

FiniteCarbon

Offset Project Data Report

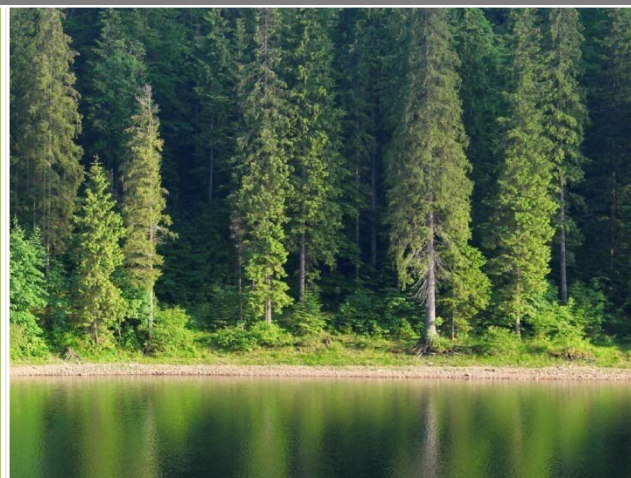
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Finite Carbon – Passamaquoddy Tribe IFM (CAR1175/CAFR5195)

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

Adopted November 14, 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 the State’s 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. This project was developed under the updated version of the FOP adopted on November 14, 2014, and also in compliance with the Regulation published January 20, 2015.

Finite Carbon is a forest carbon 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 offset.

This document is the Offset Project Data Report (OPDR) for *Finite Carbon – Passamaquoddy Tribe IFM* (“Passamaquoddy IFM,” “Passamaquoddy Project,” or “the Project”), assigned by the Climate Action Reserve, which is an ARB approved Offset Project Registry (OPR), as Project ID: CAR1175. The OPDR and all other project documentation and reports that reference carbon stocks have been prepared and submitted by Eric Downing, SAF Candidate Certified Forester (No. 303507) and Tim McAbee, SAF Certified Forester (No. 3789). Additional oversight of forestry documentation and modeling practices was provided by Jeff Meserve, who is a current Maine Licensed Forester operating under license No. LF0000003169 and satisfies the professional forester requirements¹ outlined in the FOP, section 9.1. In addition, certain appendices referenced throughout the OPDR 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 and M and are also designated in the Table of Contents under the List of Appendices with the word “Proprietary” and the end of the file name and/or document title. The geodatabase of the project area is also not included as it is in an electronic GIS format.

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

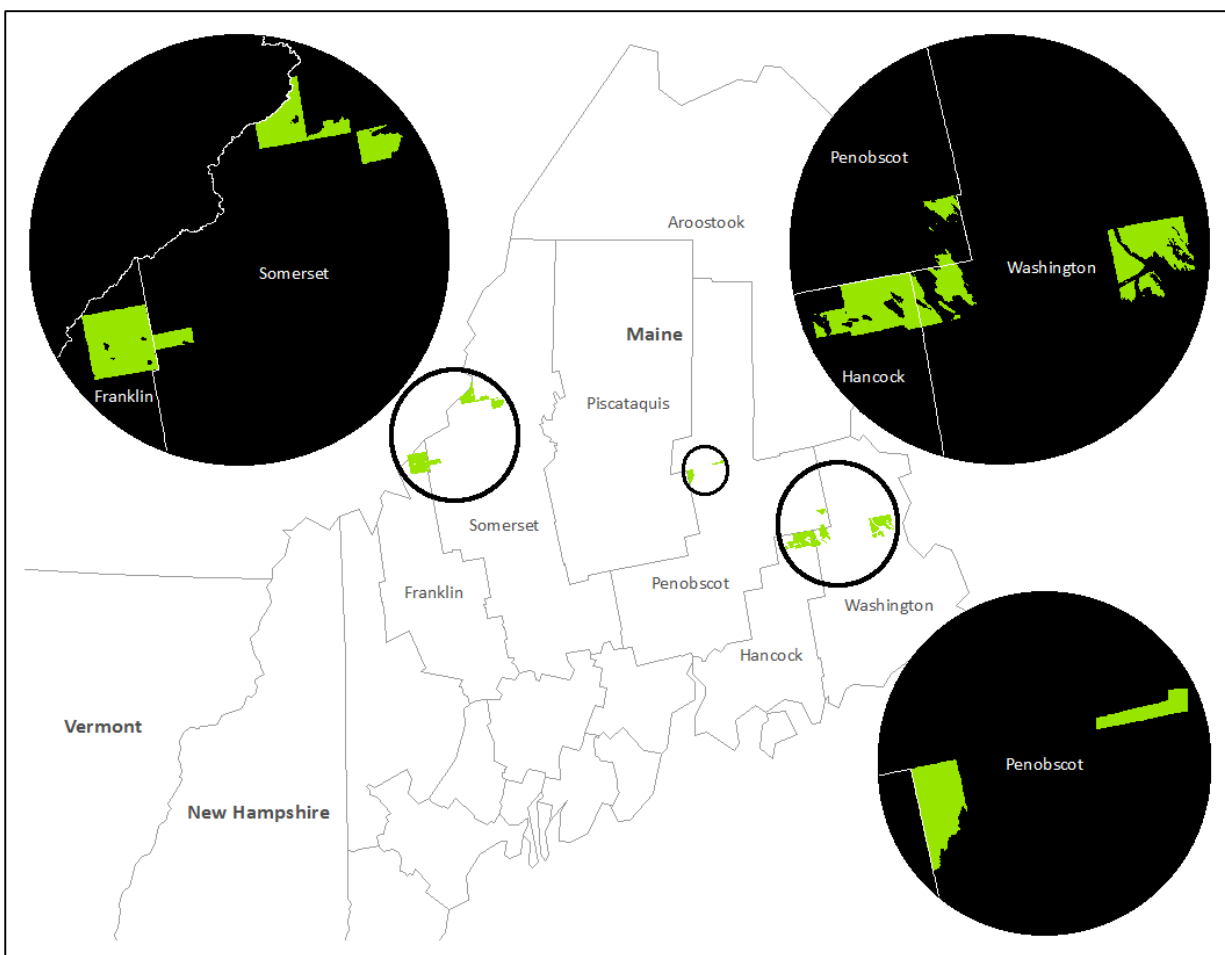


Figure 1. Project Location

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, the Passamaquoddy Tribe (“Passamaquoddy,” “the Tribe,” “Passamaquoddy Joint Tribal Council,” or “forest owner”). The project commencement date is May 28, 2014, the date on which data collection for the carbon inventory began. The Forest Owner is the Offset Project Operator (OPO). The OPO is a federally recognized Indian Tribe and the Project is on land held in trust for the Passamaquoddy Tribe by the U.S. government. In accordance with the Indian Reorganization Act (IRA) of 1934 the Tribe has the right to manage its assets and natural resources, including the ability to list a carbon offset project. The Forest Owner has retained Finite Carbon as the project developer.

Table 1. Offset Project Operator Summary

Offset Project Name/OPR Project ID:	Finite Carbon – Passamaquoddy Tribe IFM/CAR1175
ARB Project ID:	CAFR5195
Offset Project Commencement Date:	05/28/2014
First Reporting Period Start Date:	05/28/2014
First Reporting Period End Date:	08/31/2015
OPO Contact Person Name and Person Completing Report:	Ernie Neptune

OPO Name & Mailing Address:	Passamaquoddy Joint Tribal Council PO Box 343 Perry, ME 04667
OPO Contact Email Address:	ernieneptune@gmail.com
OPO Contact Phone Number:	207-796-5100
OPO's CITSS ID#:	CA1909
Original Submittal Date of OPDR:	10/23/2015
Date of Last Full (On-Site) Verification:	09/29/2015 (site visit started 10/26/2015)

There is no Authorized Project Designee for this project. 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 98,532 acres located in Franklin, Somerset, Penobscot, Hancock, and Washington Counties in the state of Maine. The approximate centroid of the project area is positioned at: 45.272°N, -67.623°W. Major towns and roads are shown in a map as Appendix A. CAR1175_Map_TownsRoads.pdf. The primary land use for the region is forestry. Review of air photos and satellite images reveal a forest-dominated landscape. The forest project lies in the 3b, 4a, 4b, 5a, and 5b climate zone as mapped by the USDA (<http://www.usna.usda.gov/Hardzone/hzm-sm1.html>).

The Project Area contains or borders dozens of rivers, lakes, streams, wetlands, vernal pools, and Great Ponds. It is located in the following watersheds: Upper Kennebec, West Branch Penobscot, Lower Penobscot, Piscataquis, and St. Croix. A map of the watersheds and major watercourses is provided as Appendix B. CAR1175_Map_Watercourses.pdf.

According to “Ecoregions and Subregions of the United States (Lower 48)” by R. G. Bailey and the USGS, the project area is in the Laurentian Mixed Forest Province and the Adirondack-New England Mixed Forest – Coniferous Forest – Alpine Meadow Province. These provinces exist within the Warm Continental Division of the Humid Temperate Domain.

The topography of the Project Area ranges from gently sloping to steep. While hilly in some areas, topography plays a minimal role in limiting forest operations. A map showing topography across the project area is provided as Appendix C. CAR1175_Map_Topography.pdf.

Due to its location, the project is not in an area that is part of the Public Land Survey System. However, a map showing counties and townships is provided as Appendix D. CAR1175_Map_CountyTownships.pdf.

1.2 Land Cover and Land Use: Past and Present

The existing land cover is dominated by forests. The forest within the Project Area is dominated by spruce-fir and northern hardwoods. The forest is managed for timber production on a sustained yield basis, while providing for a variety of cultural, recreational, and wildlife objectives.

The historical land uses in the past have been timber production for bark, pulp, and sawlogs, outdoor recreation such as hunting and fishing, as well as limited agriculture. Historically, tribal lands in the T4ND and T5ND townships were managed by the Dead River Company with records dating back to the 1920's. Indian Township was managed in tandem by the State of Maine and the University of Maine, again with records dating back to the early 1900's. Lowelltown and Holeb were managed by Great Northern Paper Company prior to the Maine Indian Land Claims settlement purchase in 1982 by the Passamaquoddy Tribe. During the 1980's, the spruce budworm outbreak initiated a salvage effort which caused the annual harvest to significantly exceed the normal annual growth.

1.3 Forest Types, Flora and Fauna

Vegetative cover within the Passamaquoddy ownership is predominantly softwoods and northern hardwoods, of both even aged and uneven aged. The Project Area is primarily dominated by the spruce-fir coevertype, comprised of spruce, hemlock, cedar, and fir species. The northern hardwoods coevertype is also very prevalent, comprised of birch, maple, and beech species, as well as a mix of spruce and hemlock. There are also some significant areas of intolerant hardwoods (poplar and birch) and pine forests (white pine and hemlock).

The Passamaquoddy Tribal Lands provides habitat for hundreds of species of vertebrate animals and fish. Vegetation structure, age, and spatial distribution of cover affect the occurrence and distribution of wildlife species. Larger mammals such as moose, deer and bear, as well as many bird species, especially eagles have a large range of movement within both a daily and seasonal time frame. These species utilize a wide variety of vegetation types for feeding, cover and propagation, but may also show a positive association with one or several vegetation types or ages.

There is a wide variety of warm water and cold water fish species found within the tribal trust lands. Game fish in the Project Area include salmon, bass, and trout. The occurrence and distribution of these species is dependent on such factors as water temperature and quality, availability of forage and cover, and human activities such as game fishing, minnow collecting, and fish stocking. Species distribution can also be affected by natural and human-caused obstructions to migration.

The ruffed grouse is found primarily in aspen/hardwood types and thrives best in areas having three distinct age classes of trees: 0-1 years, provides brood cover and foraging habitat; 2-20 years, provides winter cover and male drumming cover; and 20+ years, provides food, and wintering and nesting cover. Escape and roosting cover is also provided by mixed conifer habitat types. Feeding habitat is also provided by upland openings.

The beaver feeds primarily on young alders and hardwoods and is likely to colonize drainages that offer a nearby food source.

The black bear generally utilizes large unbroken hardwood and conifer forests.

The bobcat is a predator that inhabits lowland conifer and shrub habitats, but it will also frequent dense upland forest types wherever human disturbance is low. Young aspen and hardwood stands favor the snowshoe hare, a primary prey of the bobcat.

The brook trout is a native fish species that inhabits cold water streams and ponds. It requires a gravel substrate for spawning, and such features as deep pools, large woody debris, and overhanging banks for cover.

The moose uses second-growth boreal forests interspersed with semi-open areas and swamps or lakes that offer cover and aquatic plants for food. Climax stands of balsam fir, white birch, and aspen stands are preferred habitat. Summers are spent near water; winters in drier mixed hardwood-conifer forests.

The whitetail deer uses forest edges, swamp borders, areas interspersed with fields and woodland openings. During winter months when snow depth exceeds 16 inches (cm) Deer will “yard” in stands of conifers, forming a central resting area with trails packed through the snow.

2. Project Definition and Requirements

2.1 Project Type

Passamaquoddy IFM is an *Improved Forest Management* project type and the forest owner declares:

1. The Project takes place on forestland that has greater than 10 percent tree canopy cover. In 2015 the Project Area was estimated to have 72 percent 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 See the Worksheet Calculations file and for verification purposes.
2. The Project employs natural forest management practices as defined in Section 3 of the FOP. This is demonstrated by adherence to a renewable long-term management plan that demonstrates harvest levels and which can be permanently sustained over time and that is sanctioned by a state or federal agency. For the Project this is the *Passamaquoddy Forest Management Plan 2014*, which has been approved by the United States Department of the Interior, Bureau of Indian Affairs.
3. The project does not employ broadcast fertilization.
4. Previously Listed and/or Registered Forest Offset Project Details:
 - a. ☐ (N/A if not checked): The offset project is an early action offset project transitioning to the FOP according to the provisions of the Regulation and the FOP.
 - b. ☒ (N/A if not checked): 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:
 - i. No lands within the Project Area have ever been listed or registered with an offset project registry or program in the past.
 - ii. 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.
5. The project takes place on tribal lands. See Limited Waiver of Sovereign Immunity and BIA-approval letter uploaded to the Reserve.

2.2 Forest Owner

The Forest Owner is the Passamaquoddy Tribe. The Tribe is not the owner in fee for the Project Area. The Passamaquoddy are a federally recognized Indian Tribe and the Project is on land held in trust by the U.S. government. In accordance with the Indian Reorganization Act (IRA) of 1934 the Tribe has the right to manage its assets and natural resources, including the ability to list a carbon project. The Title Status Reports from the Bureau of Indian Affairs have been provided to the verifier under a separate cover.

