area (acres) | CP Stock (tCO2e/acre) | Area Weight | Weight CP (tCO2e/acre) |
|---|---|---|---|---|---|---|
| White Mountains | MW/Northeast Spruce-Fir | High | 533.70 | 51.24 | 0.0038 | 0.19 |
| White Mountains | MW/Northeast Spruce-Fir | Low | 30,578.79 | 40.02 | 0.2168 | 8.68 |
| White Mountains | NH/Northern Hardwood | High | 1,291.50 | 66.19 | 0.0092 | 0.61 |
| White Mountains | NH/Northern Hardwood | Low | 72,746.95 | 67.72 | 0.5157 | 34.92 |
| White Mountains | SF/Northeast Spruce-Fir | High | 481.35 | 51.24 | 0.0034 | 0.17 |
| White Mountains | SF/Northeast Spruce-Fir | Low | 35,429.95 | 40.02 | 0.2512 | 10.05 |
| | | | 141,062.25 | | | 54.62 |

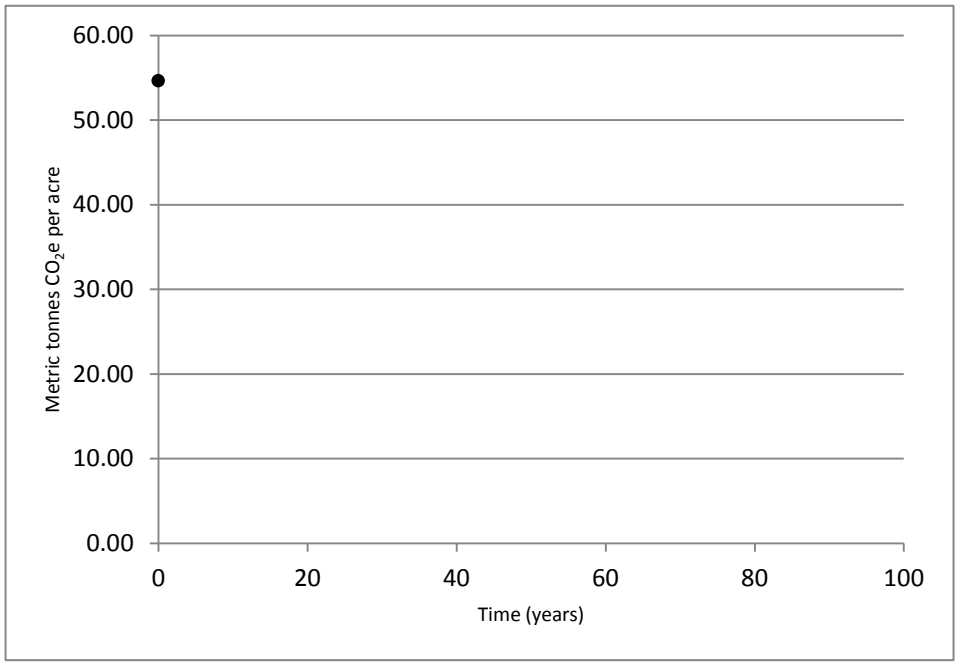



**Figure 8. Step 1 - Common Practice**

**Step 2 – Determine if Initial Stocks are Above or Below Common Practice**

Initial carbon stocks were determined using the inventory data and the most current volume and biomass equations (i.e. as specified for projects outside of California, Washington and Oregon on ARB's website as of January 2014) appropriate for the Project's Supersection and species as published and approved by ARB. The species observed in the project are listed in Table 12 along with their cubic foot volume and biomass equation assignments. The total initial above-ground standing live carbon stock is 8,800,061 $tCO_2e$ which is above the common practice. The weighted average above-ground standing live carbon stock per acre is 62.38 $tCO_2e$ (Table 13 and Figure 9).

**Table 12. Volume and Biomass Equation Assignments by Species**

| Species Name | FIA Code | ARB Associated Volume Equation FIA Code | Cubic Foot Volume Equation Reference |
|---|---|---|---|
| balsam fir | 012 | 012 | Scott, Charles T., 1981 |
| white spruce | 094 | 094 | Scott, Charles T., 1981 |
| black spruce | 095 | 094 | Scott, Charles T., 1981 |
| red spruce | 097 | 094 | Scott, Charles T., 1981 |
| eastern white pine | 129 | 129 | Scott, Charles T., 1981 |
| northern white-cedar | 241 | 241 | Scott, Charles T., 1981 |
| eastern hemlock | 261 | 261 | Scott, Charles T., 1981 |
| other softwood | 298 | 131 | Scott, Charles T., 1981 |
| striped maple | 315 | 761 | Scott, Charles T., 1981 |
| red maple | 316 | 317 | Scott, Charles T., 1981 |
| sugar maple | 318 | 318 | Scott, Charles T., 1981 |
| yellow birch | 371 | 371 | McClure, J. and Cost, N. 2010 |
| paper birch | 375 | 370 | Scott, Charles T., 1981 |
| American beech | 531 | 531 | Scott, Charles T., 1981 |
| black ash | 543 | 544 | Scott, Charles T., 1981 |
| bigtooth aspen | 743 | 544 | Scott, Charles T., 1981 |
| pin cherry | 761 | 761 | Scott, Charles T., 1981 |
| black cherry | 762 | 762 | Scott, Charles T., 1981 |
| basswood spp. | 950 | 950 | Scott, Charles T., 1981 |
| other hardwood | 998 | 761 | Scott, Charles T., 1981 |

Note: Component Ratio Method coefficients (e.g. specific gravity) are associated with the FIA Code column; cubic foot volume equation references are associated with the ARB Associated Volume Equation FIA Code column.

**Table 13. Standing Live Above-Ground Carbon**

| Forest Strata | Year | Acres | *Standing Live Above Ground metric tons $CO_2e$* Per Acre | Total |
|---|---|---|---|---|
| MW | 2013 | 31,112.50 | 64.96 | 2,021,036.60 |
| NH | 2013 | 74,038.45 | 62.72 | 4,643,469.58 |
| SF | 2013 | 35,911.30 | 59.47 | 2,135,555.42 |
| **Total** | | 141,062.25 | | 8,800,061.61 |
| **Average** | | | **62.38** | |

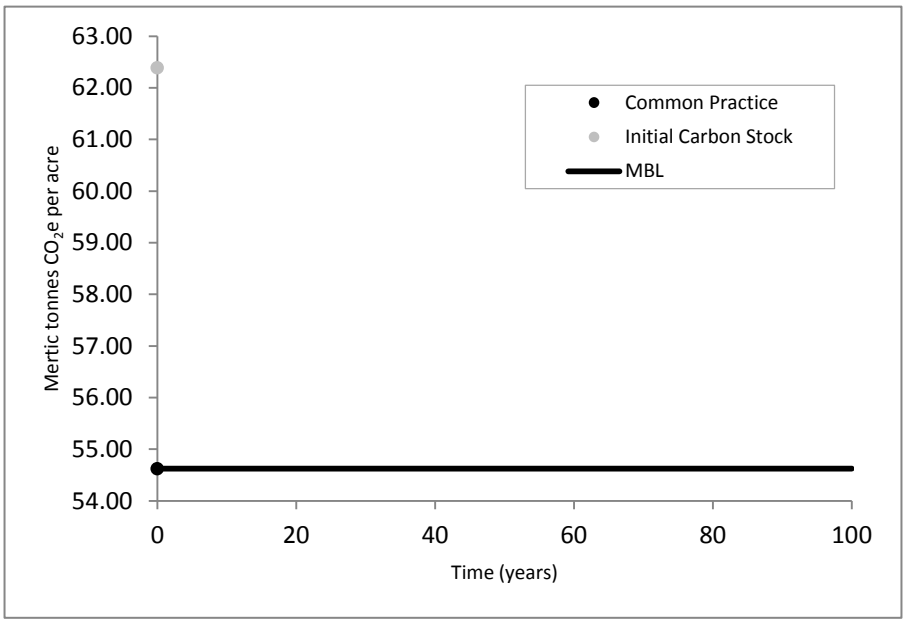



**Figure 9. Step 2 - Common Practice vs. Initial Carbon Stock**

**Step 3 – Determine Baseline Above-Ground Standing Live Carbon Stocks**

The baseline above-ground standing live carbon stocks were determined by modeling above-ground standing live carbon stocks through a series of growth and harvesting scenarios over 100 years. The annual stock levels were averaged over the required 100-year time frame such that the baseline is expressed as a single (average) value for

above-ground standing live carbon stocks per acre per year. The modeling was performed following the guidance in the FOP's Appendix B and considers the following required conditions:

## Consideration of Legal Constraints

In modeling the baseline for standing live carbon stocks, the forest owner has considered and incorporated all legal constraints that could affect baseline growth and harvesting scenarios.

*Characterization*

The baseline scenario models timber harvesting over 100 years, as a function of what it is legally allowable, financially feasible and physically possible, while at the same time adhering to the minimum baseline level (MBL). In the baseline model, forest stand development was projected using a combination of even-aged and uneven-aged systems, oftentimes creating two-aged or multi-aged conditions depending on the arrangement of treatment types over space and time. Forest stands were subject to treatment types based primarily on their forest structure and site attributes as it relates to the conservation easement, e.g. regular management area versus a special management area or a spruce-fir stand versus a northern hardwood stand.

*Baseline Legal Constraints*

Constraints that affect land-use specific to forest management activities have been incorporated into the carbon modeling. For this project, legal constraints have the greatest effect on timber harvesting levels, as opposed to what is financially feasible or physically possible. These legal constraints dictate what types of silvicultural activities (treatment types) are allowed, and where (spatial) and when (temporal) they are allowed, that is, there are different legal constraints for different locations of the project area. For this reason, each forest stand in the project area has been assigned attributes to indicate to the model what constraints apply in the baseline model. (Note: constraint types and their classes are attributed in the stands layer in the project geodatabase). There are three general constraint types that determine what treatments are operable for any given area: 1) Regular management, i.e. not restricted; 2) Special Management Areas or modified restrictions; and 3) High elevation areas. Each constraint, and how it is applied in the modeling, is described below by constraint class.

