



**OFFSET PROJECT DATA REPORT
FOR
Trinity Timberlands University Hill Improved Forest
Management Project**

**Air Resources Board
Compliance Offset Protocol – U.S. Forest Projects
Adopted: October 20, 2011**

ARB Project ID: CAFR5076

OPR Project ID: CAR1046

**Version 1.2
February 16, 2015**

Trinity Timberlands University Hill Improved Forest Management Project

Offset Project Operator:

**Trinity Timberlands LLC
c/o Timmons Advisors
3555 Timmons Lane, Suite 800
Houston, TX 77027
Contact Person: Glenda Overbeck
Phone: 713-961-1600
Email: goverbeck [at] timmonsadvisors.com
CITSS Account Number: CA 1696**

(Forest Offset Protocol §2.2)

Authorized Project Designee: (if applicable)

**Forest Carbon Partners, L.P.
275 Battery Street #510
San Francisco, CA 94111
Contact Person: Brian Shillinglaw
Phone: 415-321-3305
Email: carbon [at] newforests-us.com
CITSS Account Number: CA 1403**

Reporting Period:

The reporting period for this Offset Project Data Report is 10 months (November 18, 2013 – September 18, 2014).

Protocol Version:

**Air Resources Board
Compliance Offset Protocol – U.S. Forest Projects
Adopted: October 20, 2011
Cal. Code Regs. tit. 17, § 95800-96023 (July 2014)**

Attestation:

I certify under penalty of perjury under the laws of the State of California the GHG reductions and/or GHG removal enhancements for the Trinity Timberlands University Hill Improved Forest Management Project from November 18, 2013 to September 18, 2014 are measured in accordance with the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011 and all information required to be submitted to ARB in the Offset Project Data Report is true, accurate, and complete.

Brian Shillinglaw

Printed Name

Associate Director, Investments & Operations

Title



Signature

March 9, 2015

Date

Note to Reader on Attachments to the OPDR

This version of the OPDR includes the necessary information required in attachments E, G, H and J; thus, these attachments are not being provided separately. Attachments A and F, as well as the shapefile of the Project Area boundaries required as part of attachment E, are included as separate attachments to this document.

Note to Reader Regarding Differences Between OPDR and Listing Documents

There are differences between the listing documents and this OPDR. The differences are enumerated in the following table.

Ln #	Item	Where Changed	Listing Documents (Form and Attachment E)	OPDR, V1.2
1	Reporting period and crediting period	OPDR, pg ii	Listing form page 1	Different reporting period and crediting period
2	Commencement date	OPDR, pg 20	Listing form page 1	Commencement date changed from boots on the ground inventory date to transfer of property ownership date
3	OPO contact person	OPDR, pg ii	Listing form page 1	Changed contact person and associated contact information for contact person
4	Project area	OPDR, pg 6	Listing form page 2; Attachment E, Maps 1-3	New configuration of project area; acreage changed from 11,902 to 11,350 acres; maps of project area changed in Figures 1-7
5	Summary of forest conditions from inventory data	OPDR, pg 7	Listing form page 2; Attachment E, pg 3-5	Listing documents were based on old data provided by the previous owner; this OPDR was based on new inventory data collected for the carbon project
6	Number of sample plots	OPDR, pg 8, Table 1	Attachment E, pg 3	Revised number of plots based on new inventory
7	Site index and site class	OPDR, pg 11	Attachment E, pg 5	Changes based on new inventory data
8	Delineation of project area	OPDR, pg 32	Form pg 2	More information provided, page 32
9	Standing dead wood	OPDR, pg 22	Attachment E pg 6	Unknown at time of listing, 2.61 metric tonnes/acre based on inventory data
10	Inventory design, sampling and calculation methodology	OPDR, pg. 23	Form pg 4, Attachment E page 8	Updated inventory procedure
11	Inventory update process	OPDR, pg 32	Form pg 5, Attachment E pg 13	More detailed description, pg 29
12	Legal constraints	OPDR, pg 31	Form pg 5, Attachment E pg 18	More discussion, esp on stream buffering and NSO
13	Financial constraints	OPDR, pg 34	Form pg 5	Detailed analysis
14	Common practice calculation	OPDR pg 36	Form pg 5 and Attachment E pg 13	New calculation of common practice based on allocation of project area to high elevation mixed conifer assessment area
15	Silvicultural prescriptions	OPDR pg 40	Form pg 5, Attachment E page 14	Additional silvicultural prescriptions, much more detail provided
16	Calculation of baseline	OPDR, pg 43	Form pg 5, Attachment E page 16	Detailed description and slightly different outcomes
17	Harvested wood products	OPDR, pg 46	Form pg 5, Attachment E page 16	Revised detailed description and outcome
18	Carbon Stock Inventory	OPDR, pg 47	Form pg 4, Attachment E pg 13	Different results due to updated inventory
19	Confidence Deduction	OPDR, pg 47	Form pg 4, Attachment E pg 10	Calculated in OPDR based on new inventory data

Table of Contents

1.	Introduction	1
2.	Ownership Interest	1
3.	Project Eligibility	1
3-A:	Project Type	1
3-B:	Project Location	2
I.	Located in the United States	2
II.	Located on Forested Land	2
III.	Land Ownership Category	6
IV.	Any Previous Status as an Offset Project	6
3-C:	Project Area	6
I.	Geographic Boundaries	6
II.	Assessment Areas	15
III.	General Description of Forest Conditions	17
3-D:	Additionality – Legal Requirement Test	18
3-E:	Regulatory Compliance	18
3-F:	Use of Qualified Conservation Easements	19
3-G:	Additionality – Performance Standard Test	19
3-H:	Broadcast Fertilization.....	19
3-I:	Offset Project Commencement Date	20
3-J:	Demonstration of Sustainable Harvesting Practices	20
3-K:	Natural Forest Management	21
I.	Native Species.....	21
II.	Composition of Native Species	21
III.	Distribution of Age Classes	21
IV.	Structural Elements (Standing and Lying Dead Wood)	22
3-L:	Ongoing Management Activities.....	22
4.	Inventory Methodology	23
4-A:	GHG Assessment Boundary	23

4-B:	Inventory Design and Sampling Process.....	23
4-C:	Field Measurement and Plot Monumenting	24
4-D:	Data Management System	28
4-E:	Quantification Methodology	28
4-F:	Inventory Update Process	29
5.	Baseline Carbon Stocks – Improved Forest Management Projects.....	31
5-A:	Legal Constraints.....	31
5-B:	Financial Constraints	34
5-C:	Estimate Baseline Onsite Carbon Stocks	36
5-D:	Determination of Weighted Average Carbon Stocks (WCS).....	49
5-E:	Estimating Baseline Carbon in Harvested Wood Products.....	49
6.	Project Carbon Stocks-Improved Forest Management Projects	50
6-A:	Actual Onsite Carbon Stocks.....	50
6-B:	Actual Carbon in Harvested Wood Products	53
6-C:	Quantifying Secondary Effects.....	54
7.	Calculation of GHG Reductions and Removals.....	54
8.	Reversal Risk Rating.....	57
8-A:	Reversal Risk Rating by Category.....	57
8-B:	Summarizing the Risk Analysis and Calculating the Project Reversal Risk Rating	59
EXHIBIT I: Greenhouse Gas (GHG) Assessment Boundaries Carbon Pools/Sources That Must Be Accounted for in Quantifying Project Reductions and Removals		61
Exhibit II: REFERENCES		65
Exhibit III: INVENTORY MANUAL		67