The Offset Project Operator is the Joint Tribal Council of the Passamaquoddy Tribe, the legal entity with governing authority recognized by the Federal government. This authority can be traced back in the U.S. Code to the *(Federal) Maine Indian Claims Settlement Act*, which recognizes the Joint Tribal Council as “the sole successor in interest to the aboriginal entity generally known as the Passamaquoddy Tribe.” 25 USC 1721(a)(4). The Settlement Act further recognizes that the Passamaquoddy Tribe is represented, as of the date of enactment (October 10, 1980), by the Joint Tribal Council but acknowledges that there are separate councils at the Indian Township and Pleasant Point Reservations, which are political subdivisions of the Joint Tribal Council. 25 USC 1722(h). Passamaquoddy Tribal lands include both the Passamaquoddy Indian Reservation (comprised of Indian Township and Pleasant Point) and Passamaquoddy Indian Territory, which generally includes tribal trust lands not included as part of either reservation. As the federally recognized representative of the Passamaquoddy Tribe, the Joint Tribal Council is the entity that possesses ultimate authority over the disposition of tribal lands, as is set forth in the Limited Waiver of Sovereign Immunity and Notice of Satisfaction submitted and approved by ARB for the purposes of listing this project. Furthermore, the Settlement Act establishes a federal fund to be used for the acquisition of lands to “to be held in trust by the United States for the benefit of the respective tribe or nation”, which in this case would be the Passamaquoddy Tribe, as represented by the Joint Tribal Council. 25 USC 1724(d). Therefore, the Settlement Act firmly establishes the Joint Tribal Council as the head of the Passamaquoddy Tribal

² Dixon 2002 and Crookston and Stage 1999

government, the legal entity representing the Forest Owner, and establishes its ability to acquire trust land to be held by the United States on its behalf.

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.

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
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.	The tribe has a legal obligation to address resource activity impacts on Federal threatened or endangered species. Within the Project Area this includes habitat for the threatened Canada Lynx species in Lowelltown and Holeb as well as habitat for endangered Atlantic salmon in the Machias and St. Croix watersheds.
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 or around the project area. www.rivers.gov/
Clean Water Act	The Clean Water Act requires states to develop and maintain water quality standards, where pollutants in a river, lake or stream cannot exceed certain concentrations. The Division of Water Resources within the Tennessee Department of Environment & Conservation determines these concentrations and publishes inventories documenting the state's impaired waterbodies.	There are no designated waters in or around the project area. http://www.tn.gov/environment/na/scenicrivers/
Code of Federal Regulations (CFR) Title 25 – Indians	Forest Management Planning and Sustained Yield Management: Sustained yield is defined as “the yield of forest products that a forest can produce continuously at a	This requirement places no specific harvest restrictions on the project baseline. The baseline model was developed to

Part 163 – General Forestry Regulations (25 CFR 163) Section §163.11	given intensity of management.” Complementary to other requirements for the participation in the development and implementation of integrated resource management plans.	produce a sustained yield through a combination of area and volume control.
Code of Federal Regulations (CFR) Title 25 – Indians Part 163 – General Forestry Regulations (25 CFR 163) Section §163.12	Harvesting Restrictions: This section specifies that harvesting will not be permitted unless provisions for natural and/or artificial reforestation of acceptable tree species is included in harvest plans. It also stipulates that clearcutting shall not be prohibited when it is silviculturally appropriate, based on ecological principles.	Regeneration harvests in the baseline were designed and scheduled to ensure acceptable regeneration.
Code of Federal Regulations (CFR) Title 25 – Indians Part 163 – General Forestry Regulations (25 CFR 163) Section §163.34	Environmental Compliance: This section dictates that “actions taken by the Secretary (of the Interior) under the regulations in this part must comply with the National Environmental Policy Act of 1969, applicable council on Environmental Quality Regulations, and tribal laws and regulations.”	While this section is specific to the actions taken by the Secretary of the Interior, it can be reasonably expanded to include actions taken by the tribe in compliance with these regulations. Accordingly, the baseline scenario was developed in compliance with federal natural resource law, including the Clean Water Act and the Threatened and Endangered Species Act. Residual basal area standards for treatments in stream and shoreline buffer zones were developed to ensure compliance with the CWA, while the identification of protected species within the Project Area ensured compliance with the ESA. In both cases this involved spatial designation in GIS.

Endangered Species Act

The Endangered Species Act (ESA) provides a program for the protection and conservation of threatened and endangered plants and animals and the habitats or ecosystems in which they are found. The lead federal agencies for implementing ESA are the U.S. Fish and Wildlife Service (USFWS) and the U.S. National Oceanic and Atmospheric Administration (NOAA) Fisheries Service. Projects or activities on private lands that have the potential to “take” a listed species must apply for an Incidental Take Permit (ITP). Any party that is issued an ITP must have also prepared a Habitat Conservation Plan (HCP) which mitigates such takings and conserves the species’ habitat, both of which support overall recovery of the species.

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.

In order to protect water quality the Tribe has enacted a number of voluntary mitigation measures. These measures have also been adapted for inclusion in the baseline scenario.

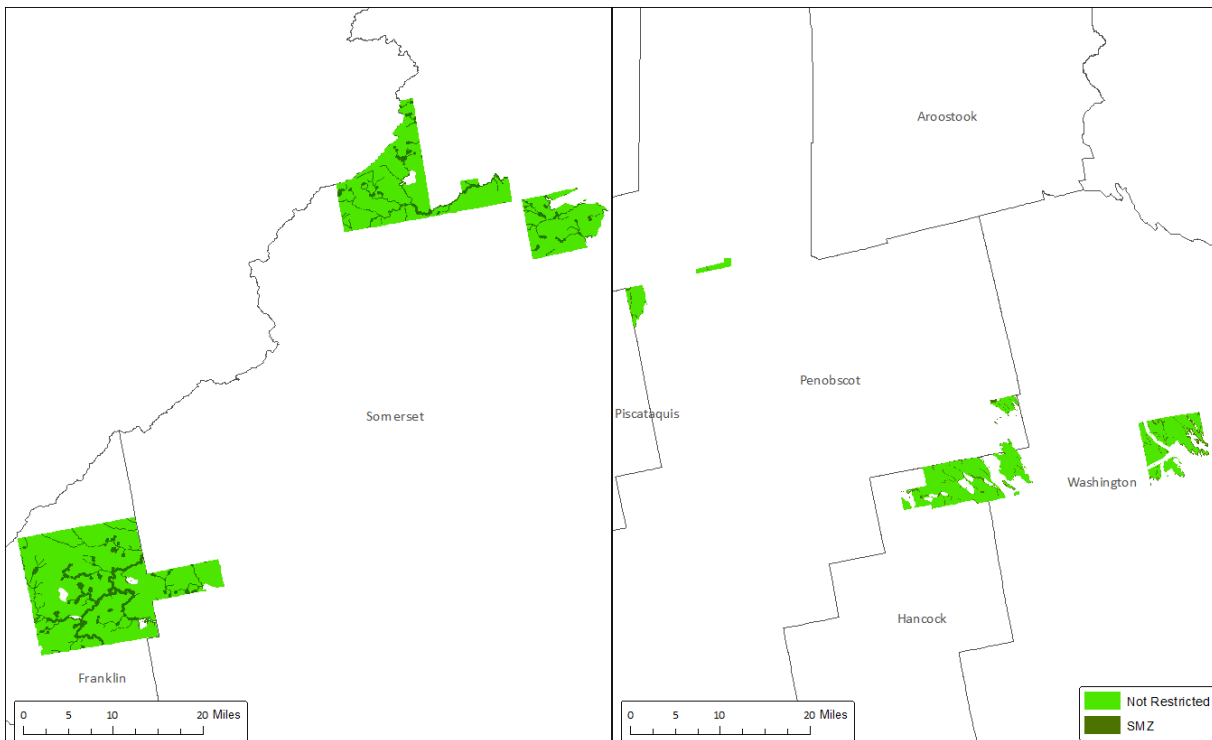


Figure 2. Legal Constraints Relative to Project Area

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 initialed and 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 applicable regulatory requirements during all reporting periods to date.

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 start date is May 28, 2014. This was the date on which data collection began for the Tribe's carbon inventory. This action represents the initiation of forest management activities that increase sequestration and/or decrease emissions relative to the baseline.

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 (or 25 years following the start of the initial reporting period, whichever is most recent). 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 May 28, 2014 and ends no later than May 27, 2039, 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 (ARBOCs) or Registry Offset Credits (ROCs).

3.5 Use of Qualified Conservation Easement

- ☒ The Project does not employ a qualified conservation easement at this time as defined in the FOP.
☐ The Project does 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 / ☐ does not occur on any of the following categories of land:

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

The project area is 98,532 acres located in Franklin, Somerset, Penobscot, Hancock, and Washington Counties in the state of Maine. The approximate centroid of the project area is positioned at: 45.272°N, -67.623°W. A map showing counties and townships is provided as Appendix D. CAR1175_Map_CountyTownships.pdf.

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 meets requirements for sustainable harvesting practices and natural forest management practices as described below.

3.8.1 Sustainable Harvesting Practices

The Forest Owner adheres to 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. For evidence see BIA Approval_Passamaquoddy FMP 10-2014.pdf.

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 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

<i>Criteria</i>	<i>Response</i>
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 basal area in the forest carbon inventory, surpassing the 95% threshold for native species (Table 4).
Composition of Native Species	
Improved Forest Management and Avoided Conversion Projects 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 Reserve's website.	The Assessment Area Data File (part of FOP Appendix F and published on the ARB website) requires that no single species in any Assessment Area exceed the given percentage for "Composition of Native Species" as a percent BA of all live trees in the Project Area, and also at the Assessment Area level. As the Project Area falls in two Supersections, the relevant project strata are tested against the applicable Assessment Area percentage in each Supersection. White Mountains Northeast Spruce-Fir: Appendix F requires no species constitute more than 60 percent of prevalence (percent BA of all live trees in the Project Area). In the White Mountains Supersection the CS, IH, and SF strata are all included with the Spruce-Fir Assessment Area. The forest carbon inventory (2015) shows that in the CS stratum northern white cedar has the highest percent composition at 34.36 percent for this Assessment Area (Table 5). In the IH stratum balsam fir has the highest percent composition at 16.50% (Table 6). In the SF stratum red spruce has the highest percent composition at 26.66% (Table 8). White Mountains Northern Hardwood: Appendix F requires no species constitute more than 70 percent of prevalence (percent BA

	of all live trees in the Project Area). In the White Mountains Supersection the TH stratum is included with the Northern Hardwood Assessment Area. The forest carbon inventory (2015) shows that in the TH stratum yellow birch has the highest percent composition at 22.31 percent for this Assessment Area (Table 9). White Mountains Northern Pine Forest: Appendix F requires no species constitute more than 65 percent of prevalence (percent BA of all live trees in the Project Area). In the White Mountains Supersection the P stratum is included with the Northern Pine Forest Assessment Area. The forest carbon inventory (2015) shows that in the P stratum eastern white pine has the highest percent composition at 18.25 percent for this Assessment Area (Table 7). Maine – New Brunswick Foothills and Lowlands Conifer Bog: Appendix F requires no species constitute more than 80 percent of prevalence (percent BA of all live trees in the Project Area). In the Maine – New Brunswick Foothills and Lowlands the CS strata is included with the Conifer Bog Assessment Area. The forest carbon inventory (2015) shows that in the CS stratum northern white cedar has the highest percent composition at 34.36 percent for this Assessment Area (Table 5). Maine – New Brunswick Foothills and Lowlands Northern Hardwoods: Appendix F requires no species constitute more than 70 percent of prevalence (percent BA of all live trees in the Project Area). In the Maine – New Brunswick Foothills and Lowlands the TH strata is included with the Northern Hardwoods Assessment Area. The forest carbon inventory (2015) shows that in the TH stratum yellow birch has the highest percent composition at 22.31 percent for this Assessment Area (Table 9). Maine – New Brunswick Foothills and Lowlands Pine Forests: Appendix F requires no species constitute more than 65 percent of prevalence (percent BA of all live trees in the Project Area). In the Maine – New Brunswick Foothills and Lowlands the P strata is included with the Pine Forests Assessment Area. The forest carbon inventory (2015) shows that in the P stratum eastern white pine has the highest percent composition at 18.25 percent for this Assessment Area (Table 7). Maine – New Brunswick Foothills and Lowlands Poplar/Birch: Appendix F requires no species constitute more than 75 percent of prevalence (percent BA of all live trees in the Project Area). In the Maine – New Brunswick Foothills and Lowlands the IH strata is included with the Poplar/Birch Assessment Area. The forest carbon inventory (2015) shows that in the IH stratum balsam fir has the highest percent composition at 16.50 percent for this Assessment Area (Table 6). Maine – New Brunswick Foothills and Lowlands Spruce-Fir: Appendix F requires no species constitute more than 70 percent of prevalence (percent BA of all live trees in the Project Area). In the Maine – New Brunswick Foothills and Lowlands the SF strata is included with the Spruce-Fir Assessment Area. The forest carbon inventory (2015) shows that in the SF stratum red spruce has the highest percent composition at 26.66 percent for this Assessment Area (Table 8).
Distribution of Age Classes/Sustainable Management	

All forest landholdings owned or controlled by the Forest Owner are currently under one of the following: 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 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 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 project elects option 2. The Forest Owner adheres to 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. For the Passamaquoddy Tribe this agency is the United States Department of the Interior Bureau of Indian Affairs. For evidence see BIA Approval_Passamaquoddy FMP 10-2014.pdf, provided with the Passamaquoddy Forest Management Plan 2014.
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 may be excluded from this test.)	Overall, the 98,532 acre Project Area holds about 11.1 percent of its forested acres in ages less than 20 years. The distribution of age classes across the project area is shown in Figure 3. Age classes by watershed are shown in Table 10.
Structural Elements (Standing and Lying Dead Wood)	
Forest Owners must ensure that lying dead wood is retained in sufficient quantities, as described below. For portions of the Project Area that have not recently undergone salvage harvesting: 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: • one (1) metric ton of carbon (C) per acre; or • 1% of standing live carbon stocks, in <i>standing</i> dead wood, whichever is higher. 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: • two (2) metric tons of carbon (C) per acre; or • 1% of standing live carbon stocks, in <i>standing</i> dead wood, whichever is higher, 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 2015, the actual onsite carbon for standing dead wood is 1.29 metric tonnes of carbon per acre, which is equivalent to 4.79% of standing live carbon. The forest owner exceeds the threshold for the percentage of deadwood by maintaining more than 1% of standing live carbon stocks in standing dead wood and more than one metric ton of carbon per acre.