*Conservation Easement*

The entire Project area is subject to the working forest conservation easement. However, some of the forest management activity requirements are specific to a subset of forest stands based on the stand's site characteristics, for example, High Elevation Zones. Forest stands in the project area of this constraint class must follow these terms at a minimum:

1. All forest management activities must follow generally accepted BMPs as described in *BMP for Erosion Control on Timber Harvesting Operations in New Hampshire* and should be guided by *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire*.

   *This overall constraint mostly refers to operational logistics and planning. It is emulated in the baseline model by assuming that all forest management activities abide by these BMPs.*

2. Special Management Areas shall be designated spatially and managed to conserve High Elevation Zones, Riparian Areas, Wetlands, Wildlife Management Areas, Natural Heritage Areas, and Cultural Heritage. Activities should have the oversight of a professional licensed forester and should be guided by a written forest management plan. Areas designated as Special Management Areas must follow *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire*.

   *This overall constraint is emulated in the baseline model by using the actual shapefile which explicitly designates these special management areas and has already been agreed upon by the Forest Owner and the Easement Holder. While adjustments to these special management areas are not set permanently and*

*can be made upon mutual consent, they are held constant in their current location throughout the baseline model. The 'Recommended Voluntary Forest Management Practices for New Hampshire' were adhered to in the development of the baseline treatment and carbon stock yield tables with the oversight of the licensed professional forester for the Project. Specifically, special management areas were either not treated (e.g. high elevation zones and natural heritage and cultural areas) or only treated with single tree/small group selection harvests (uneven-age) where no more than 40% of the stocking was harvested at any time and stand entry was no more frequent than 10 years.*

3. No liquidation harvests (defined as no regard to established silvicultural principles) shall be permitted. Traditional forest uses shall be sustained.

   *This overall constraint is emulated in the baseline model by only applying treatments that follow 'Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire' recommendations. Furthermore the baseline model was constrained using the sustained yield method and limiting harvest volumes so they did not exceed periodic annual growth over any 10 year time period.*

*Basal Area Law (RSA 227-J:9)*

These are forest stands in special management areas designated as riparian management zones. Forest stands in the project area of this constraint class must follow these terms at a minimum:

1. No more than 50% of the basal area shall be removed over a 12-month time period.

   *This overall constraint is emulated in the baseline by the actual shapefile which explicitly designates these special management areas and has already been agreed upon by the Forest Owner and the Easement Holder. Specifically, special management areas were either not treated or only treated with single tree/small group selection harvests (uneven-age) where no more than 40% of the stocking was harvested at any time and stand entry was no more frequent than 10 years.*

*Baseline Activities*

All forest stands and baseline activities in the project area are subject to be guided by the *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire*. In other words, treatment types, or silviculture systems, were applied to forest stands in the baseline model based on their legal restrictions. Specifically, these treatments included: intermediate thinnings, shelterwoods, and small group selection harvesting (i.e. uneven-aged tending/regeneration). Treatments were selected and scheduled in the baseline according to legal constraint(s) and stocking and density. In addition, all treatments were based on complying with commercial harvest operation parameters (i.e. treatments were only scheduled if they yielded a minimum harvest volume of 4 cords per acre).

An intermediate 'thinning' was defined as an even-aged, tending event. The distribution of the cut was evenly allocated across all size classes and species. No additional regeneration was simulated beyond natural sprouting. These cuts occurred only in stands not designated as special management areas. These types of treatments were operable when the stand exceeded a density halfway between the 'B-Line' and 'A-line' as shown in the stocking tables (page 51) by forest cover type in *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire* and shown in Table 14 below. If a stand was selected for harvest it was not operable again for at least 10 years.

**Table 14. Stocking Guide for Baseline Thinning Treatments**

| Strata | Stocking Guide | Frequency |
|---|---|---|
| MW | Thin to 81 sqft when BA exceeds 91 | ≥ 10 Years |
| NH | Thin to 54 sqft when BA exceeds 72 | ≥ 10 Years |
| SF | Thin to 100 sqft when BA exceeds 107 | ≥ 10 Years |

A 'shelterwood' was defined as a regeneration event in even-aged stands that were not designated as special management areas. These were low density shelterwoods targeting the removal of two-thirds of the basal area coming from below. Shelterwoods were operable after age 50 in the MW and NH strata and after age 40 in the SF stratum. In addition to natural sprouting, additional natural regeneration was simulated in the SF strata (Balsam fir @ 185 TPA and red spruce @ 115 TPA, all at 100% survival).

A 'selection harvest' was defined as a single tree or small group selection harvest (i.e. uneven-age). All selection harvests were designed using a Q-factor of 1.4 and a maximum diameter class and diameter of legacy trees based on recommendations by forest cover type in the *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire* (page 38). For all selection harvests, the target residual basal area varied based on stand density at the time of harvest, but never removed more than 40% of the basal area. All selection harvests were limited to no shorter than 10 year cycles.

MW (Mixed wood) - For stands in this stratum the maximum DBH was 14 inches and the Legacy DBH was 18 inches.

NH (Northern hardwood) - For stands in this stratum the maximum DBH was 18 inches and the Legacy DBH was 24 inches.

SF (Spruce fir) - For stands in this stratum the maximum DBH was 10 inches and the Legacy DBH was 14 inches. Additional natural regeneration was simulated (Balsam fir @ 93 TPA and red spruce @ 57 TPA, all at 100% survival).

The arrangement of these treatments over time and space create timber product value in both yields and appreciation and provide conservation of special management areas and critical habitat that is in line with the baseline scenario characterization and legal constraints. The areas in Figure 10 indicate baseline treatment paths for the project area beginning with the commencement date condition (i.e. 'Not treated' yet). The development case for each stand, and the management regime at the landscape level, yield an acceptable return on investment for the forest owner while maintaining compliance with the conservation easement measures and state laws. Overall, the baseline regime reflects maximum sustained productivity and a harvest and growth pattern that indefinitely serves multiple management objectives.

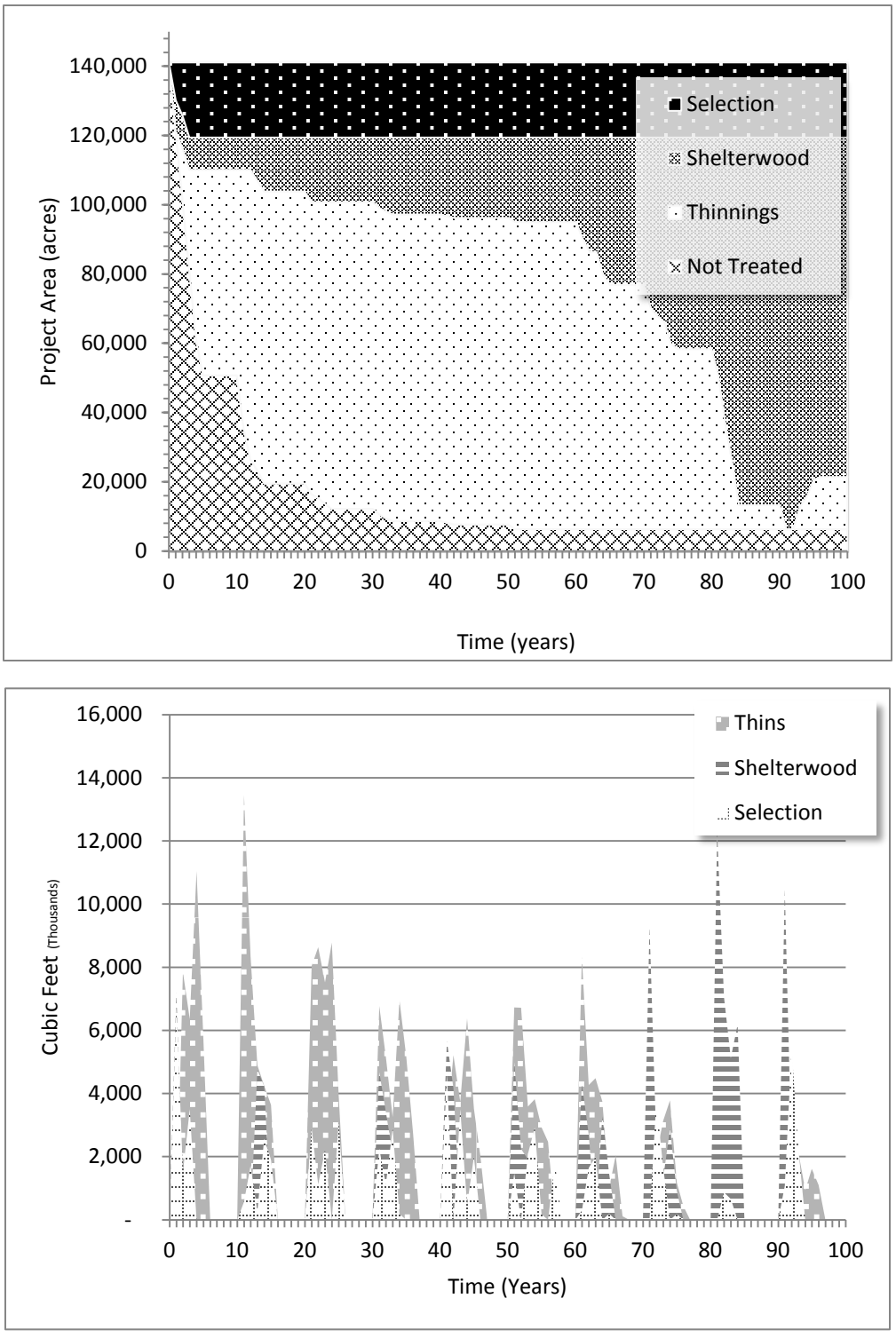



**Figure 10. Project Area (top) and harvest volumes (bottom) by baseline treatment arrangement over time**

## Consideration of Financial Constraints

In modeling the baseline for standing live carbon stocks, the forest owner has incorporated financial constraints that affect baseline growth and harvesting scenarios. For example, the project area only includes sites with adequate operability and access for commercial harvesting. As mentioned previously, stands were only eligible for treatments if they yielded a minimum harvest volume (4 cords per acre). The project area is also within 100 miles of 40 wood processing facilities and 4 biomass co-generation plants which support available logging contractors, and a strong timber market demand. The average annual harvest volume in the baseline was 56,099 cords, which is slightly below the mean annual increment in the baseline being approximately 56,314 cords per year. The Forest Owner also maintains an extensive network of permanent and seasonal roads (i.e. for timber harvesting) in conjunction with the State of New Hampshire (i.e. for recreation access) to adequately support forest operations across the property.

