

FiniteCarbon

Project Design Document

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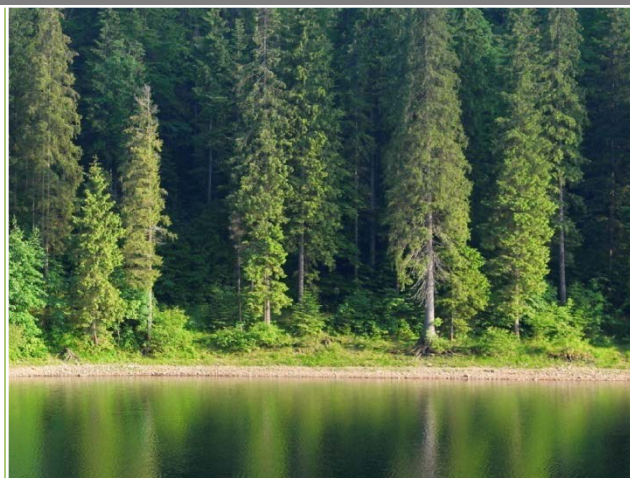
CONNECTING
FORESTRY
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FINANCE

Finite Carbon – Berry Summit (CAR1004)

Climate Action Reserve Forest Project Protocol v3.2 Improved Forest Management

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1. Introduction

The Climate Action Reserve (CAR or the Reserve) is a national offsets program working to ensure integrity, transparency and financial value in the U.S. carbon market. It does this by establishing regulatory-quality standards for the development, quantification and verification of greenhouse gas (GHG) emissions reduction projects in North America, issuing carbon offset credits known as Climate Reserve Tonnes (CRT) generated from such projects, and tracking the transaction of credits over time in a transparent, publicly-accessible system.

CAR's Forest Project Protocol (FPP) provides requirements and guidance for quantifying the net climate benefits of activities that sequester carbon on forestland. The protocol provides project eligibility rules, methods to calculate a project's net effects on greenhouse gas (GHG) emissions and removals of CO₂ from atmosphere ("removals"), procedures for assessing the risk that carbon sequestered by a project may be released (i.e. released back to the atmosphere), and approaches for long term project monitoring and reporting. The goal of the protocol is to ensure that the net GHG reductions and removals caused by a project are accounted for in a complete, consistent, transparent, accurate, and conservative manner and may therefore be reported to the Climate Action Reserve as the basis for issuing carbon offset credits.

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

This document is the Project Design Document (PDD) for *Finite Carbon – Berry Summit* ("Berry Summit"), assigned by the Climate Action Reserve, which is an ARB approved Offset Project Registry (OPR), as Project ID: CAR1004. The PDD and all other project documentation and reports that reference carbon stocks has been prepared and submitted by Tim McAbee, SAF Certified Forester (No. 3789). Additional oversight of forestry documentation and modeling practices was provided by William Kleiner, who is a current California Registered Professional Forester (RPF) operating under license No. 2148 (see Figure 1) and satisfies the professional forester requirements¹ outlined in the FPP, section 9.1. In addition, certain appendices referenced throughout the PDD document have been made proprietary and are removed for purposes of protecting private information. 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" at the end of the title.

Berry Summit is an Improved Forest Management (IFM) project (the "Project") developed and implemented using the CAR FPP v3.2 (FPP). The project is located in Northwest California in the United States (Figure 2).

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



Figure 1. California Registered Forester Certification

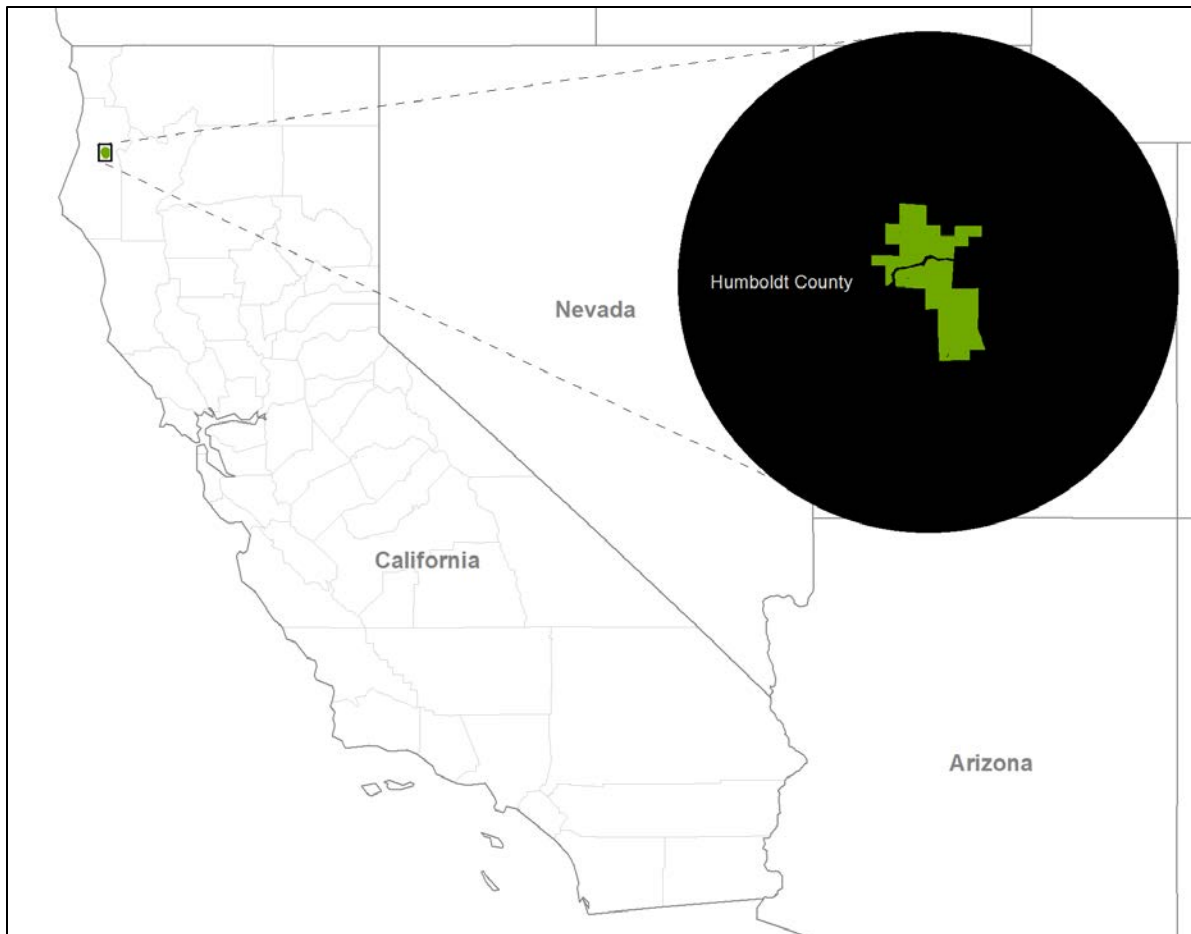


Figure 2. Project Location

The primary goal of the project is to generate carbon offset credits by maintaining and increasing additional forest carbon stock in a manner consistent with the objectives of the forest owner, Berry Summit, LLC (“BSLLC” or “forest owner”). The project was initiated on May 10, 2013 when the forest owner acquired the property in fee. The forest owner has retained Finite Carbon as the project developer consultant.

1.1 Project Area Description

The project area is located in Humboldt County in the state of California. It is situated approximately 22 miles east of the city of Eureka, which is also the county seat. The project area is approximately 7 miles west of the City of Willow Creek and occupies area on both the north and south sides of CA Highway 299. Major towns and roads are shown in a map as Appendix A. CAR1004_Map_TownsRoads.pdf.

The property is mostly situated in the Willow Creek watershed which drains into the Trinity sub-basin, and eventually into the Klamath River Basin. A small portion of the southern tip of the property stretches into the Noisy Creek-Redwood Creek watershed which drains into the Mad-Redwood sub-basin and eventually into the Northern California Coastal. Watercourses present within the project area include Willow Creek which runs east-west along CA Highway 299 and Low Gap Creek and Cedar Creek which both intersect Willow Creek. A map of the major watercourses is provided as Appendix B. CAR1004_Map_Watercourses.pdf.

The project area is part of the Klamath Mountains, nestled in the southwestern foothills of the Salmon Mountain Range. The topography varies from gentle slopes to very steep. The terrain features are generally not severe and the property ranges in elevation from 2,400 feet to 4,600 feet above mean sea level. Overall, topography plays a minimal role in limiting forest operations. A map showing topography across the project area is provided as Appendix C. CAR1004_Map_Topography.pdf.

The project falls in an area which is part of the Public Land Survey System. Berry Summit is located in Sections 7, 8, 17, 18, 20, and 29 of Township 6 North, and Range 4 East (Humboldt Base and Meridian). A map of the surrounding counties and townships are provided in a map as Appendix D. CAR1004_Map_CountyTwtnshp.pdf.

1.2 Land Cover and Land Use: Past and Present

The subject property is predominantly forested and has been historically managed for timber production with approximately 38 acres that are considered non-forested and 30 acres in roads. Berry Summit was initially harvested in the late 1940s through the early 1950s. Initial harvesting used ground-based (tractor) harvesting systems. Timber harvesting conducted in the last 15 years has consisted of both ground-based tractor logging and helicopter logging, using a variety of silvicultural methods including even-aged management, alternative prescription, seed tree removal, seed tree seed step, shelterwood removal, and selection within watercourse buffer zones.

Berry Summit was managed by the previous owner based upon the principles of the Sustainable Forestry Initiative program, receiving its initial certification in 2001. Management practices have included a combination of mechanical and chemical site preparation to promote vigorous stands and rapid tree growth. Under this program, shortly after final harvest, slash is piled and burned to reduce fuel hazards and to prepare the site for reforestation. Hand sprayed foliar chemical site preparation application has been performed in the past, as needed, before tree planting in order to reduce competing vegetation, improve seedling survival, and enhance growth. Also, hand sprayed foliar chemical applications are conducted to control brush and herbaceous vegetation as necessary.

Many road improvements have been made in conjunction with timber harvesting, providing a well maintained road system accessing most of the property. Road improvements have included the replacement and upgrading of culverts to meet 100-year storm flow, installation of rolling dips and grading of roads to improve surface drainage, rocking of crossings for erosion prevention, and removing brush for site clearance. The roads that have been improved in conjunction with recent timber harvesting have been designed to facilitate ground-based or cable-logging systems.

There is one known Northern Spotted Owl activity center located within the project area; however, no other endangered, threatened, or sensitive species is known to occupy the tract.

Currently, there is no timber harvesting plan (THP) for the project area. Future use of the property may consist of commercial forestry practices as well as recreation and wildlife habitat management.

1.3 Forest Types, Flora and Fauna

From a regional perspective, the project area is considered part of the Western Forests of the United States and is classified primarily in the Douglas-fir major forest type group. The predominant forest cover type that exists in the project area is Douglas-fir-Tanoak-Pacific Madrone.

Forest stands are dominated mainly by Douglas-fir and tanoak, with a mixture of pacific madrone. Other common associated species are canyon live oak, bigleaf maple, Oregon white oak, ponderosa pine, sugar pine, incense cedar, red alder, and Port Orford cedar. Understory vegetation varies based on successional stage but it's not uncommon to find Pacific dogwood, salal, California huckleberry, Pacific rhododendron, and poison-oak.

These types of forests also provide suitable habitat for a number of mammal species such as mountain lions, black bears, raccoons, beavers, fox, deer, and squirrels. Bird species are abundant, including many species of woodpeckers, hawks, eagles, and owls to name a few. Amphibians and reptiles are also commonly found in the area including several species of salamander, newts, frogs, lizards, and snakes.

2. Project Definition and Requirements

2.1 Project Type

Berry Summit is an *Improved Forest Management* project type and the forest owner declares:

1. The project area takes place on forestland that has greater than 10 percent tree canopy cover. In 2012-2013, the project area was estimated to have 84 percent tree canopy cover. Percent Canopy Cover (PCC) is the percentage of the ground area that is directly covered with tree crowns and was computed from inventory data for each stratum².
2. The project employs natural forest management practices as defined in Section 3 of the FPP.
3. The project does not employ broadcast fertilization.
4. The project area has never been part of a previously registered Forest Carbon Project.
5. The project takes place on private lands.

2.2 Forest Owner

The forest owner is Berry Summit, LLC. The fee owner of the property is also Berry Summit, LLC and as such is the sole owner of the project area. Furthermore, no other entity besides Berry Summit, LLC has control over the project area or forest management. Berry Summit, LLC will execute the Project Implementation Agreement (PIA).

² Dixon 2002 and Crookston and Stage 1999

3. Eligibility Rules and Other Requirements

3.1 Additionality

The project generates emission reductions and removals that are additional to what would have occurred in the absence of a carbon offset market according to the Reserve's legal requirement and performance tests.

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 1 lists all rules and regulations that were reviewed and considered as part of quantifying GHG removals and reductions and ensuring legal additionality.

Table 1. Evaluation of Rules and Regulations subject to the Project Area

Rule/Regulation	Description	Notes
Z'Berg-Nejedly Forest Practice Act of 1973 (California Public Resources Code – Division 4, Chapter 8)	Designed to protect, enhance & restore California's timberland.	See California Forest Practice Rules
California Forest Practice Rules (Title 14, California Code of Regulations, Chapter 4)	Regulations used to implement the Forest Practice Act that governs timber operations.	These rules are applied in both the baseline and project scenarios and have the greatest impact on additionality because of their specific prescriptive guidelines for forest management operations.
California Environmental Quality Act (CEQA) (Pub.Res.C. 21000 et seq.)	This act requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.	The Forest Practice Rules Timber Harvest Plan process administered by the State is certified as a functional equivalent to an environmental impact report.
Endangered Species Act (ESA) & California Endangered Species Act (Fish & G.C. 2050 et seq.)	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 CA ESA protects and preserves all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, that are threatened with extinction.	Habitat protection considerations are applied in both the baseline and project scenarios, primarily for the northern spotted owl and Water Lake Protection Zones with listed anadromous salmonids.
Clean Water Act	The CWA establishes the basic structure for regulating	Water quality protection is applied in both the baseline

(CWA) of 1972 & Porter-Cologne Water Quality Control Act (California Water Code, Division 7. Water Quality):	discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The Porter-Cologne Water Quality Act is the primary vehicle for implementation of California’s responsibilities under the federal 1972 Clean Water Act.	and project scenarios, primarily through adherence to the Forest Practice Rules sections for Water Lake Protection Zones.
National Wild & Scenic Rivers Act	The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations.	There are no nationally designated wild and scenic rivers in the project area, or close enough to have a direct impact on forest management. www.rivers.gov/
Local Ordinances	n/a	There are no local ordinances or regulations in the towns or counties of the project area that affect timber harvesting.

As a result of the legal requirement test, three primary legal requirements were identified that the project must comply with before it voluntarily yields surplus emission reductions.

California Forest Practice Rules

The purpose of the California Forest Practice Rules (FPR) is to implement the Z’Berg-Nejedly Forest Practice Act of 1973 in a way that encompasses other laws such as CEQA, Porter Cologne Water Quality Act, and the California Endangered Species Act. As part of this implementation, all harvest of merchantable timber must be approved in advance by the State (administered by the Department of Forestry and Fire Protection – also known as CAL FIRE) through the Forest Practice Rules Timber Harvest Plan process prepared by a State-registered professional forester (RPF). The rules that specifically effect the determination of the baseline are those that enforce limits to silviculture activities. This includes adhering to the requirements for minimum basal area retention, rotation ages, harvest adjacency restrictions, wildlife habitat protection, watercourse buffer widths and protection zones.

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. There is one recorded northern spotted owl activity center in the project area, and three others that are found near the project area on other forest owners’ lands. Water Lake Protection Zones with listed anadromous salmonids also exist on the project area. Considerations for the protection of these wildlife resources restrict certain types of timber harvest activities are taken into account in both the baseline and the project.

Clean Water Act

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

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

These pollutants include:

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

Through a variety of programs (including, as appropriate, non-regulatory or regulatory programs), states assist and encourage producers to use best management practices to reduce or prevent instances of nonpoint source pollutants migrating into waters. Accordingly, the State of California developed a set of guidelines that timber harvest plans must consider in terms of the protection of water resources. These are known as Water Lake Protection Zones in the Forest Practice Rules.

The purpose of WLPZs are to ensure that timber operations do not potentially cause significant adverse site-specific and cumulative impacts to the beneficial uses of water, native aquatic and riparian-associated species, and the beneficial functions of riparian zones; or result in an unauthorized take of listed aquatic species; or threaten to cause violation of any applicable legal requirements. This article also provides protection measures for application in watersheds with listed anadromous salmonids and watersheds listed as water quality limited under Section 303(d) of the Federal Clean Water Act.

These restrictions and how they are emulated in the baseline model are further described in section 6.2.1 Estimating Baseline Onsite Carbon Stocks – Private Lands. Figure 3 shows the locations of WLPZs and Figure 4 shows the areas where NSO practice guidelines are applied based on the NSO US F&WS NSO Attachment B: Take Avoidance Analysis for the Interior.