Table 4. Standing live basal area and percentage by species (2015)

Species ID	Common Name	Scientific Name	BA (sqft/ac)	Percent
097	Red Spruce	<i>Picea rubens</i>	25.47	20.35%
012	Balsam Fir	<i>Abies balsamea</i>	17.83	14.25%
261	Eastern Hemlock	<i>Tsuga canadensis</i>	14.57	11.64%
316	Red Maple	<i>Acer rubrum</i>	13.48	10.77%
371	Yellow Birch	<i>Betula alleghaniensis</i>	11.39	9.10%
241	Northern White-Cedar	<i>Thuja occidentalis</i>	7.57	6.05%
318	Sugar Maple	<i>Acer saccharum</i>	7.22	5.77%
129	Eastern White Pine	<i>Pinus strobus</i>	6.14	4.91%
375	Paper Birch	<i>Betula papyrifera</i>	5.42	4.33%
531	American Beech	<i>Fagus grandifolia</i>	4.80	3.84%
746	Quaking Aspen	<i>Populus tremuloides</i>	3.08	2.46%
095	Black Spruce	<i>Picea mariana</i>	2.09	1.67%
743	Bigtooth Aspen	<i>Populus grandidentata</i>	1.36	1.09%
315	Striped Maple	<i>Acer pensylvanicum</i>	1.10	0.88%
125	Red Pine	<i>Pinus resinosa</i>	0.88	0.70%
094	White Spruce	<i>Picea glauca</i>	0.73	0.58%
541	White Ash	<i>Fraxinus americana</i>	0.50	0.40%
761	Pin Cherry	<i>Prunus pensylvanica</i>	0.41	0.33%
701	E. Hophornbeam	<i>Ostrya virginiana</i>	0.29	0.23%
833	Northern Red Oak	<i>Quercus rubra</i>	0.23	0.18%
543	Black Ash	<i>Fraxinus nigra</i>	0.17	0.14%
071	Tamarack	<i>Larix laricina</i>	0.15	0.12%
379	Gray Birch	<i>Betula populifolia</i>	0.09	0.07%
741	Balsam Poplar	<i>Populus balsamifera</i>	0.08	0.06%
934	Mountain Ash Spp.	<i>Sorbus species</i>	0.07	0.06%
922	Black Willow	<i>Salix nigra</i>	0.01	0.01%
998	Other Live/Dead Hardwood	<i>Other hardwood</i>	0.01	0.01%
762	Black Cherry	<i>Prunus serotina</i>	0.01	0.01%
Total Native			125.15	100.00%
Total			125.15	100.00%

Table 5. Strata: CS (Conifer Bog) – ‘Composition of Native Species’
White Mountains Northeast Spruce Fir: SDI=60%
Maine – New Brunswick Foothills and Lowlands Conifer Bog: SDI=80%

Species ID	Common Name	Scientific Name	BA (sqft/ac)	Percent
241	Northern White-Cedar	<i>Thuja occidentalis</i>	34.33	34.36%
095	Black Spruce	<i>Picea mariana</i>	24.66	24.68%
012	Balsam Fir	<i>Abies balsamea</i>	18.44	18.45%
097	Red Spruce	<i>Picea rubens</i>	8.27	8.27%
316	Red Maple	<i>Acer rubrum</i>	5.66	5.67%
071	Tamarack	<i>Larix laricina</i>	2.53	2.53%
375	Paper Birch	<i>Betula papyrifera</i>	1.70	1.70%
129	Eastern White Pine	<i>Pinus strobus</i>	1.67	1.67%
543	Black Ash	<i>Fraxinus nigra</i>	1.17	1.17%
094	White Spruce	<i>Picea glauca</i>	1.06	1.06%
371	Yellow Birch	<i>Betula alleghaniensis</i>	0.34	0.34%
261	Eastern Hemlock	<i>Tsuga canadensis</i>	0.09	0.09%
Total			99.90	100.00%

Table 6. Strata: IH (Intolerant Hardwood) – ‘Composition of Native Species’
White Mountains Northeast Spruce Fir: SDI=60%
Maine – New Brunswick Foothills and Lowlands Poplar/Birch: SDI=75%

Species ID	Common Name	Scientific Name	BA (sqft/ac)	Percent
012	Balsam Fir	<i>Abies balsamea</i>	18.43	16.50%
316	Red Maple	<i>Acer rubrum</i>	14.78	13.23%
746	Quaking Aspen	<i>Populus tremuloides</i>	14.40	12.89%
097	Red Spruce	<i>Picea rubens</i>	13.93	12.48%
371	Yellow Birch	<i>Betula alleghaniensis</i>	10.69	9.57%
261	Eastern Hemlock	<i>Tsuga canadensis</i>	9.74	8.72%
375	Paper Birch	<i>Betula papyrifera</i>	9.35	8.37%
129	Eastern White Pine	<i>Pinus strobus</i>	4.78	4.28%
743	Bigtooth Aspen	<i>Populus grandidentata</i>	3.09	2.76%
531	American Beech	<i>Fagus grandifolia</i>	3.04	2.73%
315	Striped Maple	<i>Acer pensylvanicum</i>	2.70	2.42%
241	Northern White-Cedar	<i>Thuja occidentalis</i>	2.14	1.92%
318	Sugar Maple	<i>Acer saccharum</i>	1.93	1.73%
761	Pin Cherry	<i>Prunus pensylvanica</i>	0.95	0.85%
125	Red Pine	<i>Pinus resinosa</i>	0.49	0.44%
094	White Spruce	<i>Picea glauca</i>	0.43	0.38%
541	White Ash	<i>Fraxinus americana</i>	0.40	0.36%
934	Mountain Ash Spp.	<i>Sorbus species</i>	0.27	0.24%
701	E. Hophornbeam	<i>Ostrya virginiana</i>	0.16	0.15%
Total			111.69	100.00%

Table 7. Strata: P (Pine) – ‘Composition of Native Species’
White Mountains Northern Pine Forest: SDI=65%
Maine – New Brunswick Foothills and Lowlands Pine Forests: SDI=65%

Species ID	Common Name	Scientific Name	BA (sqft/ac)	Percent
129	Eastern White Pine	<i>Pinus strobus</i>	23.84	18.25%

261	Eastern Hemlock	<i>Tsuga canadensis</i>	19.79	15.15%
097	Red Spruce	<i>Picea rubens</i>	18.98	14.53%
316	Red Maple	<i>Acer rubrum</i>	16.64	12.74%
012	Balsam Fir	<i>Abies balsamea</i>	14.08	10.78%
241	Northern White-Cedar	<i>Thuja occidentalis</i>	8.92	6.83%
125	Red Pine	<i>Pinus resinosa</i>	7.05	5.40%
746	Quaking Aspen	<i>Populus tremuloides</i>	7.01	5.36%
375	Paper Birch	<i>Betula papyrifera</i>	6.67	5.10%
095	Black Spruce	<i>Picea mariana</i>	1.50	1.15%
761	Pin Cherry	<i>Prunus pensylvanica</i>	1.38	1.06%
531	American Beech	<i>Fagus grandifolia</i>	1.24	0.95%
543	Black Ash	<i>Fraxinus nigra</i>	0.80	0.61%
743	Bigtooth Aspen	<i>Populus grandidentata</i>	0.74	0.57%
318	Sugar Maple	<i>Acer saccharum</i>	0.73	0.56%
315	Striped Maple	<i>Acer pensylvanicum</i>	0.55	0.42%
371	Yellow Birch	<i>Betula alleghaniensis</i>	0.34	0.26%
094	White Spruce	<i>Picea glauca</i>	0.19	0.15%
541	White Ash	<i>Fraxinus americana</i>	0.18	0.14%
Total			130.65	100.00%

Table 8. SF (Spruce-Fir) – 'Composition of Native Species'**White Mountains Northeast Spruce Fir: SDI=60%****Maine – New Brunswick Foothills and Lowlands Spruce-Fir: SDI=70%**

Species ID	Common Name	Scientific Name	BA (sqft/ac)	Percent
097	Red Spruce	<i>Picea rubens</i>	36.35	26.66%
012	Balsam Fir	<i>Abies balsamea</i>	24.14	17.71%
261	Eastern Hemlock	<i>Tsuga canadensis</i>	18.70	13.72%
316	Red Maple	<i>Acer rubrum</i>	12.06	8.85%
241	Northern White-Cedar	<i>Thuja occidentalis</i>	9.27	6.80%
371	Yellow Birch	<i>Betula alleghaniensis</i>	8.26	6.06%
129	Eastern White Pine	<i>Pinus strobus</i>	7.29	5.35%
375	Paper Birch	<i>Betula papyrifera</i>	6.22	4.57%
318	Sugar Maple	<i>Acer saccharum</i>	3.28	2.40%
531	American Beech	<i>Fagus grandifolia</i>	2.98	2.19%
746	Quaking Aspen	<i>Populus tremuloides</i>	1.70	1.25%
095	Black Spruce	<i>Picea mariana</i>	1.47	1.08%
743	Bigtooth Aspen	<i>Populus grandidentata</i>	1.23	0.90%
094	White Spruce	<i>Picea glauca</i>	0.95	0.70%
125	Red Pine	<i>Pinus resinosa</i>	0.69	0.51%
315	Striped Maple	<i>Acer pensylvanicum</i>	0.48	0.35%
701	E. Hophornbeam	<i>Ostrya virginiana</i>	0.30	0.22%
541	White Ash	<i>Fraxinus americana</i>	0.20	0.15%
761	Pin Cherry	<i>Prunus pensylvanica</i>	0.19	0.14%
741	Balsam Poplar	<i>Populus balsamifera</i>	0.15	0.11%
379	Gray Birch	<i>Betula populifolia</i>	0.13	0.10%
543	Black Ash	<i>Fraxinus nigra</i>	0.12	0.09%
934	Mountain Ash Spp.	<i>Sorbus species</i>	0.07	0.05%
071	Tamarack	<i>Larix laricina</i>	0.05	0.04%
998	Other Live/Dead Hardwood	<i>Other hardwood</i>	0.02	0.02%
922	Black Willow	<i>Salix nigra</i>	0.02	0.01%
Total			136.34	100.00%

Table 9. TH: (Tolerant Hardwood) – 'Composition of Native Species'
White Mountains Northern Hardwood: SDI=70%
Maine – New Brunswick Foothills and Lowlands Northern Hardwoods: SDI=70%

Species ID	Common Name	Scientific Name	BA (sqft/ac)	Percent
371	Yellow Birch	<i>Betula alleghaniensis</i>	24.20	22.31%
318	Sugar Maple	<i>Acer saccharum</i>	21.83	20.12%
316	Red Maple	<i>Acer rubrum</i>	16.97	15.64%
531	American Beech	<i>Fagus grandifolia</i>	11.69	10.78%
097	Red Spruce	<i>Picea rubens</i>	10.28	9.48%
261	Eastern Hemlock	<i>Tsuga canadensis</i>	8.53	7.86%
012	Balsam Fir	<i>Abies balsamea</i>	3.78	3.48%
375	Paper Birch	<i>Betula papyrifera</i>	2.30	2.12%
315	Striped Maple	<i>Acer pensylvanicum</i>	2.23	2.06%
541	White Ash	<i>Fraxinus americana</i>	1.41	1.30%
743	Bigtooth Aspen	<i>Populus grandidentata</i>	1.39	1.28%
746	Quaking Aspen	<i>Populus tremuloides</i>	1.04	0.96%
833	Northern Red Oak	<i>Quercus rubra</i>	0.97	0.89%
761	Pin Cherry	<i>Prunus pensylvanica</i>	0.52	0.48%
701	E. Hophornbeam	<i>Ostrya virginiana</i>	0.48	0.44%
094	White Spruce	<i>Picea glauca</i>	0.42	0.39%
129	Eastern White Pine	<i>Pinus strobus</i>	0.18	0.17%
241	Northern White-Cedar	<i>Thuja occidentalis</i>	0.13	0.12%
379	Gray Birch	<i>Betula populifolia</i>	0.06	0.05%
762	Black Cherry	<i>Prunus serotina</i>	0.05	0.05%
Total			108.47	100.00%

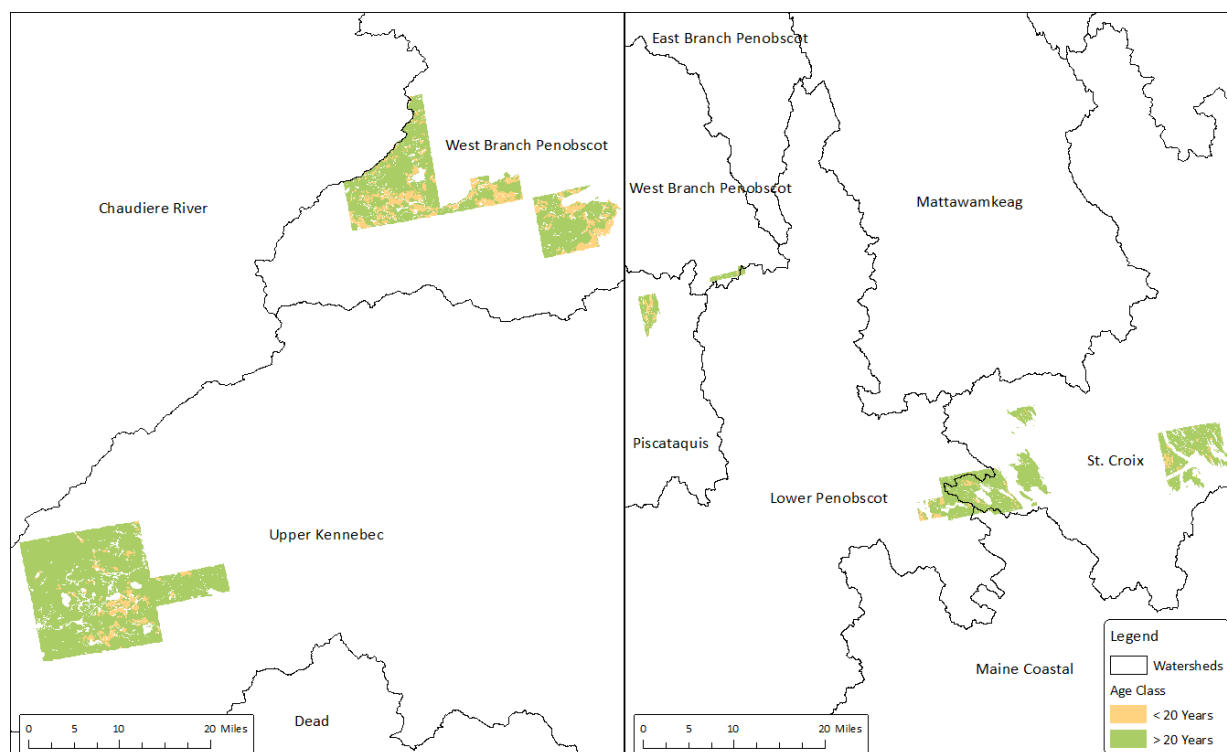


Figure 3. Project Area Age Classes

Table 10. Age Classes by Watershed

Watershed	Acres by Stand Age			Percent		
	<20	>20	Total	<20	>20	Total
Chaudiere River	9.37	17.24	26.61	35.2%	64.8%	100.0%
Lower Penobscot	1,104.41	8,208.19	9,312.60	11.9%	88.1%	100.0%
Maine Coastal	0.0	739.65	739.65	0.0%	100.0%	100.0%
Piscataquis	941.80	3,033.68	3,975.48	23.7%	76.3%	100.0%
St. Croix	2,149.25	36,437.38	38,586.63	5.6%	94.4%	100.0%
Upper Kennebec	1,773.03	23,785.29	25,558.32	6.9%	93.1%	100.0%
West Branch Penobscot	4,967.59	15,364.76	20,332.36	24.4%	75.6%	100.0%
Total	10,945.44	87,586.19	98,531.63	11.1%	88.9%	100.0%

3.8.3 Promotion of the Onsite Standing Live Carbon Stocks

Since the project start 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.