Harvest activities similar to those modeled in the baseline have been taking place on the project area for the past 15 years. Likewise, other landowners in the surrounding area and within the same Assessment Area have been conducting comparable activities in their forests for decades. As per FOP section 6.2.1.3, the forest owner has provided evidence that demonstrates harvest activities which have taken place on other properties within the project's Assessment Areas in the past 15 years and also have:

a. Slopes that do not exceed slopes in the project area by more than 10 percent

b. An equivalent zoning class to the project area

c. Comparable species composition to the project area

d. Similar access by road, cable or helicopter

The table below summarizes an analysis of similar harvest activities on nearby lands.

**Table 15. Baseline harvest activity comparison on nearby lands demonstrating consideration of financial constraints**

| Evidence/Document | Slope | Zoning Class | Species Composition | Access |
|---|---|---|---|---|
| Timber Harvesting Activity showing a final harvest treatment on nearby lands (see Figure 11 and ACR199 Financial Considerations in Baseline.pdf submitted to verifier under separate cover). | Slope, elevation, and terrain in terms of operability within 10 percent of lands in project area (see Figure 11) | Similar zoning class as project area (both subject to similar laws and ordinances at federal, state and local levels and both subject to working forest conservation easements). | Species composition is comparable, i.e., overstory comprised of sugar maple, yellow birch, spruce, fir and other hardwoods.<br><br>Trees per acre by species were not specifically available for analysis but harvest removal volumes by species, historical aerial photography and close proximity of similar harvest activities indicate that project site and comparable harvest site consist of a similar mixture of hardwoods and spruce/fir, i.e. within 20 percent. Harvest removal volumes are similar given matching silvicultural prescriptions, access to timber buyers and logging contractors, and as well as overall proximity to the project area (comparable harvest site removal volume 4.3 cords/acre vs. minimum feasible harvest volume of 4 cords/acre used in baseline financial constraint). | Nearby harvest activity close enough to project area whereby they could potentially deliver wood to the same wood processing facility. Woods roads and skid trails comparable and typical for the properties in the region. |

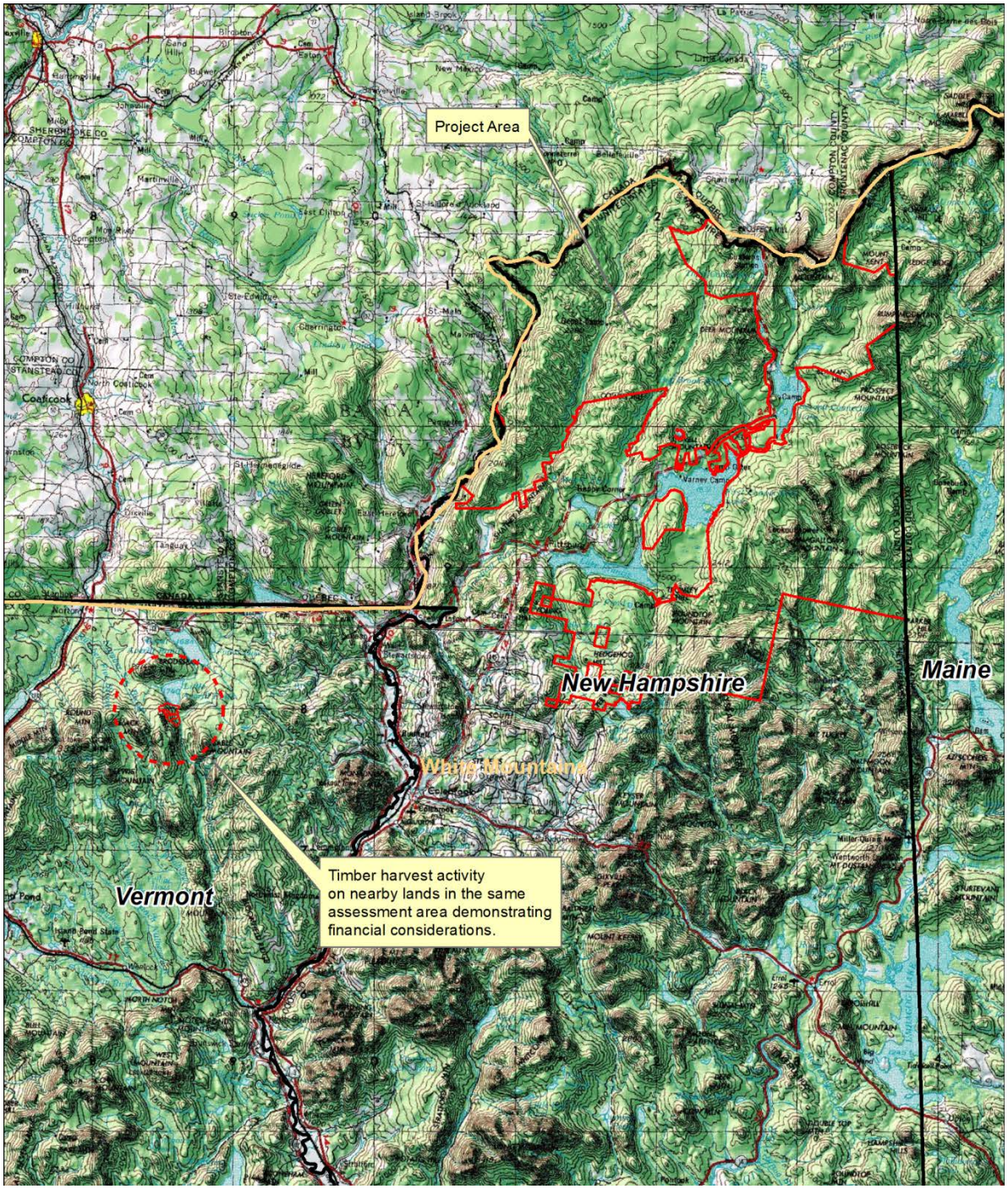



**Figure 11. Terrain of similar timber harvest activity on nearby lands**

### Minimum Baseline Level

The averaged model results must not fall below a minimum baseline level (MBL). Because initial above-ground standing live carbon stocks (ICS) were above Common Practice (CP), the MBL was determined using the formula in the FOP's **Equation 6.5**:

MBL = CP

| | | | |
|---|---|---|---|
| Where: | MBL | = | Minimum baseline level (above-ground standing live carbon stocks) |
| | CP | = | Common Practice (as determined in Step 1) |

Therefore, since CP equals 54.62 $tCO_2e$ per acre then Equation 6.5 is evaluated as MBL = 54.62 $tCO_2e$ per acre. The final, average modeled results, expressed as above-ground standing live carbon stocks per acre, must not fall below the MBL, 54.62 $tCO_2e$. Furthermore since ICS is greater than CP the project is not required to conduct a logical management unit (LMU) analysis to determine the weighted average carbon stocks (WCS) used in Equation 6.6 of the FOP.

### Setting the Baseline for Above-Ground Standing Live Carbon Stocks

The baseline growth and harvest regime was planned using Remsoft's forest modeling software, Woodstock[3]. Yield tables (i.e. development cases) were created from the 2013 inventory data for each stratum using the Forest Vegetation Simulator (FVS[4]) as described previously, taking into account the timing and responses of harvesting and mortality. All legal and financial considerations were applied in the baseline model through treatment types and output constraints. Figure 12 plots above-ground standing live carbon stocks against time. The results show the 'average above-ground standing live carbon stocks' per acre (54.78 $tCO_2e$), which constitutes the baseline and is a result of modeling the legal constraints as the basis for the project baseline, does not fall below the MBL (54.62 $tCO_2e$). The total baseline average above-ground standing live carbon stock is 7,726,868 $tCO_2e$.