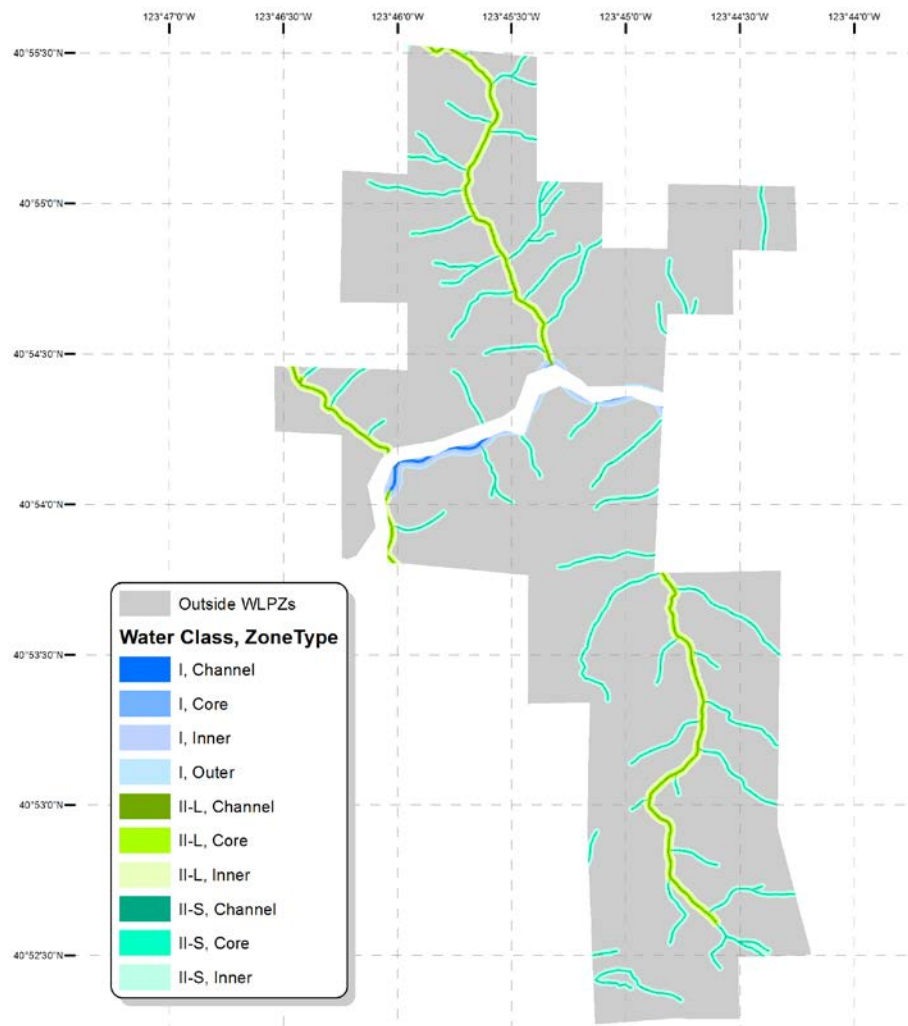


Figure 3. WLPZ legal constraints relative to Project Area

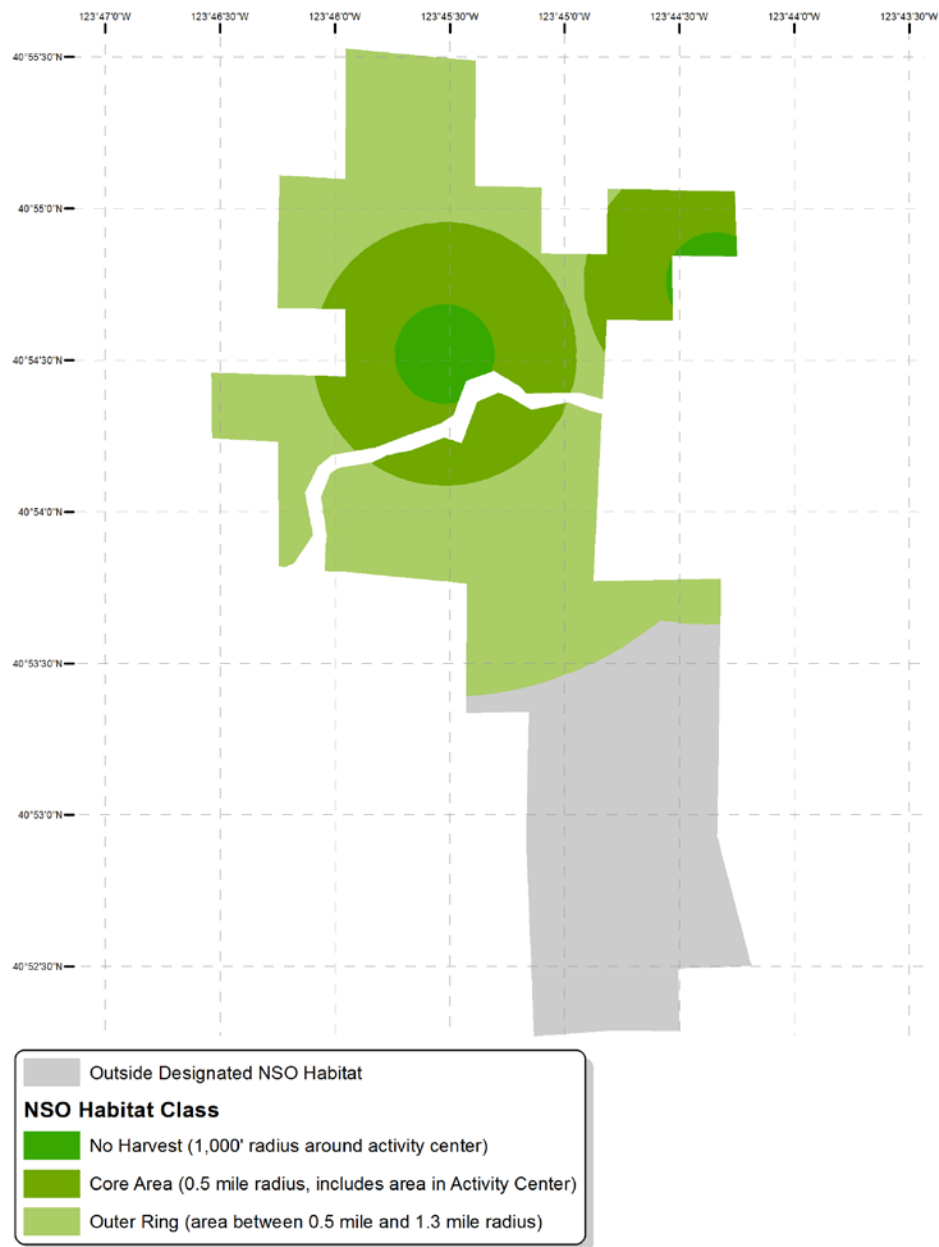


Figure 4. NSO legal constraints relative to Project Area

These legal constraints are reflected in the project's modeled baseline carbon stocks, as required in section 6.2 of the FPP. The Forest Owner also meets the Legal Requirement Test by signing the Reserve's Regulatory Attestation Form and the Attestation of Voluntary Implementation, indicating the project is in compliance with all laws and has been voluntarily implemented.

3.1.2 Performance Test

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

3.2 Project Start Date

An Improved Forest Management project's start date must be linked to a discrete, verifiable action that delineates a change in practice relative to the project's baseline. Forest Owners may choose to identify one of the following actions:

- Recordation of a conservation easement on the Project Area. The project start date is the date the easement was recorded.
- **Transferring of property ownership (to a public or private entity). The project start date is the date of property transfer.**
- Submitting the project to the Reserve.⁴ The project start date is the date of submittal, provided that the project completes verification within 30 months of being submitted. If the project does not meet this deadline, it must be resubmitted under the latest version of the protocol; it will not retain the initial submittal date and will be subject to any new project start date requirements.

The project start date has been identified as May 10, 2013 denoted by transfer of property ownership. The forest owner has submitted a copy of the recorded deed as evidence of the date the property was transferred to the forest owner.

3.3 Crediting Period

The crediting period for the project starts May 10, 2013 and ends no later than May 9, 2113, a period equal to 100 years, the length of the baseline.

3.4 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 Climate Reserve Tonne of greenhouse gas (GHG) reductions or removals achieved by the project.

3.5 Project Implementation Agreement

The PIA will be submitted to the Reserve after it has been recorded in the Office of Land Records for Humboldt County.

3.6 Use of Qualified Conservation Easement or Qualified Deed Restrictions

The project does not employ a qualified conservation easement at this time as defined in the FPP. The project also does not employ a Qualified Deed Restriction.

3.7 Attestation of Title

The forest owner has indicated they have an exclusive ownership claim to the GHG reductions and removals achieved by this project by signing and submitting the Reserve's Attestation of Title form. This form will be signed and submitted after the conclusion of each reporting period.

3.8 Project Location

The project is located in the United States of America. Specifically, it is situated in Humboldt County, in the State of California (see Appendix D. CAR1004_Map_CountyTwnshp.pdf). The approximate geometric center of the project area is 40.9050° latitude, -123.7580° longitude.

3.9 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.

3.10 Sustainable Harvesting and Natural Forest Management Practices

This project will employ natural forest management practices as described below as well as sustainable harvesting practices if it elects to conduct commercial harvesting in the future.

3.10.1 Sustainable Harvesting Practices

Commercial harvesting is not currently planned in the project area for the near term. If the forest owner elects to conduct commercial harvesting in the future it will adequately demonstrate sustainable long-term harvesting practices using the forest certification option, or other compliant options. The forest owner does not hold any other forest lands besides Berry Summit.

3.10.2 Natural Forest Management

The evaluation worksheet provided in Table 3.2 of the FPP 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 2 below.

Table 2. 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 tree observations in the forest carbon inventory and thus, encompasses 100 percent of the standing live carbon pool (Table 3).
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 FPP Appendix F. and published on the Reserve website) requires that no single species in the Southern Cascades Mixed Conifer assessment area constitute more than 65 percent of prevalence as measured by basal area of all live trees in the project area. The forest carbon inventory (January 2013) shows Douglas-fir having the highest percent composition at 47.4 percent for this assessment area (Table 3).
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,	N/A – There is no commercial or regeneration harvesting currently planned in the project area. The forest owner does not own or have any real interest in any other forest lands in addition to the project

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.)	area.
On a watershed scale up to 10,000 acres (or the project area, whichever is smaller), all projects must maintain, or make progress toward maintaining, no more than 40 percent of their forested acres in ages less than 20 years. (Areas impacted by Significant Disturbance may be excluded from this test.)	Overall, the Project Area holds about 5.9 percent of its forested acres in ages less than 20 years. The Project Area was not divided by watershed because it is less than 10,000 acres. The location and a table of acres and percent by age class are shown in Figure 5.
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 2013, the actual onsite carbon for standing dead wood is 2.16 metric tons of carbon per acre (equivalent to 3.05% of standing live carbon). The forest owner therefore maintains more than 1% of standing live carbon stocks in standing dead wood as well as (1) metric ton of carbon (C) per acre.

Table 3. Standing live basal area and percentage by species (January 2013)

Species ID	Common Name	Scientific Name	BA (sqft/ac)	Percent
017	grand fir	<i>Abies arandis</i>	2.54	1.06%
041	Port Orford cedar	<i>Chamaecyparis lawsoniana</i>	5.74	2.39%
081	incense cedar	<i>Calocedrus decurrens</i>	1.30	0.54%
116	Jeffrey pine	<i>Pinus jeffreyi</i>	0.38	0.16%
117	sugar pine	<i>Pinus lambertiana</i>	0.55	0.23%
122	ponderosa pine	<i>Pinus ponderosa</i>	1.50	0.63%
202	Douglas-fir	<i>Pseudotsuqa menziesii</i>	113.6	47.37%
231	Pacific yew	<i>Taxus brevifolia</i>	0.64	0.27%
312	bigleaf maple	<i>Acer macrophyllum</i>	12.71	5.30%
351	red alder	<i>Alnus rubra</i>	1.89	0.79%
361	Pacific madrone	<i>Arbutus menziesii</i>	3.46	1.44%
431	giant chinquapin	<i>Chrysolepis chrysophylla</i> var. <i>chrysophylla</i>	3.51	1.46%
492	Pacific dogwood	<i>Cornus nuttallii</i>	0.01	0.00%
631	tanoak	<i>Lithocarpus densiflorus</i>	79.61	33.20%
805	canyon live oak	<i>Quercus chrysolepis</i>	6.43	2.68%
815	Oregon white oak	<i>Quercus garryana</i>	4.79	2.00%
818	California black oak	<i>Quercus kelloggii</i>	0.75	0.31%
920	willow species	<i>Salix</i>	0.21	0.09%
981	California laurel	<i>Umbellularia californica</i>	0.20	0.08%
Total Native			239.82	100.00%
Total			239.82	100.00%

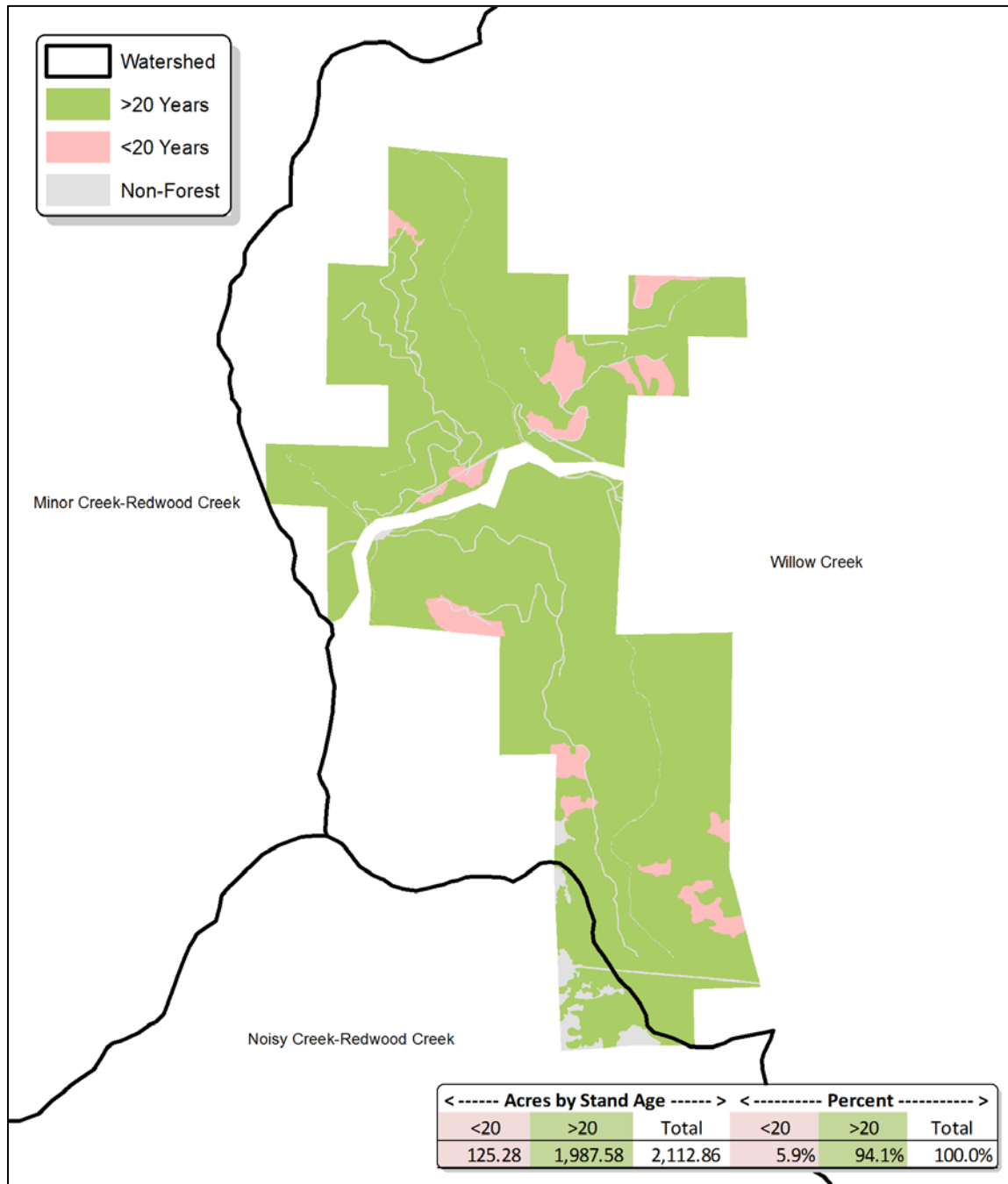


Figure 5. Project Area Age Classes relative to Watersheds

3.10.3 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.

3.10.4 Balancing Age and Habitat Classes

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

Since the project start date, no active Timber Harvest Plans are on record with CAL FIRE, and no commercial or regeneration harvesting has occurred in the project area.

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:

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

Where: PROJAREA = Total acres in project area

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

L = Number of exclusion areas

$EXCLAREA_h$ = Size of area in exclusion area h

2. Determine Gross Ownership Area (GR SOWNAREA)

- a. The forest owner provided a shapefile called 'Stands'; this shapefile maps the authoritative, managerial and operational boundaries under Berry Summit, LLC land and timber right holdings in the project area; the shapefile was imported into the project geodatabase as a feature class and renamed 'Stands_Baseline'; the data was reviewed and summarized to determine the values in Equation 1.
- b. A new field was created in 'Stands_Baseline' titled 'LandUse'. 'LandUse' will identify all polygons in the Berry Summit property as part of the project area or excluded; if it is excluded, a reason is indicated by the field value. The field values are:

MCF	Project Area (Mixed Conifer)
Watercourse	Channel of a watercourse
Road	Area occupied road improvements
NF	Non-forest/Ineligible

- c. GR SOWNAREA = 2,196.78 acres

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

- a. A land-use class field was identified for each polygon in 'Stands_Baseline'; this field is titled 'LandUse'; the land-use classes are summarized in Table 4.

Table 4. Gross Ownership Area by Land-Use

Land Use	Class	Total Acres
MCF	Forest	2,112.86
Watercourse	Non-Forest	13.63
Road	Non-Forest	31.95
NF	Non-Forest	38.33
Total		2,196.78

Note: The difference in the summation of each land use value and the 'Total' value presented in this table (i.e. 0.01 acre) is a result of rounding.

- b. There are 83.92 acres for non-forest (ineligible areas) within the gross ownership area.
 - c. The $EXCLAREA_1 = 83.92$ acres. These lands are symbolized in Figure 6.
4. Using Equation 1, the project area is 2,112.86 acres. These lands are colored green in Figure 6.

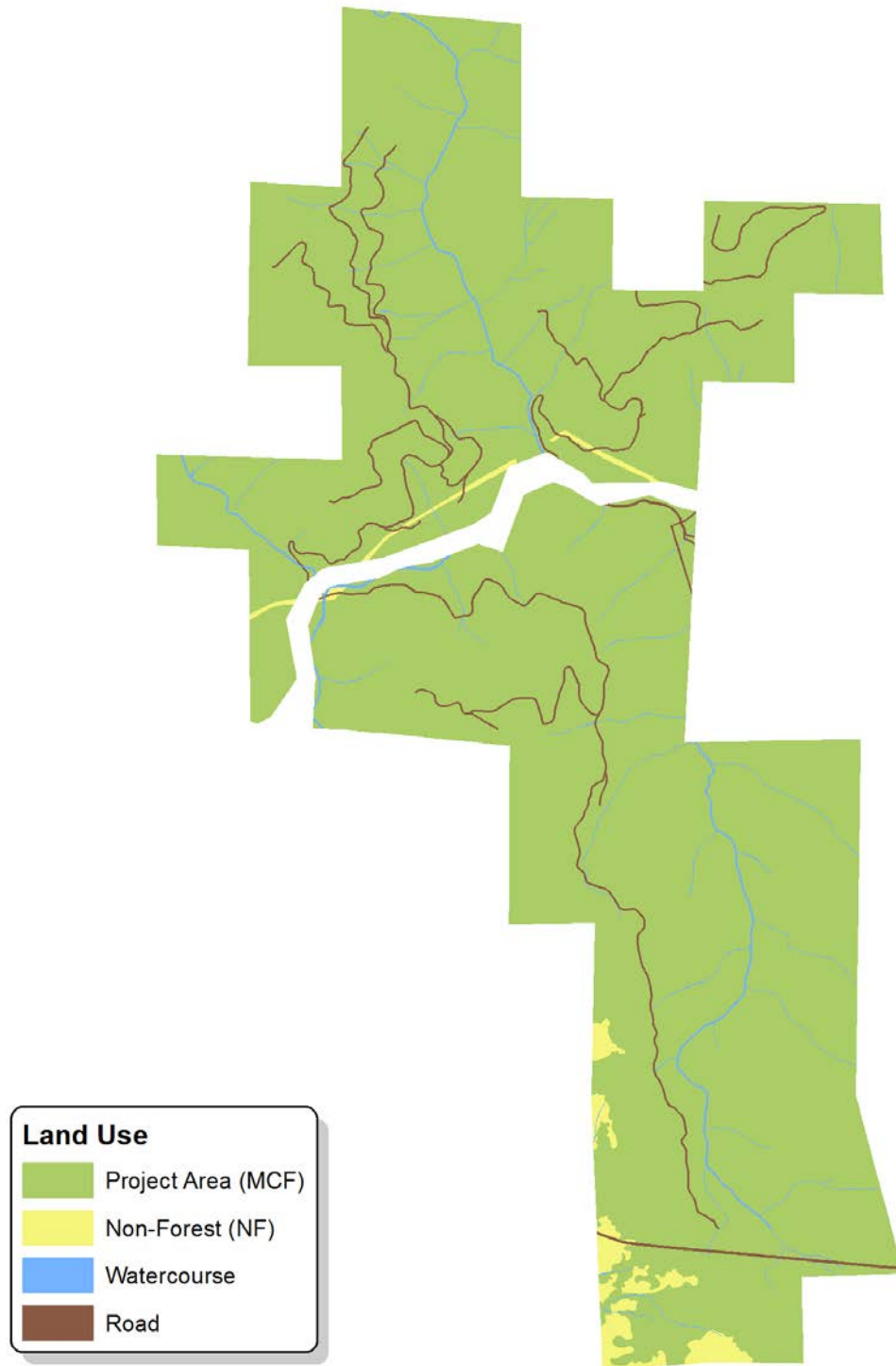


Figure 6. Ineligible Areas relative to Project Area

5. Defining the Project's GHG Assessment Boundary

Table 5 was adapted from CAR Forest Project Protocol Version 3.2, Table 5.2 (included primary and secondary effect sources, sinks, and reservoirs for improved forest management projects) and describes the project's GHG assessment boundary.