Early successional habitat blocks are implemented in active harvest areas and poorly performing stands to promote an early habitat component for ruffed grouse, woodcock, and other small game species for nesting, resting, and feeding opportunities. Early successional habitat also provides browsing opportunities for deer, moose, and bear, while predators benefit from increased prey numbers. This type of even-aged management is limited to blocks no larger than 5 acres. The Tribal Forestry Department uses shapefiles to define harvest blocks in a GIS system to ensure that adjacency requirements are always met.

As demonstrated in Table 10, only 11 percent of the Project Area is in ages less than 20 years. Ongoing sustainable forest management will ensure that the project will remain in compliance with this requirement.

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:

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

Where: PROJAREA = Total acres in project area

GRSOWNAREA = Total acres in gross ownership area (Passamaquoddy trust lands)

L = Number of exclusion areas

$EXCLAREA_h$ = Size of area in exclusion area h

$NFAREA_h$ = Size of area in non-forest area h

2. Determine Gross Ownership Area (GRSOWNAREA)

- a. The forest owner provided shapefiles for all of their trust land; these map the authoritative, managerial and operational boundaries of the Passamaquoddy Tribe. The shapefiles were imported into the project geodatabase as feature classes and merged into a single Project Area shapefile; the data was reviewed and summarized to determine the values in Equation 1.
 - b. $GRSOWNAREA = 115,429$ acres.
3. Determine exclusion areas ($EXCLAREA_1$) and non-forest (i.e. Ineligible land-use classes) ($NFAREA_1$)
 - a. Forested areas were excluded from the Project in consultation with tribal leadership and their forestry department. This included portions of Indian Township considered likely candidates for future economic development, selected shoreline buffers around lakes and Great Ponds that were considered most suitable for future camp leases that will be granted to tribal members, inholdings (privately owned parcels within the boundaries of the Project Area), and the acres in township T19 MD BPP which are managed by the Passamaquoddy Wild Blueberry Company. There were 10,197.61 excluded acres.
 - b. A land-use class field was identified for each polygon in 'Stands'; this field is titled 'Strata'; the land-use classes are summarized in Table 11.

Table 11. Project Ownership Area by Land-Use

Strata	Land Use Class	Total Acres
CS	Forest	4,726.71
IH	Forest	9,891.68
NF	Non-Forest	6,699.39
P	Forest	6,228.33
SF	Forest	54,330.87
TH	Forest	23,354.04
Total		105,270.43

- c. There are 6,699.39 acres of non-forest (ineligible areas) within the gross project area.
 - d. The $EXCLAREA_1 = 10,197.61$ acres. These lands are colored purple in Figure 4. The $NFAREA_1 = 6,699.39$ acres. These lands are colored orange in Figure 4. The total area excluded from the gross ownership = 16,897.00 acres.
4. Using Equation 1, the project area is 98,531.63 acres. These lands are colored green in Figure 4.

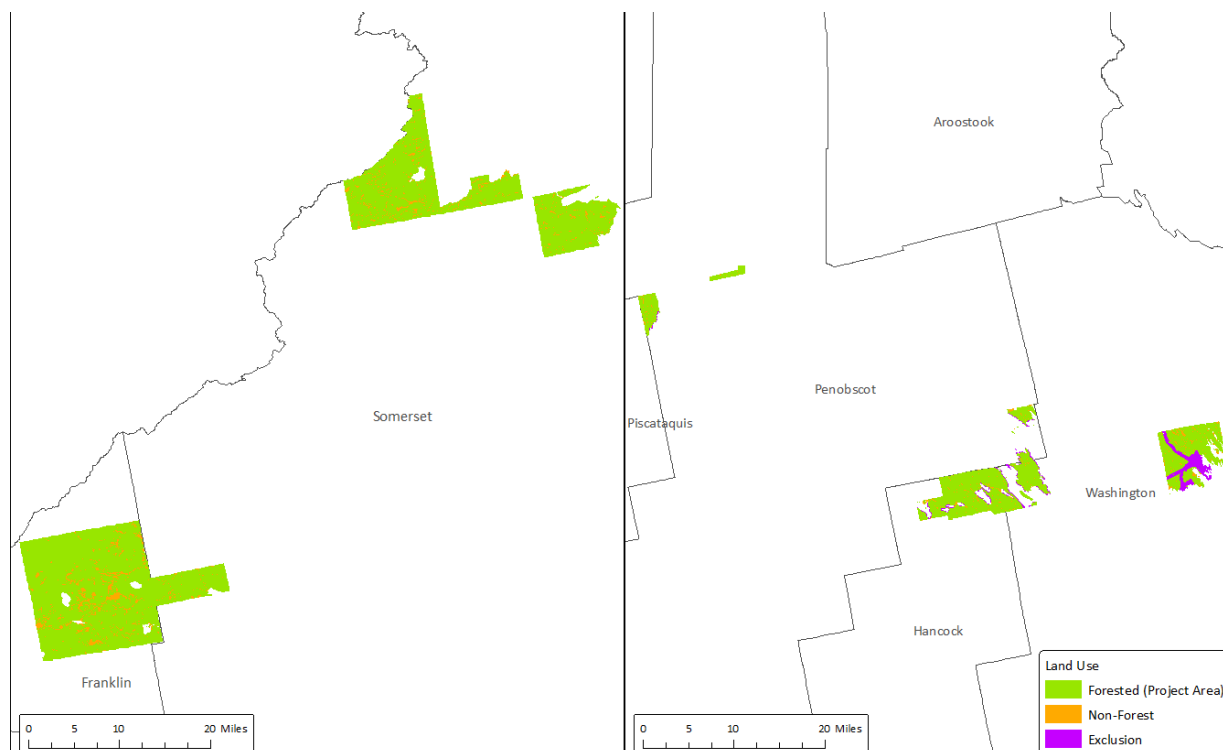


Figure 4. Ineligible Areas Relative to Project Area

5. Defining the Project's GHG Assessment Boundary

Table 11 was adapted from the FOP, Table 5.2 and describes the project's GHG assessment boundary. Because commercial harvesting in the project will always be equal or less than the baseline scenario, forest carbon in landfills (IFM-8) is included.

Table 12. 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 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 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 harvest volumes Project: Estimated from measured harvest 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 harvest volumes Project: Estimated from measured harvest 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 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 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) Project: Quantified as a component of calculating	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.

			carbon stored for 100 years in wood products (SSR #IFM-7) and landfills (SSR #IFM-8)	
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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 J.W. Sewell Company (a regional forestry consulting group). Inventory work began on May 28, 2014 with the collection of data by Oversett Forest Management on the Tribe's pre-existing FIA plots. Collection of the final plot data used to model the project and baseline carbon stocks was completed in the spring and summer of 2015. 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, 4b, 5a, and 5b climate zones as shown on USDA FS mapping for the region (<http://www.usna.usda.gov/Hardzone/hzm-sm1.html>).

The stratification used in the project was based on the field data collection tally and field notes from the cruisers along with current harvest plan mapping, field observations by Finite Carbon foresters, and current orthophotography from the National Agriculture Imagery Program.³ The forest cover types used for this stratification were mapped to the appropriate FOP Assessment Areas (i.e. forest vegetative communities) listed in the Assessment Area Data File for the White Mountains and Maine – New Brunswick Foothills and Lowlands Supersections. The tree species found in each stratum in the project area are consistent with the species listed in the Assessment Area Data File. The strata currently existing in the project area are listed in Table 13. As activities occur in the project, the strata will be updated using the stratification process described above and in the referenced rule document.

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 500 plots. Plots were allocated randomly. Six plots had to be dropped from the inventory when it was discovered they fell on previously unmapped non forest features that met the minimum mapping standards established in the project inventory specifications (Appendix H. CAR1175 Project Inventory Specifications Proprietary.pdf). These features were roads and non-forested wetlands that had not been included in the owner's GIS data at the time of the inventory design, but which were added in September 2015. Therefore the final number of plots used for carbon calculations was 494. All plots were assigned GPS coordinates and stored in the project geodatabase. The plot locations are shown in Figure 5.

³ National Agriculture Imagery Program. 2013. Accessed at mapserver.maine.gov/basemap/index.html on March 3, 2014.

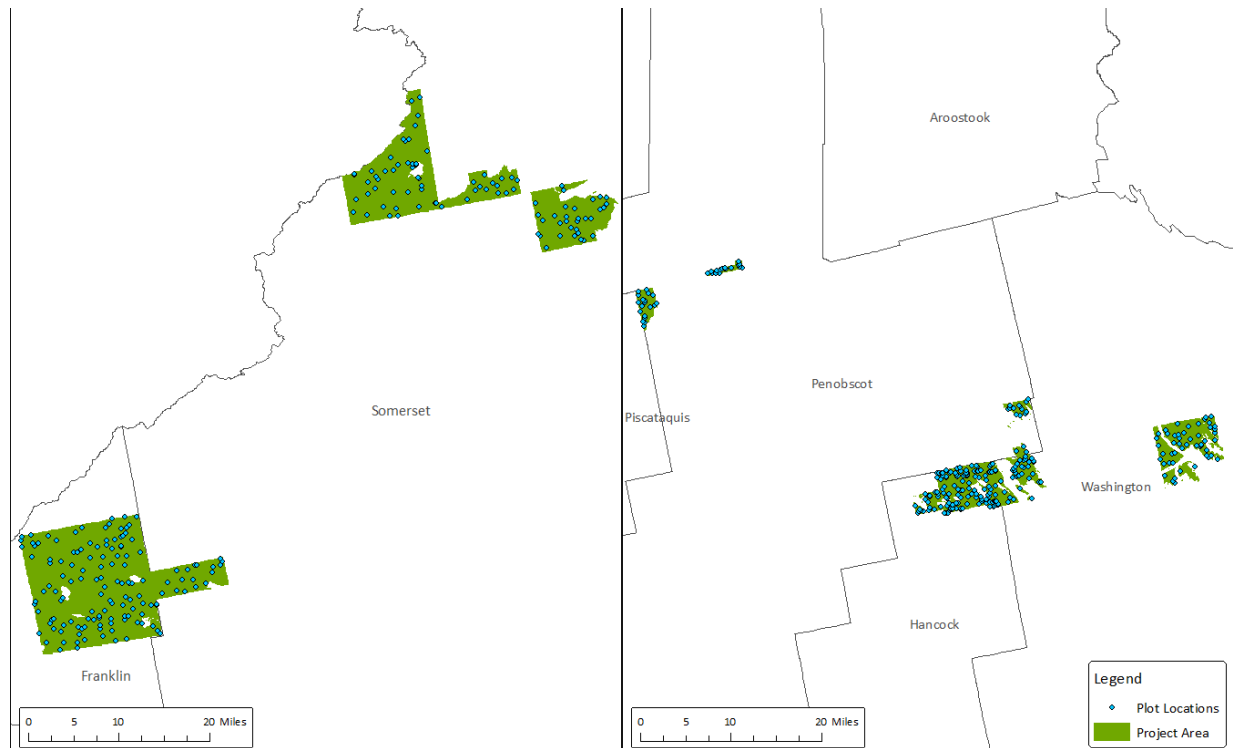


Figure 5. Plot Locations in Baseline Inventory

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 rebar and paint. Cruisers also used GPS to locate or update base map features as well as ground-truth forest types and stand lines.

Sampling method for all full biomass points used with this project was a 1/15th acre fixed radius sample point for all stems 5.0 inches DBH and larger and a 1/250th acre fixed radius plot for all stems 1.0 to 4.9 inches DBH. All borderline trees were measured to the geometric center of the base or point of origin of the tree using approved devices, including slope adjustments for slopes of 10% and greater in accordance with the guidance provided in Appendix H. CAR1175 Project Inventory Specifications Proprietary.pdf.

The following data was collected for all standing live or dead trees on the 1/15th and 1/250th acre plot, starting with the first “in” tree immediately east of magnetic north from plot center:

- tree species;
- diameter at breast height;
- total height of each stem;
- height to a 4 inch top of each stem;
- soundness deduction; and
- snag decomposition class

In order to verify the quality of the data collection, the contractor performed an internal audit of the data. Thirty-eight points (8%) were internally checked for accuracy. 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. 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, correcting erroneous samples, and gathering missing data 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 2015 inventory of onsite carbon stock was conducted. The onsite carbon stock for each plot was determined using the ARB published cubic foot volume equations as referenced by species in Table 15. Species Observed in Project and the Component Ratio Method (Heath et al. 2009). The mean, standard deviation and 90 percent confidence interval for onsite carbon stock were then calculated for each stratum from their respective plot carbon stocks. Percent error by stratum was determined by dividing half of the width of the confidence interval by the mean. The percent error for tCO₂e per acre for all actual onsite carbon stocks combined was calculated by strata at a 90 percent confidence level (Table 13). The total project uncertainty (sampling error) is 3.65 percent.

Table 13. Summary of Percent Error by Strata and Project Total (2015 tCO₂e/acre, all portions)

Strata	Mean tCO ₂ e per Acre	Percent Error (PE)
CS	60.79	15.84%
IH	91.55	12.05%
P	103.36	15.99%
SF	105.78	4.73%
TH	109.85	7.69%
Project Total	103.00	3.65%

6.1.4 Growth & Yield Model

Forest inventory field data was transferred to the project developer in a database, along with all relevant GIS files. A project geodatabase serves as the central data repository for spatial data. 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/fmfc/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 CAR growth model (FOP 3.2, 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 6). 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 Passamaquoddy project.

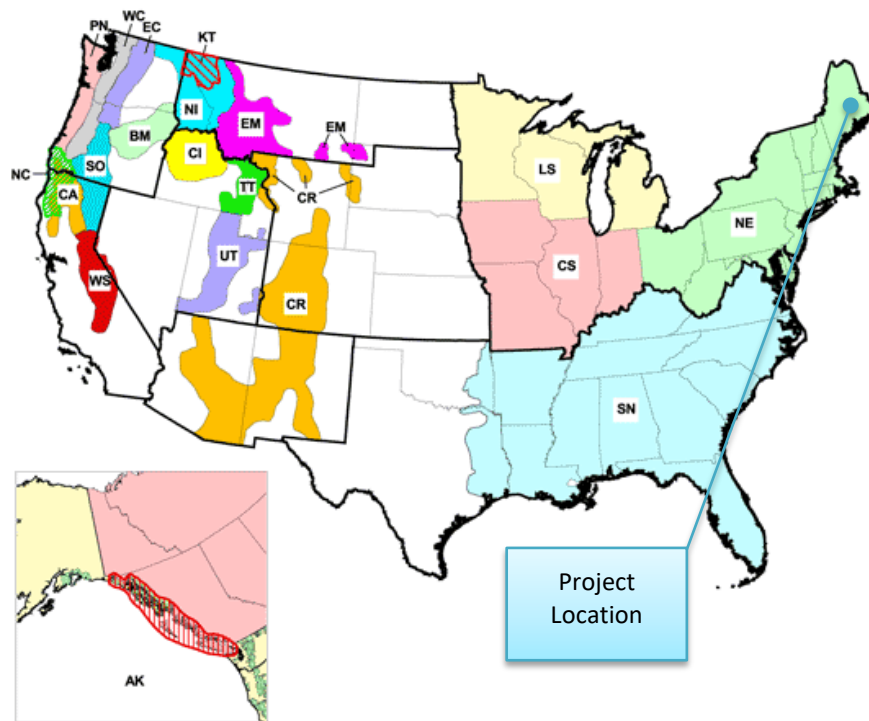


Figure 6. FVS Variants Map

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. Because the project start date is one year before the effective inventory date, the inventory was grown backwards to determine the initial carbon stocks. This was done by growing the inventory forward to determine incremental growth. The annual increment was then subtracted from the carbon stocks at the time of the inventory to produce the carbon stocks at the start date in 2014. The inventory was then modeled from the start date to establish the baseline carbon stocks.