[3] http://www.remsoft.com/products.php

[4] http://www.fs.fed.us/fmsc/fvs/

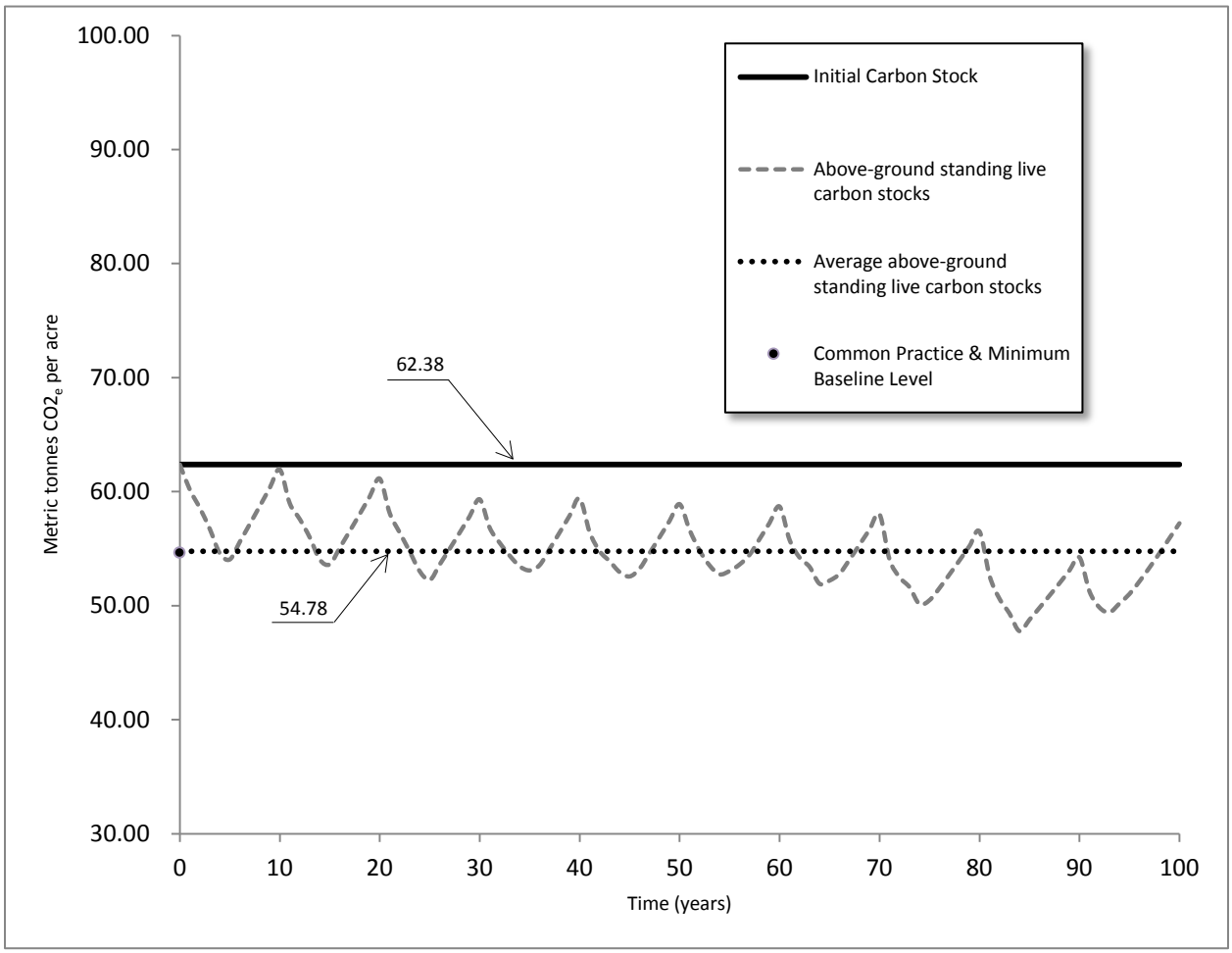



**Figure 12. Baseline above-ground standing live carbon stocks**

**Step 4 – Determine the Baseline for All Onsite Carbon Pools**

Additional pools, shown in Figure 13, were modeled and quantified in the same fashion as the above-ground standing live carbon stocks in the previous step. These additional pools were below-ground carbon stocks and standing dead carbon stocks. The final total average baseline onsite carbon stock for all pools is 9,476,863 tCO2e or 67.18 $tCO_2e$ per acre (Figure 14). This was input to the ROC/ARBOC Monitoring Calculation Worksheet under *Baseline Onsite Carbon Stocks (tonnes CO2e)*, calc row 6.

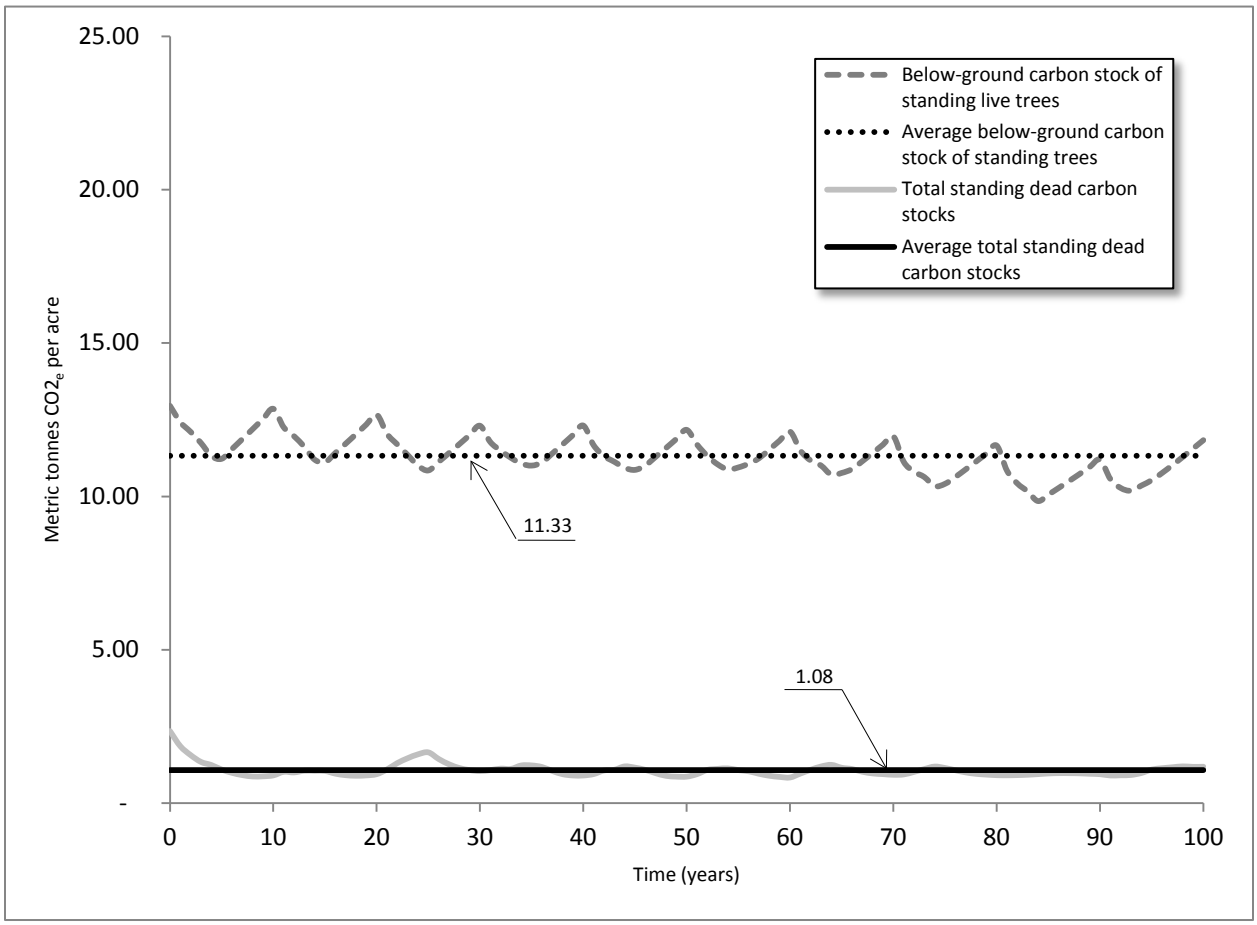



**Figure 13. Additional baseline carbon pools**

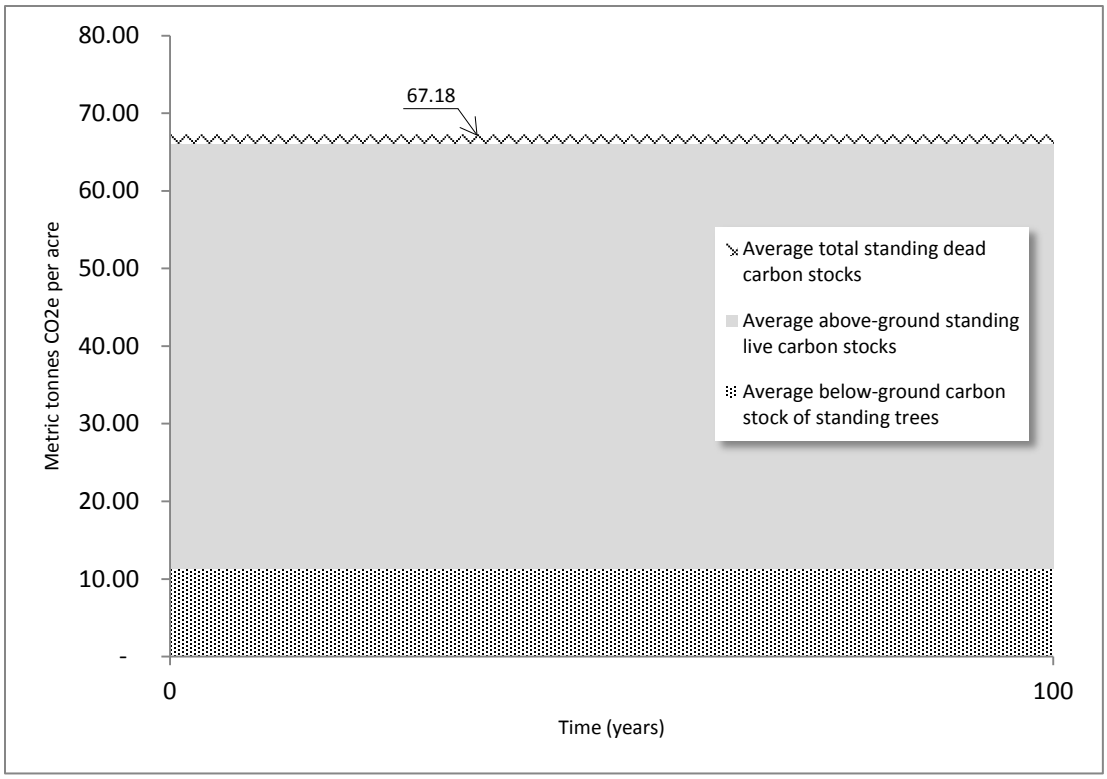



**Figure 14. Final baseline for all onsite carbon pools**

## 6.2.2 Estimating Baseline Carbon in Harvested Wood Products

To estimate the amount of baseline carbon transferred to long-term storage in harvested wood products, first the amount of carbon in trees (i.e. standing live carbon stocks) harvested for wood products was determined from the growth and harvest regime used to develop the baseline for onsite carbon stocks. Baseline and project harvest volume projections in cubic feet are shown in a table in Appendix G. ACR199 Baseline and Project Harvest Volumes. The average of baseline carbon in trees harvested for wood products was 237,213 $tCO_2e$ (1.68 $tCO_2e$/acre) as shown in Figure 15. This was input to the ROC/ARBOC Monitoring Calculation Worksheet calc row 10.