Table 5. 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 harvesting volumes Project: Estimated from measured harvesting volumes	Included because many Improved Forest Management Projects may significantly change carbon storage in in-use forest products relative to baseline levels. Treated as a "source/sink" because forest product carbon is quantified according to the change in harvesting volumes, relative to baseline levels, in each year. Of this change (increase or decrease), only the average amount of carbon expected to remain stored for 100 years is included in the final quantification of annual net GHG removals/emissions. This approach accounts for CO2 emissions from decomposition or disposal of wood products (see SSR #IFM-17).
IFM-8	Forest product carbon in landfills	Reservoir / Pool	CO2	Baseline: Estimated from modeled harvesting volumes Project: Estimated from measured harvesting volumes	Because of significant uncertainties associated with forecasting the quantity of forest product carbon that will remain stored in landfills, landfill carbon is excluded from quantification in years when project harvesting volumes exceed baseline volumes. Landfill carbon is included, however, in years when project harvesting volumes are below baseline levels. This case-dependent exclusion or inclusion is necessary to ensure that total GHG reductions and removals caused by the Forest Project are not overestimated.
Secondary Effect Sources, Sinks, and Reservoirs					
IFM-9	Biological emissions from site preparation	Source	CO2	Baseline: N/A Project: Quantified based on measured carbon stock changes	Biological emissions from site preparation are not quantified separately, but rather are captured by measuring changes in

	activities			in included reservoirs (SSR #IFM-6, where applicable)	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 carbon stored for 100 years in wood products (SSR #IFM-7) and landfills (SSR #IFM-8)	CO2 emissions from the decomposition of forest products are built into calculations of how much forest product carbon will remain in in-use wood products and in landfills, averaged over 100 years.

6. Quantifying Net GHG Reductions and Removals

6.1 Forest Inventory & Modeling Plan

6.1.1 Inventory Plan & Design

The baseline forest carbon inventory was planned by Finite Carbon, and implemented and completed by Western Timber Services, Inc. in January, 2013. 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 8a and 8b climate zone as shown on USDA FS mapping for the region (<http://www.usna.usda.gov/Hardzone/hzm-sm1.html>).

The stratification rules used in the Berry Summit project were based on broad forest type and age classes. Broad forest type classes follow the Assessment Areas (i.e. forest vegetative communities) listed in the Assessment Area Data File for the project's Supersection. The tree species found in any particular stratum in the project area should be consistent with the species listed in the Assessment Area Data File. Within broad forest types, areas that are under even-age or two-age silvicultural systems should be categorized by one of the following age classes as well: 0 to 30 years (20+/-); 31 to 50 years (40+/-), 51 to 70 years (60+/-), and 71 years and older (80+/-). The age of each stratum does not need to be exact and should be designated based on average age of the cohort or, in the case of two-aged stands, the age of the cohort that best represents the stand's current and/or future productivity which is typically the younger cohort. In the event strata are recognized as uneven-aged stands (i.e. an area occupied by three or more cohorts) a stocking class will be assigned in lieu of age class. Stocking class refers to the total carbon stocks per acre (tCO₂e/acre) in all components of standing live and standing dead trees (bole, top, stump, below-ground, and saplings) and defined as: Low (0-99); Low-Medium (100-199); Medium-High (200-299); and High (300+). Both broad forest types and age class designations (or stocking classes) should be estimated based on existing forest inventory data, and validated in the field when forest inventories are conducted. The strata currently existing in the project area are listed in Table 6. As activities occur in the project, the strata will be updated using the stratification process described above. See Appendix H. CAR1004 Project Inventory Specifications 20131010 Proprietary.pdf for more detailed stratification rules.

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 155 plots. Plots were allocated along a randomly placed grid within stratum delineations (i.e. polygons), with grid lines generally running along one of two perpendicular azimuths, north/south or east/west. All plots were assigned GPS coordinates and stored in the project geodatabase. The plot locations are shown in Figure 7.

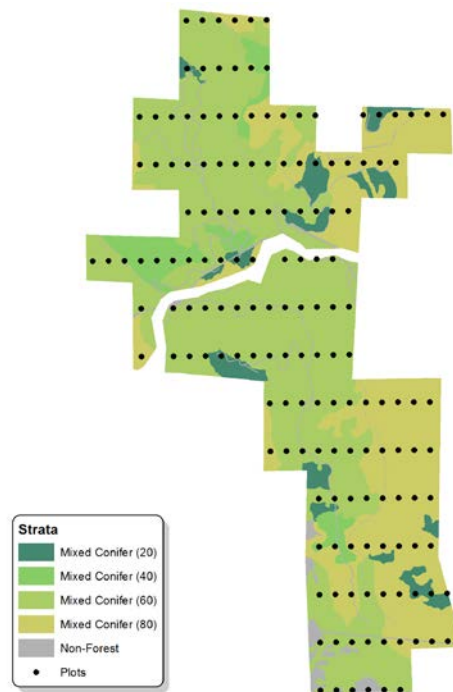


Figure 7. Cruise lines and plots for baseline inventory

6.1.2 Field Data Collection

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

Tree data was then systematically collected using point sampling (i.e. variable radius plots) with a 30 Basal Area Factor prism for all stems 7.6 inches dbh and larger. A nested plot of 1/50th acre for trees below 7.6 inches dbh and greater than 0.6 inches dbh was also collected at the same plot center. All borderline trees were measured to the geometric center of the base of the tree using approved devices, including slope adjustments for slopes of 10% and greater in accordance with the USFS procedures laid out in the forest management field book 2008 edition (included in this specification).

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

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

In order to verify the quality of the data collection, the contractor performed an internal audit of the data. This audit consisted of a minimum of 5% of the samples collected. Initially, audits addressed all cruisers equally. If

however, individual cruisers were found to be consistently out of compliance, the auditor or audit team then focused on individuals in order to verify compliance with the specifications.

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

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

6.1.3 Inventory Plot Statistics

A statistical analysis of the onsite carbon stock was conducted. The onsite carbon stock for each plot was determined using the CAR published cubic foot volume and biomass equations for projects in the states of California, Washington, and Oregon as referenced by species in Table 10. 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 6). The total project uncertainty (sampling error) is 7.54 percent.

Table 6. Summary of Percent Error by Strata and Project Total (2013 tCO₂e/acre, all portions)

IFM1 & IFM3		
Strata	per Acre	Percent Error (PE)
MCF(20)	20.09	97.70%
MCF(40)	162.29	47.95%
MCF(60)	284.78	7.66%
MCF(80)	301.19	15.99%
Project Total	267.69	7.54%

6.1.4 Growth & Yield Model

Forest inventory field data was transferred to Finite Carbon in a database, along with all relevant GIS files. A project geodatabase serves as the central data repository. The inventory data was then reformatted for input to the Forest Vegetation Simulator (Crookston 2003). The Forest Vegetation Simulator (FVS) is a family of forest growth simulation models supported and maintained by a special unit of the USDA Forest Service (www.fs.fed.us/fmrc/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 (FPP 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 8). FVS can simulate a wide range of silvicultural treatments for most major forest tree species, forest types, and stand conditions. The Klamath Mountains (NC) Variant (Keyser 2008) has been used for the Berry Summit project.

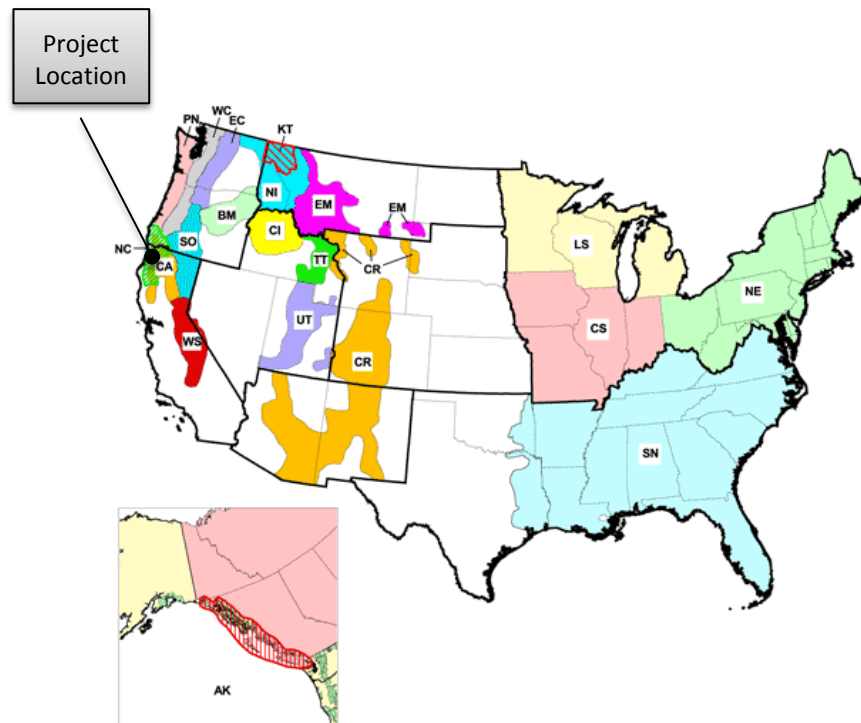


Figure 8. FVS Variants Map

Tree data is entered directly into the model with the inventory sampling design in order to grow the stands and perform simulated management activities in both the baseline and project scenario. FVS outputs a treelist with tree level attributes which are used to apply the appropriate cubic foot volume and biomass equations by species for the respective CAR Supersections for projects located in California, Washington or Oregon as published on the Reserve’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. CAR1004 Data Management & Analytical Systems.

Model Calibrations

The variant (“NC”) and project location code (indicating the closest National Forest – in this case, Shasta-Trinity National Forest) were input to the model along with the inventory design parameters for proper calibration.

Site index is used in some of the growth equations in the FVS NC Variant. Because property specific site index data³ was available to calibrate the growth model, a site species site index was input for each stratum. Douglas-fir was the site species for all strata because it is the most prevalent species (see Table 3); however, the site index value for each stratum was different because the site index data was spatially explicit. Table 7 summarizes the site index value for Douglas-fir (i.e. the site species) by strata.

**Table 7. Site Species Site Index
by Strata**

Strata	Site Index
MCF(20)	98
MCF(40)	106
MCF(60)	109
MCF(80)	101

The following section numbers reference those of section 6.2 in the FPP Version 3.2, 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 *Southern Cascades* CAR Supersection (Appendix E. CAR1004_Map_AssessmentAreas.pdf).

The project area was further classified into Assessment Areas by associating the corresponding species composition from the FPP 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 in 2013. There was one Assessment Areas identified in the project area: Mixed Conifer (see Table 8 as well as Appendix E. CAR1004_Map_AssessmentAreas.pdf).

³ Provided by the previous forest owner, Green Diamond, who had several CAL FIRE approved, active Timber Harvest Plans associated with the project area over the course of its tenure. The data was reviewed with a California Registered Professional Forester who confirmed that the site index values were appropriate for the project area and site classes.

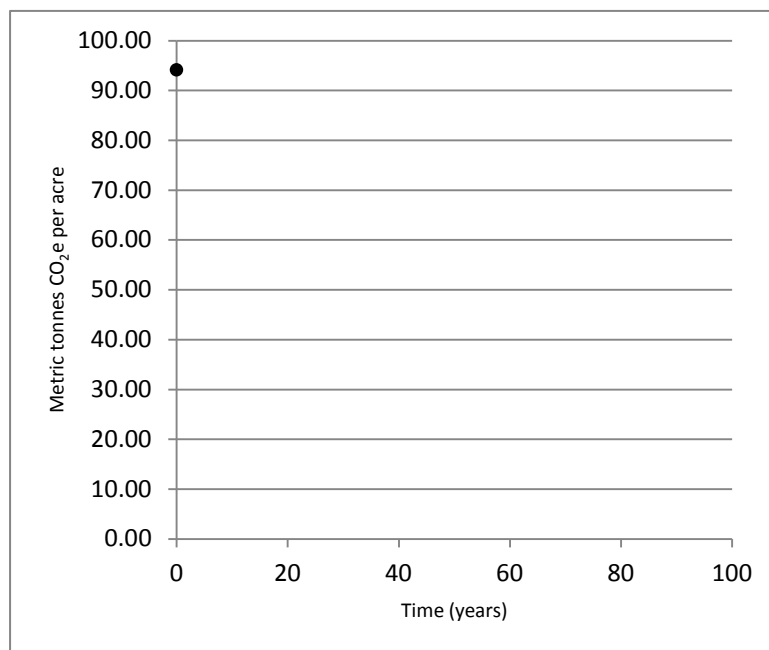
Table 8. Common Practice Assessment Area Data

Supersection	Assessment Area	Associated Species	Site Class	Board Feet	Basal Area (Square Feet per Acre)	Common Practice - Above Ground Carbon Mean (Metric Tonnes CO ₂ -equivalent)	Composition of Native Species
Southern Cascades	Southern Cascade Mixed Conifer	Aspen, California laurel, California mixed conifer, Douglas fir, fir, spruce, mountain hemlock, giant chinkapin, grand fir, incense cedar, knobcone pine, mountain hemlock, Pacific madrone, ponderosa pine, Port Orford cedar, red alder, sugar pine, tanoak, western red cedar	Low	9,514	110	86	65%
Southern Cascades	Southern Cascade Mixed Conifer	Aspen, California laurel, California mixed conifer, Douglas fir, fir, spruce, mountain hemlock, giant chinkapin, grand fir, incense cedar, knobcone pine, mountain hemlock, Pacific madrone, ponderosa pine, Port Orford cedar, red alder, sugar pine, tanoak, western red cedar	High	15,526	134	128	65%

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. California Timber Site data based on field analysis and used in previously approved Timber Harvest Plans for the project area indicate that the project area is classified as Timber Sites II (384.47 acres) and III, IV and V (1,728.39 acres). Based on this analysis, the total common practice carbon stock is 198,743 tCO₂e. The weighted average common practice carbon stock on a per acre basis is 94.06 tCO₂e (Table 9 and Figure 9).

Table 9. Common Practice Carbon Stocks

Supersection	Assessment Area	Site Class	Project Area (acres)	CP Stock	Area Weight	Weight CP
Southern Cascades	Mixed Conifer	Low	1,728.39	86.43	0.8180	70.70
Southern Cascades	Mixed Conifer	High	384.47	128.38	0.1820	23.36
			<u>2,112.86</u>			<u>94.06</u>

**Figure 9. Step 1 - Common Practice****Step 2 – Determine if Initial Stocks are Above or Below Common Practice**

Initial carbon stocks were determined using the inventory data and the most current volume and biomass equations (i.e. as specified for projects in California, Washington and Oregon on the Reserve’s website as of July

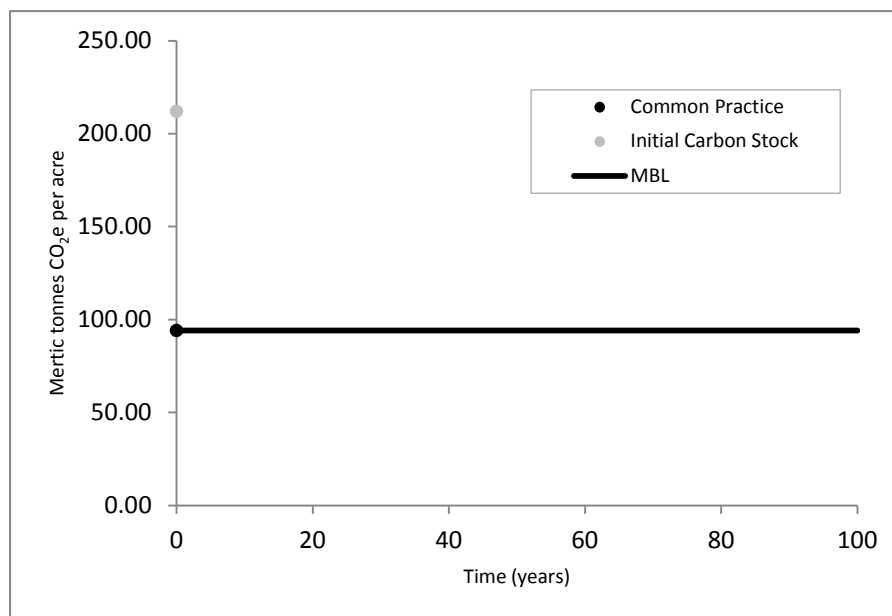
2013) appropriate for the Supersections and species as published by the Reserve. The species observed in the project are listed in Table 10 along with their cubic foot volume and biomass equation assignments. The total initial above-ground standing live carbon stock is 447,782 tCO₂e which is above the common practice. The weighted average above-ground standing live carbon stock per acre is 211.93 tCO₂e (Table 11 and Figure 10).

Table 10. Volume and Biomass Equation Assignments by Species

FIA Code	Species Name	Volume Equation Number	Biomass of Live Branches Equation Assignments	Biomass of Stem Bark Equation Assignments	Wood Density
017	grand fir	23	1	2	21.84
041	Port Orford cedar	8	10	13	24.34
081	incense cedar	19	10	12	21.84
116	Jeffrey pine	5	7	9	23.71
117	sugar pine	20	8	10	21.22
122	ponderosa pine	5	7	9	23.71
202	Douglas-fir	3	6	8	28.70
231	Pacific yew	8	10	13	41.81
312	bigleaf maple	37	0	0	27.46
351	red alder	26	16	20	23.09
361	Pacific madrone	40	0	0	43.06
431	giant chinquapin	32	0	0	29.95
492	Pacific dogwood	26	0	0	43.68
631	tanoak	34	0	0	36.19
805	canyon live oak	42	0	31	49.92
815	Oregon white oak	41	0	0	37.44
818	California black oak	38	0	0	34.94
920	willow species	40	0	0	22.46
981	California laurel	33	0	0	36.82

Table 11. Standing Live Above-Ground Carbon

<i>Standing Live Above Ground metric tons CO₂e</i>				
Forest Strata	Year	Acres	Per Acre	Total
MCF(20)	2013	125.29	14.05	1,760.58
MCF(40)	2013	114.13	126.90	14,482.61
MCF(60)	2013	1,201.13	226.20	271,689.86
MCF(80)	2013	672.32	237.76	159,849.35
Total		2,112.86		447,782.40
Average			211.93	

**Figure 10. Step 2 - Common Practice vs. Initial Carbon Stock****Step 3 – Determine Baseline Above-Ground Standing Live Carbon Stocks**

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

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

Consideration of Legal Constraints

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

Characterization

The baseline scenario models timber harvesting over 100 years, as a function of what it is legally allowable, financially feasible and physically possible, while at the same time adhering to the minimum baseline level (MBL). In the baseline model, forest stand development was projected using a combination of even-aged and uneven-aged systems, oftentimes creating two-aged or multi-aged conditions depending on the arrangement of treatment types over space and time. Forest stands were subject to treatment types based primarily on their forest structure and site attributes as it relates to the California Forest Practice Rules, e.g. Timber Site II vs. Timber Site V or designated northern spotted owl (NSO) habitat vs. non-designated NSO habitat.

Baseline Legal Constraints

Constraints that affect land-use specific to forest management activities have been incorporated into the carbon modeling. For this project, legal constraints have the greatest effect on timber harvesting levels, as opposed to what is financially feasible or physically possible. These legal constraints dictate what types of silvicultural activities (treatment types) are allowed, and where (spatial) and when (temporal) they are allowed, that is, there are different legal constraints for different locations of the project area. For this reason, each forest stand in the project area has been assigned attributes to indicate to the model what constraints apply in the baseline model. (Note: constraint types and their classes are attributed in the stands layer in the project geodatabase). There are four general constraint types that determine what treatments are operable for any given area: 1) Timber Site; 2) NSO designated forage habitat; and 3) Water and Lake Protection Zones; and 4) slope class. Each constraint, and how it is applied in the modeling, is described below by constraint class.

NSO Designated Forage Habitat

These are forest stands in the project area subject to Northern Spotted Owl (NSO) habitat protection measures. Conservation guidelines set forth in the US F&WS Attachment B: Take Avoidance Analysis for the Interior were used to establish conservative protection measures and assumptions in the baseline model and ensure that baseline activities near the activity center would not result in the "take" of an individual northern spotted owl. It consists of identifying particular types and quantities of habitat (e.g. Nesting/Roosting vs. Foraging) in specific proximities to the activity center. Each habitat type has defined forest structure retention standards based on basal area, quadratic mean diameter, trees per acre, and percent canopy closure. In addition, these areas are also subject to the Forest Practice Rules. Forest stands in the project area of this constraint class must follow these terms at a minimum:

1. Within 1,000 feet of the NSO activity center, no harvest can occur.

This overall constraint is emulated in the baseline model by mapping the area within a 1,000 foot radius of the activity center in the project geodatabase (Figure 4). There is one (1) activity center in the project area and one that is outside the project area but within 1,000 feet of the project area boundary. No harvesting was permitted in these areas in the baseline model.