Tables

Table 1 - Summary Conditions from Inventory Data	8
Table 2 - Approximate 50-year breast-high age site index ranges for common site class systems in California.....	11
Table 3 - Measured Site Index Values	12
Table 4 – Soil Properties	14
Table 5 – Acres by Supersection & Assessment Area.....	15
Table 6 - Species Composition by Basal Area, Volume, & Native Species Proportion	18
Table 7 - Comparison of slopes for Project Area and Comparison THP	35
Table 8 – Comparison of Species Composition	36
Table 9 - Common Practice Calculation.....	36
Table 10 - Regression Formulas for Estimating Total Height from DBH	38
Table 11 - Silvicultural Prescriptions Modeled for Baseline and Project activity.....	40
Table 12 - Silvicultural Prescriptions Modeled for WLPZ Areas in Baseline	42
Table 13 - Baseline Acreage Allocation by prescription and strata	44
Table 14 - Carbon (CO ₂ e) reported from the baseline harvest schedule.....	45
Table 15 - 2013 Carbon Statistics by Strata	51
Table 16 - Project Acreage Allocation by Prescription & Strata.....	52
Table 17 - Carbon (CO ₂ e) reported from the Project Activity harvest schedule	53
Table 18 - Project Contribution to the Buffer Account Based on Risk	59

Figures

Figure 1 - Vicinity Map.....	3
Figure 2 - Location Map	4
Figure 3 - Forest Vegetation Type Map	5
Figure 4 - Watersheds in Vicinity of Carbon Project	10
Figure 5– Project Area in Relation to Supersections	16
Figure 6 – Age Class Analysis.....	26
Figure 7 - Inventory Layout	27
Figure 8 – Onsite Baseline Stocking as Modeled	44
Figure 9 - Final Baseline Results Averaged	45

1. Introduction

The Trinity Timberlands University Hill Carbon Project (Trinity Project) is an Improved Forest Management (IFM) project developed pursuant to the California Air Resources Board Compliance Offset Protocol – U.S. Forest Projects adopted October 20, 2011. The Offset Project Operator is Trinity Timberlands LLC. Trinity Timberlands LLC has contracted with Forest Carbon Partners, L.P. to be the Authorized Project Designee. The approximately 11,350-acre project is located on commercial timberland land held in fee ownership by Trinity Timberlands LLC, in western Trinity County, California.

The Trinity Timberlands University Hill Improved Forest Management Project will shift forest management practices to improve ecological values while generating income from carbon offset sales and logging, with the aim of developing a growing inventory of higher-value, larger diameter trees.

2. Ownership Interest

(Forest Offset Protocol §2.2, §9.1.1.1(3), Regulation §95974)

Trinity Timberlands LLC is the sole owner of the real property and is identified as the Offset Project Operator with the legal authority to implement the offset project.

As the Offset Project Operator, Trinity Timberlands LLC delegates responsibility to Forest Carbon Partners, L.P., a limited partnership managed by New Forests, as an Authorized Project Designee for performing and meeting the requirements of project listing, monitoring, reporting, record retention, verification, and credit issuance.

3. Project Eligibility

3-A: Project Type

(Forest Offset Protocol §2.1, §2.1.2, §9.1.1.1(4&5))

The Trinity Timberlands University Hill Carbon Project is an Improved Forest Management project as defined by Air Resources Board Compliance Offset Protocol – U.S. Forest Projects, adopted: October 20, 2011. The Project will produce CO₂ emission reductions by managing the project forest for increased carbon sequestration and stocking when compared to the project baseline. This will be accomplished by a combination of no harvest, practicing selection management on all suitable timber stands within the project area, and variable retention harvests on stands currently in need of species composition adjustment, with the goal of eventually bringing the historically even-aged harvest areas under selection management over the long term.

3-B: Project Location

I. Located in the United States

(Forest Offset Protocol §3.6)

The project takes place on land located in the United States.

The Trinity Timberlands University Hill Carbon Project is located west of the town of Hyampom, CA in Trinity County. Various creeks on the property drain east to the South Fork Trinity River. The project is located in the Township, Ranges, and portions of Sections noted below – all in the Humboldt Base Meridian. Figure 1 – Vicinity Map below shows the Project Area in relation to major roads, major rivers, towns and jurisdictional boundaries. Figure 2 – Location Map below indicates the configuration of the carbon project along with major roads, topography and the following township, range and sections.

Township
and Range

Sections

1N 6E	1, 2, 3, 11, 12
2N 6E	3-5, 8-10, 15, 16, 21, 22, 26, 27, 34, 35
3N 6E	18, 19, 27, 29, 30, 32-36

II. Located on Forested Land

(Forest Offset Protocol §2.1.2, §9.1.1.3(1))

The Trinity Timberlands University Hill Carbon Project takes place on land that has greater than 10 percent tree canopy cover based on air photo timber typing prepared specifically for the project in 2013. The project area has been in forest cover for the past 100 years or longer. The Vegetation Type map includes timber stands that have over 10 percent tree cover, as well as areas that currently have less than 10 percent tree cover due to recent harvesting or fire. These have been included in the project because they are expected to have significant tree cover in the coming decades. See Figure 3 – Forest Vegetation Type Map below. Compliance with the 10 percent tree canopy cover requirement is also demonstrated by overlaying a shapefile of the project area on current Google satellite imagery (Attachment F).

Trinity Timberlands University Hill Improved Forest Management Project
Vicinity Map