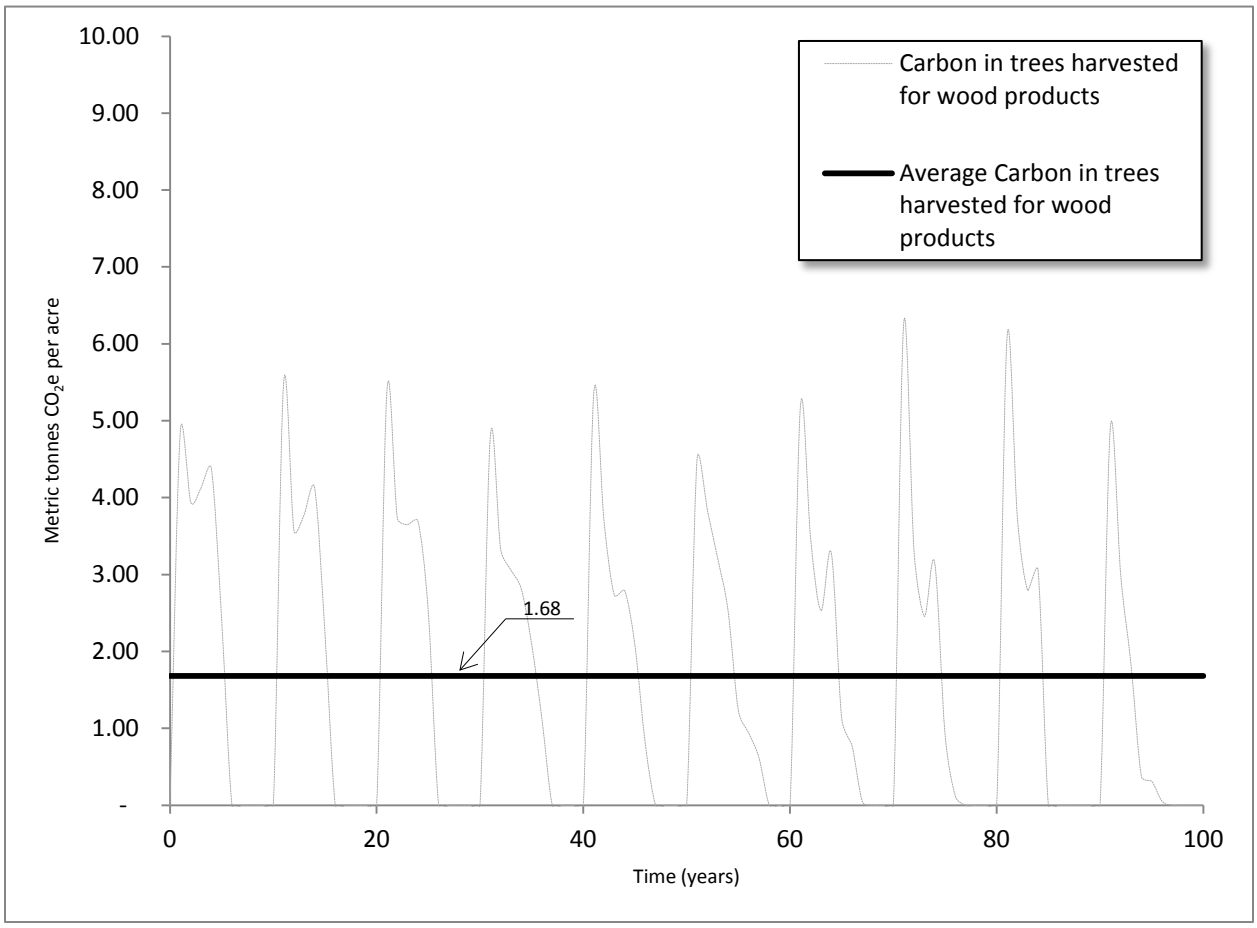



**Figure 15. Baseline carbon in trees harvested for wood products**

Second, the amount of baseline carbon in harvested wood delivered to the mill was calculated. This is only the carbon in the merchantable wood portion of the trees harvested for wood products prior to delivery to the mill. The stem bark, top, stump and below ground portions were considered to be immediately emitted to the atmosphere for accounting purposes. The estimates were derived using the same volume and biomass equations to calculate biomass in live trees. The average baseline carbon in harvested wood delivered to the mill was 100,928 $tCO_2e$ (0.72 $tCO_2e$/acre) as shown in Figure 16. This was input to the ROC/ARBOC Monitoring Calculation Worksheet, calc row 12.

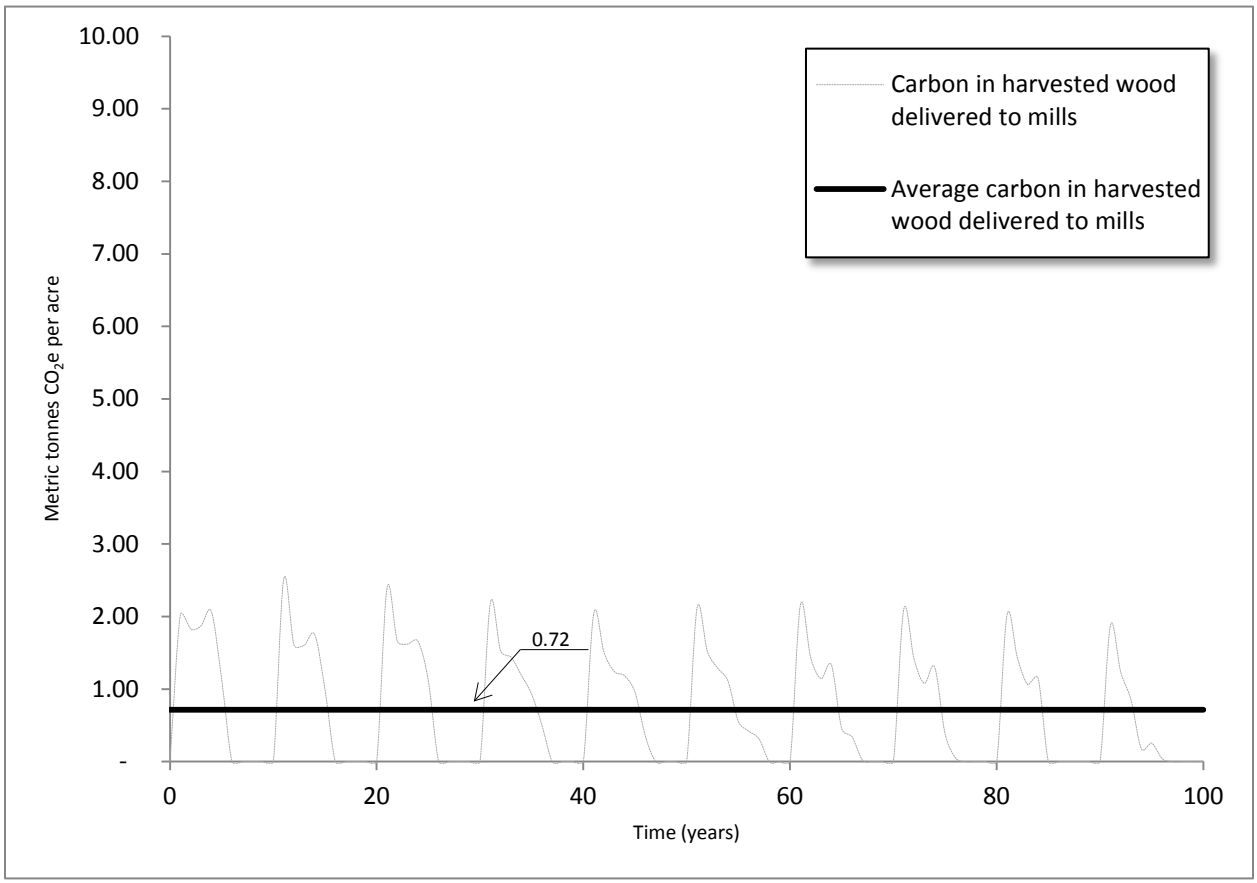



**Figure 16. Baseline carbon in harvested wood delivered to mills**

The amount of carbon in wood delivered to the mill that transfers to wood products is then determined for each reporting period using the Harvested-Wood-Products-Calculation-Worksheet (HWPCW) tool. The HWPCW tool is regional specific. CT Lakes is in New Hampshire which is grouped in the Northeast Region as shown in Figure 17 ("NE").