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. CAR1175 Data Management & Analytical Systems Proprietary.

Model Calibrations

The variant (“NE”) and project location code (indicating the closest National Forest and Ranger District – in this case, the 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. The modifications, for major species where site index condition was available, are shown in Table 14 below. Other species in the project where FIA site index data was not available were calibrated by FVS default transformations.

Table 14. Site Index Calibration Summary

FIA Spp.	Spp. Name	FVS (NE) SI Default	Average SI Condition (FIA)
12	balsam fir	52	41
71	tamarack (native)	50	52
94	white spruce	50	43
95	black spruce	50	34
97	red spruce	50	38
125	red pine	65	50
129	eastern white pine	65	54
241	northern white-cedar	42	30
261	eastern hemlock	52	40
316	red maple	56	54
318	sugar maple	56	52
371	yellow birch	56	62
375	paper birch	56	57
531	American beech	56	53
541	white ash	59	62
543	black ash	59	55
743	bigtooth aspen	60	70
746	quaking aspen	60	77
833	northern red oak	58	59

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 *Allegheny and North Cumberland Mountains* CAR Supersection (Appendix E. CAR1175_Map_AssessmentAreas.pdf).

The project area strata was mapped onto the FOP Assessment Areas by associating the corresponding species composition from FOP Appendix F Assessment Area Data File with that of the broad forest types mapped for each stratum and stand based on aerial photography analysis and field validation during the forest carbon inventory. There were two Supersections with eight Assessment Areas identified in the Project Area and highlighted in the table below (Table 13 and Appendix E. CAR1130_Map_AssessmentAreas.pdf).

Table 15. Common Practice Assessment Area Data

Supersection	Assessment Area	Species Mix	Site Class	Bd Ft	BA	CP	SDI
White Mountains	White Mountains Mixed Hardwoods	Balsam poplar, black ash, American elm, red maple, chestnut oak, black oak, scarlet oak, cottonwood, northern red oak, river birch, sycamore, sweetbay, swamp tupelo, white oak, red oak, hickory, willow	All	2,637	81	50	60%
	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%
			High	2,883	107	51	60%
	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%
			Low	3,179	92	68	70%
	White Mountains Northern Pine Forest	Eastern white pine, eastern hemlock, northern red oak, white ash, pine, red pine	All	7,822	133	84	65%
Maine - New Brunswick Foothills and Lowlands	Maine - New Brunswick Foothills and Lowlands Conifer Bog	White cedar, tamarack	All	2,878	119	51	80%
	Maine - New Brunswick Foothills and Lowlands Lowland Hardwoods	Balsam poplar, black ash, american elm, red maple, silver maple, sweetbay, swamp tupelo, sycamore, pecan	All	900	50	26	60%
	Maine - New Brunswick Foothills and Lowlands Northern Hardwoods	Willow, black cherry, white ash, yellow poplar, basswood, beech	Low	1,811	85	53	70%
			High	2,230	92	54	70%
	Maine - New Brunswick Foothills and Lowlands Pine Forests	White pine, eastern hemlock, red oak, white ash, jack pine, red oak, pitch oak, Hickory	All	5,528	141	80	65%
	Maine - New Brunswick Foothills and Lowlands Poplar/Birch	aspen, gray birch, paper birch	All	1,614	80	41	75%
	Maine - New Brunswick Foothills and Lowlands Spruce-Fir	Balsam fir, eastern hemlock, larch, Norway spruce, red spruce, white spruce	High	3,348	112	55	70%
			Low	2,830	100	48	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. Geographic soil survey data for

the Project Area indicate that the project area is classified as Forest Service Types IV and V. Based on this analysis, the total common practice carbon stock is 5,034,084.08 tCO₂e. The weighted average common practice carbon stock on a per acre basis is 51.09 tCO₂e (Table 14. Common Practice Carbon Stocks and Figure 7).

Table 16. Common Practice Carbon Stocks

Supersection	AssessmentArea	SiteClass	Project Area (Acres)	CP Stock	Area Weight	Weight CP
White Mountains	Northeast Spruce-Fir	Low	28,258.47	40.02	0.2867	11.47
White Mountains	Northern Hardwood	Low	15,940.48	67.72	0.1617	10.95
White Mountains	Northern Pine Forest	Low	469.47	83.87	0.0048	0.40
Maine - New Brunswick Foothills and Lowlands	Conifer Bog	Low	3,198.91	51.01	0.0325	1.66
Maine - New Brunswick Foothills and Lowlands	Northern Hardwoods	Low	7,413.56	53.00	0.0752	3.99
Maine - New Brunswick Foothills and Lowlands	Pine Forests	Low	5,758.86	79.84	0.0584	4.67
Maine - New Brunswick Foothills and Lowlands	Poplar/Birch	Low	4,040.03	41.32	0.0410	1.69
Maine - New Brunswick Foothills and Lowlands	Spruce-Fir	Low	33,451.85	47.88	0.3394	16.25
			98,531.63			
						51.09

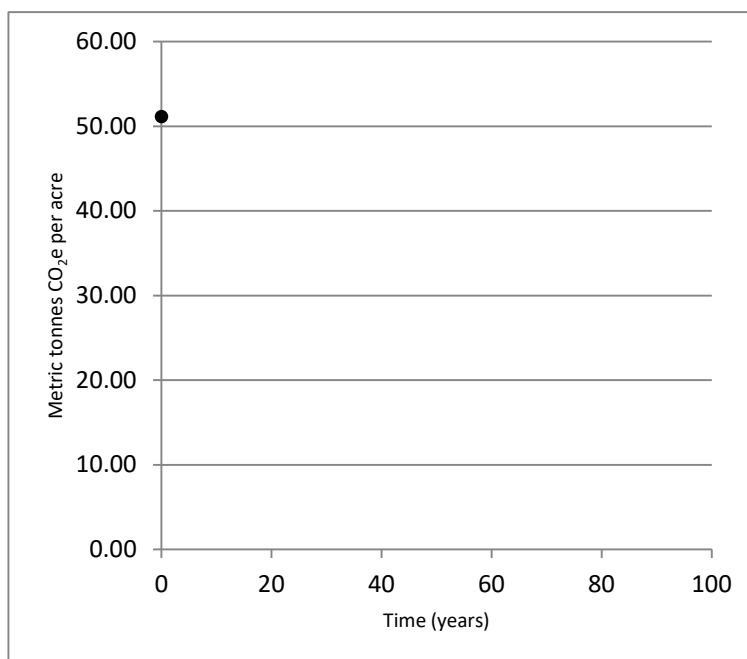


Figure 7. Step 1 - Common Practice

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. Component Ratio Method) appropriate for the Supersections and species as published by ARB. The species observed in the project are listed in Table 16 along with their cubic foot volume equation reference. The total initial above-ground standing live carbon stock is 7,786,949.30 tCO₂e, which is above the common practice. The weighted average above-ground standing live carbon stock per acre is 79.03 tCO₂e (Table 18 and Figure 8).

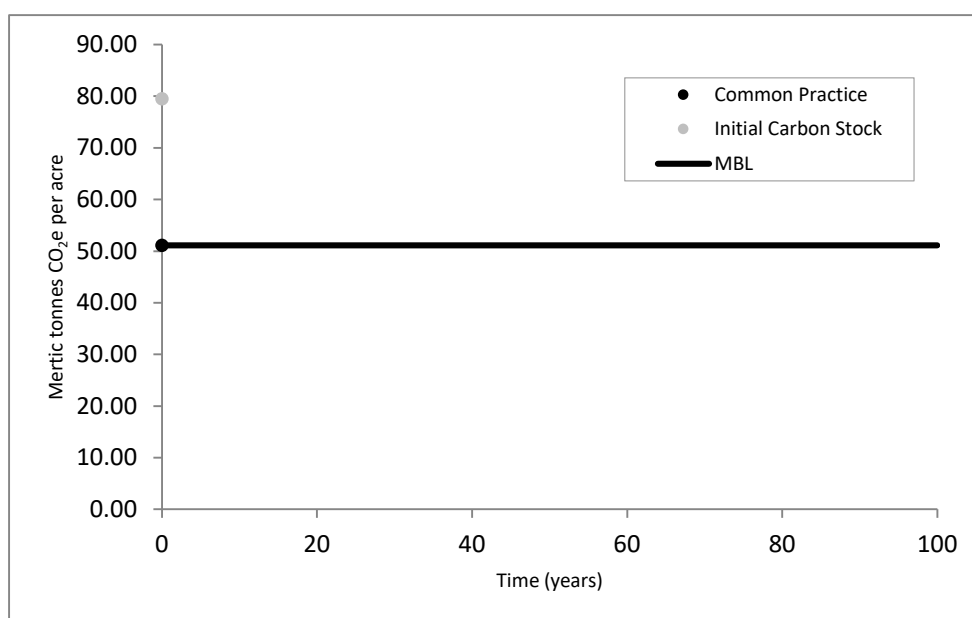
Table 17. Species Observed in Project

Name	FIA Code	ARB Volume FIA Code ⁴	Equation Reference
Quaking Aspen	746	544	Scott, Charles T., 1981
Red Maple	316	317	Scott, Charles T., 1981
Red Pine	125	129	Scott, Charles T., 1981
Northern Red Oak	833	833	Scott, Charles T., 1981
Red Spruce	097	094	Scott, Charles T., 1981
Sugar Maple	318	318	Scott, Charles T., 1981
Striped Maple	315	999	Scott, Charles T., 1981
Tamarack	071	131	Scott, Charles T., 1981
White Ash	541	544	Scott, Charles T., 1981
Northern White-Cedar	241	241	Scott, Charles T., 1981
Eastern White Pine	129	129	Scott, Charles T., 1981
White Spruce	094	094	Scott, Charles T., 1981
Yellow Birch	371	370	Scott, Charles T., 1981
American Beech	531	531	Scott, Charles T., 1981
Black Ash	543	544	Scott, Charles T., 1981
Black Cherry	762	762	Scott, Charles T., 1981
Balsam Fir	012	012	Scott, Charles T., 1981
Black Willow	922	999	Scott, Charles T., 1981
Balsam Poplar	741	544	Scott, Charles T., 1981
Black Spruce	095	094	Scott, Charles T., 1981
Bigtooth Aspen	743	544	Scott, Charles T., 1981
Eastern Hemlock	261	261	Scott, Charles T., 1981
Gray Birch	379	370	Scott, Charles T., 1981
E. Hophornbeam	701	999	Scott, Charles T., 1981
Mountain Ash Spp.	934	999	Scott, Charles T., 1981
Other Live/Dead Hardwood	998	999	Scott, Charles T., 1981
Paper Birch	375	370	Scott, Charles T., 1981
Blue Spruce	096	094	Scott, Charles T., 1981
Pin Cherry	761	999	Scott, Charles T., 1981

⁴ FIA code for species equation reference for ARB-approved volume equation used in carbon calculations (<https://www.arb.ca.gov/cc/capandtrade/protocols/usforest/2014/coefficientsdatabase.zip>)

Table 18. Initial Above-Ground Standing Live Carbon (2014)

Strata	Year	Acres	Per Acre (Above-Ground Standing Live)	Total
CS	2014	4,726.71	40.89	193,275.29
IH	2014	9,891.68	68.97	682,234.45
P	2014	6,228.33	79.97	498,079.91
SF	2014	54,330.87	80.85	4,392,812.33
TH	2014	23,354.04	86.52	2,020,547.32
Total		98,531.63		7,786,949.30
Average			79.03	

**Figure 8. 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 in every 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, e.g. regular management area versus a special management area or a spruce-fir stand versus a northern hardwood stand. Though the Tribe is not subject to the Maine Forest Practices Act (FPA) and the Rule Chapters issued by the State’s Department of Agriculture, Conservation and Forestry, these rules governed the silvicultural treatments applied in the baseline. This provided both an additional measure of conservatism as well as a useful set of guidelines for regeneration standards and management of riparian and shoreline areas that could be implemented in the model. Most significantly the baseline model was designed to produce a sustained yield through a combination of area and volume control keywords employed in the harvest scheduling model, guaranteeing a continual flow of wood products for the duration of the projection, and therefore compliance with 25 CFR 163 Section §163.11.

Baseline Legal Constraints

Constraints that affect land-use specific to forest management activities have been incorporated into the carbon modeling. These 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 an attribute 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 two general constraint types that determine what treatments are operable for any given area: 1) Regular management, i.e. not restricted; and 2) Special Management Areas (SMAs) or modified restrictions. Each constraint, and how it is applied in the modeling, is described below by constraint class.

Constraint Classes

1. Regular Management – All forest management activities comply with the Maine Forest Practices Act and the applicable Rule Chapters published by the Maine Department of Agriculture, Conservation and Forestry. The most relevant chapter for these areas is *Chapter 20: Forest Regeneration & Clearcutting Standards*, which specifies separation zone and regeneration standards for different categories of overstory removals and clearcuts.

In addition this management class follows generally accepted BMPs as described in *Best Management Practices for Forestry: Protecting Maine’s Water Quality*. 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 – While the baseline for the project is not subject to the terms of the Maine Forest Practices Act, to ensure the long-term sustainability of the baseline and compliance with federal environmental protections the areas were designed to comply with the standards found in the FPA *Chapter 21: Statewide Standards for Timber Harvesting and Related Activities in Shoreland Areas*. In the baseline these areas abide by the standards laid out in those Rule Chapters. On private land across the state these rules govern timber harvesting and related activities conducted in, over, or near water bodies, including rivers, streams, brooks, ponds, lakes, Great Ponds, freshwater and coastal wetlands, and tidal waters.

This overall constraint is emulated in the baseline model by buffering these areas according to the standards employed by the Tribe, which in width exceed the standard established by the State. These buffers are 300 feet along lakes, Great Ponds, and rivers, and 100 feet along streams. While the boundaries of these special management areas are not set permanently by the Tribe and adjustments can be made, they are held constant in their current location throughout the baseline model. The state BMPs 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, in keeping with Option 2 from Rule Chapter 21, special management areas were only treated with thinnings or single tree/small group selection harvests (uneven-age) with 60 square feet basal area retention, of which at least 40 square feet was in trees greater than or equal to 4.5 inches DBH, and stand entry was no more frequent than 10 years. This constraint also serves to protect Atlantic salmon habitat in the St. Croix and Machias watersheds. Though much of the shoreline and riparian areas in those two watersheds was from the start excluded from the Project Area as was described in Section 4. Identifying the Project Area, these limitations on harvesting in Special Management Areas will ensure that the activity will not negatively impact the endangered species. This conclusion is further supported by the findings of the federal government in response to questions about the Maine FPA at the time of the determination of endangered status for the Atlantic salmon in the Gulf of Maine area, and which are available here: <http://www.gpo.gov/fdsys/pkg/FR-2009-06-19/html/E9-14269.htm>.