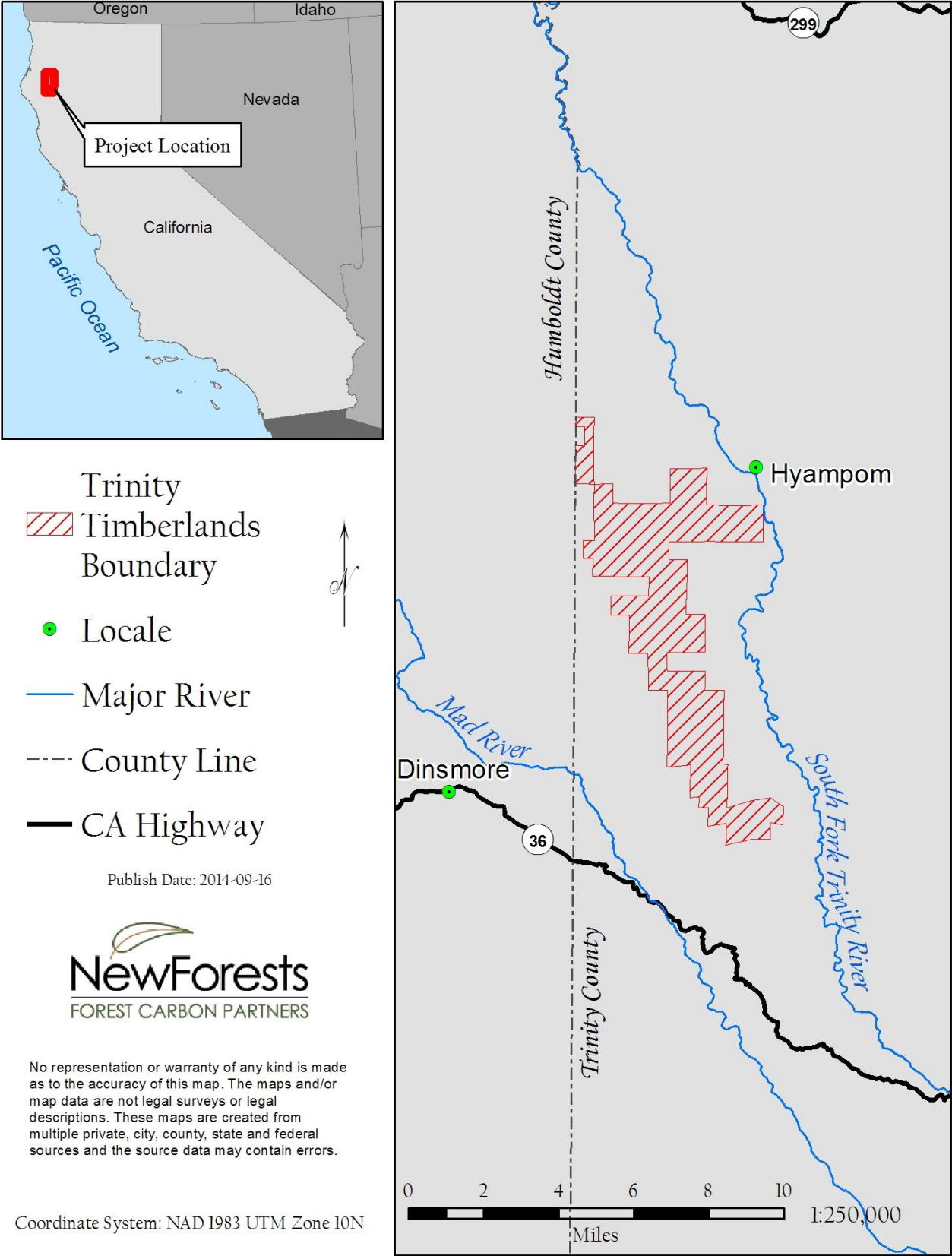


Figure 1 - Vicinity Map

Trinity Timberlands University Hill Improved Forest Management Project
Location Map