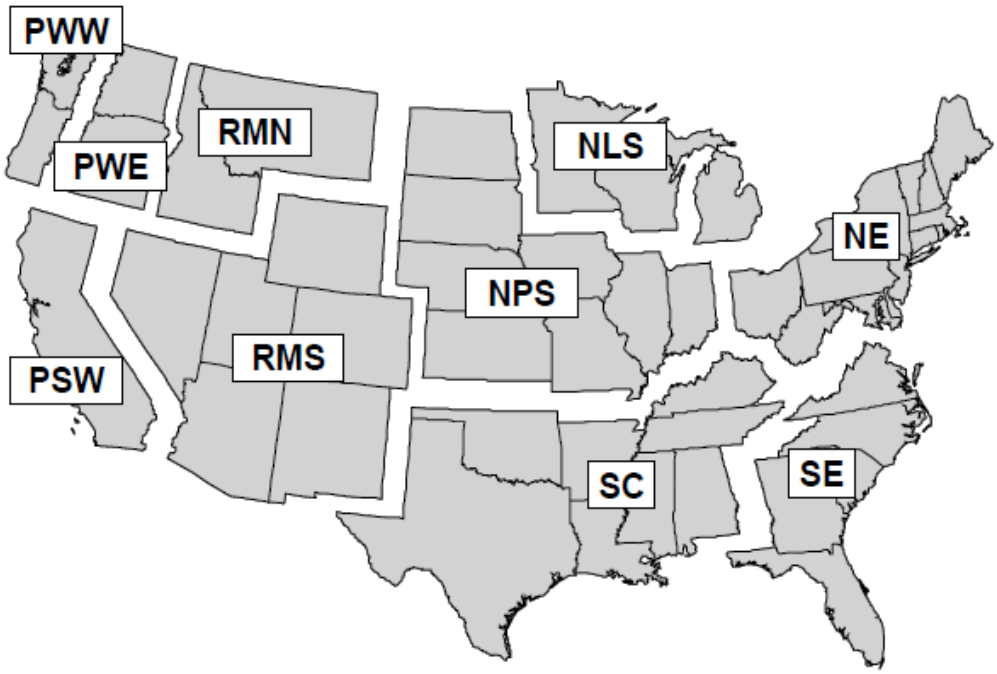



**Figure 17. Definition of Regions**

The average baseline carbon in harvested wood delivered to the mill was input to the HWPCW tool in Table 7. In HWPCW Table 5, the average baseline carbon in harvested wood delivered to the mill is then distributed among the wood product classes based on the percent product values established by the volume actually harvested in the project for that reporting period (see "% Product" in HWPCW tool Table 4). Actual harvest volume for Reporting Period 1 were entered by wood product class in Table 3 of the HWPCW so the average baseline carbon in harvested wood delivered to the mill is distributed among the correct wood product classes in Tables 4 and 5 of the HWPCW. A mill efficiency rate is applied next to determine the net baseline carbon in harvested wood delivered to the mill that is actually transferred to wood products. Default mill efficiency data, which vary by region, state, species group and product class, is provided in the Mill Efficiency Data File as it appears on the ARB website and is also in Table 11 of the HWPCW. The mill efficiencies are also shown in Table 16 below. The mill efficiency values are automatically used in the HWPCW tool as a function of selecting the Region in Section 1.

**Table 16. Mill Efficiencies by Product**

| Region | State | Hardwood Saw Log | Hardwood Pulpwood | Softwood Saw Log | Softwood Pulpwood |
|---|---|---|---|---|---|
| Northeast (NE) | New Hampshire | 0.614 | 0.650 | 0.569 | 0.513 |

After applying the mill efficiency rate, the HWPCW tool approximates the climate benefits of carbon storage in harvested wood products by estimating the *average* amount of carbon stored over 100 years in In-use wood products and landfills for each *wood product class*. Decay rates for each wood product class for In-use wood products and landfills have been provided by ARB as "average storage factors" (found in FOP, Table C.2 and C.3).

The amount of carbon transferred into each wood product class was multiplied by the 100-year average storage factor for In-use wood products to estimate the average carbon storage over 100 years in In-use wood products for the period (Table 17).

**Table 17. Average storage factors used to estimate carbon in In-Use wood products and landfills**

| 100-Year Average Storage Factor | Softwood Lumber | Hardwood Lumber | Plywood | Oriented Strand Board | Non-structural Panels | Miscellaneous | Paper |
|---|---|---|---|---|---|---|---|
| In-Use (IFM7) | 0.463 | 0.250 | 0.484 | 0.582 | 0.380 | 0.176 | 0.058 |
| Landfills (IFM8) | 0.298 | 0.414 | 0.287 | 0.233 | 0.344 | 0.454 | 0.178 |

In the same fashion, 100-year average storage factors were used to estimate the average carbon storage over 100 years in landfills for the period. This is automatically calculated in the HWPCW tool. Finally, the HWPCW tool sums the baseline carbon stored long-term in wood products for the reporting period, first by excluding carbon stored in landfills, and then by including carbon stored in landfills (see HWPCW tool Table 6). These values are then input to the ROC/ARBOC Monitoring Calculation Worksheet in calc rows 15 and 16.

The total baseline carbon stored long-term in wood products since the project start date is shown in Table 18.

**Table 18. Total Baseline Carbon Stored Long-Term in Harvested Wood Products**

| | |
|---|---|
| Reporting Period 1 Begin Date | 08-July-2013 |
| Reporting Period 1 End Date | 07-January-2014 |
| Baseline Carbon Stored Long-term in Wood Products (tonnes $CO_2e$) - Excl Landfill | 10,065 |
| Baseline Carbon Stored Long-term in Wood Products (tonnes $CO_2e$) - Incl Landfill | 25,573 |

## 6.2.3 Determining Actual Onsite Carbon Stocks

Initial onsite carbon stocks were determined using the inventory data and the most current volume and biomass equations (i.e. volume and biomass equations for projects in California, Washington and Oregon) appropriate for the Supersections and species as published by the ARB. For each subsequent reporting period actual onsite carbon stocks will be determined using the same growth and yield model software as described in the baseline. The actual onsite carbon stocks are listed by reporting period in Table 19 and the total stocks were input to the ROC/ARBOC Monitoring Calculation Worksheet in calc row 1 (Sampled Onsite Carbon Stocks).

This difference between the baseline carbon stocks and the actual carbon stocks is a result of the project's management plan and activities. The management activities that lead to increased carbon stocks are not necessarily characterized as different types of silviculture systems than what were used in the baseline (see baseline characterization). Rather, the project uses the emissions trading market incentives to implement a reduced management intensity that supports longer rotations and increased habitat protection measures.

**Table 19. Actual Onsite Carbon Stocks**

| | | Total Stocks (tCO2e) | | | Stocks Per Acre (tCO2e) | | |
|---|---|---|---|---|---|---|---|
| Reporting Period 1 Begin Date | Reporting Period 1 End Date | IFM 1 | IFM 3 | Total | IFM 1 | IFM 3 | Total |
| Initial Carbon Stocks | | 10,627,440.7 | 331,780.6 | 10,959,221.3 | 75.34 | 2.35 | 77.69 |
| 08-July-2013 | 07-Jan-2014 | 10,627,440.7 | 331,780.6 | 10,959,221.3 | 75.34 | 2.35 | 77.69 |
| Baseline Carbon Stocks | | 9,324,449.7 | 152,413.2 | 9,476,863.0 | 66.10 | 1.08 | 67.18 |

## 6.2.4 Determining Actual Carbon in Harvested Wood Products

The amount of actual carbon transferred to long-term storage in harvested wood products was estimated using the same HWPCW tool and settings as discussed in 6.2.2 Estimating Baseline Carbon in Harvested Wood Products. Harvest volume delivered to the mill was summarized in a Verified Mill Report in cords for both softwoods and

hardwoods based on the actual harvest reports and mill scale receipts in the Project reporting period. This was input to Table 3 of the HWPCW tool by wood product class (Table 20).

**Table 20. Wood Product Classes (Reporting Period 1)**

| Entered into ACR199 RP1 Harvested Wood Products Calculation Worksheet 20140107 | |
|---|---|
| **Hardwood** | **Cords** |
| Lumber | 3,520.85 |
| Misc Products | 680.00 |
| Non Structural Panels | 116.17 |
| Paper | 11,681.59 |
| | |
| **Softwood** | |
| Lumber | 5,475.47 |
| Paper | 918.92 |
| | |
| **Total** | 22,393.00 |

The harvest volume is then subsequently converted to cubic feet and then tons of $CO_2e$ using the conversion factors and specific gravity factors found in HWPCW tool Table 11. The sum of these tons of $CO_2e$ in all wood product classes is reported as the actual project carbon in harvested wood delivered to the mill and is input to the ROC/ARBOC Monitoring Calculation Worksheet in calc row 11.

The actual project carbon in trees harvested for wood products (i.e. carbon in the wood delivered to the mill plus all other components of the tree, i.e. bark, stump, top, and coarse roots) is determined using a multiplier, or expansion ratio. The multiplier is developed based on the ratio of baseline carbon in trees harvested for wood products to baseline carbon in harvested wood delivered to the mill (see calc rows 10 and 12 in the ROC/ARBOC Monitoring Calculation Worksheet and Table 7 of the HWPCW tool). Because the carbon harvested in the baseline was determined using the method and equations required for projects outside of California, Washington and Oregon, the multiplier also reflects this method. The multiplier, in this case 2.35, is the same for all reporting periods. The actual project carbon in trees harvested for wood products is calculated in Table 6 of the HWPCW tool and then input to the ROC/ARBOC Monitoring Calculation Worksheet in calc row 9.

The net wood material transferred to wood products (i.e. after mill processing) is determined by applying the respective mill efficiency rates to the harvest volumes by wood product class (Table 16. Mill Efficiencies by Product). This volume is then converted to cubic feet and tons of $CO_2e$. After the net tons $CO_2e$ transferred to wood products is calculated, the long-term storage in In-Use wood products and wood products in landfills is determined by applying the average-storage factors by wood product class (Table 17. Average storage factors used to estimate carbon in In-Use wood products and landfills, also see HWPCW tool Table 4).

Finally, the actual project carbon stored long-term in wood products is summed by wood product class for both excluding and including carbon stored in landfills (see Table 6 of the HWPCW tool). These values are entered into the ROC/ARBOC Monitoring Calculation Worksheet in calc rows 12 and 13, for each reporting period.

A summary of the actual project carbon stored long-term in wood products is shown in Table 21.

**Table 21. Summary of Project Harvest Volumes and Carbon by Reporting Period**

| Reporting Period Begin Date | 08-July-13 | 08-Jan-14 | 08-Jan-15 | 08-Jan-16 | 08-Jan-17 | 08-Jan-18 |
|---|---|---|---|---|---|---|
| Reporting Period End Date | 07-Jan-14 | 07-Jan-15 | 07-Jan-16 | 07-Jan-17 | 07-Jan-18 | 07-Jan-19 |
| Actual Carbon in Trees Harvested for Wood Products in (tonnes CO2e) | 97,637 | - | - | - | - | - |
| Actual Carbon in Harvested Wood Delivered to Mills (tonnes CO2e) | 41,542 | - | - | - | - | - |
| Actual Carbon Stored Long-term in Wood Products (tonnes CO2e) - Excl Landfill | 4,308 | - | - | - | - | - |
| Actual Carbon Stored Long-term in Wood Products (tonnes CO2e) - Incl Landfill | 10,739 | - | - | - | - | - |

## 6.2.5 Quantifying Secondary Effects

Secondary effects were calculated automatically by the project ROC/ARBOC Monitoring Calculation Worksheet according to Equation 6.10 in the FOP. The results, which reference the ROC calculation rows, are shown in Table 22. The values used were (CalcRow9 – CalcRow10) * 20%, which equals CalcRow28. The baseline and actual carbon in trees harvested for wood products represents total tree carbon. Note that landfill carbon is included in the harvested wood products calculation for this reporting period of the Project.