2. Areas designated as **high quality nesting/roosting habitat** will maintain 210 square feet per acre of basal area, a 15 inch QMD, 60 percent canopy closure and 8-26 inch dbh trees per acre. Areas designated as **nesting/roosting habitat** will maintain 150 square feet per acre of basal area, a 15 inch QMD, 60 percent canopy closure and 8-26 inch dbh trees per acre. Areas designated as **foraging habitat** will maintain 120 square feet per acre of basal area, a 13 inch QMD, 40 percent canopy closure and 5-26 inch dbh trees per

acre. Areas designated as **low quality foraging habitat** will maintain 80 square feet per acre of basal area, a 11 inch QMD, and 40 percent canopy closure (no 26 inch dbh trees per acre retention is required for low quality foraging habitat).

This overall constraint is emulated in the baseline model by mapping designated areas in proximity to the activity center and only applying silvicultural treatments that retain these forest structure metrics to those specific areas. In addition, any silvicultural activities had to adhere to the allowed harvest methods by the Forest Practice Rules as further described below.

Watercourse and Lake Protection Zones (WLPZs)

These are forest stands in the project area subject to Article 6 in the California Forest Practice Rules. These rules help ensure that harvest operations implement specific measures to protect water resources, riparian areas and associated riparian species. Because the project area is in a watershed with listed anadromous salmonids (specifically the Coastal Anadromy Zone), it also requires greater protection measures than areas without listed anadromous salmonids. Forest stands in the project area of this constraint class must follow these terms at a minimum:

1. Timber harvest operations shall establish WLPZs based on watercourse class and adhere to the harvest methods allowed by zone and slope according to Table 12 and Table 13.

Table 12. Summary of Procedures for Determining WLPZ Widths and Protection Measures – Confined Channel Zones – Coastal Anadromy Zone

Class	Core Zone	Inner Zone	Outer Zone	Special Operating Zone
Class I	30 feet from water transition line. No harvesting in core zone. Note: Centerline of watercourse was buffered 15 feet on each side to establish water transition lines of channel zone (i.e. 30 feet from water transition line to water transition line).	70 feet from landward edge of Core Zone, Harvesting prescriptions should focus on practices that use thinning from below. Silvicultural systems for harvesting are limited to the use of commercial thinning or single tree selection modified to meet the following requirements: if commercial thinning, QMD of conifer trees $\geq 8"$ must increase postharvest; postharvest stand has minimum 80% overstory canopy cover (can be composed of conifers and hardwoods but at least 25% overstory conifer canopy cover; the 13 largest conifer trees (dead or alive) on each acre that encompasses the core	50 feet from landward edge of Inner Zone. Limited to use of commercial thinning or single tree selection modified to meet the following requirements: postharvest stand shall have a minimum 50% overstory canopy cover; postharvest canopy may be composed of both conifers and hardwoods and have at least 25% overstory conifer canopy.	50 feet, only applicable where even-age regeneration used adjacent to WLPZ; retain understory and mid-canopy conifers and hardwoods.

		and inner zones.		
Class I watercourses with flood prone area or Channel Migration Zones are present	n/a on Berry Summit	n/a on Berry Summit	n/a on Berry Summit	n/a on Berry Summit
Class II-S (standard)	Width can vary based on slope (see Table 13). Width used in baseline model as a conservative approach is 15 feet from water transition line (i.e. width allowed for slopes greater than 10%). No harvesting in core zone. Note: Centerline of watercourse was buffered 1 foot on each side to establish water transition lines of channel zone (i.e. 2 feet from water transition line to water transition line).	Width can vary based on slope (see Table 13). Width used in baseline model as a conservative approach is 60 feet (i.e. width allowed for slopes from 30% to 50%). To protect water temperature, filter strip properties, upslope stability, and fish and wildlife values, at least 50% of the total canopy covering the ground shall be left in a well distributed multi-storied stand configuration composed of a diversity of species similar to that found before the start of operations. The residual overstory canopy shall be composed of at least 25% of the existing overstory conifers.		
Class II-L (large) <i>(identified using Office-based approach 2. “Blue Line” streams)</i>	30 feet from water transition line (see Table 13). No harvesting in core zone Note: Centerline of watercourse was buffered 10 feet on each side to establish water transition lines of channel zone (i.e. 20 feet from water transition line to water transition line).	70 feet from landward edge of Core Zone (see Table 13). Harvesting prescriptions should focus on practices that use thinning from below. Silvicultural systems for harvesting are limited to the use of commercial thinning or single tree selection modified to meet the following requirements: if commercial thinning, QMD of conifer trees $\geq 8"$ must increase postharvest; postharvest stand has minimum 80% overstory canopy cover (can be composed of conifers and hardwoods but at least 25% overstory canopy cover; the 13 largest conifer trees (dead or alive) on each acre that encompasses the core and inner zones.		

Table 13. Core and Inner Zone Widths for Class II Watercourses

Water Class	Class II-S (feet)				Class II-L (feet)			
Geographic Location	Watersheds in the coastal anadromy zone		Watersheds outside the coastal anadromy zone		Watersheds in the coastal anadromy zone		Watersheds outside the coastal anadromy zone	
Slope Class	Core Zone (feet)	Inner Zone (feet)	Core Zone (feet)	Inner Zone (feet)	Core Zone (feet)	Inner Zone (feet)	Core Zone (feet)	Inner Zone (feet)
<10%	0	50	0	50	30	70	20	80
10%-30%	15	35	10	40	30	70	20	80
30%-50%	15	60	10	65	30	70	20	80
>50%	15	85	10	90	30	70	20	80

This overall constraint was emulated by mapping WLPZs boundaries in the project geodatabase (see Figure 3). Table 14 shows the resulting number of acres in the project area by WLPZ class and zone type. Harvest activities in the baseline were either excluded or followed the protection measures as described in Table 12 according to their watercourse class and zone.

Table 14. Acres by WLPZ Class and Zone Type

Class	Zone Type	Acres
I	Channel	1.32
I	Core	2.74
I	Inner	8.02
I	Outer	8.05
II-L	Channel	8.61
II-L	Core	25.84
II-L	Inner	58.53
II-S	Channel	2.87
II-S	Core	42.66
II-S	Inner	166.90
Total		325.55

Timber Site

All forest stands in the project area are subject to minimum rotation lengths (for even-aged silviculture) and retention standards (for uneven-aged silviculture and intermediate treatments in even-aged stands) based on their “Timber Site” or site class. Forest stands in the project area of this constraint class must follow these terms at a minimum:

1. All forest stands where even-aged regeneration harvests are applied shall have the minimum rotation lengths as listed in Table 15. In addition, even-aged regeneration units must be separated by another unit the same size or 20 acres, whichever is smaller, and a 300’ buffer in all directions (unless all adjacent units are at least 5 years old, or 5 feet tall AND at least 3 years old).

Table 15. Rotation Length by Site Class

Site Class	Rotation
I (none on Berry Summit)	50 years
II & III	60 years
IV & V	80 years

This overall constraint is emulated in the baseline by not allowing even-aged stands to be regenerated before they reach the minimum age. Furthermore, the adjacency standard is emulated in the baseline model by implementing patch clearcutting silviculture systems for even-age stands where the maximum opening size is limited to 2 acres, limiting the total number of patch clearcut acres in any one year, and a 5-year greenup lock.

2. All forest stands where uneven-aged silviculture is applied shall maintain the minimum basal area retention thresholds as listed in Table 16.

Table 16. Retention Standards by Site Class

Site Class	Basal Area
I (none on Berry Summit)	125 square feet per acre
II & III	75 square feet per acre
IV & V	50 square feet per acre

This overall constraint is emulated in the baseline by setting a minimum basal area target for uneven-aged stands when they are treated.

3. All forest stands where intermediate treatments (i.e. commercial thinning in even-aged stands) are applied shall have the minimum retention thresholds as listed in Table 17.

Table 17. Retention Standards by Site Class for commercial Thinnings

Site Class	Basal Area	Trees Per Acre $\geq$ 4 inches DBH
I (none on Berry Summit)	125 square feet per acre	100
II & III	100 square feet per acre	100
IV	75 square feet per acre	75
V	50 square feet per acre	75

This overall constraint is emulated in the baseline by setting a minimum basal area target and trees per acre for even-aged stands when they are thinned.

Slope Class

The slope of all even-aged forest stands in the project area dictate the harvest method and harvest area size limits. These limits are listed in Table 18.

Table 18. Harvest Method and Area Size Limits

Method	Slope Class	Harvest Area Size Limit
Tractor yarding	30-50	20 acres
Tractor yarding, EHR is low (slopes < 30%)	0-30	30 acres
Aerial and cable yarding	50-65	30 acres
Special provisions (N/A in baseline)	n/a	40 acres

While all forest stand polygons are attributed with slope class, this overall constraint is emulated in the baseline model by applying patch clearcutting regeneration harvests that limit opening sizes to 2 acres. Furthermore, it is assumed in the baseline model that the harvest method used corresponds with its associated slope class.

Baseline Activities

All forest stands and baseline activities in the project area are subject to the Maximum Sustained Production (MSP) of High Quality Timber Products section of the California Forest Practice Rules. It is assumed in the baseline model that MSP is achieved by subsection (c) in a THP whereby:

(1) For even-age management, meeting the minimum stand age standards, meeting minimum stocking and basal area standards for the selected silvicultural methods as contained in the Forest Practice Rules only with group A species, and protecting the soil, air, fish and wildlife, water resources and other public trust resources through the application of these rules; or

(2) For uneven-aged management, complying with the seed tree retention standards, meeting minimum stocking and basal area standards for the selected silvicultural methods as contained in the Forest Practice Rules only with group A species, and protecting the soil, air, fish and wildlife, water resources and other public trust resources through the application of these rules.

(3) For intermediate treatments and special prescriptions, complying with the stocking requirements of the individual treatment or prescription.

In other words, treatment types, or silviculture systems, were applied to forest stands in the baseline model such that they followed the silvicultural method objectives in Article 3 of the Forest Practice Rules and as additionally described in this section. Specifically, these treatments included: patch clearcuts, thinnings, and selection harvesting (i.e. uneven-aged tending/regeneration). Treatments were selected and scheduled in the baseline based on legal constraint(s) and stocking. In addition, all treatments were based on complying with commercial harvest operation parameters (i.e. treatments were only scheduled if they yielded a minimum harvest volume of 2,500 board feet per acre).

A ‘patch clearcut’ was defined as an even-aged, single regeneration event. Cuts occurred in 2 acre patches dispersed among the available area in the selected stand. The distribution of the cut focused on complete overstory removal of conifers greater than 7.6 inches dbh. A minimum of 5 percent of conifers less than 7.6 inches dbh and 2.5 percent of hardwoods were reserved as advance regeneration and surviving trees, respectively. Planted conifer regeneration was established immediately following the harvest and hardwood sprouts, if any, were controlled. This treatment was applicable to even-aged mixed conifer stands on operable slopes outside of NSO designated habitat and WLPZ areas. Additionally, it was only operable after the stand age reached the minimum rotation length based on its site class.

A ‘thinning’ was defined as an intermediate cut in even-aged stands and varied based on site class as well as whether or not it was in a WLPZ designated area.

For stands on site classes II and III, intermediate thinnings were operable when the stand exceeded a stocking whereby thinning to 100 square feet per acre of basal area left at least of 100 trees per acre of trees greater than or equal to 4 inches dbh and yielded the minimum feasible harvest volume. The residual stand also maintained a minimum 50 percent canopy cover of which at least 25 percent of the overstory was conifer. This treatment was applicable to stands on non-WLPZ areas, Class II-S Inner WLPZs, and Class I Outer WLPZs, all of which areas had to be outside of NSO designated habitat.

For stands on site class IV, intermediate thinnings were operable when the stand exceeded a stocking whereby thinning to 75 square feet per acre of basal area left at least of 75 trees per acre of trees greater than or equal to 4 inches dbh and yielded the minimum feasible harvest volume. For Class II-S

Inner WLPZs, the residual stand also maintained a minimum 50 percent canopy cover of which at least 25 percent of the overstory was conifer. This treatment was applicable to stands on non-WLPZ areas and Class II-S Inner WLPZs, all of which areas had to be outside of NSO designated habitat.

For stands on site class V, intermediate thinnings were operable when the stand exceeded a stocking whereby thinning to 50 square feet per acre of basal area left at least of 75 trees per acre of trees greater than or equal to 4 inches dbh and yielded the minimum feasible harvest volume. For Class II-S Inner WLPZs, the residual stand also maintained a minimum 50 percent canopy cover of which at least 25 percent of the overstory was conifer. This treatment was applicable to stands on non-WLPZ areas and Class II-S Inner WLPZs, all of which areas had to be outside of NSO designated habitat.

A ‘selection harvest’ was defined as a single tree selection harvest (i.e. uneven-age). All selection harvests were designed using a Q-factor of 1.4 and a maximum diameter class of 24 inches. The target residual basal area varied based on site class, NSO habitat type, and WLPZ type. Stands became operable for re-entry when cutting to the Forest Practice Rules retention standards yielded the minimum feasible harvest volume; this typically resulted in 10-15 year harvest cycles depending on site class. Conifer regeneration was established immediately following the harvest and hardwood sprouts, if any, were controlled.

For stands on site classes IV and V, selection harvests were operable when the stand exceeded a stocking whereby thinning to 50 square feet per acre of basal area yielded the minimum feasible harvest volume. This treatment was only applicable in non-NSO designated habitat and outside any WLPZs.

For stands on site classes II through V, selection harvests were operable when the stand exceeded a stocking whereby thinning to 80 square feet per acre of basal area yielded the minimum feasible harvest volume. In Class I Outer and Class II-S Inner WLPZs, the residual stand also maintained a minimum 50 percent canopy cover of which at least 25 percent of the overstory was conifer. This treatment was also applicable to areas of NSO Low Quality Foraging Habitat but maintained 40 percent canopy cover and a quadratic mean diameter of 11 inches.

For stands on site classes II through V, selection harvests were also operable when the stand exceeded a stocking whereby thinning to 120 square feet per acre of basal area yielded the minimum feasible harvest volume. In Class II-S Inner WLPZs, the residual stand also maintained a minimum 50 percent canopy cover of which at least 25 percent of the overstory was conifer. This treatment was also applicable to areas of NSO Foraging Habitat but maintained 40 percent canopy cover, a quadratic mean diameter of 13 inches, and 5 trees per acre greater than or equal to 26 inches dbh.

For stands on site classes II through V, selection harvests were also operable when the stand exceeded a stocking whereby thinning to 150 square feet per acre of basal area yielded the minimum feasible harvest volume. In Class II-S Inner WLPZs, the residual stand also maintained a minimum 50 percent canopy cover of which at least 25 percent of the overstory was conifer. This treatment was also applicable to areas of NSO Nesting/Roosting Habitat but maintained 60 percent canopy cover, a quadratic mean diameter of 15 inches, and 8 trees per acre greater than or equal to 26 inches dbh.

For stands on site classes II through V, selection harvests were also operable when the stand exceeded a stocking whereby thinning to 210 square feet per acre of basal area yielded the minimum feasible harvest volume. In Class II-S Inner WLPZs, the residual stand also maintained a minimum 50 percent canopy cover of which at least 25 percent of the overstory was conifer. No harvesting occurred in the baseline model for NSO High Quality Nesting/Roosting Habitat.

For stands on site classes II through V, selection harvests were also operable when the stand exceeded a stocking whereby thinning to 80 percent canopy cover yielded the minimum feasible harvest volume. This variation of selection harvest was applicable to stands in Class I Inner and Class II-L Inner WLPZs. In

this case, 25 percent of the residual canopy cover was in conifer species and the quadratic mean diameter of conifer trees greater than or equal to 8 inches dbh increased post-harvest.

The arrangement of these treatments over time and space create timber product value in both yields and appreciation and provide NSO habitat that is in line with the baseline scenario characterization and legal constraints. By the end of the baseline model, 212 acres remain not treated as a result of being protected NSO habitat or restricted WLPZ areas. The areas in Figure 11 indicate baseline treatment paths for the project area beginning with the start date condition (i.e. 'Not treated' yet). The development case for each stand, and the management regime at the landscape level, yield an acceptable return on investment for the forest owner while maintaining compliance with the California Forest Practice Rules and NSO Take Avoidance protection measures. Overall, the baseline regime reflects maximum sustained productivity and a harvest and growth pattern that indefinitely serves multiple management objectives.

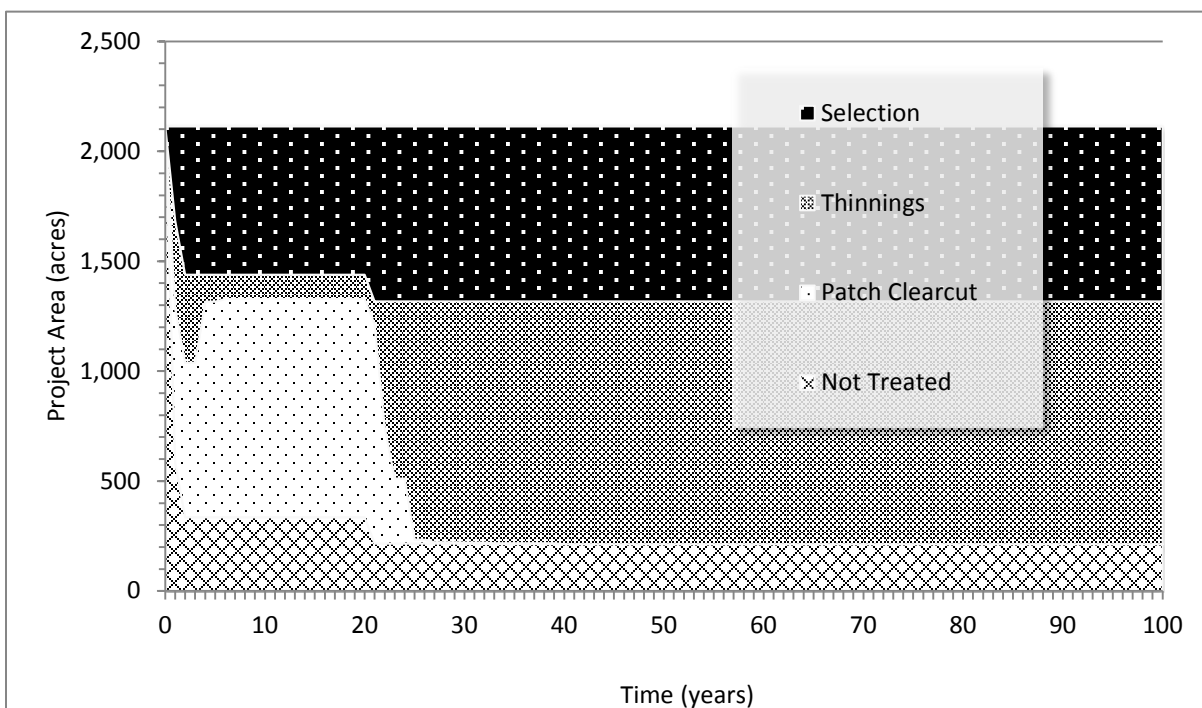


Figure 11. Project Area by baseline treatment arrangement over time

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 harvest volume. The project area is also within 75 miles of five sawmill facilities and three biomass co-generation plants which support available logging contractors, and a strong timber market demand. The average annual harvest volume in the baseline was 1.8 million board feet (Scribner decimal C), which is slightly below the mean annual increment of approximately 2.0 million board feet per year. The forest

owner also maintains an extensive network of permanent and seasonal roads to support forest operations across the property.

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

- a. Slopes that do not exceed slopes in the project area by more than 10 percent
- b. An equivalent zoning class to the project area
- c. Comparable species composition to the project area
- d. Similar access by road, cable or helicopter

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

Table 19. Baseline harvest activity comparison on nearby lands demonstrating consideration of financial constraints

Evidence/Document	Slope	Zoning Class	Species Composition	Access
Timber Harvesting Activity showing a final harvest treatment on nearby lands (see Figure 12).	Slope, elevation, and terrain in terms of operability within 10 percent of lands in project area (see Figure 12)	Same zoning class as project area (both subject to Forest Practice Rules in Coastal District).	Species composition is comparable, i.e., overstory comprised of Douglas-fir, port-orford cedar, white fir, Jeffrey pine, ponderosa pine, incense cedar, tanoak, red alder and other hardwoods. Trees per acre were not available for analysis but historical aerial photography and extreme proximity of similar harvest activities indicate that project site and comparable harvest site consist of a similar mixture of conifers and hardwoods. Harvest removal volumes are assumed to be similar given matching silvicultural prescriptions, access to timber buyers and logging contractors, and overall proximity to the project area.	Nearby harvest activity close enough to project area whereby they would use the same paved roads. Woods roads and skid trails comparable and typical for the surrounding properties.