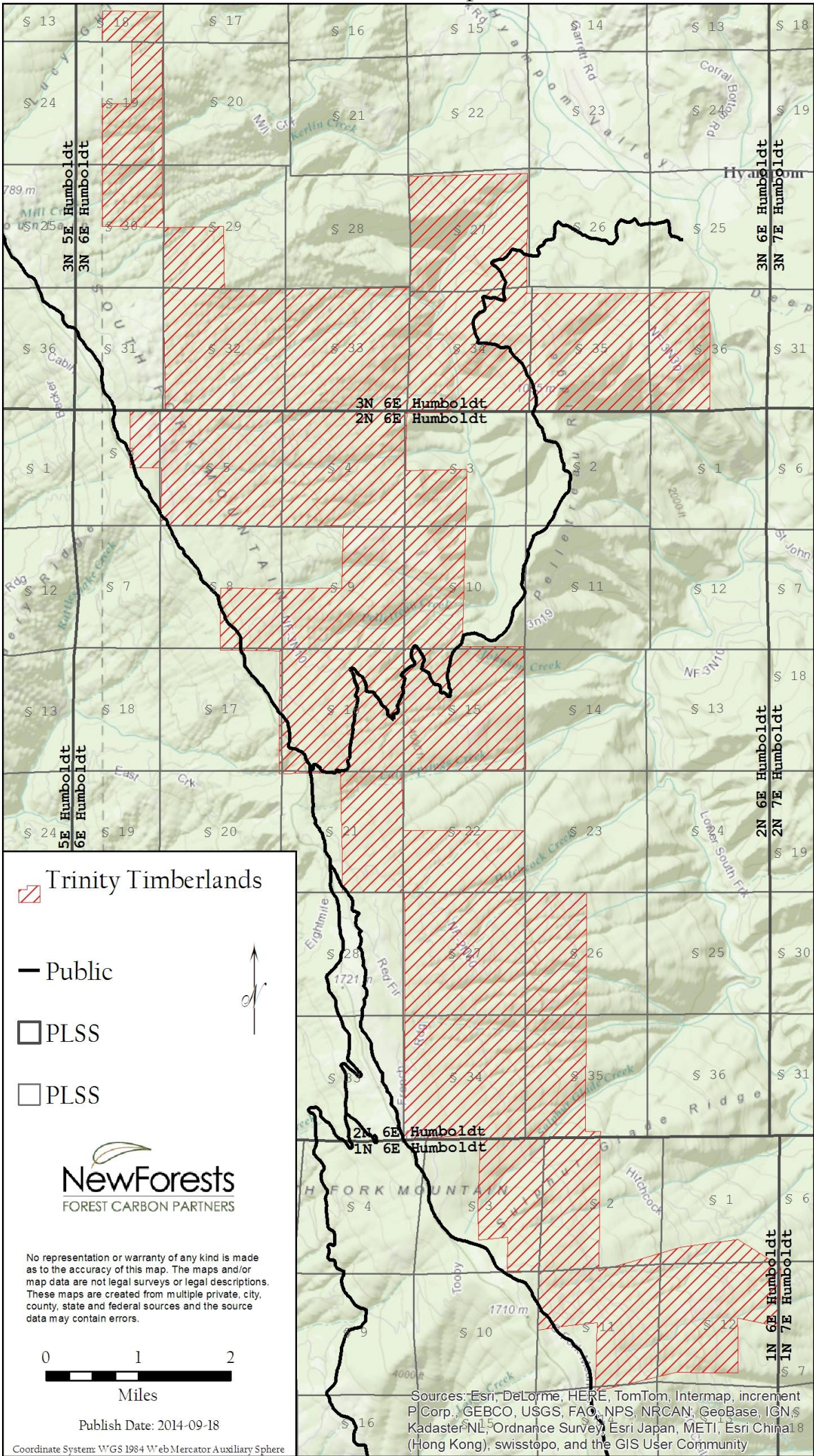


Figure 2 - Location Map

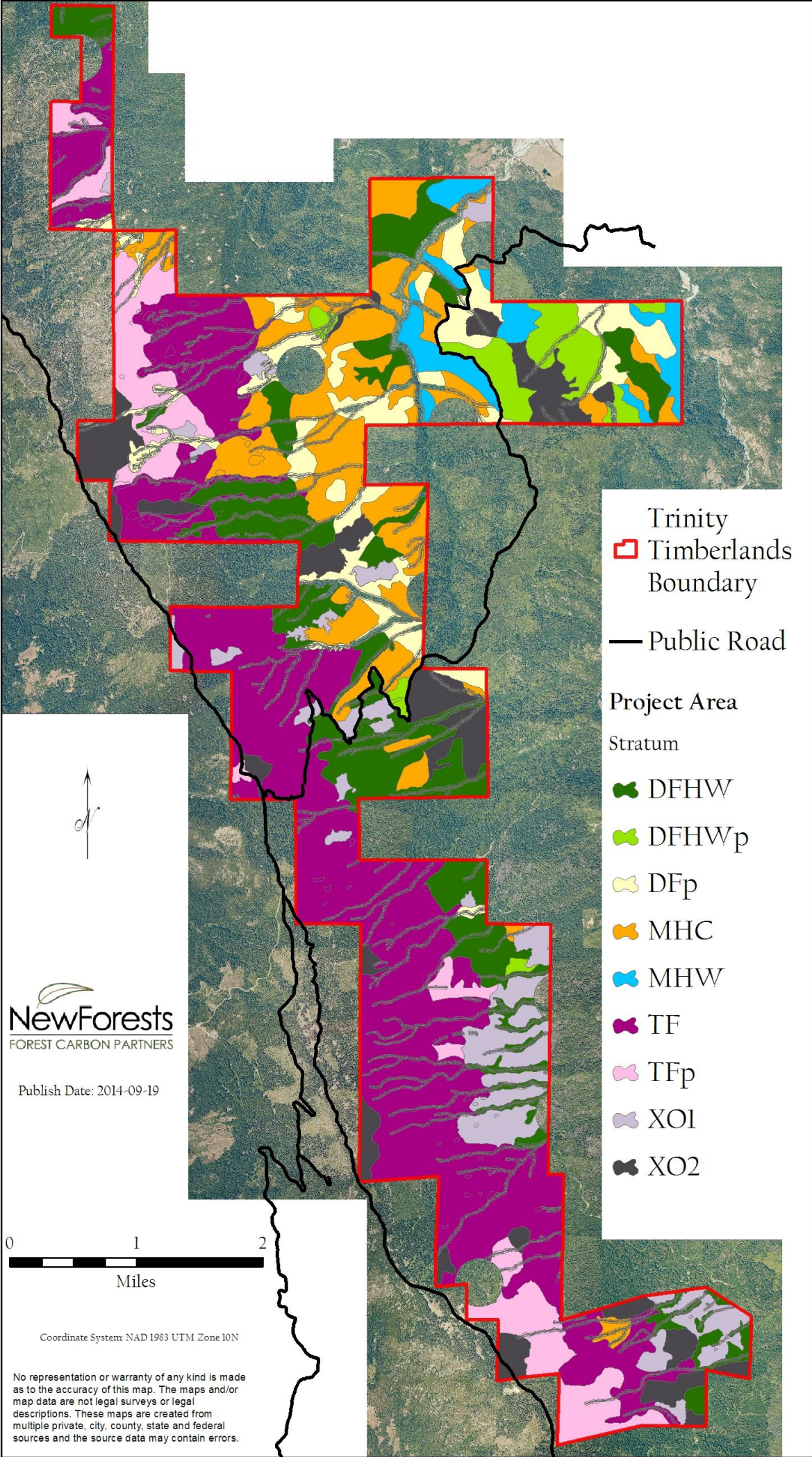


Figure 3 - Forest Vegetation Type Map

III. Land Ownership Category

(Forest Offset Protocol §3.6, §9.1.1.1(6), Regulation §95975(l))

Trinity Timberlands LLC is the sole owner in fee of the offset project area. The offset project area is not located 1) on land that is owned by, or subject to an ownership or possessory interest of a Tribe, 2) on Indian Land as defined in 25 U.S.C. §81(a)(1), or 3) on land that is owned by any person, entity, or Tribe within the external borders of such Indian Lands.

IV. Any Previous Status as an Offset Project

(Forest Offset Protocol §2.1.2, §9.1.1.1(8))

None of the land within the Project Area has ever been listed or registered with an offset project registry or program, nor have greenhouse gas emission reductions or removal enhancements associated with the Project Area been credited or claimed for the purpose of greenhouse gas mitigation or reduction goals, either in a voluntary or regulatory context.

3-C: Project Area

I. Geographic Boundaries

(Forest Offset Protocol §4, §9.1.1.1(15))

Topography & Climate

The climate of the project area is mountainous Mediterranean, consisting of hot, dry summers and cold, wet winters. The annual precipitation measured below the property at the town of Hyampom (1,100 ft elevation) is approximately 44 inches with 88% of the precipitation occurring between November and April. However, this does not account for the substantial snowfall occurring on the property between 3,000 and 5,000 feet. The highest point on the property is about 5,600 ft. Temperatures range from the high 90°'s (F) in summer to below freezing in winter. The Project Area covers a wide range of elevations and aspects, which strongly influence the microclimate and vegetation types in this ecosystem. Areas closer to the ridgeline of South Fork Mountain have lower gradient slopes while steeper slopes prevail closer to Pelletreau Creek.

The centroid of the project area is located at 123 degrees, 29', 52" W and 40 degrees, 33' 29" N.

General Location, Towns and Roads

The western boundary of the project is located along South Fork Mountain and Forest Service Route 1, while the northern boundary stops at the Kerlin Creek road. The town of Trinity Timberlands University Hill Improved Forest Management Project

Hyampom sits just below the project to the east, from which the Pelletreau ridge road climbs the hill bisecting the property. Highway 36 and the town of Mad River lie to the southwest of the project approximately 3 miles.

Watercourses and Watersheds

According to the Calwater 2.2.1 California Interagency Watershed Map of 1999 (generally CALWAT 2.2) the project is primarily located in the CALFIRE planning watersheds of Big Creek (1106.220003), Kerlin Creek (1106.220002), Pelletreau Creek (1106.220004), Cold Springs Creek (1106.230803), Sulphur Glade Creek (1106.230701), and McClellan Place (1106.230702), as well as having smaller portions within East Creek and Little Bear Wallow Creek.

Existing Land Cover and Land Use

The forest components of the 11,350-acre Project Area are fairly diverse. The higher elevation areas are primarily white fir and red fir stands between 30 and 60 years old. The middle elevation sections of the property are dominated by Douglas-fir, while the lower slopes are comprised of dense, mixed hardwood and fir forest.

The land was first harvested for timber in the late 1950s to early 1970s. Nearly all (97 percent) of it is designated as Timber Production Zone, with the remainder split between Timber Production/Agricultural Exclusive and Unclassified. Since 1992, 57 percent of the property (7,555 acres) was re-logged, two-thirds of it by “seed tree removal,” leaving an understory of advanced regeneration. Just over a thousand acres were clear-cut or subjected to a rehabilitation prescription. The projected land use on the property is timber production. The surrounding area is largely national forest where there is very little timber management taking place. Private parcels in the area will likely continue to be used for homesteading and agricultural activities. The primary land use pressure is to divide up larger parcels into smaller ones to sell for marijuana production.

Forest Vegetation Types in the Project Area

An independent and comprehensive vegetation typing of the property was done coincident with installing the inventory plots. It was done using color stereo air photos taken in 2013 using a typing scheme similar to the California Wildlife Habitat Relationship WHR (Mayer and Laudenslayer, 1988) system but with more specific species calls. The vegetation polygon shapefile from the former landowner, Green Diamond, was used as the basis from which to start the typing. Labels designating diameter class, canopy cover and species were assigned to every polygon. This resulted in approximately 160 different vegetation type labels. It was necessary to combine these into a manageable number of strata for growth and yield modeling purposes. A set of rules as to which species and density calls should be combined to form the strata was created so that the merging of type labels would be

objective and maintain the independence of the original air photo interpretation. Generally the size class designations were not used. A full description of the typing process and rules for combining the types into strata can be found in “Trinity Timberlands Timber Typing Task Order and Stratification methodology.docx”.

The final result was 9 strata which became the basis for all growth and yield modeling and harvest planning as shown in Figure 3 above. Data characterizing these final strata are from 689 carbon plots that were installed on the property in 2013. (See section 4.B for more information on the stratification of the inventory plots). Summary conditions for the 9 types are shown below. The density descriptions refer to the canopy cover labels from the timber typing.