**Table 22. Market Leakage and Other Secondary Effects**

| | | Reporting Period Begin Date | 08-July-13 | 08-Jan-14 | 08-Jan-15 | 08-Jan-16 | 08-Jan-17 | 08-Jan-18 |
|---|---|---|---|---|---|---|---|---|
| **Calc Row** | **Market Effects and Leakage - All Projects** | Reporting Period End Date | 07-Jan-14 | 07-Jan-15 | 07-Jan-16 | 07-Jan-17 | 07-Jan-18 | 07-Jan-19 |
| 9 | Actual Carbon in Trees Harvested for Wood Products in (tonnes CO2e) | | 97,637 | | | | | |
| 10 | Baseline Carbon in Trees Harvested for Wood Products (tonnes CO2e) | | 237,213 | | | | | |
| 11 | Actual Carbon in Harvested Wood Delivered to Mills (tonnes CO2e) | | 41,542 | | | | | |
| 12 | Baseline Carbon in Harvested Wood Delivered to Mills (tonnes CO2e) | | 100,928 | | | | | |
| 13 | Actual Carbon Stored Long-term in Wood Products (tonnes CO2e) - Excl Landfill | | 4,308 | | | | | |

| | | |
|---|---|---|
| 14 | Actual Carbon Stored Long-term in Wood Products (tonnes CO2e) - Incl Landfill (IFM-7 & IFM-8) | 10,739 |
| 15 | Baseline Carbon Stored Long-term in Wood Products (tonnes CO2e) - Excl Landfill | 10,065 |
| 16 | Baseline Carbon Stored Long-term in Wood Products (tonnes CO2e) - Incl Landfill (IFM-7 & IFM-8) | 25,573 |
| 17 | Diff Between Actual and Baseline Carbon in Harvested Wood (tonnes CO2e) - Excl Landfill | (5,757) |
| 18 | Difference Between Actual and Baseline Carbon in Harvested Wood (tonnes CO2e) - Incl Landfill | (14,833) |
| 19 | Difference in Actual and Baseline Carbon Stored in Wood Products (tonnes CO2e) - Landfill Adj | (14,833) |
| 20 | GHG Reductions / Removals for Carbon Stored in Wood Products (tonnes CO2e) w/ mkt response (IFM-17) | (11,867) |
| | **Other Secondary Effects - IFM Projects** | |
| 27 | Difference Between Actual and Baseline Carbon in Trees Harvested for Wood Products (tonnes CO2e) | (139,577) |
| 28 | Other Secondary Effects Emissions (shifting activities/materials) IFM Projects (tonnes CO2e) (IFM-14) | (27,915) |

## 6.2.6 Calculating Total Net GHG Reductions and Removals

### 6.2.6.1 Confidence Deduction

The inventory uncertainty was calculated as 4.12 percent error (see Table 8). The inventory was field-verified using the sequential sampling method. Plots were randomly selected and measured by the verifier for each strata during the site visit which occurred the week of March 3, 2014. The test results concluded that all strata passed at the required allowance level. Consequently, no additional uncertainty deduction was applied during field verification. Because the inventory percent error is less than the 5 percent threshold for allowed uncertainty before applying a discount (see Table A.4. in FOP, Appendix A), 0.0 percent was applied in the ROC Monitoring Calculation Worksheet (i.e., Calc row 2).

### 6.2.6.2 Total Net GHG Reductions and Removals

Total Net GHG Reductions and Removals were calculated automatically using the Project ROC Monitoring Calculation Worksheet. The results, which reference the ROC calculation rows, are shown in Table 23.

**Table 23. Total Net GHG Reductions and Removals**

| Calc Row | Onsite Carbon Stocks | Start Date 08-July-13 | Reporting Period Begin Date / Reporting Period End Date | 08-July-13 / 07-Jan-14 | 08-Jan-14 / 07-Jan-15 | 08-Jan-15 / 07-Jan-16 | 08-Jan-16 / 07-Jan-17 | 08-Jan-17 / 07-Jan-18 | 08-Jan-18 / 07-Jan-19 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Sampled Onsite Carbon Stocks (tonnes CO2e) | 10,959,221 | | 10,959,221 | | | | | |
| 2 | Confidence Deduction | | | - | | | | | |
| 3 | Adjusted Sampled Onsite Carbon Stocks (adjusted for confidence deduction) (tonnes CO2e) | | | 10,959,221 | | | | | |
| 4 | Soil Carbon Emissions | | | - | | | | | |
| 5 | Increment in Actual Onsite Carbon Stocks (tonnes CO2e) | | | 10,959,221 | | | | | |
| 6 | Baseline Onsite Carbon Stocks (tonnes CO2e) | 10,959,221 | | 9,476,863 | | | | | |
| 7 | Increment in Baseline Onsite Carbon Stocks (tonnes CO2e) | | | - | | | | | |
| 8 | Quantified GHG Reductions / Removals for Onsite Carbon Stocks (tonnes CO2e) | | | 1,482,358 | | | | | |
| 20 | GHG Reductions / Removals for Carbon Stored in Wood Products (tonnes CO2e) w/ mkt response | | | (11,867) | | | | | |
| 28 | Other Secondary Effects Emissions (shifting activities/materials) IFM Projects (tonnes CO2e) | | | (27,915) | | | | | |
| | **Quantified GHG Reductions and Removals** | | | | | | | | |
| 34 | Annual GHG Reductions/Removals Net of Discounts and Secondary Effects (tonnes CO2e) | | | 1,442,576 | | | | | |
| 35 | Cumulative GHG Reductions/Removals; not incl.neg. carryover or reversals (tonnes CO2e) | | | 1,442,576 | | | | | |
| 36 | Cumulative Negative Carryover from Prior Year (tonnes CO2e) | | | - | | | | | |
| 37 | ROCs Issued - Net of Negative Carryover, bef. Buffer or adjust for Reversals (tonnes CO2e) | | | 1,442,576 | | | | | |
| | **Calculation of Buffer Pool Contribution** | | | | | | | | |
| 38 | Project Specific Reversal Risk Rating | | | 19.20% | | | | | |
| 39 | ROCs from other Reporting Periods submitted to Buffer Pool | | | - | | | | | |
| 40 | Buffer Pool Contributions (ROCs) | | | 276,975 | | | | | |

| | | | |
|---|---|---|---|
| | **Accounting for Reversals** | | |
| 41 | Annual Reversals (tonnes CO2e) | - | |
| 42 | Total "Avoidable Reversals" to be compensated by the Forest Owner (tonnes CO2e) | - | |
| 43 | "Unavoidable Reversals" compensated by the ARB from the Buffer Pool (tonnes CO2e) | - | |
| | **Compensating for Avoidable Reversals** | | |
| 44 | "Avoidable Reversals" compensated by retirement of ROCs in the Forest Owners Buffer Account (tonnes CO2e) | - | |
| 45 | "Avoidable Reversals" compensated by retirement of ROCs issued to other Forest Projects Registered with the ARB (tonnes CO2e) | - | |
| 46 | Carryover "Avoidable Reversals" which need to be compensated by Forest Owner (tonnes CO2e) | - | |
| | **ROCs Issued to OPO Account Holder** | | |
| 47 | Annual ROCs Issued to Account Holder | 1,165,601 | |
| 48 | Vintage I - Calendar year of Reporting Period start date (OPR assigns vintage of ROCs corresponding to date of issuance, in this case 2014) | N/A | |
| 49 | Portion of ROCs in first vintage in Reporting Period | N/A | |
| 50 | Vintage II - Calendar year of Reporting Period end date (Vintage - if different from start date vintage) | 2014 | |
| 51 | Portion of ROCs in second vintage Reporting Period | 1,165,601 | |
| 52 | Cumulative ROCs Issued to Account Holder | 1,165,601 | |

# 7. Ensuring the Permanence of Credited GHG Reductions and Removals

The ARB requires that credited GHG reductions and removals be effectively "permanent." For Forest Projects, this requirement is met by ensuring that the carbon associated with credited GHG reductions and removals remains stored for at least 100 years. The ARB ensures the permanence of GHG reductions and removals through three mechanisms:

## 7.1 Monitoring, Reporting and Verification

Forest owners are required to monitor onsite carbon stocks, submit regular monitoring reports, and submit to regular third-party verification of those reports along with periodic verification site visits for the duration of the project life. See the Project Monitoring section for more detail. As demonstrated in Table 19 and from the Monitoring Calculation Worksheet no reversal has been identified in Reporting Period 1 nor has there been any decrease over any 10-year consecutive period in the standing live carbon pool.

## 7.2 Regulatory Obligation

The regulatory obligation for all intentional reversals of GHG reductions and GHG removal enhancements will be compensated for through retirement of other Compliance Instruments.

## 7.3 Forest Buffer Account

A buffer account is maintained by the ARB to provide insurance against reversals of GHG reductions and removals due to unavoidable causes (including natural disturbances such as fires, pest infestations or disease outbreaks). The required buffer account contribution is determined by a project-specific, risk rating worksheet and the following formula:

*100% - ((1-financial failure%) x (1-illegal forest biomass removal%) x (1-conversion%) x (1-over harvesting%) x (1-social risk%) x (1-wildfire%) x (1-disease/Insect outbreak%) x (1-other catastrophic events%))*

The total required buffer account contribution for the current reporting period is 19.2 percent (Table 24).