Baseline Activities

All forest stands and baseline activities in the project area are guided by the *Best Management Practices for Forestry: Protecting Maine's Water Quality* and the relevant State of Maine Rule Chapters. 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, single tree and small group selection harvesting (i.e. uneven-aged tending/regeneration), and liberation harvests. Treatments were selected and scheduled in the baseline according to legal constraint(s) and stocking and density. In addition, all treatments were designed with fairly conservative commercial harvest operation parameters (i.e. treatments were only scheduled if there was a minimum stocking level of 10 cords per acre for a liberation harvest, 20 cords per acre for a selection harvest or thinning treatment).

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 types of treatments were operable when the stand contained at least 20 cords per acre. They were designed to leave a residual basal area of 60 square feet per acre, of which at least 40 square feet was in trees greater than or equal to 4.5 inches DBH. This residual basal area allows this type of thinning to be implemented in SMAs within the Project Area. If a stand was selected for harvest it was not operable again for at least 10 years.

Table 19. Stocking Guide for Baseline Thinning Treatments

Strata	Treatment Type	Stocking Guide (BA)		Frequency
		< 5.0" DBH	≥ 5.0" DBH	
CS	Thinning	20	40	≥ 10 Years
IH	Thinning	20	40	≥ 10 Years
P	Thinning	20	40	≥ 10 Years

SF	Thinning	20	40	≥ 10 Years
TH	Thinning	20	44	≥ 10 Years

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 available references including the University of Maine Cooperative Extension, the US Forest Service, *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire*, as well as consultation with local professional foresters. These references also guided simulated natural regeneration for softwood stands. Hardwood regeneration was simulated with natural sprouting in the model. For all selection harvests the target residual basal area varied based on stand density at the time of harvest, but was never reduced below 60 square feet per acre. Removals were made without species preference. All selection harvests were limited to no shorter than 10 year cycles. Strata-specific settings were implemented as follows:

CS (Conifer Bog) – For stands in this stratum the maximum DBH was 10 inches and the Legacy DBH was 15 inches. Additional natural regeneration was simulated (Northern white cedar @ 65 TPA, black spruce @ 50 TPA, and balsam fir @ 35 TPA, all at 100% survival).

IH (Intolerant Hardwood) – For stands in this stratum the maximum DBH was 12 inches and the Legacy DBH was 14 inches.

P (Pine) – For stands in this stratum the maximum DBH was 18 inches and the Legacy DBH was 20 inches. Additional natural regeneration was simulated (Eastern white pine @ 60 TPA, eastern hemlock @ 45 TPA, and red spruce @ 45 TPA, all at 100% survival).

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 (red spruce @ 70 TPA, balsam fir @ 45 TPA, and eastern hemlock @ 35 TPA, all at 100% survival).

TH (Tolerant Hardwood) – For stands in this stratum the maximum DBH was 14 inches and the Legacy DBH was 16 inches.

A ‘liberation harvest’ was defined in consultation with Rule Chapter 20 as a timber harvest that removes the overstory component of a stand, leaving a stand of advanced regeneration that is stocked with at least 450 trees per acre, well distributed on the harvest area, that meet the acceptable growing stock standards, as defined by the Rule Chapter, which are at least 3 feet in height for softwood trees and 5 feet in height for hardwood trees. This also ensure compliance with section §163.12 of the CFR which states that harvesting on Indian lands will not be permitted unless provisions for natural and/or artificial reforestation of acceptable tree species is included in harvest plans. It is important to note that this kind of harvest activity is considered by the State of Maine to be distinct from clearcutting and would therefore be exempt from separation zone standards that apply to clearcuts on private forest land in the State. Removals were made without species preference. If a stand was treated with a liberation harvest it was not considered operable again for at least 10 years. Hardwood regeneration was simulated with natural sprouting in all strata. Softwood strata received additional simulated regeneration guided by the State of Maine Rule Chapter 20 (for more detail see Appendix F. CAR1175 Data Management & Analytical Systems) with the following planting targets:

CS (Conifer Bog) –Northern white cedar @ 220 TPA, black spruce @ 160 TPA, and balsam fir @ 120 TPA, all at 100% survival

P (Pine) –Eastern white pine @ 190 TPA, eastern hemlock @ 160 TPA, and red spruce @ 150 TPA, all at 100% survival

SF (Spruce-Fir) – Red spruce @ 230 TPA, balsam fir @ 150 TPA, and eastern hemlock @ 120 TPA, all at 100% survival

The arrangement of these treatments over time and space creates timber product value in yields and in appreciation while also providing conservation of special management areas that is in line with the baseline scenario characterization and legal constraints. It also serves other Tribal goals such as promoting habitat protection and enhancement measures that are in line with those in the Tribe’s current lynx management plan. This is done through the combination of liberation and selection harvesting, maintaining sufficient forest cover at the optimal mid-regeneration conditions in the Lowelltown and Holeb areas. The acres in Figure 9 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, with a focus on an early reduction in onsite stocking to compensate for the aging forest resource in the Project Area. Subsequent years feature sustainable harvest levels in keeping with 25 CFR 163 Section §163.11. Annual changes in baseline stocks reflect a redistribution in age classes over the first two decades, which provides a greater early return from timber harvesting while also promoting sustained productivity and a harvest and growth pattern that indefinitely serves multiple management objectives.

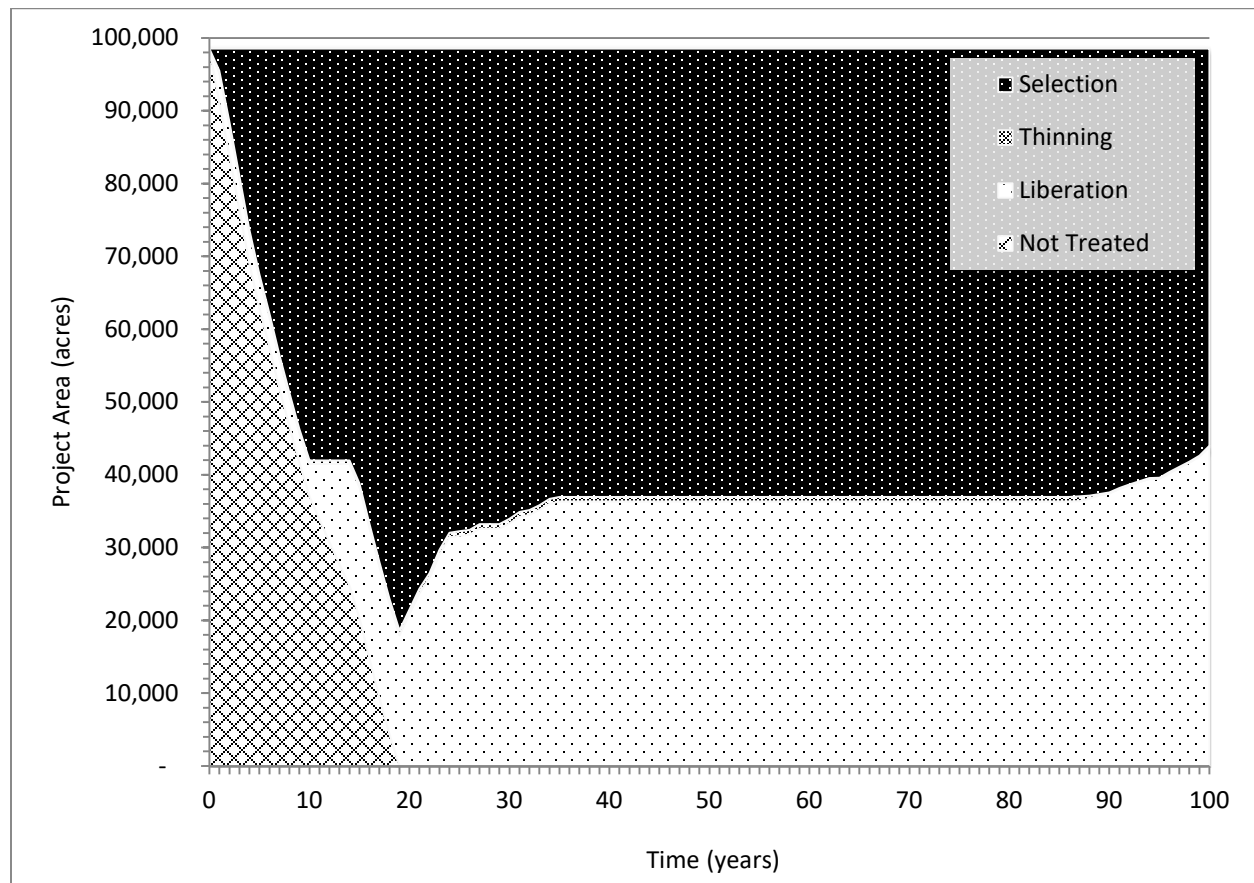


Figure 9. Project Area by baseline treatment arrangement over time

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 stocking level (10 cords per acre for an overstory removal, 20 cords per acre for a selection harvest or thinning treatment). The project area is also within the wood procurement circle of a number of wood processing facilities, including the large pulp facility in Woodland (formerly Domtar), which support available logging contractors, and a strong timber market demand. The average annual harvest volume in the baseline was 61,922 cords. The Forest Owner also maintains an extensive network of permanent and seasonal roads (i.e. for timber harvesting) to adequately support forest operations across the property.

In order to demonstrate that the growth and harvesting regime assumed for the baseline is financially feasible the OPO has elected to perform a financial analysis in accordance with the FOP section 6.2.1.3. This analysis of the anticipated growth and harvesting regime has included all relevant costs and returns, with consideration for all legal, physical, and biological constraints. Costs for this analysis were based on averages provided by the OPO and remain redacted in the publicly available version of the analysis, while stumpage prices were derived from the State of Maine's published price report. The results of the analysis demonstrated the financial feasibility of the baseline model and are available in CAR1175 Consideration of Financial Constraints v1.2 Redacted.pdf.

Minimum Baseline Level

The averaged model results must not fall below a minimum baseline level (MBL). Since initial above-ground standing live carbon stocks were above Common Practice, the MBL was determined using the formula in the FOP's Equation 6.5 (Determining the Minimum Baseline Level Where Initial Stocks are Above Common Practice).

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 51.09 tCO_{2e} per acre then Equation 6.5 is evaluated as MBL = 51.09 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, 51.09 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, Woodstock⁵. Yield tables (i.e. development cases) were created from the 2015 inventory data for each stratum using the Forest Vegetation Simulator (FVS⁶) 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 11 plots above-ground standing live carbon stocks against time. The results show the 'average above-ground standing live carbon stocks' per acre (51.09 tCO₂e), 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. The total baseline average above-ground standing live carbon stock is 5,034,084.08 tCO₂e.

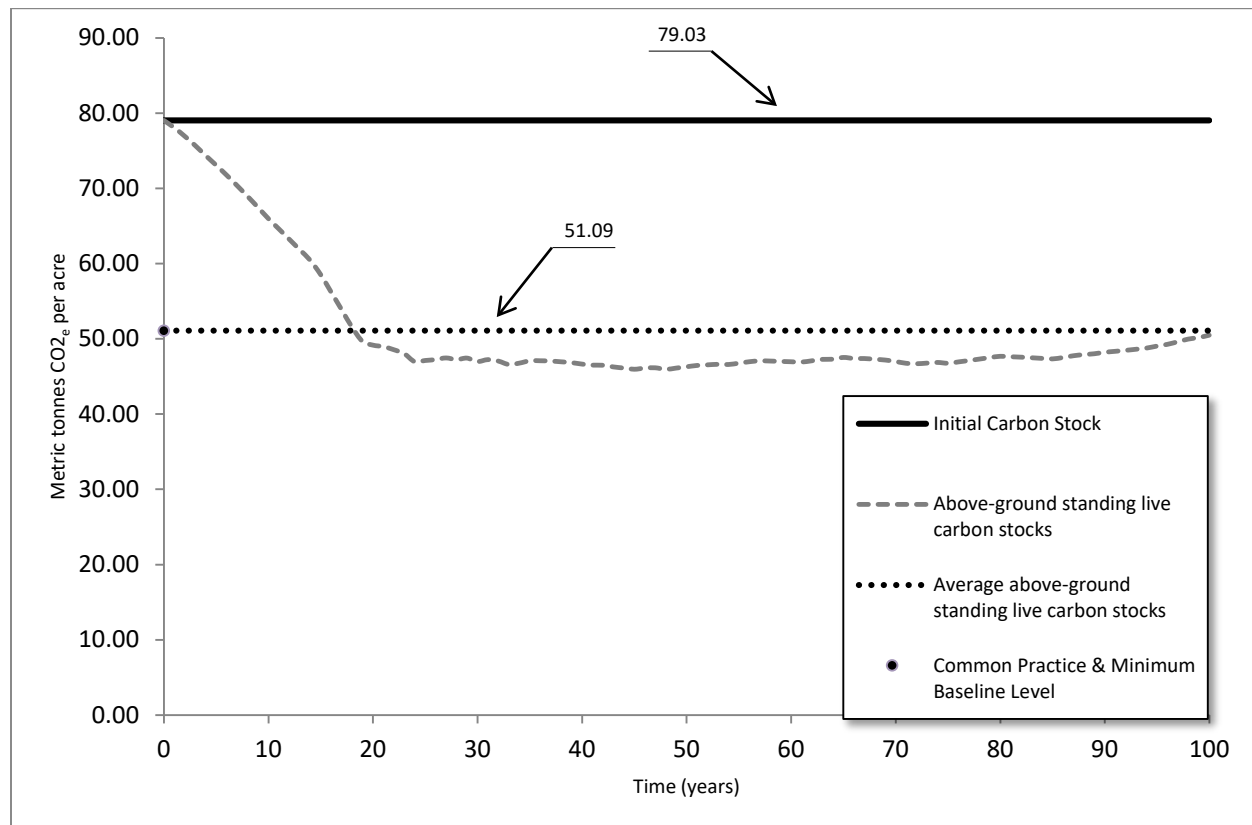


Figure 10. Baseline above-ground standing live carbon stocks

Step 4 – Determine the Baseline for All Onsite Carbon Pools

Additional pools, shown in Figure 12, 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 standing live carbon stocks and total standing dead carbon stocks. The final total baseline onsite carbon stock for all pools is 6,261,205 tCO₂e or 63.55 tCO₂e per acre (Figure 13). This was input to the ROC/ARBOC Monitoring Calculation Worksheet under *Baseline Onsite Carbon Stocks (tonnes CO₂e)*, calc row 6.