Table 1 - Summary Conditions from Inventory Data

Strata	Acres	Plots	Conifer Basal Area/acre	Hdwd Basal Area/acre	Conifer BF/acre	Total Cubic Ft. per acre	Avg Site Index	Stand Age
DFp	837	44	144	117	22,269	6,206	96.1	57
DFHW	1,697	112	122	72	13,807	4,594	105.7	54
DFHWp	404	22	66	114	8,513	3,126	94.6	75
MHC	1,428	90	99	133	11,079	4,937	85.7	50
MHW	368	19	52	114	6,066	2,918	90.4	63
TF	3,963	241	156	21	16,154	3,808	94.3	47
TFp	891	55	110	8	10,898	2,425	89.5	50
XO1	786	53	43	21	4,498	1,522	91.6	15
XO2	976	53	61	41	6,928	1,588	94.4	35
Total	11,350	689						

Douglas-fir poor stocking (DFp) - Primarily DF with < 40% overstory density. This stratum was subjected to heavy thinning in the recent past and has a significant but patchy component of large hardwoods and predominant fir.

Douglas-fir Hardwood (DFHW) - Douglas-fir primarily with substantial hardwood mixed in comprised mainly of Golden chinquapin. Tree diameters are generally smaller than DFp.

Douglas-fir Hardwood poor stocking (DFHWp) - Douglas-fir primarily with substantial hardwood mixed in but with <40% overstory density. It has been harvested more heavily recently.

Montane Hardwood Conifer (MHC) - Mixed hardwood and conifer (WHR type). This one has more hardwood stocking than conifer but enough conifer to warrant economical harvesting and has not been harvested in quite a while. It is common on the lower elevation portions of the property.

Montane Hardwood (MHW) - Montane hardwood (WHR type). This type is dominated by tanoak and canyon live oak. It needs management intervention to increase the conifer component.

True fir (TF) - True fir > 40% density. This type is comprised of primarily white fir and red fir and encompasses the high elevation portions of the property. Plenty of stocking with good growth potential and almost no hardwood competition.

True fir poor stocking (TFp) - True fir < 40% density

Recent cutover (XO1) - Young cutover. This type was either clearcut or burned in the last 5 to 20 years and has a wide range of seedling stocking levels.

Stocked cutover (XO2) - Slightly older cutover. This type had some form of regeneration harvest or burn between 20 and 40 years ago. The stocking is patchy with a fair amount of residual timber.

Trinity Timberlands University Hill Improved Forest Management Project
 Cal Water Planning Watersheds Map

1:86,000

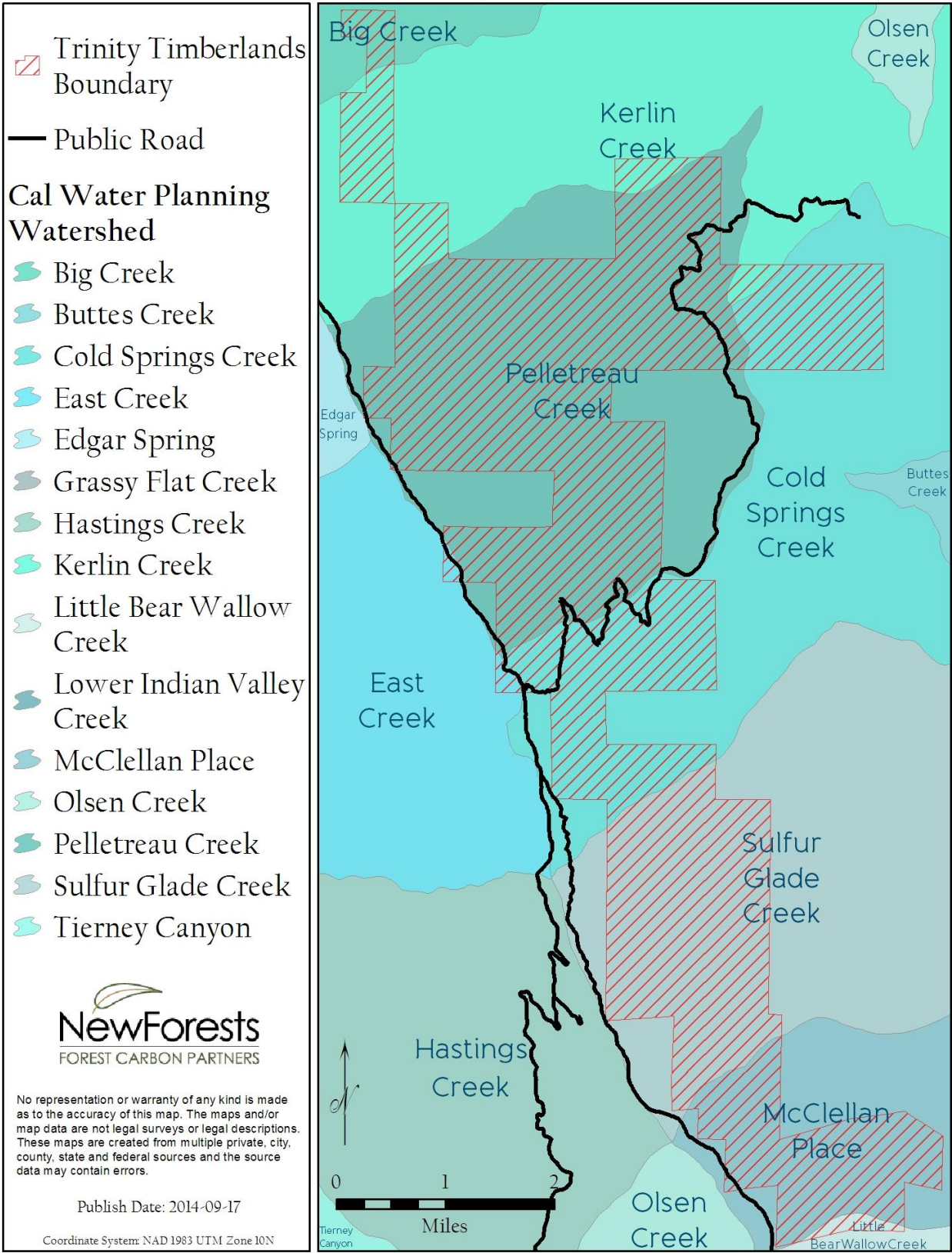


Figure 4 - Watersheds in Vicinity of Carbon Project

Site Classes

Site classes are productivity classes defined by ranges of site index. Site index is measured as the height of a tree at a given age (50 years is the typical standard base age used in California though 100 years used to be more common). The 100 year base age site classes as referenced in the California Forest Practice Rules (FPRs) (14 CCR §1060) have been converted to 50-year breast-high age base equivalent break points by Krumland and Eng (2005a) in California Forestry Report No. 4. The FPRs and Compliance Forest Protocol recognize five site classes with I and II being considered high and III, IV and V being considered low. Table 2 below is from that report.

Table 2 - Approximate 50-year breast-high age site index ranges for common site class systems in California

SITE CLASS	REDWOOD	NORTH COASTAL DOUGLAS-FIR	MIXED CONIFER
	<i>Site Index Range (feet)</i>		
I	122+	140+	80+
II	102-122	120-140	67 – 80
III	80-102	100-120	55- 67
IV	60-80	80-100	42 – 55
V	<60	<80	<42

Of the 689 plots that characterize the project area, there were 106 plots that had a tree bared for age which qualified as a site tree. Average North Coastal Douglas-fir site index and the number of site trees per stratum are shown below. Site index was assigned to each tree using the CA_SITEINDEX ExcelSIExample.xls spreadsheet and CA_SITEINDEX Users Guide and Programming Notes explanatory document (Krumland and Eng, 2005b) which are provided by CALFIRE on their website (see citation for weblink). Once calculated, this data was imported to Access to calculate the average site index for each stratum. Site class was filled in from the table above. Site class by strata as shown in Table 3 below was used to inform the legally permissible and financially feasible harvesting prescriptions modeled in the baseline. Site class for the purposes of determining common practice for the Project Area was determined by using measured site tree data and soil type classifications from the NRCS Web Soil Survey, as described in Section 5-C.