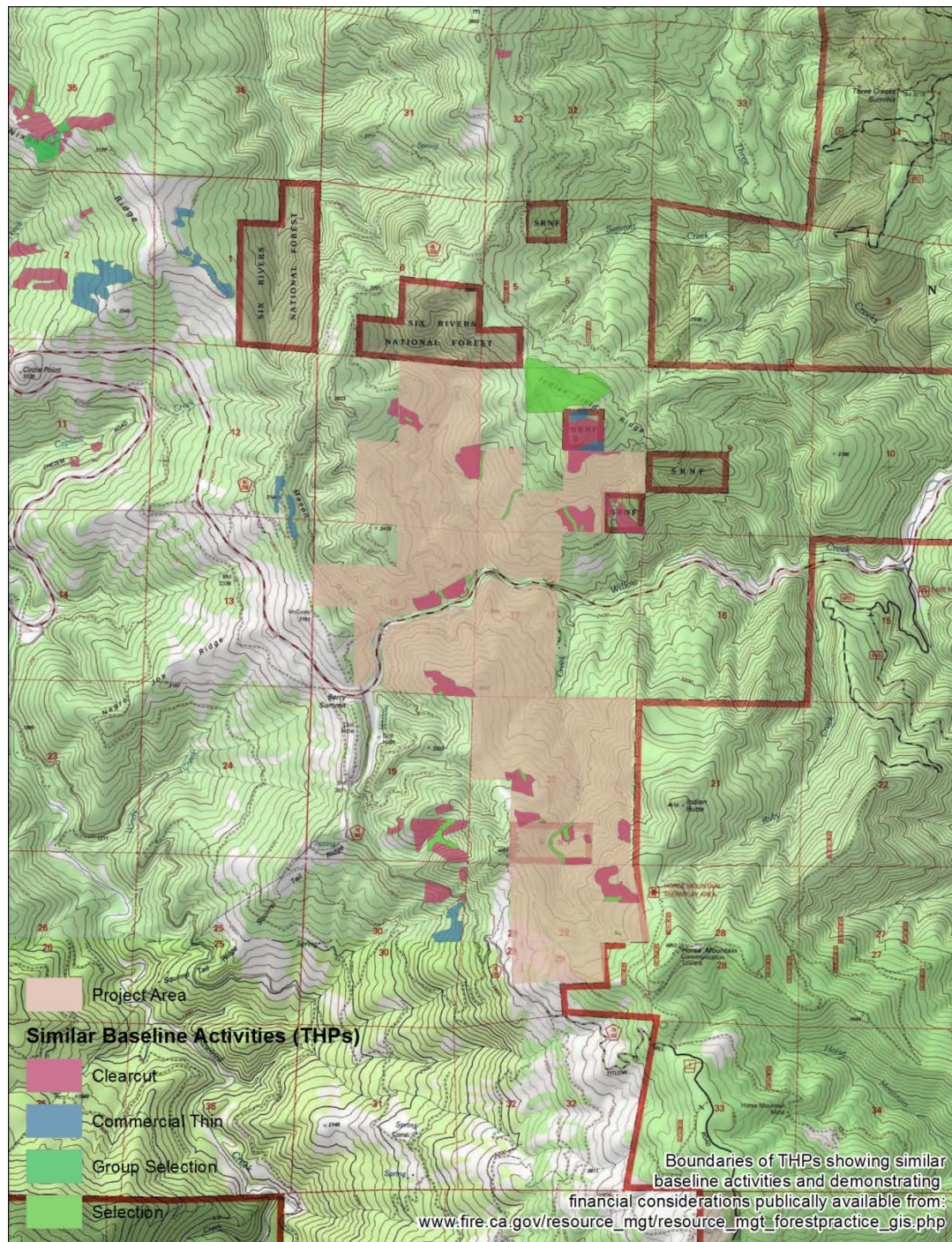


Figure 12. Terrain of similar timber harvest activity on nearby lands

Minimum Baseline Level

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

$$MBL = \text{MAX} (CP, \text{MIN} (ICS, CP + ICS - WCS))$$

Where:	MBL	=	Minimum baseline level (above-ground standing live carbon stocks)
	CP	=	Common Practice (as determined in Step 1)
	ICS	=	Initial above-ground standing live carbon stocks per acre within the Project Area (as determined in Step 2)
	WCS	=	The weighted average above-ground standing live carbon stocks per acre for all Forest Owner (and affiliate) landholdings within the same logical management unit as the Project Area. See Section 6.2.1.1 for requirements and guidance on calculating WCS.

The first inner function in Equation 6.5 evaluates the minimum of ICS or (CP + ICS – WCS). The ICS was determined in step 2 (ICS = 212.05 tCO₂e per acre). The CP was determined in step 1 (CP = 94.06 tCO₂e per acre). The WCS was calculated using inventory data and Equation 6.7 from the FPP which is expressed as:

Equation 6.7:

$$\text{If } \left| 1 - \frac{ECS}{ICS} \right| \leq 0.2, \text{ then } WCS = ICS$$

$$\text{If } \left| 1 - \frac{ECS}{ICS} \right| > 0.2, \text{ then } WCS = \frac{ICS \times PA + ECS \times EA}{PA + EA}$$

Where:	WCS	=	Same as in Equation 6.5
	ICS	=	Same as in Equation 6.5

PA	=	Size of the project area in acres
ECS	=	Above-ground standing live carbon stocks per acre within the LMU <i>but excluding the Project Area (EA)</i> , as determined from existing inventory data
EA	=	Size of the LMU in acres, <i>excluding the Project Area</i>
LMU	=	Logical Management Unit

A “logical management unit” or “LMU” is defined as all land that the Forest Owner and its affiliate(s) either own in fee or hold timber rights on, and which it or they manage as an explicitly defined planning subunit. LMUs are generally characterized by having unique biological, geographical, and/or geological attributes, are generally delimited by watershed boundaries and/or elevation zones, and contain unique road networks.

In this case, the project area has been identified as one LMU. In other words, the project area is the LMU for the purposes of calculating WCS and no commercial forestland within the LMU has been excluded from the project area. By the nature of the project area’s relatively small size and the fact it is the only forest currently owned by the forest owner, the LMU has been defined by identifying all lands where the forest owner and its affiliate(s) own in fee within the same Assessment Area(s) covered by the Project Area.

As a matter of evaluating the first if-then expression in Equation 6.7, ECS, was equal to zero (0) because there is no area being excluded inside the LMU. Likewise, the EA is also equal to zero (0).

Using the values of ECS and ICS, the first if-then expression can be tested as:

$$\text{If } \left| 1 - \frac{ECS}{ICS} \right| \leq 0.2, \text{ then } WCS = ICS$$

$$\text{If } \left| 1 - \frac{0}{211.93} \right| \leq 0.2, \text{ then } WCS = ICS$$

$$\text{If } |1 - 0| \leq 0.2, \text{ then } WCS = ICS$$

$$\text{If } |1| \leq 0.2, \text{ then } WCS = ICS$$

Because the sentence in the first if-then expression is not true, the second if-then expression is true and WCS is calculated as:

$$WCS = \frac{ICS \times PA + ECS \times EA}{PA + EA}$$

$$WCS = \frac{211.93 \times 2,112.86 + 0 \times 0}{2,112.86 + 0}$$

$$WCS = 211.93$$

Therefore, the minimum of ICS or (CP + ICS – WCS) is:

$$\begin{aligned} \text{MIN} &= (\text{ICS}, \text{CP} + \text{ICS} - \text{WCS}) \\ &= (211.93, 94.06 + 211.93 - 211.93) \\ &= (211.93, 94.06) \\ &= 94.06 \end{aligned}$$

The primary function of Equation 6.5 is then reduced and the minimum baseline level is determined as:

$$\begin{aligned} \text{MBL} &= \text{MAX}(\text{CP}, \text{MIN}(\text{ICS}, \text{CP} + \text{ICS} - \text{WCS})) \\ &= \text{MAX}(94.06, \text{MIN}(211.93, 94.06 + 211.93 - 211.93)) \\ &= \text{MAX}(94.06, \text{MIN}(211.93, 94.06)) \end{aligned}$$

$$= \text{MAX}(94.06, 94.06)$$

$$= 94.06$$

The average modeled results, expressed as above-ground standing live carbon stocks per acre, must not fall below the MBL, 94.06 tCO₂e.

Setting the Baseline for Above-Ground Standing Live Carbon Stocks

The baseline growth and harvest regime was planned using Remsoft's forest modeling software, Woodstock⁴. Yield tables (i.e. development cases) were created from the January 2013 inventory data for each stratum using the Forest Vegetation Simulator (FVS⁵) 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 13 plots above-ground standing live carbon stocks against time. The results show the 'average above-ground standing live carbon stocks' per acre (113.04 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 (94.06 tCO₂e). The total baseline average above-ground standing live carbon stock is 238,847 tCO₂e.

⁴ <http://www.remsoft.com/products.php>

⁵ <http://www.fs.fed.us/fmrc/fvs/>

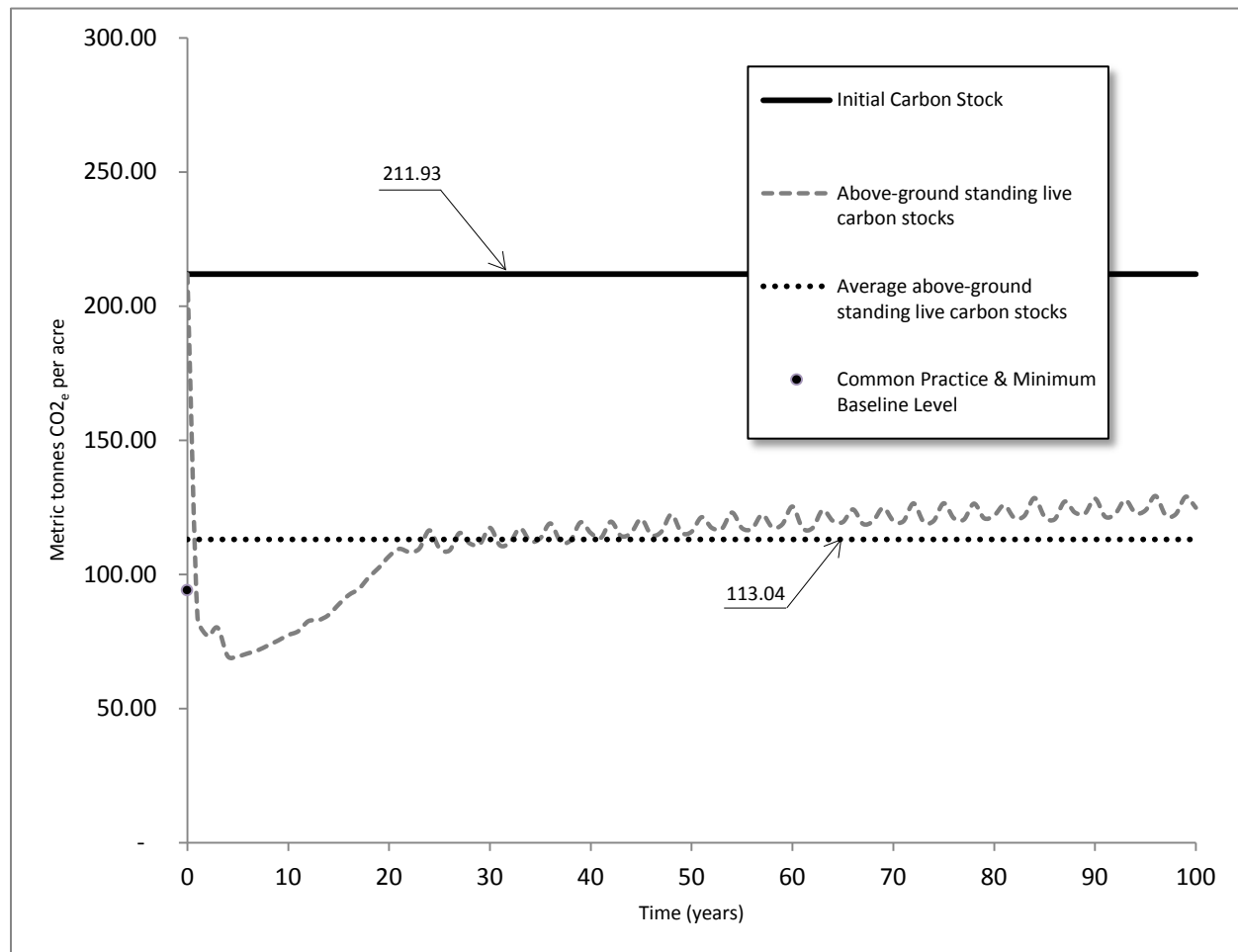


Figure 13. Baseline above-ground standing live carbon stocks

Step 4 – Determine the Baseline for All Onsite Carbon Pools

Additional pools, shown in Figure 14, were modeled and quantified in the same fashion as the above-ground standing live carbon stocks in the previous step. These additional pools were below-ground carbon stocks and standing dead carbon stocks. The final total average baseline onsite carbon stock for all pools is 325,350 tCO₂e or 153.99 tCO₂e per acre (Figure 15). This was input to the CRT form under *Baseline Onsite Carbon Stocks (tonnes CO₂e)*, calc row 6.

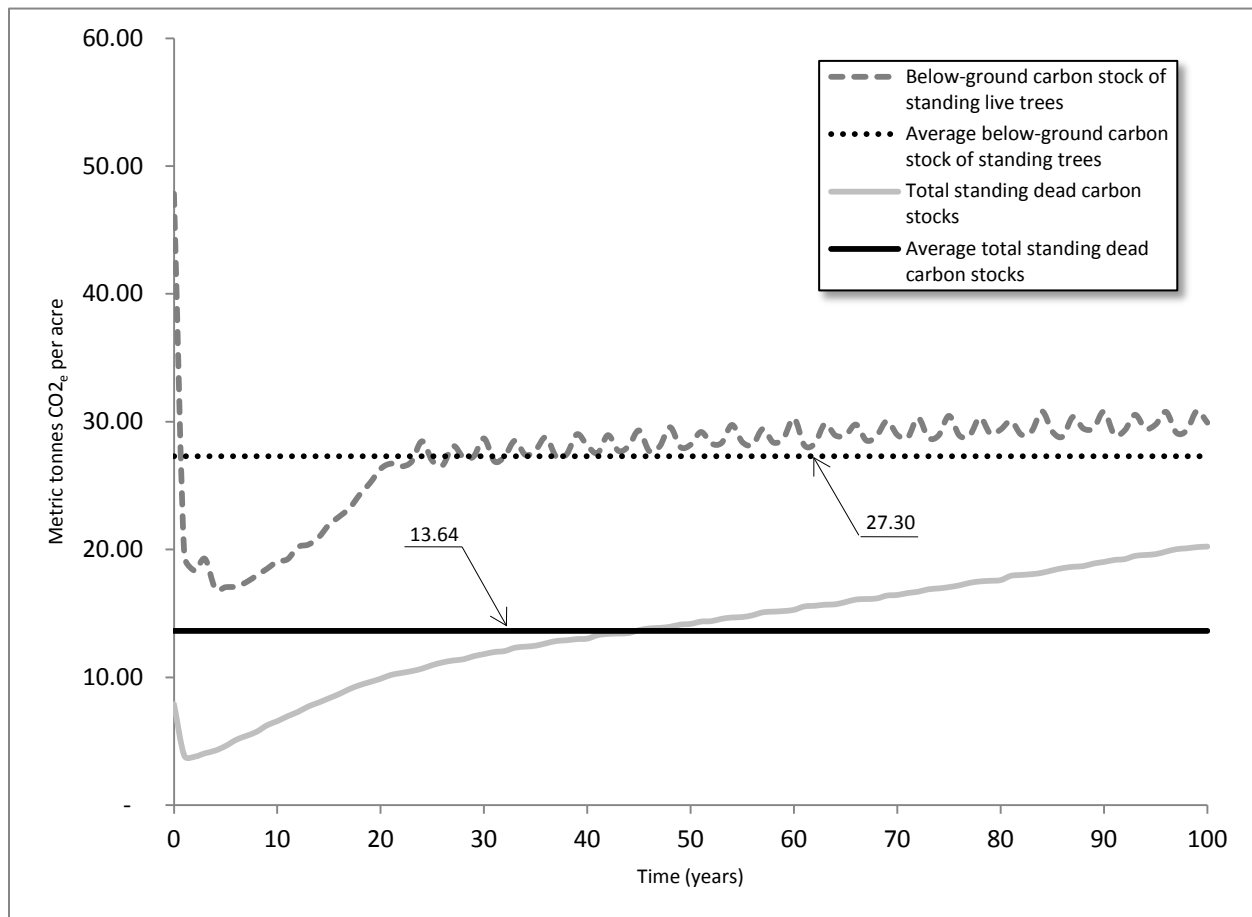


Figure 14. Additional baseline carbon pools

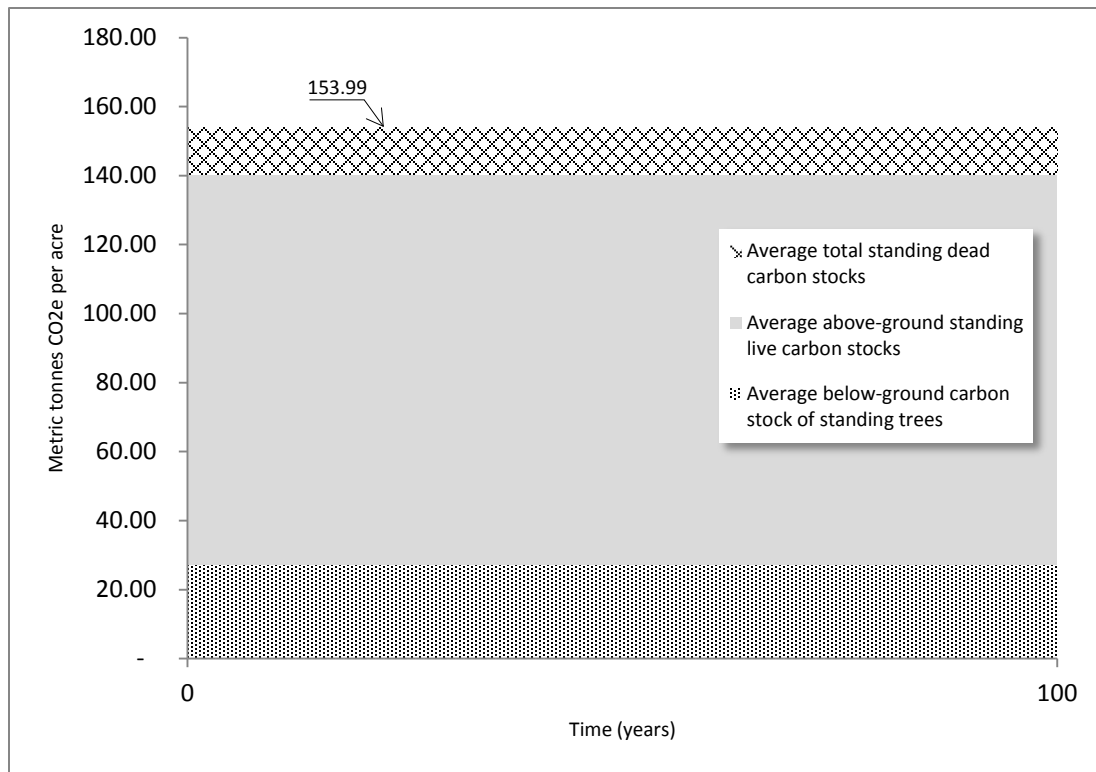


Figure 15. Final baseline for all onsite carbon pools

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 and project harvest volume projections in cubic feet are shown in a table in Appendix G. CAR1004 Baseline and Project Harvest Volumes. The average of baseline carbon in trees harvested for wood products was 18,089 tCO₂e (8.56 tCO₂e/acre) as shown in Figure 16. This was input to the CRT Monitoring Calculation Worksheet calc row 10.