⁵ <http://www.remsoft.com/products.php>

⁶ <http://www.fs.fed.us/fmnc/fvs/>

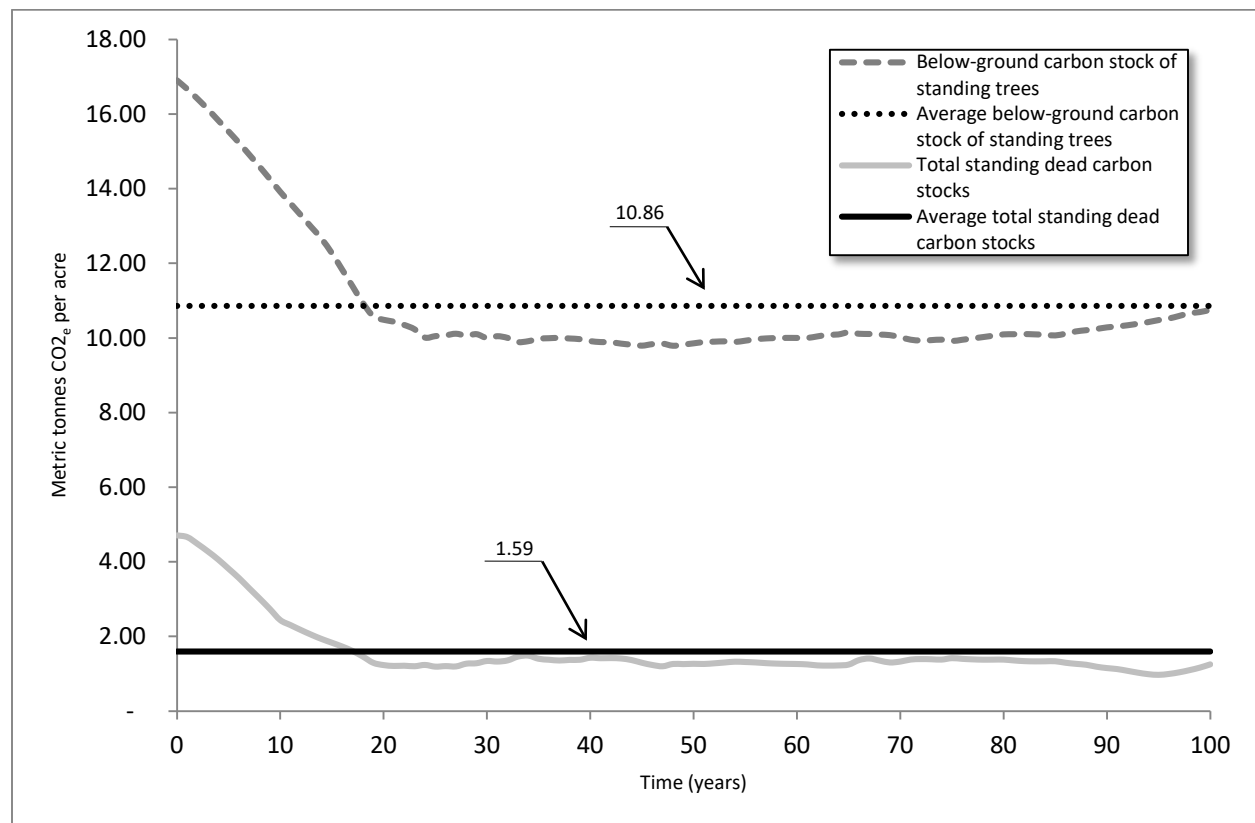


Figure 11. Additional baseline carbon pools

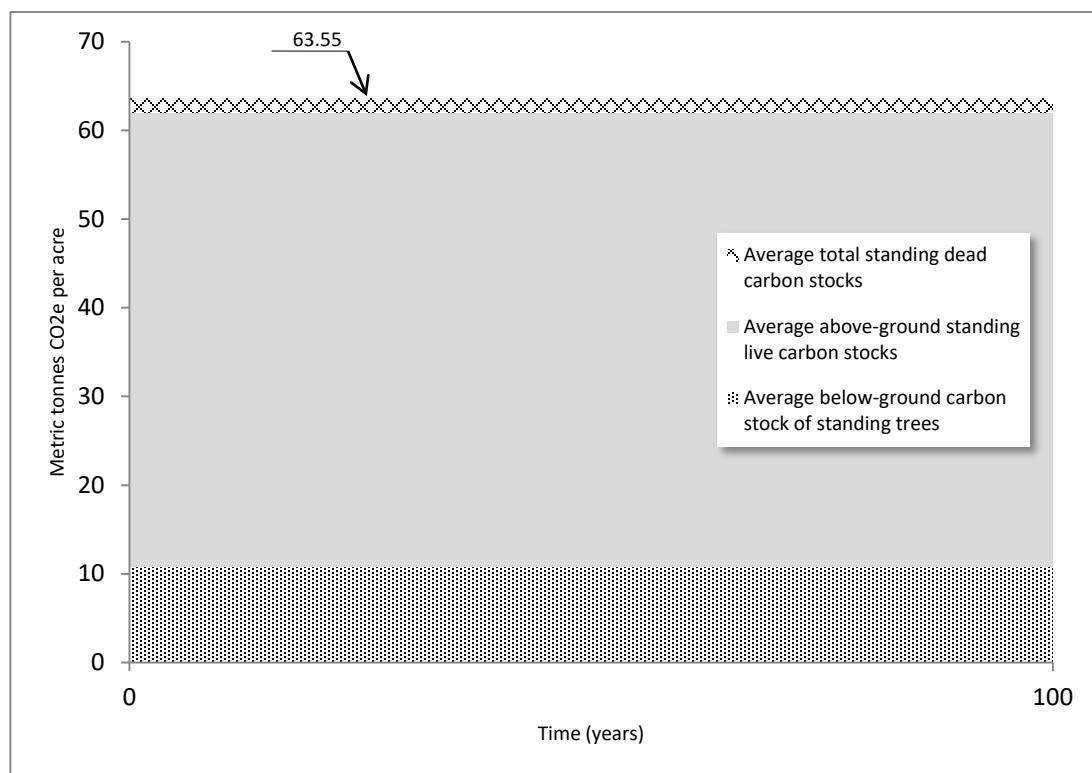


Figure 12. Final baseline for all onsite carbon pools

6.2.3 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 harvest volume projections in cubic feet are shown in a table in Appendix G. CAR1175 Baseline Harvest Volumes. These same harvests projections in tCO₂e are shown in Appendix K. CAR 1175 Baseline Inventory, Growth and Harvest by Year. The average of baseline carbon in trees harvested for wood products was 215,831 tCO₂e, or 2.19 tCO₂e/acre (Figure 14. Baseline carbon in trees harvested for wood products). In order to account for the initial 15-month reporting period this value was pro-rated (269,789 tCO₂e) before it was input to the CRT Monitoring Calculation Worksheet calc row 10.

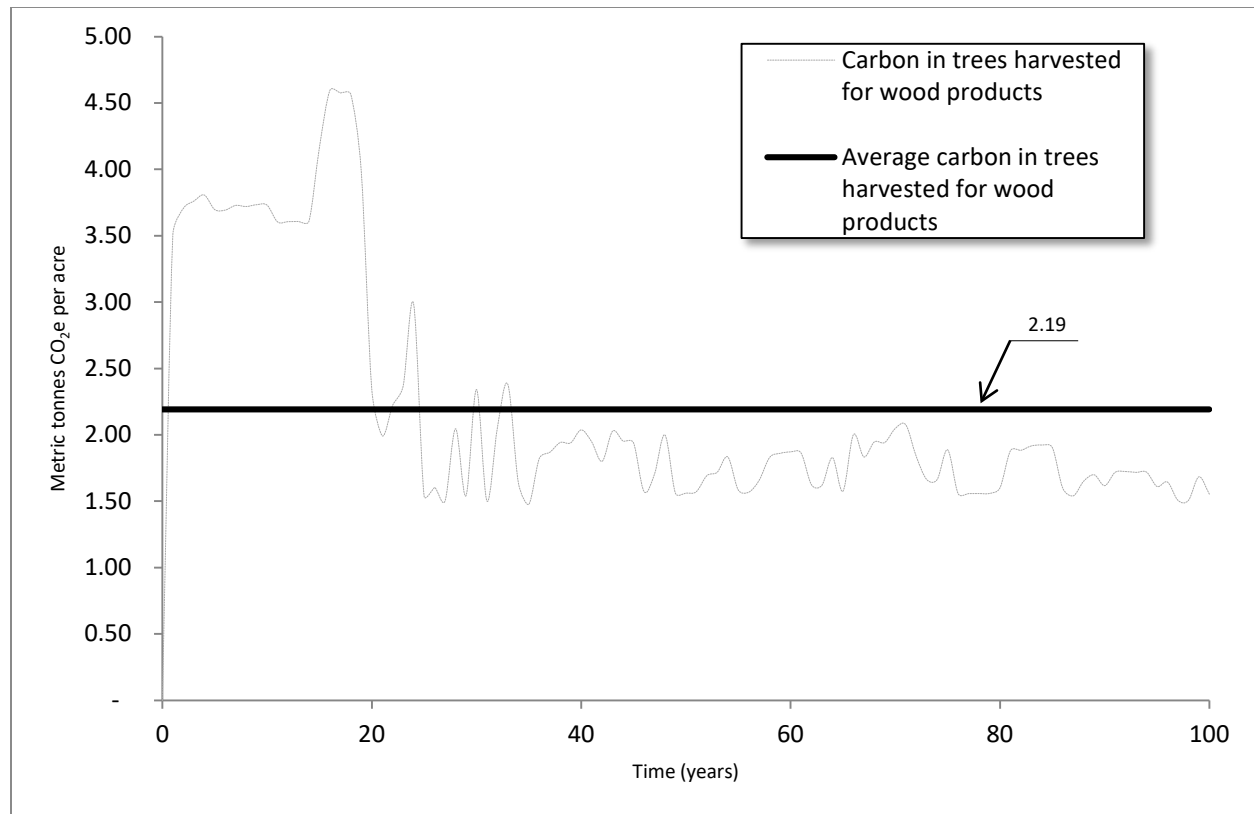


Figure 13. Baseline carbon in trees harvested for wood products

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 (i.e. DRYBIO_BOLE less the bark component). The 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 101,617 tCO₂e, or 1.03 tCO₂e/acre, (Figure 15. Baseline carbon in harvested wood delivered to mills). In order to account for the initial 15-month reporting period this value was pro-rated (127,023 tCO₂e) before it was input to the ROC/ARBOC Monitoring Calculation Worksheet, calc row 12.

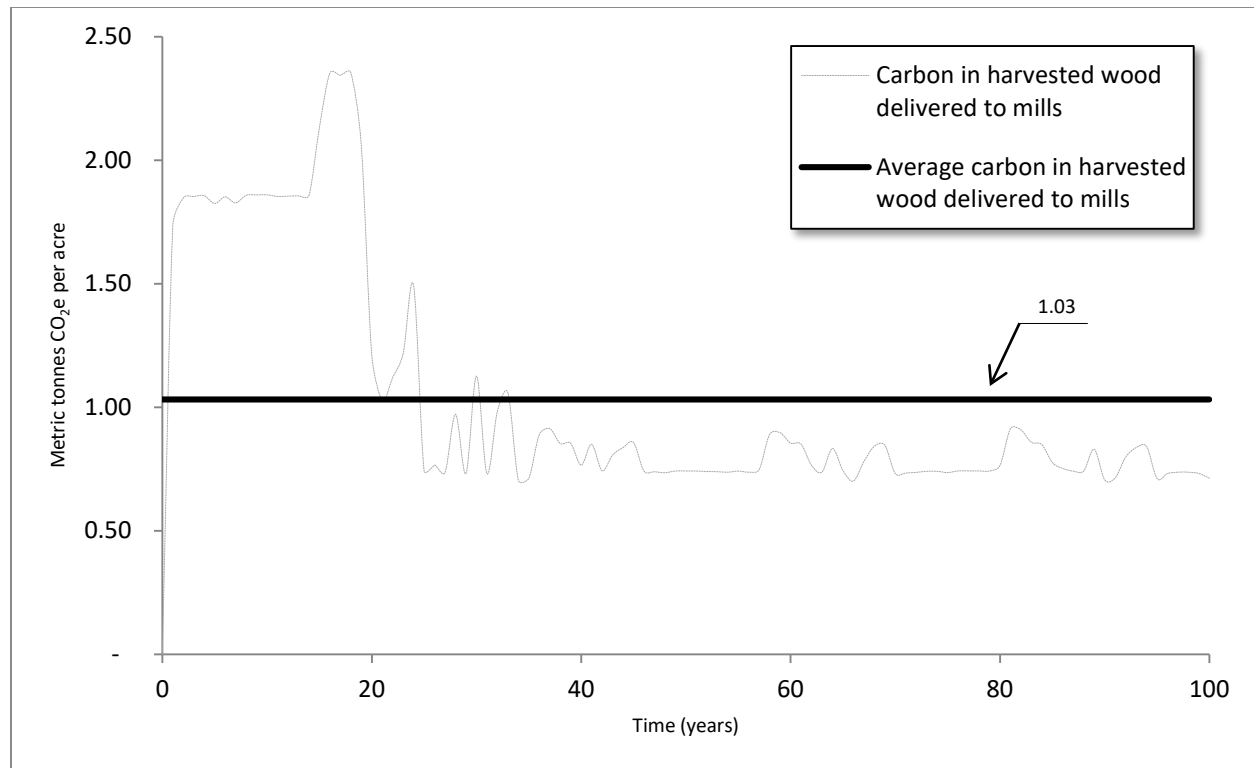


Figure 14. Baseline carbon in harvested wood delivered to mills

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 provided under a separate cover for verification purposes (Appendix L. CAR1175 Harvested Wood Product Worksheet.pdf). The HWPCW tool is regional specific. The Project is in Maine which is grouped in the Northeast region (NE) as shown in Figure 16. Definition of Regions.

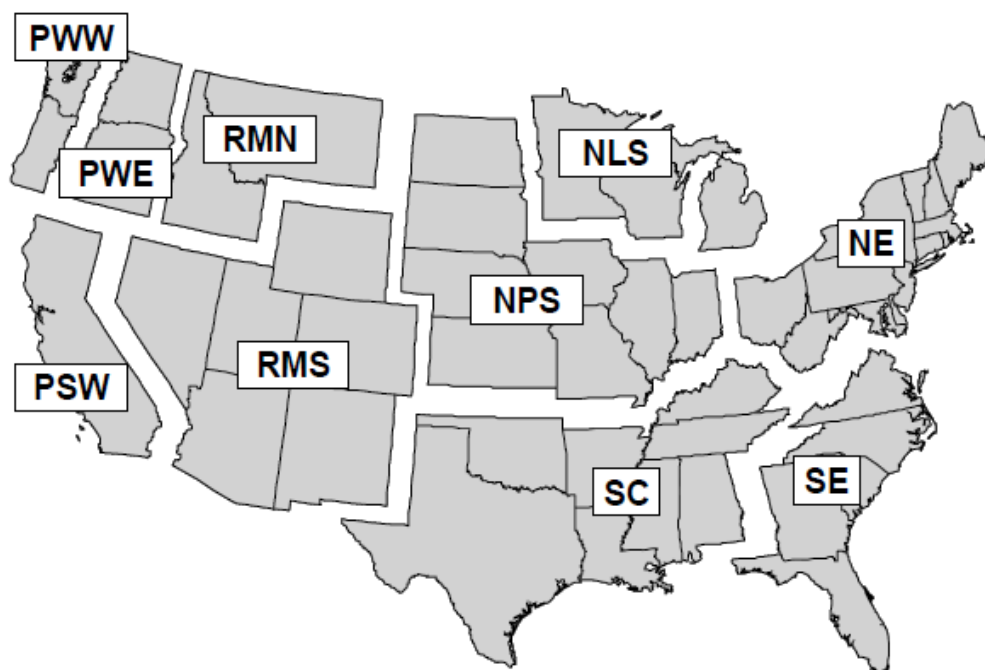


Figure 15. Definition of Regions

The average baseline carbon in harvested wood delivered to the mill was input to the HWPCW 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 a weighted average of the default percent product values for the two project supersections (Assessment Area Data File available from ARB website).