Table 3 - Measured Site Index Values

Strata	Acres	Plots	Site Tree Plots	Avg Site Index	Site Class
DFp	837	44	6	96.1	IV
DFHW	1,697	112	19	105.7	III
DFHWp	404	22	2	94.6	IV
MHC	1,428	90	9	85.7	IV
MHW	368	19	2	90.4	IV
TF	3,963	241	49	94.3	IV
TFp	891	55	7	89.5	IV
XO1	786	53	4	91.6	IV
XO2	976	53	8	94.4	IV
Total	11,350	689	106		

Geology and Soils

From West to East, the parcels are underlain by Rattlesnake Creek Terrain, Galice Formation, and then South Fork Mountain schist. James (1983) reported that areas affected by heavy logging activity leading up to the 1964 flood were concentrated in *“the sensitive terrain and steep slopes of the South Fork Mountain Schist, Galice Formation, and to a lesser extent, the Rattlesnake Creek terrain.”*

Soils information was obtained from the NRCS Web Soil Survey and from the NRCS soils survey (USDA NRCS 2013, 2014). The Trinity Timberlands soils are comprised of approximately 9% Holland family deep soils on 20-40% slopes, 11% Holland deep-Hugo families complex on 20 to 40 percent slopes, about 10% is in Hugo family soils, 10% is Hugo-Neuns families complex on 20 to 40 percent slopes, 20% is Marpa-Neuns families complex on 40 to 60 percent slopes, 3% is Albus-Race families association deep on 35 to 70 percent slopes, and minor amounts of various combinations of these same soil associations. The table below presents the properties of the soils found within the carbon project area.

Shape Files

Relevant shapefiles generated in ArcGIS are available for distribution to the Verification Body and the Offset Project Registry. The shapefiles are in the *.shp format and include files that geographically describe the following:

- Property Boundary
- Assessment Area (Supersection)
- Plot Locations
- Project Area (includes vegetation strata)
- Watercourses
- Soils

Delineation of Project Area

Creation of the Project Area began by using the property boundary shapefile obtained from Green Diamond (the previous owner). Through the course of inventory measurements and other field work, several monumented corners were located. These corners verified the location of the boundaries in GIS and in some cases resulted in slight modifications to the lines. The next step after settling on the correct property boundary was to remove the legally constrained northern spotted owl (NSO) areas and streams from the gross project area. This process is described in detail in Section 5-A Legal Constraints later in this document. The end result was to remove the 1,000 ft. core buffers of all NSO Activity Centers as well as the portions of the stream zones which are effectively no-harvest zones. See section 5-A for a more detailed description of the process used to address legal constraints.

Table 4 – Soil Properties

MU	Name	T Factor	Kw Factor	Kf Factor	NRCS ER	Depth Range Inches	Texture	% Coarse Frgs	% Slope	Detach.	Perm.	Depth	% Coarse	Slope	2-Yr 1 hr	Total Factor	EEHR	Total Factor	EEHR
										BOF Tech Rule Addendum 1 Factor						w/Low Remain Veg		w/Mod Remain Veg	
37:	Deadwood family-Rock outcrop complex, 60 to 80 percent slopes.	1	0.13	0.26	M	15-19	loamy-skeletal	30	70	17	3	9	7	25	6	79	E	73	H
66:	Forbes family, 20 to 40 percent slopes.	5	0.19	0.22	M	8-67	clay to clay loam	4	30	8	4	1	10	6	6	47	L	41	L
67:	Forbes family, 40 to 60 percent slopes.	5	0.19	0.22	M	8-67	clay to clay loam	4	50	8	4	1	10	15	6	56	M	50	M
97:	Holland family, 20 to 40 percent slopes.	3	0.13	0.28	M	26-59	clay loam to loam	3	30	12	4	2	10	6	6	52	M	46	L
104:	Holland family-Holland family, deep complex, 20 to 40 percent slopes.	3	0.13	0.28	M	26-59	clay loam to loam	3	30	12	4	2	10	6	6	52	M	46	L
116:	slopes.	4	0.12	0.31	H	50-59	clay loam to loam	4	30	12	4	2	10	6	6	52	M	46	L
121:	Holland, deep-Hugo families complex, 20 to 40 percent slopes.	4	0.12	0.31	H	50-59	clay loam to loam	4	30	12	4	2	10	6	6	52	M	46	L
131:	Hugo family, 15 to 40 percent slopes.	4	0.22	0.25	M	50-54	clay loam to loam	0	27	12	4	2	10	5	6	51	M	45	L
133:	Hugo family, 60 to 80 percent slopes.	4	0.22	0.25	M	50-54	clay loam to loam	6	70	12	4	2	10	25	6	71	H	65	M
136:	Hugo-Holland, deep families complex, 20 to 40 percent slopes.	4	0.22	0.25	M	50-54	clay loam to loam	3	30	12	4	2	10	6	6	52	M	46	L
137:	Hugo-Neuns families complex, 20 to 40 percent slopes.	5	0.22	0.25	M	50-54	clay loam to loam	3	30	12	4	2	10	6	6	52	M	46	L
176:	Marpa family, 60 to 80 percent slopes.	2	0.15	0.32	H	26-36	loamy skeletal	0	70	17	3	5	10	25	6	78	E	72	H
187:	Marpa-Neuns families complex, 40 to 60 percent slopes.	2	0.15	0.32	H	26-36	loamy skeletal	3	50	17	3	5	10	15	6	68	H	62	M
189:	Marpa family, deep, 40 to 60 percent slopes.	5	0.15	0.32	H	60-64	loamy skeletal	0	50	17	3	1	10	15	6	64	M	58	M
204:	Neuns family, 60 to 80 percent slopes.	2	0.05	0.20	L	23-33	loamy skeletal	3	70	17	3	5	10	25	6	78	E	72	H
211:	Neuns-Holland families complex, 40 to 60 percent slopes.	2	0.05	0.18	L	23-27	loamy skeletal	3	50	17	3	6	10	15	6	69	H	63	M
222:	Neuns family-Neuns family, deep complex, 60 to 80 percent slopes.	2	0.05	0.18	L	23-27	loamy skeletal	3	70	17	3	6	10	25	6	79	E	73	H
225:	Neuns family, deep, 40 to 60 percnt slopes.	5	0.10	0.35	H	61-65	loamy skeletal	3	50	17	3	1	10	15	6	64	M	58	M
227:	Neuns, deep-Hugo families complex, 20 to 40 percent slopes.	5	0.10	0.35	H	61-65	loamy skeletal	3	30	17	3	1	10	6	6	55	M	49	L
228:	Neuns family, deep-Neuns family complex, 40 to 70 percent slopes.	5	0.10	0.35	H	61-65	loamy skeletal	3	55	17	3	1	10	17	6	66	H	60	M
230:	Neuns family, schist substratum-Neuns family, deep complex, 20 to 40 percent	2	0.08	0.34	H	26-36	loamy skeletal	3	30	17	3	5	10	6	6	59	M	53	M
254:	Deadwood-Skymor families association, 35 to 70 percent slopes	1	0	0	L	0-4	rock	40	52	0	0	15	9	16	6	58	M	52	M
256:	Hecker family, deep, 35 to 70 percent slopes	1	0	0	L	0-4	rock	8	52	0	0	15	9	16	6	58	M	52	M
258:	Albus-Race families association, deep, 35 to 70 percent slopes	1	0	0	L	0-4	rock	0	52	0	0	15	9	16	6	58	M	52	M
285:	Secca-Forbes families association, 20 to 40 percent slopes.	5	0.27	0.36	H	41-45	clay to clay loam	0	30	8	4	3	10	6	6	49	L	43	L
351:	Xerofluvents-Riverwash association, 0 to 20 percent slopes.	3	0.16	0.26	L	11-60	??	0	10			1	10	2	6	31	L	25	L