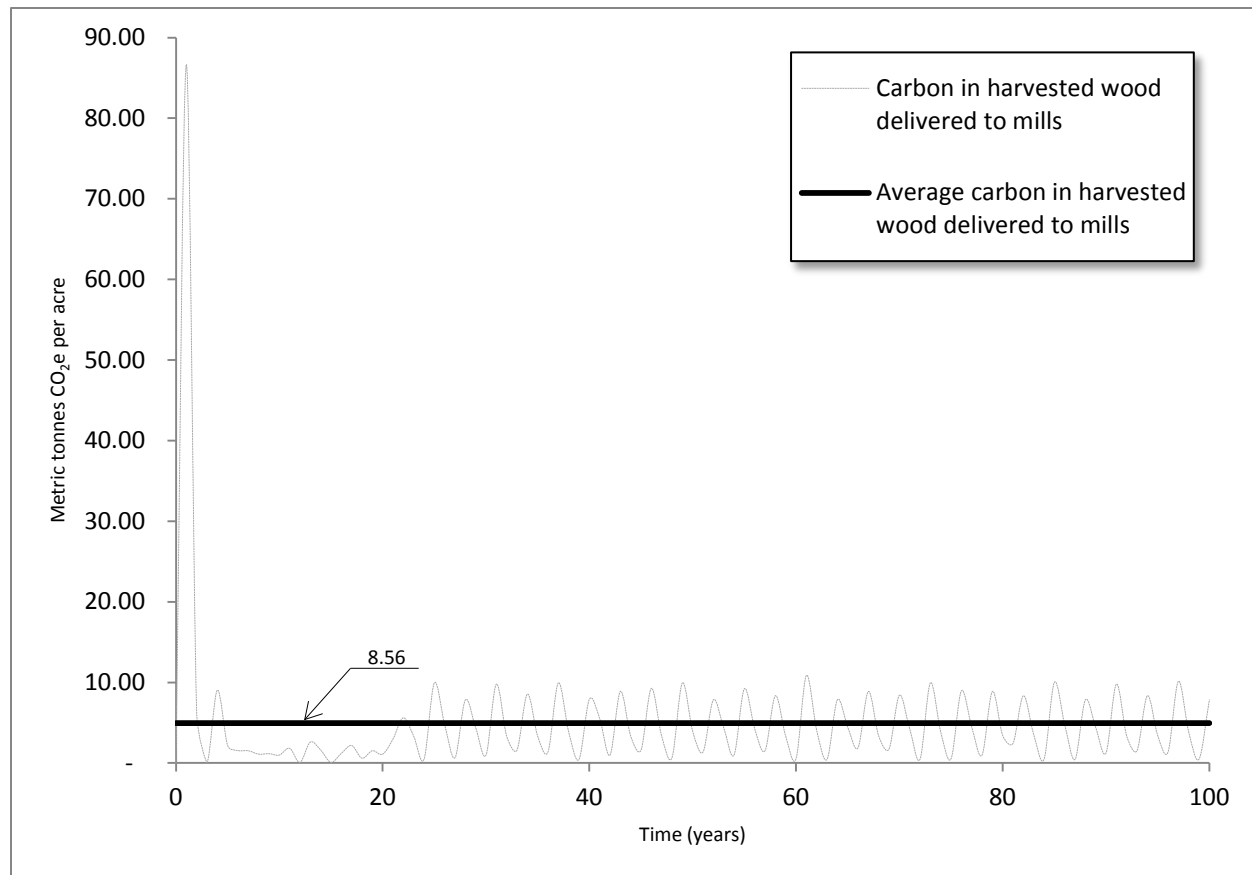


Figure 16. Baseline carbon in trees harvested for wood products

Second, the amount of baseline carbon in harvested wood delivered to the mill was calculated. This is only the carbon in the merchantable wood portion of the trees harvested for wood products prior to delivery to the mill. The stem bark, top, stump and below ground portions were considered to be immediately emitted to the atmosphere for accounting purposes. The estimates were derived using the same volume and biomass equations to calculate biomass in live trees. The average baseline carbon in harvested wood delivered to the mill was 10,459 tCO₂e (4.95 tCO₂e/acre) as shown in Figure 17. This was input to the CRT Monitoring Calculation Worksheet, calc row 12.

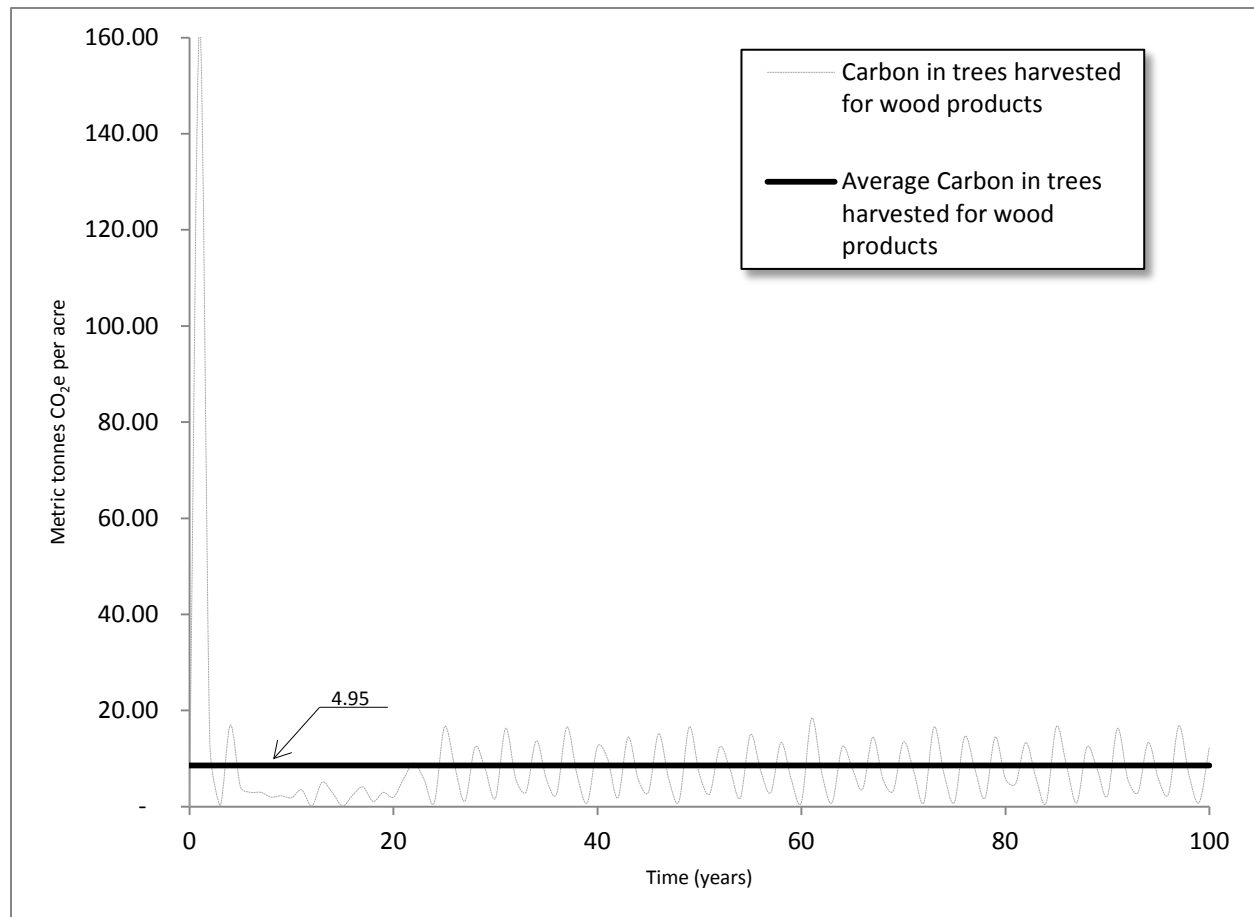


Figure 17. Baseline carbon in harvested wood delivered to mills

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 as published on the Reserve website. The HWPCW tool is regional specific. Berry Summit is in California which is grouped in the Pacific Southwest Region as shown in Figure 18 (“PSW”).

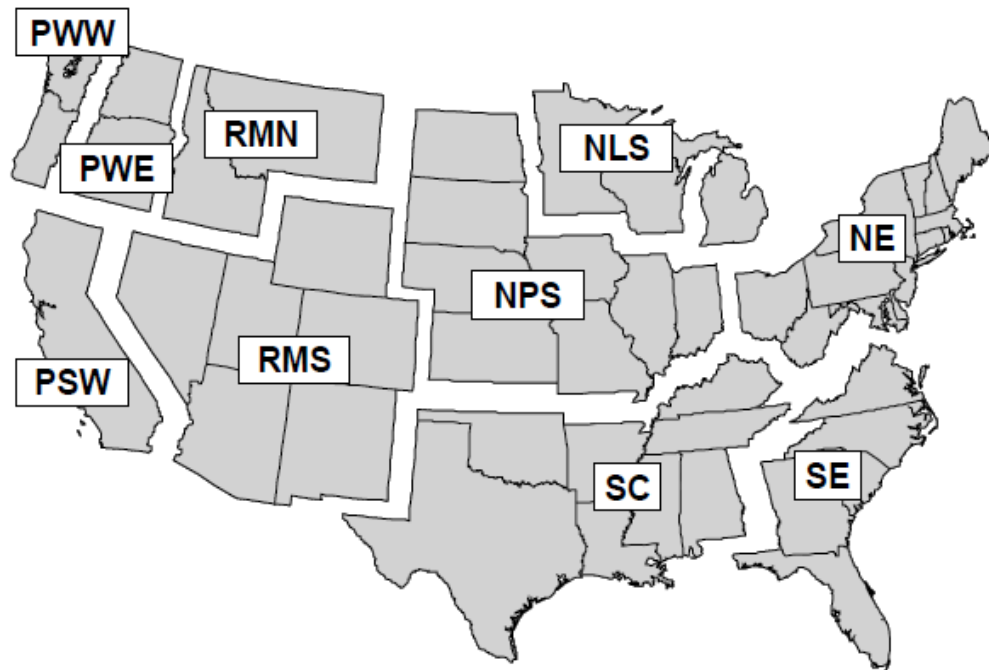


Figure 18. Definition of Regions

The average baseline carbon in harvested wood delivered to the mill was input to the HWPCW tool in Table 7. In HWPCW Table 5, the average baseline carbon in harvested wood delivered to the mill is then distributed among the wood product classes based on the percent product values established by the volume actually harvested in the project for that reporting period (see “% Product” in HWPCW tool Table 4). Because no harvesting has occurred in the project area since the project start date, there are no actual harvest volumes to report. However, an immaterial value⁶ indicative of the proportion of species groups harvested in the baseline were input in Table 3 of the HWPCW so the average baseline carbon in harvested wood delivered to the mill is distributed among the correct wood product classes in Tables 4 and 5 of the HWPCW. A mill efficiency rate is applied next to determine the net baseline carbon in harvested wood delivered to the mill that is actually transferred to wood products. Default mill efficiency data, which vary by region, state, species group and product class, is provided in the Mill Efficiency Data File as it appears on the Reserve website and is also in Table 11 of the HWPCW. The mill efficiencies are also shown in Table 20 below. The default values were used to calculate the baseline harvested wood products only because there were no project harvested wood products. The mill efficiency values are automatically used in the HWPCW tool as a function of selecting the Region in Section 1.

⁶ 0.30 units for the miscellaneous product column under hardwoods, 0.35 units for the lumber product column under the softwoods, and 0.35 units for the plywood product column under the softwoods (units = MBF Scribner “C”)

Table 20. Mill Efficiencies by Product

Region	State	Hardwood Saw Log	Hardwood Pulpwood	Softwood Saw Log	Softwood Pulpwood
Pacific Southwest	California	0.568	0.568	0.675	0.675

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 the Reserve as “average storage factors” (found in Table C.2, FPP version 3.2).

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 21).

Table 21. 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 CRT 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 22.

Table 22. Total Baseline Carbon Stored Long-Term in Harvested Wood Products

Reporting Period Begin Date	10-May-13
Reporting Period End Date	01-Sept-13
Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Excl Landfill	2,618
Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Incl Landfill	4,882

6.2.4 Determining Actual Onsite Carbon Stocks

Initial onsite carbon stocks were determined using the inventory data and the most current volume and biomass equations (i.e. volume and biomass equations for projects in California, Washington and Oregon) appropriate for the Supersections and species as published by the Reserve. 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 23 and the total stocks were input to the CRT 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 carbon market incentives to implement a reduced management intensity that supports longer rotations and increased habitat protection measures.

Table 23. Actual Onsite Carbon Stocks

Reporting Period Begin Date	Reporting Period End Date	Total Stocks (tCO ₂ e)			Stocks Per Acre (tCO ₂ e)		
		IFM 1	IFM 3	Total	IFM 1	IFM 3	Total
Initial Carbon Stocks		548,869.5	16,722.2	565,591.7	259.78	7.91	267.69
10-May-13	01-Sept-13	564,136.8	22,851.8	586,988.6	267.00	10.82	277.82

6.2.5 Determining Actual Carbon in Harvested Wood Products

No harvest activity has occurred in the project since the project start date and therefore no actual carbon in harvested wood products has been determined. In the event the forest owner elects to harvest, the amount of actual carbon transferred to long-term storage in harvested wood products will be estimated using the same

HWPCW tool and settings as discussed in 6.2.3 Estimating Baseline Carbon in Harvested Wood Products. Harvest volume delivered to the mill will be summarized in a verified mill report in MBF Scribner “C” (or other appropriate unit) for both softwoods and hardwoods based on the actual harvest reports and mill scale receipts in the project reporting period. This will be input to Table 3 of the HWPCW tool by wood product class (Table 24. Wood Product Classes).

Table 24. Wood Product Classes

Verified Mill Report	HWPCW Tool Wood Product Class
Hardwood sawtimber	Hardwood lumber or non-structural panels
Hardwood feedstock	Hardwood misc. products
Softwood sawtimber	Softwood lumber or plywood

The harvest volume is then subsequently converted to cubic feet and then tons of CO₂e using the conversion factors and specific gravity factors found in HWPCW tool Table 11. The sum of these tons of CO₂e in all wood product classes is reported as the actual project carbon in harvested wood delivered to the mill and is input to the CRT Monitoring Calculation Worksheet in calc row 11.

The actual project carbon in trees harvested for wood products (i.e. carbon in the wood delivered to the mill plus all other components of the tree, i.e. bark, stump, top, and coarse roots) is determined using a multiplier, or expansion ratio. The multiplier is developed based on the ratio of baseline carbon in trees harvested for wood products to baseline carbon in harvested wood delivered to the mill (see calc rows 10 and 12 in the CRT Monitoring Calculation Worksheet and Table 7 of the HWPCW tool). Because the carbon harvested in the baseline was determined using the method and equations required for projects in California (and Washington and Oregon), the multiplier also reflects this method. The multiplier, in this case 1.73, is the same for all reporting periods. The actual project carbon in trees harvested for wood products is calculated in Table 6 of the HWPCW tool and then input to the CRT Monitoring Calculation Worksheet in calc row 9.

The net wood material transferred to wood products (i.e. after mill processing) is determined by applying the respective mill efficiency rates to the harvest volumes by wood product class (Table 20. Mill Efficiencies by Product). This volume is then converted to cubic feet and tons of CO₂e. After the net tons CO₂e transferred to wood products is calculated, the long-term storage in In-Use wood products and wood products in landfills is determined by applying the average-storage factors by wood product class (Table 21. Average storage factors used to estimate carbon in In-Use wood products and landfills, also see HWPCW tool Table 4).

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

A summary of the actual project carbon stored long-term in wood products is shown in Table 25.

Table 25. Summary of Project Harvest Volumes and Carbon by Reporting Period

Reporting Period Begin Date	10-May-13	02-Sept-13	02-Sept-14	02-Sept-15	02-Sept-16	02-Sept-17
Reporting Period End Date	01-Sept-13	01-Sept-14	01-Sept-15	01-Sept-16	01-Sept-17	01-Sept-18
Actual Carbon in Trees Harvested for Wood Products in (tonnes CO ₂ e)	0	-	-	-	-	-
Actual Carbon in Harvested Wood Delivered to Mills (tonnes CO ₂ e)	0	-	-	-	-	-
Actual Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Excl Landfill	0	-	-	-	-	-
Actual Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Incl Landfill	0	-	-	-	-	-

Note: No harvesting has occurred in the current reporting period, or since the project start date.

6.2.6 Quantifying Secondary Effects

Secondary effects were calculated automatically by the project CRT Monitoring Calculation Worksheet. The results, which reference the CRT calculation rows, are shown in Table 26. Note that landfill carbon is included in the harvested wood products calculation for these reporting periods of the Project.

Table 26. Market Leakage and Other Secondary Effects

Calc Row	Market Effects and Leakage - All Projects	Reporting Period Begin Date	10-May-13	2-Sep-13	2-Sep-14	2-Sep-15	2-Sep-16	2-Sep-17
		Reporting Period End Date	1-Sep-13	1-Sep-14	1-Sep-15	1-Sep-16	1-Sep-17	1-Sep-18
9	Actual Carbon in Trees Harvested for Wood Products in (tonnes CO ₂ e)		-					
10	Baseline Carbon in Trees Harvested for Wood Products (tonnes CO ₂ e)		18,090					
11	Actual Carbon in Harvested Wood Delivered to Mills (tonnes CO ₂ e)		-					
12	Baseline Carbon in Harvested Wood Delivered to Mills (tonnes CO ₂ e)		10,459					
13	Actual Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Excl Landfill		-					
14	Actual Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Incl Landfill		-					
15	Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Excl Landfill		2,618					
16	Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Incl		4,882					

	Landfill		
17	Diff Between Actual and Baseline Carbon in Harvested Wood (tonnes CO2e) - Excl Landfill	(2,618)	
18	Difference Between Actual and Baseline Carbon in Harvested Wood (tonnes CO2e) - Incl Landfill	(4,882)	
19	Difference in Actual and Baseline Carbon Stored in Wood Products (tonnes CO2e) - Landfill Adj	(4,882)	
20	GHG Reductions / Removals for Carbon Stored in Wood Products (tonnes CO2e) w/ mkt response	(3,906)	
Other Secondary Effects - IFM Projects			
27	Difference Between Actual and Baseline Carbon in Trees Harvested for Wood Products (tonnes CO2e)	(18,090)	
28	Other Secondary Effects Emissions (shifting activities/materials) IFM Projects (tonnes CO2e)	(3,618)	

6.2.7 Calculating Total Net GHG Reductions and Removals

6.2.7.1 Confidence Deduction

The inventory uncertainty was calculated as 7.54 percent error (see Table 6). The inventory was field-verified using the t-Test, paired two-sample for means. Eight (8) plots were selected to be verified and measured by the verifier. The test results concluded that the null hypothesis (i.e. the mean difference is equal to zero) was unable to be rejected. Consequently, no additional uncertainty deduction was applied during field verification. Because the inventory percent error is greater than the 5 percent threshold for allowed uncertainty before applying a discount (see Table A.5. in FPP, Appendix A), 2.54 percent was applied in the CRT 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 CRT Monitoring Calculation Worksheet. The results, which reference the CRT calculation rows, are shown in Table 27.