Table 20. Wood Products Generated

Supersections	Softwood Lumber	Hardwood Lumber	Plywood	Oriented Strand Board	Non-structural Panels	Misc	Paper
White Mountains	36%	14%	0%	0%	0%	0%	51%
Maine-New Brunswick Foothills and Lowlands	40%	10%	0%	0%	0%	0%	50%
Weighted Average	38%	12%	0%	0%	0%	0%	50%

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. Regional Mill Efficiency Data is available on the ARB website and is also shown in Table 19. The default values were used to calculate both baseline and project carbon in harvested wood products. The mill efficiency values are automatically used in the HWPCW tool as a function of selecting the Region in Section 1.

Table 21. Mill Efficiencies by Product

Region	State	Hardwood Saw Log	Hardwood Pulpwood	Softwood Saw Log	Softwood Pulpwood
Northeast (NE)	Maine	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 20).

Table 22. 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 21.

The total baseline carbon stored long-term in wood products since the project start date is shown in Table 21.

Table 23. Total Baseline Carbon Stored Long-Term in Harvested Wood Products

Reporting Period Start Date	Reporting Period End Date	Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Excl Landfill	Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Incl Landfill
05/28/2014	08/31/2015	17,056.30	35,328.64

6.2.4 Determining Actual Onsite Carbon Stocks

Initial onsite carbon stocks were determined using the inventory data, the most current volume and biomass equations (i.e. volume and biomass equations for projects outside of California, Washington and Oregon) appropriate for the Supersections and species as published by the ARB, and the same growth and yield model software as described in the baseline. For each subsequent reporting period (excepting inventory years) actual onsite carbon stocks were determined using that same growth and yield model software. Activity data and emissions factors were updated based on inventory updates and data collected for harvest events. The actual onsite carbon stocks are listed by reporting period in Table 21 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 activities, which emphasize long-term planning and stewardship.

Table 24. Actual Onsite Carbon Stocks

Reporting Period Begin Date	Reporting Period End Date	Total Stocks (tCO ₂ e)	Stocks Per Acre (tCO ₂ e)
Initial Carbon Stocks		9,917,158.12	100.65
28-May-14	31-Aug-15	10,149,179.16	103.00

6.2.5 Determining Actual Carbon in Harvested Wood Products

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 outside of 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.

6.2.6 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/ARBOC calculation rows, are shown in Table 22. Market Leakage and Other Secondary Effects. 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 these reporting periods of the Project.

Table 25. Market Leakage and Other Secondary Effects

		Reporting Period Begin Date	28-May-14
Calc Row	Market Effects and Leakage - All Projects	Reporting Period End Date	31-Aug-15
9	Actual Carbon in Trees Harvested for Wood Products in (tonnes CO2e)		60,468
10	Baseline Carbon in Trees Harvested for Wood Products (tonnes CO2e)		269,789
11	Actual Carbon in Harvested Wood Delivered to Mills (tonnes CO2e)		28,470
12	Baseline Carbon in Harvested Wood Delivered to Mills (tonnes CO2e)		127,022
13	Actual Carbon Stored Long-term in Wood Products (tonnes CO2e) - Excl Landfill		3,850
14	Actual Carbon Stored Long-term in Wood Products (tonnes CO2e) - Incl Landfill		7,975
15	Baseline Carbon Stored Long-term in Wood Products (tonnes CO2e) - Excl Landfill		17,056
16	Baseline Carbon Stored Long-term in Wood Products (tonnes CO2e) - Incl Landfill		35,329
17	Diff Between Actual and Baseline Carbon in Harvested Wood (tonnes CO2e) - Excl Landfill		(13,206)
18	Difference Between Actual and Baseline Carbon in Harvested Wood (tonnes CO2e) - Incl Landfill		(27,353)
19	Difference in Actual and Baseline Carbon Stored in Wood Products (tonnes CO2e) - Landfill Adj		(27,353)
20	GHG Reductions / Removals for Carbon Stored in Wood Products (tonnes CO2e) w/ mkt response		(21,883)
Other Secondary Effects - IFM Projects			
27	Difference Between Actual and Baseline Carbon in Trees Harvested for Wood Products (tonnes CO2e)		(209,320)
28	Other Secondary Effects Emissions (shifting activities/materials) IFM Projects (tonnes CO2e)		(41,864)

6.2.7 Calculating Total Net GHG Reductions and Removals

6.2.7.1 Confidence Deduction

The inventory uncertainty was calculated as 3.65 percent error (see Table 12). The inventory was field-verified using the sequential sampling method. Plots were randomly selected and measured by the verifier for three (3)

different strata during the site visit which occurred the week of October 26, 2015. The inventory percent error is 3.65 percent, which is less than the 5 percent the threshold for allowed uncertainty before applying a discount (see Table A.4. in FOP, Appendix A), therefore additional deduction was applied in the ROC/ARBOC Monitoring Calculation Worksheet (i.e., Calc row 2).

6.2.7.2 Total Net GHG Reductions and Removals

Total Net GHG Reductions and Removals were calculated automatically using the Project ROC/ARBOC Monitoring Calculation Worksheet. The results, which reference the ROC calculation rows, are shown in Table 25.

Table 26. Total Net GHG Reductions and Removals

Calc Row	Onsite Carbon Stocks	Start Date	Reporting Period Begin Date	28-May-14
		28-May-14	Reporting Period End Date	31-Aug-15
1	Sampled Onsite Carbon Stocks (tonnes CO2e)	9,917,158		10,149,179
2	Confidence Deduction			-
3	Adjusted Sampled Onsite Carbon Stocks (adjusted for confidence deduction) (tonnes CO2e)			10,149,179
4	Soil Carbon Emissions			-
5	Increment in Actual Onsite Carbon Stocks (tonnes CO2e)			10,149,179
6	Baseline Onsite Carbon Stocks (tonnes CO2e)	9,917,158		6,261,205
7	Increment in Baseline Onsite Carbon Stocks (tonnes CO2e)			-
8	Quantified GHG Reductions / Removals for Onsite Carbon Stocks (tonnes CO2e)			3,887,974
20	GHG Reductions / Removals for Carbon Stored in Wood Products (tonnes CO2e) w/ mkt response			(21,883)
28	Other Secondary Effects Emissions (shifting activities/materials) IFM Projects (tonnes CO2e)			(41,864)
Quantified GHG Reductions and Removals				
34	Annual GHG Reductions/Removals Net of Discounts and Secondary Effects (tonnes CO2e)			3,824,227
35	Cumulative GHG Reductions/Removals; not incl.neg. carryover or reversals (tonnes CO2e)			3,824,227
36	Cumulative Negative Carryover from Prior Year (tonnes CO2e)			-
37	CRTs Issued - Net of Negative Carryover, bef. Buffer or adjust for Reversals (tonnes CO2e)			3,824,227
Calculation of Buffer Pool Contribution				
38	Project Specific Reversal Risk Rating			15.84%
39	CRTs from other Reporting Periods submitted to Buffer Pool			-
40	Buffer Pool Contributions (CRTs)			605,758
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 Reserve from the Buffer Pool (tonnes CO2e)	-
Compensating for Avoidable Reversals		
44	"Avoidable Reversals" compensated by retirement of CRTs in the Forest Owners Reserve Account (tonnes CO2e)	-
45	"Avoidable Reversals" compensated by retirement of CRTs issued to other Forest Projects Registered with the Reserve (tonnes CO2e)	-
46	Carryover "Avoidable Reversals" which need to be compensated by Forest Owner (tonnes CO2e)	-
CRTs Issued to Account Holder		
47	Annual CRTs Issued to Account Holder	3,218,469
48	Vintage I - Calendar year of Reporting Period start date (Vintage)	2014
49	Portion of CRTs in first vintage in Reporting Period	1,518,277
50	Vintage II - Calendar year of Reporting Period end date (Vintage - if different from start date vintage)	2015
51	Portion of CRTs in second vintage Reporting Period	1,700,192
52	Cumulative CRTs Issued to Account Holder	3,218,469

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 21 and from the ROC/ARBOC 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:

$$100\% - ((1-\text{financial failure}\%) \times (1-\text{illegal forest biomass removal}\%) \times (1-\text{conversion}\%) \times (1-\text{over harvesting}\%) \times (1-\text{social risk}\%) \times (1-\text{wildfire}\%) \times (1-\text{disease/Insect outbreak}\%) \times (1-\text{other catastrophic events}\%))$$

The total required buffer pool contribution for the current reporting period is 15.48 percent (Table 25).

Table 27. Risk rating analysis for required buffer pool contribution

Risk Category	No QCE or not Public Land	QCE and/or Public Land	Score	(1-Score)
Financial	5.0%	1.0%	1.0%	99.0%
Management				
Illegal forest biomass removal	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 (X%)	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%	- 84.16%
Total Risk Score				15.84%

* = Default values from FOP Assessment Area Data File

As a native tribe whose land is held in trust by the U.S. government, the Passamaquoddy IFM project qualifies for the 'QCE and/or Public Land rating for financial risk. All other risk ratings were the default 'No QCE or not Public Land' option.

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. CAR1175 Full Monitoring Plan Proprietary.pdf. This project enhances the existing monitoring plan established under the Tribe's BIA-approved forest management plan.

The forest owner will use the most recent measurements from the permanent CFI plots and approved growth & yield modeling to annually update the project's forest carbon stocks in between full site visit verifications. The CFI plots will be remeasured just prior to the full site visit verifications. Measuring the same plots through time will reduce sampling variability and provide reliable estimates of actual growth through time. Inventory plot data used in the estimate of actual onsite carbon stocks will not be more than 12 years old.

For annual inventory updates that utilize growth and yield modeling, each event (e.g. timber harvests) will require spatial and tabular updates of the carbon data set. Data updates, including harvest volume summaries and silvicultural prescriptions, will be submitted by the Forest Owner to Finite Carbon on or shortly after August 31 for the previous year and prepared for verification within the required time period allowed (4 months for annual OPDR submittal).

1. **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.

2. **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. Finite Carbon shall also be informed if the activity produces or is expected to produce a forest type conversion.

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 may 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 reversals will depend on the extent and intensity of the reversal should they occur; however, they will always follow the project inventory specifications

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

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 26.

Table 26. Summary of Updates Since Project Listing

Update ID (UID)	Listing Form Section	Update Description	Update Document Location Reference
1.	Part VII. Carbon Stock Inventory	Project carbon stocks changed with the completion of the project inventory (see Table 15).	<i>CAR1175 OPDR (and subsequent versions); CAR1175 OPDR Worksheet Calculations; and CAR1175 ARB_Monitoring-Calculation-Worksheet.xlsx</i>
2.	Part V. Offset Project Area	Project acreage and acreage by assessment area changed with the completion of the project inventory.	<i>CAR1175 OPDR (and subsequent versions); CAR1175 OPDR Worksheet Calculations; and CAR1175 ARB_Monitoring-Calculation-Worksheet.xlsx</i>
3.	Part V. Offset Project Area	Project acreage and acreage by assessment area changed with final review of deeds during creation of Title Status Report for Indian Township	<i>CAR1175 OPDR (and subsequent versions); CAR1175 OPDR Worksheet Calculations; and CAR1175 ARB_Monitoring-Calculation-Worksheet.xlsx</i>

References

2014 Stumpage Prices by Maine County/Unit. Department of Agriculture, Conservation and Forestry. Maine Forest Service. 2014. http://www.maine.gov/dacf/mfs/publications/annual_reports.html.

25 USC 1721-1735. (Federal) Maine Indian Claims Settlement Act. Available online at: <https://www.law.cornell.edu/uscode/text/25/chapter-19/subchapter-II>

Bennett, Karen P. editor. 2010. *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire (second edition)*. University of New Hampshire Cooperative Extension, Durham, N.H.

CA Air Resources Board Compliance Offset Protocol U.S. Forest Offset Projects – U.S. Forest Protocol Resources, 2013. <http://www.arb.ca.gov/cc/capandtrade/protocols/usforestprojects.htm>

Crookston, N.L.; Stage, A.R. 1999. Percent canopy cover and stand structure statistics from the Forest Vegetation Simulator. Gen. Tech. Rep. RMRS-24. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 11p.

Dixon, Gary E. comp. 2002. *Essential FVS: A User's Guide to the Forest Vegetation Simulator*. Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 193p.

Eyre, F.H. (editor). 1980. *Forest Cover Types of the United States and Canada*. Society of American Foresters, Bethesda, MD. 148 p.

Keyser, Chad E., comp. 2008 (revised April 11, 2011). Southern (SN) Variant Overview – Forest Vegetation Simulator. Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 69p.

Moesswilde, Morten. 2010. *Best Management Practices for Forestry: Protecting Maine's Water Quality*. Maine Forest Service, Augusta, ME. https://www.maine.gov/dacf/mfs/policy_management/water_resources/bmps.html

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for [Scott County, Tennessee]. Available online at <http://soildatamart.nrcs.usda.gov> . Last accessed [09/21/2015].

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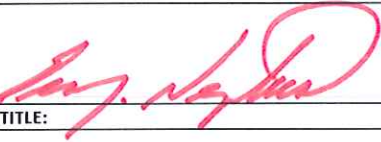
Appendix M. CAR1175 Sampling Error Calculations.pdf

Attestation and OPO/APD Signature

for

CAR1175/CAFR5195

Submitted with the Offset Project Data Report

	I certify under penalty of perjury under the laws of the State of California the GHG reductions and/or GHG removal enhancements for			
	Project Name:		Reporting Period Start Date:	Reporting Period End Date:
	Finite Carbon – Passamaquoddy Tribe IFM (CAR1175/CAFR5195)	from	05/28/2014	To 08/31/2015
	are measured in accordance with the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011, and all information required to be submitted to ARB in the Offset Project Data Report is true, accurate, and complete.			
Initial Above				
I further certify that I am duly authorized to represent and legally bind the Offset Project Operator (OPO) on all matters related to the Offset Project Data Report.				
SIGNATURE:			PRINTED NAME:	
			Ernest J. Neptune	
TITLE:			DATE:	
Forest Supervisor			11/3/16	

This attestation satisfies the requirement in Section 95976(d)(5), which is now section 95976(d)(6) following the amendments effective July 1, 2014.