II. Assessment Areas

(Forest Offset Protocol §4, §9.1.1.1(16), Appendix F)

The Project is located wholly within the Southern Cascades Supersection, in the Mixed Conifer and High Elevation Conifer Assessment Areas (Figure 5). According to Appendix F of the Compliance Forest Protocol, Determining a Value for Common Practice, acreage within each Assessment Area of the Supersection must be identified for any contiguous area of 20 acres or more. This was accomplished as part of the timber typing process. The true fir types (TF & TFp) are considered to be in the High Elevation Conifer Assessment Area, while the rest of the strata are considered to be in the Mixed Conifer Assessment Area based on their species compositions.

Once the project acreage is allocated to the proper Assessment Area, a site determination must be made as High or Low if necessary for the Assessment Areas of the project. Soil polygons from the NRCS Web Soil Survey were intersected with plots where site tree data was collected. Average site index was calculated for each soil type where site tree data existed (90% of the project acreage had a soil type that also had at least one site tree), and then site class was assigned to each soil type. The soil types were also intersected with the assessment areas to determine the acreage of each type in each assessment area. This way the acres by site class for each assessment area could be determined. The table below was constructed to present the acres of each site class in the Project.

Table 5 – Acres by Supersection & Assessment Area

Ecosection / Supersection	Assessment Area	Site Class	Acres
Southern Cascades	Southern Cascade High Elevation Conifer	All	4,853.6
Southern Cascades	Southern Cascade Mixed Conifer	High	165.9
Southern Cascades	Southern Cascade Mixed Conifer	Low	6,330.7
Total			11,350.2

Trinity Timberlands University Hill Improved Forest Management Project
CAR Supersections Map

1:200,000

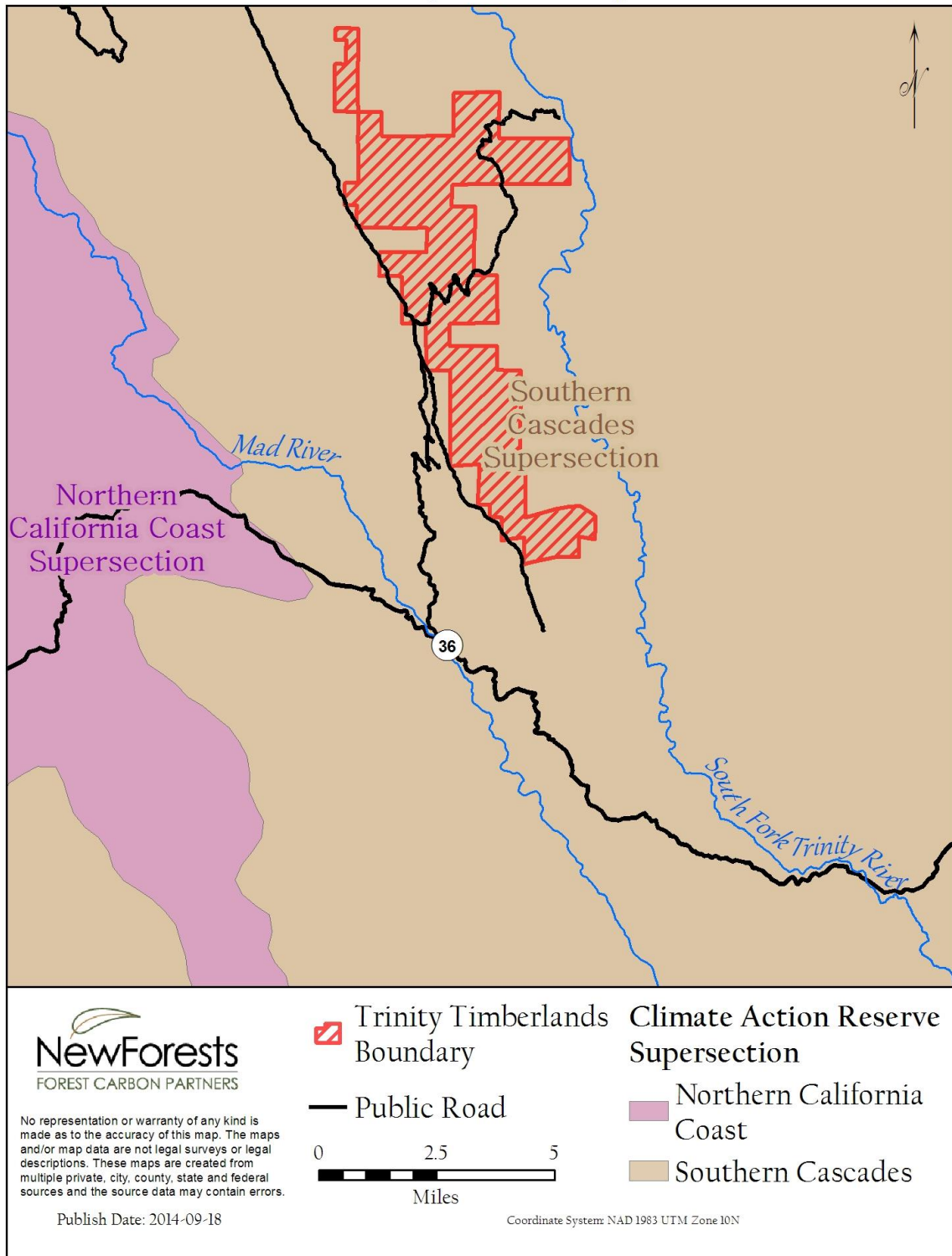


Figure 5– Project Area in Relation to Supersections

III. General Description of Forest Conditions

(Forest Offset Protocol §9.1.1.1(17))

Tree species composition; age class distribution; management history

The species composition in the Project Area is 35.7% Douglas-fir (*Pseudotsuga menziesii*), 22.6% white fir (*Abies concolor*), 13.9% tanoak (*Lithocarpus densiflorus*), 7.8% Pacific madrone (*Arbutus menziesii*), and 7.7% golden chinkapin (*Castanopsis chrysophylla*). No other species comprises more than 7% of the forest by basal area, although there are many other species present in lesser amounts. Table 6 below shows the species distribution in the project area.

The age class distribution is a product of the management history, which was characterized by even-aged harvesting over the last 40 years. Many of these harvests did not remove 100% of the volume, so there is a modest component of older trees which are more prevalent in some vegetation types than others. The average age for the nine strata ranges from 15 years for the recent cutover type to 75 years for DFHWp and is displayed above in Table 1.

All of the parcels comprising the project have been logged at least once, using primarily even-aged methods. However, sub-merchantable conifers and large hardwoods were commonly left behind. Most of the logging occurred from the 1950's through the 70's. However, portions of most of the strata have been logged in the past 20 years, with the most recent harvest taking place in 2008.