**Table 24. Risk rating analysis for required buffer pool contribution**

| Risk Category | Risk Sub-Category | Without QCE and or Public Ownership | QCE and or Public Ownership | Score | (1-Score) |
|---|---|---|---|---|---|
| Financial | | 5.0% | 1.0% | 5.0% | 95.0% |
| Management | | | | | |
| | Illegal Logging | 0.0% | 0.0% | 0.0% | 100.0% |
| | Risk of conversion | 2.0% | 0.0% | 2.0% | 98.0% |
| | Risk of over harvesting | 2.0% | 0.0% | 2.0% | 98.0% |
| Social | | 2.0% | 2.0% | 2.0% | 98.0% |
| Natural Disturbance | | | | | |
| | Wildfire* | 4.0% | 4.0% | 4.0% | 96.0% |
| | Disease Insect | 3.0% | 3.0% | 3.0% | 97.0% |
| | Other catastrophic | 3.0% | 3.0% | 3.0% | 97.0% |
| Risk Rating Analysis Result | | | | 100% - | 80.8% |
| Total Risk Score | | | | | 19.2% |

* = Default values from FOP Assessment Area Data File

All risk 'scores' were determined using the 'Without QCE' ratings. Wildfire risk was established based on the default risk for the subject Supersection and Assessment Areas from the most recent Assessement Area Data File as published on the ARB website.

# 8. Project Monitoring

The primary purpose of the project's annual monitoring plan is to ensure up-to-date estimates of project carbon stocks and provide assurance that GHG reductions or removals achieved by a project have not been reversed. See full monitoring plan in Appendix J. ACR199 Full Monitoring Plan Proprietary v1.1.pdf.

This project establishes a strong forest monitoring program on the property. The major components of the monitoring plan are:

- Annual forest carbon inventory and carbon stock updates (described in detail below)
- Annual enforcement of conservation easement by the State of New Hampshire
- Annual Third-Party Audit - forest carbon project verification by OPR/ARB accredited verifier

The forest owner will use permanent CFI plots and approved growth & yield modeling to annually update the project's forest carbon stocks. Measuring the same plots through time will reduce sampling variability and provide reliable estimates of actual growth through time. Due to ongoing timber harvesting within the Project area, the inventory will be updated following harvesting events as well at the end of the reporting period. When necessary, new plots will be installed in areas affected by planned or unplanned harvests, land sales, conversions to other land use, natural events, or other similar events. Each event will require spatial and tabular updates of the carbon data set. Data updates including harvest volume summaries will be submitted by the Forest Owner to Finite Carbon on or shortly after January 7$^{th}$ for the previous year and prepared for verification within the required time period allowed (4 months).

1. Land Sales: Land sales activity has a tremendous bearing on every carbon project. Should all or a portion of the area committed to the carbon contract be sold while under the contract term, Finite Carbon will need to be notified as soon as possible. The forest owner will be required to provide digital mapping and possibly other documentation for the area affected by the sale. Please note that any Land Sales taking place on the Project Area will remain subject to the Regulations, and therefore remain part of the Project. Should any portion of the Project Area be sold and wish to terminate the Project, the whole project will be considered terminated. Once the Project Area for Improved Forest Management Projects has been verified, the Project Area cannot be changed for the duration of the Project's lifetime.

2. Natural Events: Natural events can include wind storms, tornadoes, ice storms, floods, land-slides, earth quakes, insect or disease infestations, or other impacts of weather or nature on the forest carbon stocks. Finite Carbon must be notified immediately following an event of this type. The forest owner will be required to supply mapping of the damaged area, and in some cases, a re-inventory of the original sample locations affected by the event performed to the specifications attached.

3. Harvests and Land Use Conversions: IFM projects typically encounter planned timber harvests, thinning, clearing for roadways, log yards, decks, or other uses on a regular basis. When these events occur, the Forest Owner is required to provide Finite Carbon with a digital (GPS and/or GIS) polygon file of the affected area. If harvest activities affect permanent plots, a complete re-inventory of those samples affected by the action may be required. All points re-inventoried will conform to the original specifications and shall be freshly flagged and painted for relocation. Finite Carbon shall also be informed if the activity produces or is expected to produce a forest type conversion. All new inventory plot data should be submitted electronically in MS Excel or Access formats.

The calculation of actual on-site carbon reported for each subsequent reporting period shall use plot and tree data grown forward by the growth model to the current reporting year along with incorporation of any recently re-measured plots or new plots. The forest owner will attempt to annually re-measure at least 20% of the permanent

inventory plots; however, inventory plot data used in the estimate of actual onsite carbon stocks will not be more than 12 years old.

On-going monitoring by the forest owner and its forest managers will ensure Unintentional Reversals and will be reported to ARB. Where necessary, an inventory of affected portions of the forest will be inventoried to account for unintentional reversals that create a need for ARB offset credits replacement from the ARB buffer account. Inventory design to account for losses from unintentional losses will depend on the extent and intensity of the reversal should they occur; however, they will always follow the project inventory specifications (Appendix H. ACR199 Project Inventory Specifications Proprietary v1.2.pdf).

## 8.1 Methods for Quality Control

Quality Control for this project is defined as a series of activities and documented procedures that serve to maintain an acceptable level of data quality for monitoring forest carbon stocks and demonstrating compliance with the FOP. Quality control success will be measured by whether or not the project passes annual verifications.

### 8.1.1 Organization and Responsible Individuals

Individuals responsible for maintaining project operations have been defined in the Listing Form and listed under the OPO's account information. Any changes, including new contact information, will be updated to the account information immediately.

### 8.1.2 Document Control

The Forest Owner and Finite Carbon will be responsible for maintaining critical documents and files that support forest carbon data collection and processing. The most critical documents and files necessary to be maintained include:

- Offset Project Data Reports;
- Inventory Specifications and Procedures document;
- Project geodatabase (GIS files);
- Model Plan and Analytical Systems document;
- ARB Offset Credit Monitoring Calculation Worksheet;
- Harvest Wood Product Calculation Worksheets; and
- Annual forest monitoring report.

All edits and revisions to documents after project registration will be clearly marked and identified by placing a revision date or version at the beginning of the document or at the end of the name of the file. Operation procedures are in place so that out dated files will be archived in the OPO's OPR project account, the OPO's computers and offices and/or Finite Carbon's computers and offices for a minimum of 15 years. Other forms and documents required by the ARB will be maintained and stored in the Offset Project Registry software.

### 8.1.3 Central Data Repository

The ESRI personal geodatabase format will be used to store spatial and tabular project inventory data. Built-in features of the geodatabase structure, such as domains (i.e. field value validation) and relationships, help control data quality. Edits and updates will occur at the end of each reporting period to account for activities in the previous year unless an event such as a reversal occurs, in which case updates will take place and be reported to the ARB in the required time frame as outlined in the FOP. All results will be summarized in the annual forest offset project data report.

### 8.1.4 Accuracy of Project Listing Information

All of the information submitted for project Listing is still accurate with the exception of the following updates listed in Table 25.

**Table 25. Summary of Updates Since Project Listing**

| Update ID (UID) | Listing Form Section | Update Description | Update Document Location Reference |
|---|---|---|---|
| 1. | Part V. Offset Project Area (A. and E.) | The Mixed Wood (MW) stratum was previously mapped to the Mixed Hardwood Assessment Area. Based on examination of composition of native species in this stratum it should be mapped to the Northeast Spruce-Fir Assessment Area. | *ACR199 OPDR RP1 20140107 v1.0.pdf* (1.3 Forest Types, Flora and Fauna & Table 10. Common Practice Carbon Stocks) |
| 2. | Part VII. Carbon Stock Inventory (A.) | In the project inventory specification document, the stratification rules were not changed but strengthened to reflect the update made in UID 1 above. Also, under the Inventory Design-Sampling Method, the minimum DBH was changed to 1.0 inch for tree sizes in the 1/100$^{th}$ acre fixed plot (since only trees 1 inch DBH and greater apply to the required volume and biomass equations.) | *ACR199 OPDR RP1 20140107 v1.1.pdf* (Appendix H. ACR199 Project Inventory Specifications Proprietary v1.1) |
| 3. | Any reference to "preliminary estimates" were confirmed or revised. | Final assertion of baseline and project carbon stocks | *ACR199 OPDR RP1 20140107 v1.5.pdf* |
| 4. | Any reference to "preliminary estimates" were confirmed or revised. | Final assertion of baseline and project carbon stocks based on OPR review. | *ACR199 OPDR RP1 20140107 v1.7.pdf* |
| 5. | Part VIII. B | Full documentation was provided to demonstrate financial feasibility in the baseline | *ACR199 OPDR RP1 20140107 v1.11.pdf* (Table 15 and Figure 11) and ACR199 Financial Considerations in Baseline Proprietary.pdf |

# References

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## List of Appendices

Certain appendices referenced throughout the OPDR document have been made proprietary and are removed for purposes of protecting private information. These appendices serve as supplemental documentation for verification purposes. The appendices that have been removed are F, H, J, M and N and are designated with the word "Supplemental Proprietary" at the end of the document title. The geodatabase of the project area is also not included as it is in a GIS format.

**Appendix A. ACR199_Map_TownsRoads.pdf**

**Appendix B. ACR199_Map_Watercourses.pdf**

**Appendix C. ACR199_Map_Topography.pdf**

**Appendix D. ACR199_Map_CountyTwnshp.pdf**

**Appendix E. ACR199_Map_AssessmentAreas.pdf**

**Appendix F. ACR199 Data Management & Analytical Systems Supplemental Proprietary v1.0.pdf**

**Appendix G. ACR199 Baseline and Project Harvest Volumes 20140107.pdf**

**Appendix H. ACR199 Project Inventory Specifications Supplemental Proprietary v1.2.pdf**

**Appendix I. ACR199 _Geodatabase_v1.0 Supplemental.mdb**

**Appendix J. ACR199 Full Monitoring Plan Supplemental Proprietary v1.1.pdf**

**Appendix K. ACR199 Baseline Inventory, Growth and Harvest by Year v1.0.pdf**

**Appendix L. ACR199 RP1 Harvested Wood Product Worksheets v1.1.pdf**

**Appendix M. ACR199 Sampling Error Calculations Supplemental Proprietary v1.1.pdf**

**Appendix N. ACR199 OPO Fee Ownership Documentation Supplemental Proprietary.pdf**

**Appendix O. ACR199 Canopy Cover v1.0.pdf**