Table 27. Total Net GHG Reductions and Removals

Calc Row	Onsite Carbon Stocks	Start Date	Reporting Period Begin Date	10-May-13	2-Sep-13	2-Sep-14	2-Sep-15	2-Sep-16	2-Sep-17
		10-May-13	Reporting Period End Date	1-Sep-13	1-Sep-14	1-Sep-15	1-Sep-16	1-Sep-17	1-Sep-18
1	Sampled Onsite Carbon Stocks (tonnes CO2e)	565,592		586,989					
2	Confidence Deduction								

		0	
3	Adjusted Sampled Onsite Carbon Stocks (adjusted for confidence deduction) (tonnes CO2e)	572,079	
4	Soil Carbon Emissions	-	
5	Increment in Actual Onsite Carbon Stocks (tonnes CO2e)	572,079	
6	Baseline Onsite Carbon Stocks (tonnes CO2e)	565,592	325,350
7	Increment in Baseline Onsite Carbon Stocks (tonnes CO2e)	-	
8	Quantified GHG Reductions / Removals for Onsite Carbon Stocks (tonnes CO2e)	246,729	
20	GHG Reductions / Removals for Carbon Stored in Wood Products (tonnes CO2e) w/ mkt response	(3,906)	
28	Other Secondary Effects Emissions (shifting activities/materials) IFM Projects (tonnes CO2e)	(3,618)	
	Quantified GHG Reductions and Removals		
34	Annual GHG Reductions/Removals Net of Discounts and Secondary Effects (tonnes CO2e)	239,205	
35	Cumulative GHG Reductions/Removals; not incl.neg. carryover or reversals (tonnes CO2e)	239,205	
36	Cumulative Negative Carryover from Prior Year (tonnes CO2e)	-	
37	CRTs Issued - Net of Negative Carryover, bef. Buffer or adjust for Reversals (tonnes CO2e)	239,205	
	Calculation of Buffer Pool Contribution		
38	Project Specific Reversal Risk Rating	19.20%	
39	CRTs from other Reporting Periods submitted to Buffer Pool	-	
40	Buffer Pool Contributions (CRTs)	45,928	
	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	193,277
48	Vintage I - Calendar year of Reporting Period start date (Vintage)	2,013
49	Portion of CRTs in first vintage in Reporting Period	193,277
50	Vintage II - Calendar year of Reporting Period end date (Vintage - if different from start date vintage)	
51	Portion of CRTs in second vintage Reporting Period	-
52	Cumulative CRTs Issued to Account Holder	193,277

7. Ensuring the Permanence of Credited GHG Reductions and Removals

The Reserve 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 Reserve 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 section Project Monitoring section for more detail.

7.2 Project Implementation Agreement

Forest owners are required to sign a Project Implementation Agreement (PIA) with the Reserve which obligates forest owners to retire CRTs to compensate for reversals of GHG reductions and removals. The PIA has been executed and submitted to the Reserve and is recorded in the Office of Land Records, Humboldt County, California.

7.3 Buffer Pool

A buffer pool is maintained by the Reserve 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 pool contribution is determined by a project-specific, risk rating worksheet and the following formula:

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

The total required buffer pool contribution for the current reporting period is 19.2 percent (Table 28).

Table 28. Risk rating analysis for required buffer pool contribution

Risk Category	Risk Sub-Category	PIA Only	PIA + QCE or QDR or Public	Score	(1-Score)
Financial		5.0%	1.0%	5.0%	95.0%
	PIA Subordinate Clause (Type I)*	2.0%	2.0%	0.0%	100.0%
Management					
	Illegal Logging**	0.0%	0.0%	0.0%	100.0%
	Risk of conversion	2.0%	0.0%	2.0%	98.0%
	Risk of over harvesting	2.0%	0.0%	2.0%	98.0%
Social*		2.0%	2.0%	2.0%	98.0%
Natural Disturbance					
	Wildfire***	4.0%	4.0%	4.0%	96.0%
	Disease Insect	3.0%	3.0%	3.0%	97.0%
	Other catastrophic	3.0%	3.0%	3.0%	97.0%
Risk Rating Analysis Result					80.8%
Total Risk Score					19.2%

* = Waived because all tons and project are being converted to the ARB offset program and compliance offset protocol.

** = Default values from FPP

*** = From Assessment Area Data File

All risk 'scores' were determined using the 'PIA Only' ratings. Wildfire risk was established based on the default risk for the subject Supersection and Assessment Areas from the most recent Assessment Area Data File as published on the Reserve website.

8. Project Monitoring

The primary purpose of the project's annual monitoring plan is to ensure up-to-date estimates of project carbon stocks and provide assurance that GHG reductions or removals achieved by a project have not been reversed. See full monitoring plan in Appendix J. CAR1004 Full Monitoring Plan 20130510 Proprietary.pdf.

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

- Annual forest carbon inventory and carbon stock updates (described in detail below)
- Annual Third-Party Audit - forest carbon project verification by OPR/ARB accredited verifier

The forest owner will use permanent CFI plots and approved growth & yield modeling to annually update the project's forest carbon stocks. Measuring the same plots through time will reduce sampling variability and provide reliable estimates of actual growth through time. Due to the possible inclusion of timber harvesting in the future within the project area, the inventory will be updated following harvesting events as well. When necessary, new plots will be installed in areas affected by planned or unplanned harvests, land sales, conversions to other land use, natural events, or other similar events. Each event will require spatial and tabular updates of the carbon data set. Data updates including harvest volume summaries will be submitted by the Forest Owner to Finite Carbon on June 11th for the previous year and prepared for verification within the required time period allowed.

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

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

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

The calculation of actual on-site carbon reported for each period shall use plot and tree data grown forward by the growth model to the current reporting year along with incorporation of any recently re-measured plots or new plots. The forest owner will attempt to annually re-measure at least 20% of the permanent inventory plots; however, inventory plot data used in the estimate of actual onsite carbon stocks will not be more than 12 years old.

On-going monitoring by the forest owner and its forest managers will ensure Unavoidable Reversals and will be reported to CAR. Where necessary, an inventory of affected portions of the forest will be inventoried to account for unintentional reversals that create a need for CRT replacement from the Reserve buffer pool. Inventory design to account for losses from unintentional losses will depend on the extent and intensity of the reversal should they occur; however, they will always follow the project inventory specifications (Appendix H. CAR1004 Project Inventory Specifications 20131010 Proprietary.pdf).

8.1 Methods for Quality Control

Quality Control for this project is defined as a series of activities and documented procedures that serve to maintain an acceptable level of data quality for monitoring forest carbon stocks and demonstrating compliance with the Forest Project Protocol. 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 Submittal Form and listed under the forest owner'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:

- Project Design Document;
- Inventory Specifications and Procedures document;
- Project geodatabase (GIS files);
- Model Plan and Analytical Systems document;
- CRT 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 at the beginning of the document or within the name of the file. Out dated files will be archived. Other forms and documents required by the Reserve 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 Reserve in the required time frame as outlined in the FPP. All results will be summarized in the annual forest monitoring report.

References

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.

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<http://www.climateactionreserve.org/how/protocols/forest/>

Keyser, Chad E. comp. 2008 (Revised October 4, 2011). Klamath Mountains (NC) Variant Overview – Forest Vegetation Simulator. Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 46p.

List of Appendices

Appendix A. CAR1004_Map_TownsRoads.pdf

Appendix B. CAR1004_Map_Watercourses.pdf

Appendix C. CAR1004_Map_Topography.pdf

Appendix D. CAR1004_Map_CountyTwnshp.pdf

Appendix E. CAR1004_Map_AssessmentAreas.pdf

Appendix F. CAR1004 Data Management & Analytical Systems 20130905 Proprietary.pdf

Appendix G. CAR1004 Baseline and Project Harvest Volumes 20130905.pdf

Appendix H. CAR1004 Project Inventory Specifications 20131010 Proprietary.pdf

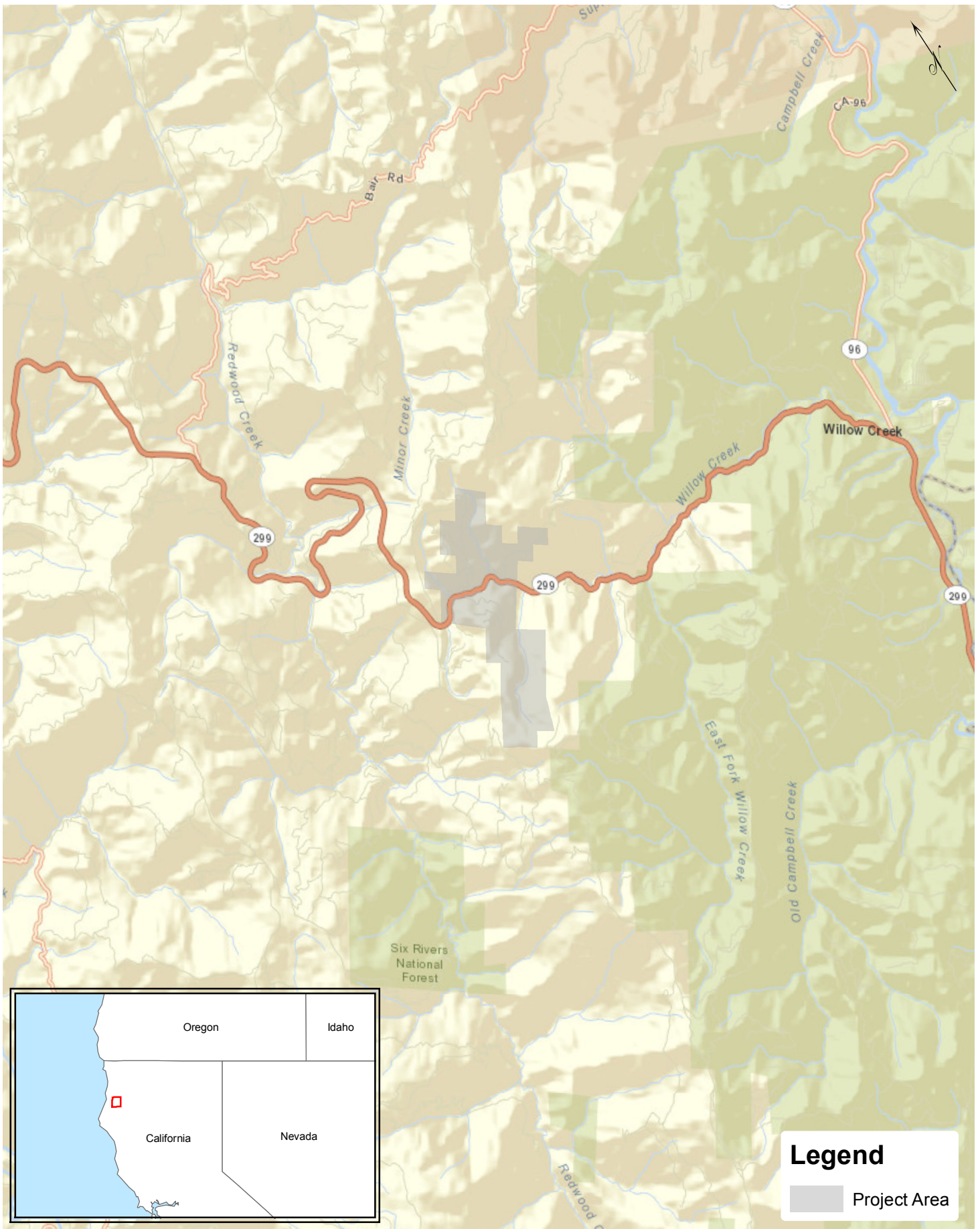
Appendix I. CAR1004_Geodatabase_20130510.mdb

Appendix J. CAR1004 Full Monitoring Plan 20130510 Proprietary.pdf

Appendix K. CAR1004 Baseline Inventory, Growth and Harvest by Year 20130905.pdf

Appendix L. CAR1004 Harvested Wood Product Worksheets 20130905.pdf

Appendix M. CAR1004 Sampling Error Calculations 20130905 Proprietary.pdf



1 in = 2 miles

May 2013

Map Showing Towns and Roads

on lands belonging to

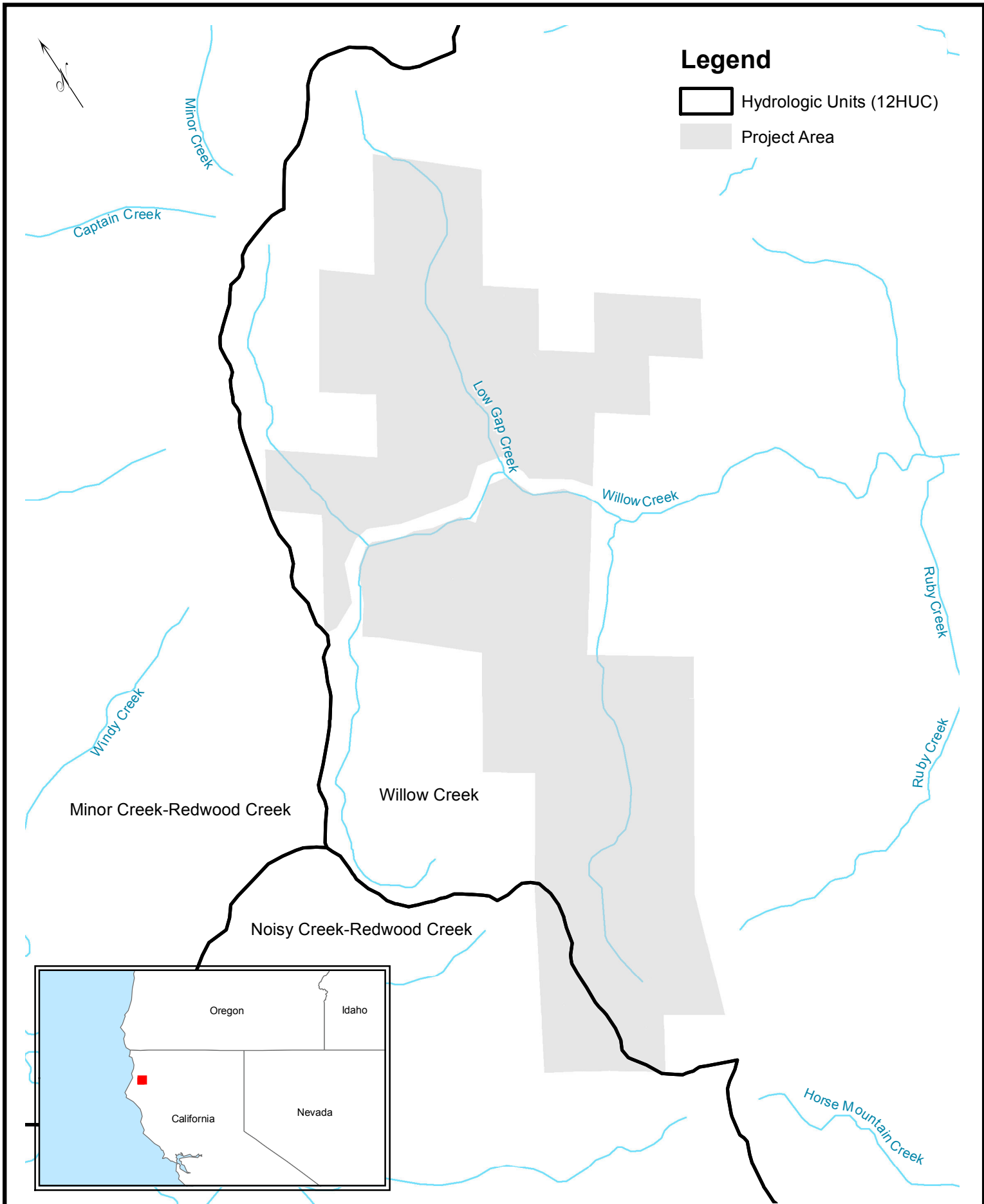
Berry Summit, LLC

Situate in the State of California

*and being part of an Improved Forest Management project
developed using the CAR Forest Project Protocol v3.2
and identified as*

CAR1004

Finite Carbon - Berry Summit

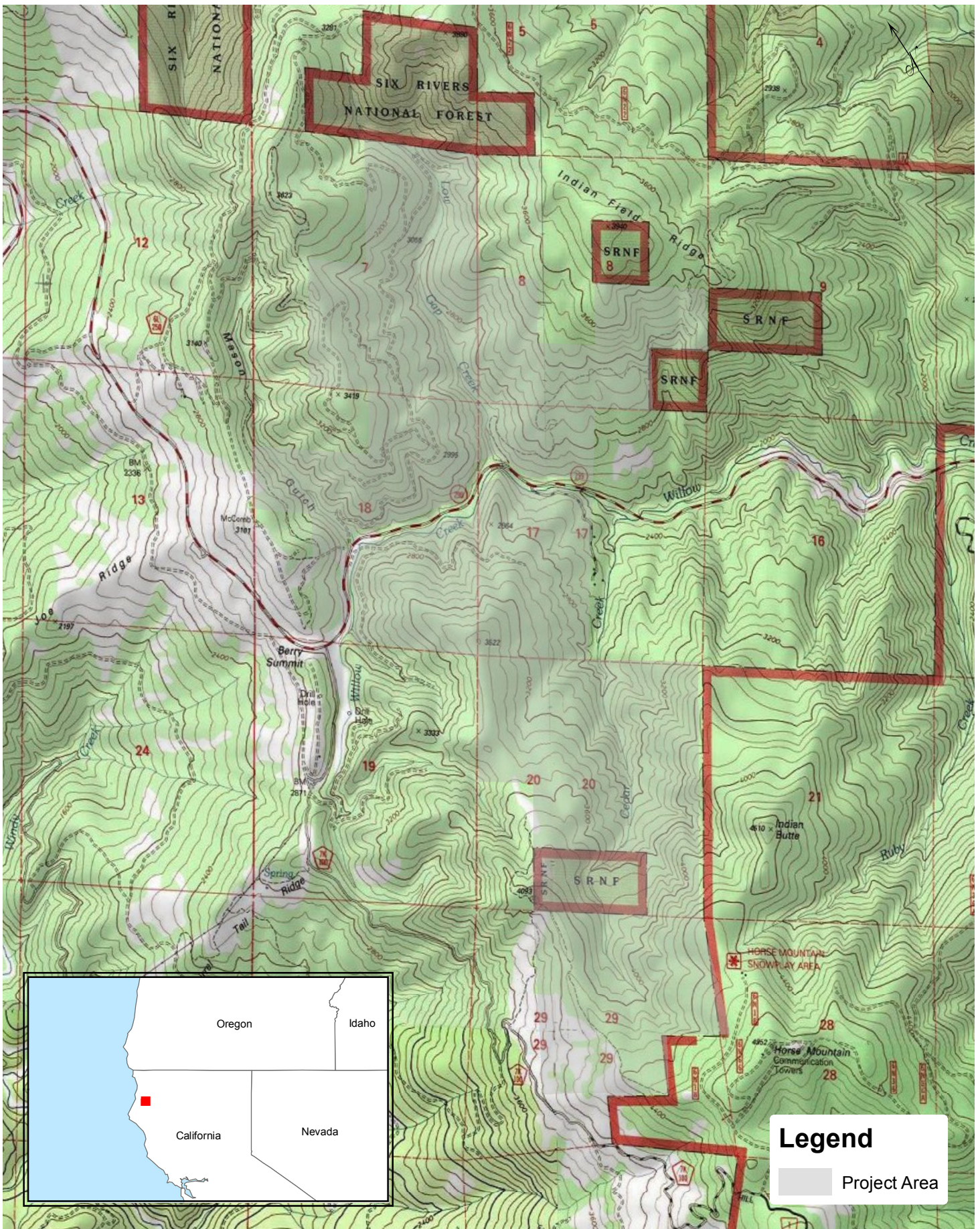


1 in = 1 miles

May 2013

Map Showing Major Watercourses
on lands belonging to
Berry Summit, LLC
Situate in the State of California
and being part of an Improved Forest Management project
developed using the CAR Forest Project Protocol v3.2
and identified as

CAR1004
Finite Carbon - Berry Summit



1 in = 1 miles

May 2013

Map Showing Topography

on lands belonging to

Berry Summit, LLC

Situate in the State of California

*and being part of an Improved Forest Management project
developed using the CAR Forest Project Protocol v3.2
and identified as*

CAR1004

Finite Carbon - Berry Summit

-  Project Area
-  publdsur
-  County



Township 7 North Range 4 East

Humboldt County

Township 6 North Range 3 East

Township 6 North Range 4 East

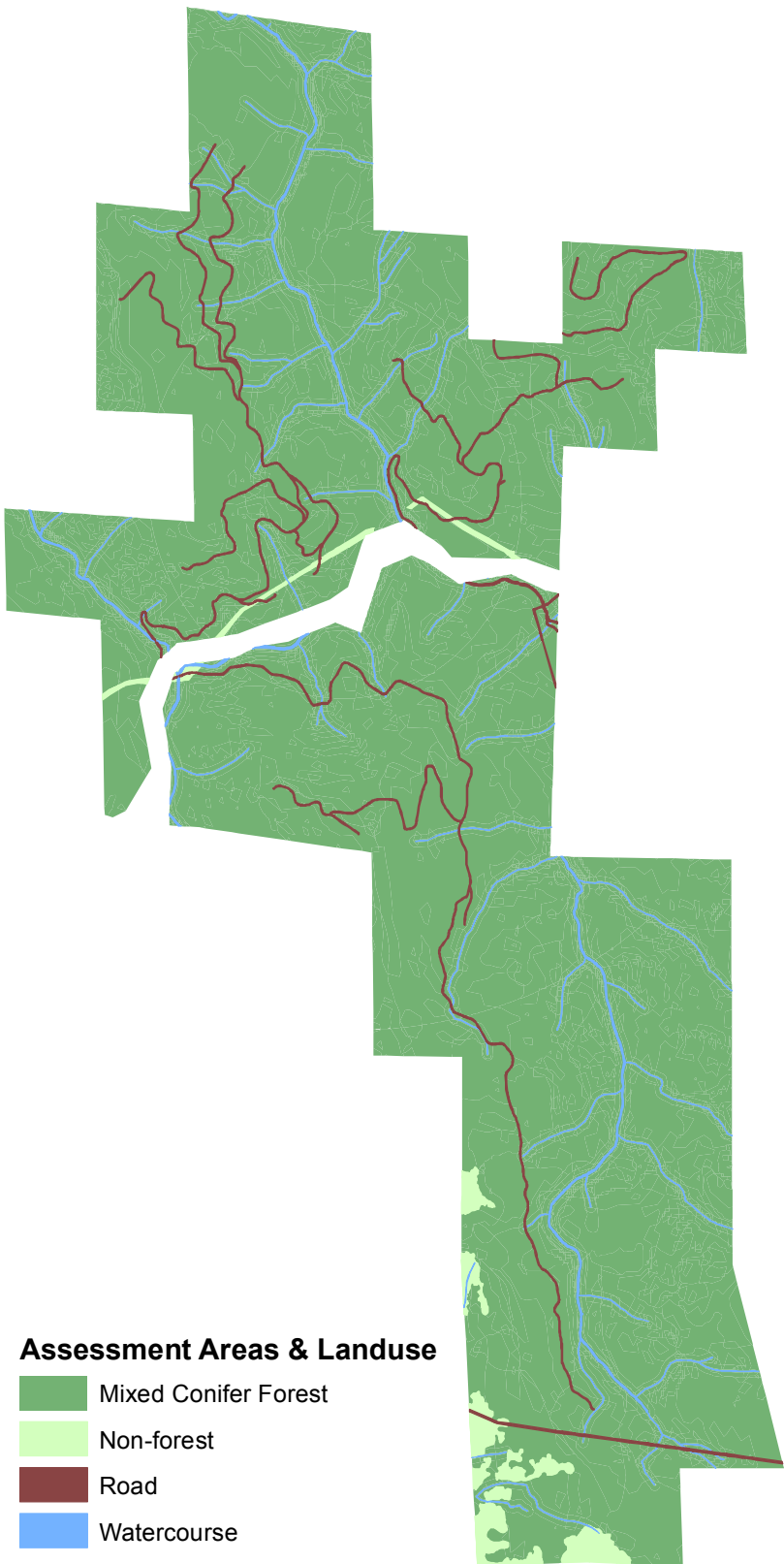


1 in = 1 miles

May 2013

Map Showing Counties and Townships
on lands belonging to
Berry Summit, LLC
Situate in the State of California
and being part of an Improved Forest Management project
developed using the CAR Forest Project Protocol v3.2
and identified as

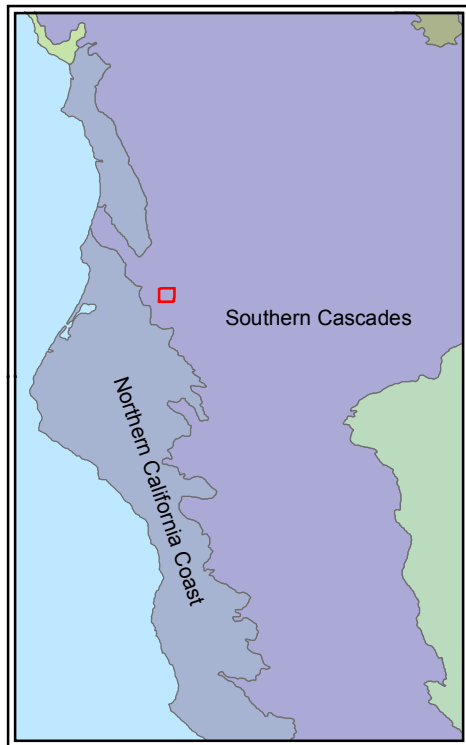
CAR1004
Finite Carbon - Berry Summit



Assessment Areas & Landuse

-  Mixed Conifer Forest
-  Non-forest
-  Road
-  Watercourse

Supersections



1 in = 0.5 miles

May 2013

Map Showing Assessment Areas
on lands belonging to
Berry Summit, LLC
Situate in the State of California
and being part of an Improved Forest Management project
developed using the CAR Forest Project Protocol v3.2
and identified as

CAR1004
Finite Carbon - Berry Summit

Appendix G. CAR1004 Baseline-Project Harvest Volumes

Year	Harvest Volume (Cubic Feet)		Year	Harvest Volume (Cubic Feet)	
	Baseline	Project		Baseline	Project
2013	-	-	2064	656,188	-
2014	8,962,375	-	2065	2,164,103	-
2015	1,406,825	-	2066	2,021,152	-
2016	142,484	-	2067	507,513	-
2017	1,139,597	-	2068	2,505,437	-
2018	1,457,149	-	2069	1,782,913	-
2019	615,567	-	2070	901,321	-
2020	736,183	-	2071	2,343,073	-
2021	877,477	-	2072	1,441,480	-
2022	722,156	-	2073	337,174	-
2023	608,259	-	2074	3,378,315	-
2024	1,153,858	-	2075	1,651,223	-
2025	142,484	-	2076	321,649	-
2026	1,315,855	-	2077	2,164,103	-
2027	1,056,447	-	2078	2,029,784	-
2028	142,484	-	2079	842,052	-
2029	705,670	-	2080	2,464,103	-
2030	1,457,149	-	2081	1,448,374	-
2031	321,454	-	2082	925,200	-
2032	736,183	-	2083	2,351,705	-
2033	877,477	-	2084	1,776,019	-
2034	1,279,902	-	2085	328,543	-
2035	1,694,880	-	2086	3,043,775	-
2036	1,441,480	-	2087	1,627,344	-
2037	321,649	-	2088	330,280	-
2038	3,043,775	-	2089	2,522,521	-
2039	1,954,989	-	2090	2,029,975	-
2040	345,528	-	2091	507,513	-
2041	2,157,209	-	2092	2,464,103	-
2042	2,021,152	-	2093	1,457,005	-
2043	507,410	-	2094	1,235,860	-
2044	2,798,642	-	2095	2,343,073	-
2045	1,448,374	-	2096	1,465,359	-
2046	910,144	-	2097	328,543	-
2047	2,366,952	-	2098	3,052,407	-
2048	1,441,480	-	2099	1,961,883	-
2049	663,082	-	2100	321,649	-
2050	3,043,775	-	2101	2,164,103	-
2051	1,627,344	-	2102	2,021,152	-
2052	321,649	-	2103	540,024	-
2053	2,172,735	-	2104	2,798,642	-
2054	2,379,571	-	2105	1,448,374	-
2055	507,513	-	2106	901,321	-
2056	2,464,103	-	2107	2,343,073	-
2057	1,448,374	-	2108	1,450,112	-
2058	909,953	-	2109	653,400	-
2059	2,677,612	-	2110	3,042,282	-
2060	1,441,480	-	2111	1,575,043	-
2061	352,422	-	2112	255,919	-
2062	3,043,775	-	2113	2,078,980	-
2063	1,635,975	-			

Appendix K. CAR1004 Baseline Inventory, Growth and Harvest by Year

Year	Standing Live (IFM1) tCO2e		Standing Live Increment (IFM1) tCO2e		Carbon Harvested in Wood Delivered to Mill tCO2e	
	Per Acre	Total	Per Acre	Total	Per Acre	Total
2013	259.78	548,870	-	-	-	-
2014	103.69	219,075	(156.09)	(329,795)	86.65	183,082
2015	95.33	201,418	(8.36)	(17,656)	6.34	13,397
2016	99.39	210,001	4.06	8,583	0.08	179
2017	86.47	182,694	(12.92)	(27,307)	9.04	19,095
2018	86.53	182,836	0.07	143	2.17	4,588
2019	87.69	185,267	1.15	2,431	1.55	3,268
2020	89.19	188,450	1.51	3,183	1.52	3,219
2021	91.52	193,366	2.33	4,916	1.10	2,325
2022	93.86	198,305	2.34	4,939	1.16	2,442
2023	96.46	203,809	2.60	5,504	0.99	2,085
2024	98.09	207,256	1.63	3,447	1.83	3,860
2025	102.79	217,188	4.70	9,932	0.08	179
2026	103.34	218,334	0.54	1,146	2.59	5,481
2027	105.83	223,609	2.50	5,275	1.62	3,415
2028	110.74	233,977	4.91	10,368	0.08	179
2029	114.89	242,755	4.15	8,778	1.20	2,530
2030	117.86	249,027	2.97	6,272	2.17	4,588
2031	123.29	260,498	5.43	11,472	0.60	1,269
2032	127.78	269,992	4.49	9,494	1.52	3,219
2033	133.10	281,218	5.31	11,226	1.10	2,325
2034	136.24	287,848	3.14	6,630	2.97	6,286
2035	134.88	284,978	(1.36)	(2,870)	5.61	11,853
2036	136.49	288,376	1.61	3,399	3.34	7,049
2037	144.90	306,144	8.41	17,768	0.46	968
2038	136.65	288,732	(8.24)	(17,413)	9.95	21,015
2039	135.55	286,407	(1.10)	(2,324)	4.76	10,065
2040	143.55	303,308	8.00	16,901	0.66	1,388
2041	138.77	293,211	(4.78)	(10,097)	7.82	16,529
2042	138.59	292,814	(0.19)	(397)	4.41	9,312
2043	146.07	308,623	7.48	15,809	0.98	2,076
2044	137.72	290,986	(8.35)	(17,638)	9.79	20,679
2045	139.27	294,259	1.55	3,273	3.34	7,066
2046	145.73	307,912	6.46	13,653	1.60	3,380
2047	139.72	295,205	(6.01)	(12,706)	8.55	18,056
2048	141.28	298,501	1.56	3,295	3.34	7,049
2049	147.79	312,265	6.51	13,764	1.38	2,912
2050	139.49	294,727	(8.30)	(17,538)	9.95	21,015
2051	140.15	296,120	0.66	1,393	3.86	8,156
2052	148.46	313,671	8.31	17,551	0.46	968
2053	143.55	303,308	(4.90)	(10,363)	7.90	16,687
2054	141.17	298,273	(2.38)	(5,035)	5.52	11,657
2055	148.61	313,992	7.44	15,719	0.98	2,076
2056	142.05	300,134	(6.56)	(13,858)	8.88	18,753
2057	143.57	303,339	1.52	3,205	3.34	7,066
2058	149.98	316,886	6.41	13,547	1.60	3,371
2059	142.43	300,930	(7.55)	(15,956)	9.26	19,562
2060	143.97	304,180	1.54	3,250	3.34	7,049
2061	151.94	321,020	7.97	16,839	0.67	1,406

Appendix K. CAR1004 Baseline Inventory, Growth and Harvest by Year

2062	143.60	303,406	(8.34)	(17,614)	9.95	21,015
2063	144.11	304,479	0.51	1,073	3.93	8,296
2064	150.53	318,051	6.42	13,572	1.37	2,895
2065	145.65	307,747	(4.88)	(10,305)	7.83	16,547
2066	145.38	307,174	(0.27)	(573)	4.41	9,312
2067	152.81	322,862	7.43	15,688	0.98	2,076
2068	145.64	307,717	(7.17)	(15,146)	9.21	19,462
2069	145.27	306,937	(0.37)	(779)	4.26	8,993
2070	151.73	320,592	6.46	13,655	1.53	3,231
2071	145.96	308,388	(5.78)	(12,204)	8.35	17,636
2072	147.42	311,487	1.47	3,099	3.34	7,049
2073	155.56	328,686	8.14	17,199	0.53	1,126
2074	145.37	307,148	(10.19)	(21,538)	10.86	22,942
2075	145.60	307,636	0.23	488	4.06	8,576
2076	153.81	324,980	8.21	17,344	0.46	968
2077	148.90	314,599	(4.91)	(10,382)	7.83	16,547
2078	148.47	313,706	(0.42)	(892)	4.47	9,452
2079	154.00	325,379	5.52	11,673	1.89	4,002
2080	147.35	311,323	(6.65)	(14,057)	8.88	18,753
2081	148.79	314,383	1.45	3,060	3.34	7,066
2082	154.90	327,275	6.10	12,892	1.73	3,651
2083	148.98	314,766	(5.92)	(12,509)	8.41	17,776
2084	148.58	313,921	(0.40)	(845)	4.25	8,975
2085	156.78	331,265	8.21	17,344	0.47	986
2086	148.36	313,458	(8.43)	(17,807)	9.95	21,015
2087	148.89	314,580	0.53	1,122	3.86	8,156
2088	156.98	331,673	8.09	17,094	0.52	1,108
2089	149.87	316,652	(7.11)	(15,021)	8.94	18,892
2090	149.39	315,648	(0.48)	(1,004)	4.48	9,461
2091	156.71	331,104	7.32	15,456	0.98	2,076
2092	150.02	316,981	(6.68)	(14,122)	8.88	18,753
2093	151.30	319,678	1.28	2,697	3.41	7,207
2094	155.87	329,332	4.57	9,654	2.44	5,157
2095	150.05	317,032	(5.82)	(12,300)	8.35	17,636
2096	151.11	319,282	1.07	2,250	3.53	7,468
2097	159.30	336,571	8.18	17,289	0.47	986
2098	150.73	318,466	(8.57)	(18,105)	10.01	21,155
2099	149.40	315,659	(1.33)	(2,807)	4.77	10,082
2100	157.54	332,861	8.14	17,202	0.46	968
2101	152.56	322,337	(4.98)	(10,524)	7.83	16,547
2102	152.21	321,598	(0.35)	(739)	4.41	9,312
2103	159.06	336,070	6.85	14,472	1.25	2,635
2104	150.52	318,031	(8.54)	(18,039)	9.79	20,679
2105	151.88	320,905	1.36	2,874	3.34	7,066
2106	158.25	334,365	6.37	13,459	1.53	3,231
2107	152.38	321,965	(5.87)	(12,400)	8.35	17,636
2108	153.64	324,626	1.26	2,661	3.40	7,189
2109	160.01	338,077	6.37	13,451	1.37	2,900
2110	151.22	319,505	(8.79)	(18,572)	10.13	21,403
2111	151.74	320,613	0.52	1,108	3.83	8,090
2112	159.81	337,665	8.07	17,053	0.48	1,024
2113	154.79	327,045	(5.03)	(10,620)	7.84	16,569

Appendix L. CAR1004 Harvested wood Products Worksheets 2013 (RP1)

Section 1. Data Inputs

Table 1. Key to worksheet inputs

The key below provides a color-coded reference to cells in this worksheet where inputs are provided directly by the users of this spreadsheet. Assumptions are populated based on external data sources, and either calculations or outputs are conducted automatically. An action is required by the user anywhere a "Step" is indicated.

Step Guidance, which generally describes user input needed	Region*	Pacific Southwest (PSW)
Project data entered annually by Project Submitter	Reporting Period	1-Sep-13
Assumptions and/or data populated automatically	Hardwood Harvest Units:	MBF-Scribner ("C" or "Small")
Default Values	Softwood Harvest Units:	MBF-Scribner ("C" or "Small")
Data calculated automatically for input into the Calculation Worksheet	*From the Reserve's Assessment Area Data File.	

Table 2. Project Characteristics

Step 1. Using the pull-down menus where provided, enter the current reporting period project data into Table 2. If multiple hardwood and/or softwood harvest units were recorded, consolidate into one hardwood and one softwood harvest unit using the conversion factors in Table 4.

Region*	Pacific Southwest (PSW)
Reporting Period	1-Sep-13
Hardwood Harvest Units:	MBF-Scribner ("C" or "Small")
Softwood Harvest Units:	MBF-Scribner ("C" or "Small")
*From the Reserve's Assessment Area Data File.	

Table 3. Volume in Logs Delivered to Mill

Step 2. Enter the name of the mill(s) and the volume of harvested wood sent to the mill(s) during the current reporting period in Table 2. Both the hardwood and softwood volumes must be categorized based on the wood product classes shown below. If wood products class data is insufficient, categorize the unknown wood products as "miscellaneous". Default mill efficiencies are provided based on Table 5. The default values may be overwritten if mill-specific data is available and is verifiable.

Hardwood								Softwood							
Wood Product Classes								Wood Product Classes							
Mill	Mill Efficiency	Lumber	Oriented Strandboard	Non Structural Panels	Misc. Products	Mill Efficiency	Paper	Mill Efficiency	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Misc. Products	Mill Efficiency	Paper
Local Mill	56.8%				0	56.8%		67.5%	0	0				67.5%	
	56.8%					56.8%		67.5%						67.5%	
	56.8%					56.8%		67.5%						67.5%	
	56.8%					56.8%		67.5%						67.5%	
	56.8%					56.8%		67.5%						67.5%	
Gross Total:					0				0	0					
Net Total:					0				0	0					

Section 2. Estimates of Carbon Storage in Wood Products and Emissions associated with Harvested Trees

Table 4. Estimates of CO₂-equivalent (CO₂e) in Harvested Wood Products associated with Project Activities

Units	Hardwood					Softwood					Sum
	Lumber	Oriented Strandboard	Non Structural Panels	Misc. Products	Paper	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Misc. Products	Paper
Project carbon in harvested wood delivered to mills (Calc Fc)	-	-	50	-	-	58	88	-	-	-	196
Project carbon in harvested wood delivered to mills (CO ₂ e)	-	-	1	-	-	1	1	-	-	-	3
Project carbon transferred to wood products (Calc Fc)	-	-	38	-	-	38	38	-	-	-	114
Project carbon transferred to wood products (CO ₂ e)	-	-	1	-	-	1	1	-	-	-	3
% Product	0%	0%	0%	32%	0%	34%	34%	0%	0%	0%	100%
Long-term storage in in-use wood products (CO ₂ e)	-	-	0	-	-	0	0	-	-	-	0
Long-term storage in wood products in landfills (CO ₂ e)	-	-	0	-	-	0	0	-	-	-	0

Table 5. Estimates of CO₂-equivalent (CO₂e) in Harvested Wood Products associated with Baseline Activities

Units	Hardwood					Softwood					Sum
	Lumber	Oriented Strandboard	Non Structural Panels	Misc. Products	Paper	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Misc. Products	Paper
Baseline CO ₂ e	-	-	1,874	-	-	2,416	2,416	-	-	-	10,478
% Product	0%	0%	0%	32%	0%	34%	34%	0%	0%	0%	100%
Long-term storage in in-use wood products (CO ₂ e)	-	-	330	-	-	1,119	1,169	-	-	-	2,618
Long-term storage in wood products in landfills (CO ₂ e)	-	-	851	-	-	720	683	-	-	-	2,254

Table 6. Calculations to be Inserted into the Calculation Worksheet

Calculation Sheet Inputs (for Current Reporting Period)	Row Location in Calculation Worksheet
Actual Project Carbon in Harvested Wood Delivered to Mill (CO ₂ e)	10 (Row 23)
Actual Project Carbon in Trees Harvested for Wood Products (CO ₂ e)	4 (Row 16)
Actual Project Carbon Stored Long-term in Wood Products (CO ₂ e) - Excl Landfill	15 (Row 27)
Actual Project Carbon Stored Long-term in Wood Products (CO ₂ e) - Incl Landfill	2
Baseline Carbon Stored Long-term in Wood Products (CO ₂ e) - Excl Landfill	2
Baseline Carbon Stored Long-term in Wood Products (CO ₂ e) - Incl Landfill	2

Table 7. Harvested Wood Carbon - Harvested Tree Carbon

This table uses the 100-year baseline data to calculate a ratio of carbon in trees harvested for wood products to carbon in harvested wood delivered to the mill.

Baseline Carbon in Trees Harvested for Wood Products (CO ₂ e) (from Row 23 of the Monitoring Calculation Worksheet)	10089
Baseline Carbon in Harvested Wood Delivered to Mill (CO ₂ e) (from Row 23 of the Monitoring Calculation Worksheet)	10419

Multiplier of Carbon in Wood Delivered to Mill to Carbon in Trees Harvested for Wood Products:

[illegible]