Table 6 - Species Composition by Basal Area, Volume, & Native Species Proportion

Common Name	Species			Basal Area Per Acre (ft ²)	Composition by Basal Area (%)	Native species	Percent by Native
	Scientific Name	FVS Code	FIA Code				
Douglas-fir	Pseudotsuga menziesii	DF	202	61.9	35.7%	Yes	35.7%
white fir	Abies concolor	WF	15	39.1	22.6%	Yes	22.6%
tanoak	Lithocarpus densiflorus	TO	631	24.1	13.9%	Yes	13.9%
Pacific madrone	Arbutus menziesii	MA	361	13.5	7.8%	Yes	7.8%
golden chinkapin	Castanopsis chrysophylla	GC	431	13.3	7.7%	Yes	7.7%
red fir	Abies magnifica (magnifica)	RF	20	9.6	5.5%	Yes	5.5%
canyon live oak	Quercus chrysolepis	CY	805	4.1	2.4%	Yes	2.4%
sugar pine	Pinus lambertiana	SP	117	3.5	2.0%	Yes	2.0%
California black oak	Quercus kelloggii	BO	818	1.3	0.8%	Yes	0.8%
incense-cedar	Libocedrus decurrens	IC	81	0.8	0.4%	Yes	0.4%
ponderosa pine	Pinus ponderosa	PP	122	0.7	0.4%	Yes	0.4%
red alder	Alnus rubra	RA	351	0.6	0.3%	Yes	0.3%
bigleaf maple	Acer macrophyllum	BM	312	0.4	0.2%	Yes	0.2%
willow species	Salix sp.	WI	920	0.2	0.1%	Yes	0.1%
gray pine	Pinus sabiniana	GP	127	0.2	0.1%	Yes	0.1%
Pacific yew	Taxus brevifolia	PY	231	0.1	0.1%	Yes	0.1%
other hardwoods		OH	998	0.1	0.0%	Yes	0.0%
Pacific dogwood	Cornus nuttallii	DG	492	0.0	0.0%	Yes	0.0%
western white pine	Pinus monticola	WP	119	0.0	0.0%	Yes	0.0%
Total				173.3	100.0%		100.0%

3-D: Additionality – Legal Requirement Test

(Forest Offset Protocol §3.1, §3.1.1.2, §9.1.1.1(9), Regulation §95973(a))

The legal constraint to forest management on Trinity Timberlands is the California Forest Practice Rules and the California Forest Practices Act. As a result, the baseline for this project is modeled using applicable provisions of California state law, including the Z'berg Nejedly Forest Practice Act and the Porter-Cologne Water Quality Control Act as well as California's rules for forest management at 14 CCR 895 through 14 CCR 1110 which are designed to protect water quality, archaeological resources, threatened and endangered species, cumulative impacts, etc. In doing so, we use the 14 CCR 895 through 14 CCR 1110 requirements which include stream buffer requirements for all class I and II watercourses, application of threatened and endangered species protections including protection of Northern Spotted Owl (NSO) habitat, silvicultural requirements, adjacency requirements, archaeological resource protection, etc.

These legal constraints are examined more closely in the Baseline Modeling Section 5-A of this document.

3-E: Regulatory Compliance

(Forest Offset Protocol §3.7, Regulation §95973(b))

Trinity Timberlands University Hill Improved Forest Management Project

For Project activities, Trinity Timberlands complies with applicable provisions of the following state and federal laws:

- Z'berg Nejedly Forest Practices Act
- Porter Cologne Water Quality Act
- California Fish and Game Code
- California Endangered Species Act
- California Environmental Quality Act (CEQA)
- Federal Endangered Species Act
- Federal Clean Water Act as regulated by the State Water Resources Control Board
- Archaeological Resources Protection Act

The project is not being implemented as the result of any law, statute, regulation, court order or other legally binding mandate. The Forest Project and associated Project Lands have met and been in compliance with all local, state, or federal regulatory requirements during the reporting period.

3-F: Use of Qualified Conservation Easements

(Forest Offset Protocol §3.5, §9.1.1.1(18))

The project will not employ a Qualified Conservation Easement.

3-G: Additionality – Performance Standard Test

(Forest Offset Protocol §3.1, §3.1.2.2)

In Improved Forest Management projects, project activities are considered additional to the extent they produce GHG reductions and/or GHG removal enhancements in excess of those that would have occurred under a conservative Business-As-Usual Scenario, as defined by the baseline estimation requirements. This Improved Forest Management project automatically satisfies the performance test according to Section 3.1.2.2 of the Protocol. Activities considered additional are described in section 3-A above.

3-H: Broadcast Fertilization

(Forest Offset Protocol §2.1.2(3), §9.1.1.1(10))

Trinity Timberlands has not employed broadcast fertilization in the Project Area since the project commencement date and has no plans to employ broadcast fertilization at any future time in the Project Area.

3-I: Offset Project Commencement Date

(Forest Offset Protocol §3.2, §9.1.1.1(7))

The project commencement date is November 18, 2013, which is the date that the OPO, Trinity Timberlands, acquired the last remaining portion of the project area and thus could commence the carbon project. This event qualifies as “transferring of property ownership” and is one of the three actions specified in the Protocol as denoting an Improved Forest Management project’s offset project commencement date. The first reporting period for this project is the period from November 18, 2013 to September 18, 2014, reflecting the installation of an inventory in 2013 plus one year of growth.

3-J: Demonstration of Sustainable Harvesting Practices

(Forest Offset Protocol 3.8.1, §9.1.1.1(13))

Since commercial harvesting will potentially be employed on the project area, it is necessary for the project to satisfy (at the time of commercial harvest) the Forest Offset Protocol §3.8.1 – Sustainable Harvesting Practices. Three options are given to satisfy this requirement:

1. The forest owner must be certified under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System certification systems.
2. The forest owner must adhere to a renewable long-term management plan that demonstrates harvest levels which can permanently be sustained over time and that is sanctioned and monitored by a state or federal agency.
3. The forest owner must employ uneven-aged silvicultural practices and canopy retention averaging at least 40% across the forest as measured on any 20 acres within the entire forestland owned by the forest owner.

Option 1 was chosen for the project. Trinity Timberlands will pursue sustainable harvesting practices through the implementation of a long-term forest management plan certified by the Forest Stewardship Council. The long-term forest management plan is still in development as of the date of this OPDR, and thus there is no formalized plan to harvest within the project area at the present time. At the time that commercial harvest is planned at some point in the future (e.g. a THP is submitted for a future harvest), the project area and all other forestland owned by the OPO will be included in group FSC certification as part of a certified pool of landowners managed by BBW Associates under group certificate # IN-2014-1.

3-K: Natural Forest Management

I. Native Species

(Forest Offset Protocol §3.8.2, Table 3.2, §9.1.1.1(14.a))

Both before and after commercial timber harvest, project activities will improve or maintain natural ecosystem processes, enhance native tree species and adhere to the Natural Forest Management practices required by the Forest Offset Protocol. As stated in Table 3.2 of the Forest Offset Protocol, the project must consist of at least 95% native species based on the sum of carbon in the standing live pool.

Project Area species composition has been assessed using basal area per acre. One hundred percent of the project is comprised of native species based on the 2013 inventory. Table 6 above provides the quantification required to show that at least 95% of the carbon in the standing live carbon pool is composed of native species.

II. Composition of Native Species

(Forest Offset Protocol §3.8.2, Table 3.2, §9.1.1.1(14.a))

The Forest Offset Protocol requires that no single species comprise more than 65% of the given basal area for standing live carbon under the “Species Diversity Index” in the Assessment Area Data File. For the IFM Project Douglas-fir represents the highest proportion of the total stocks at 35.7% of the average basal area with white fir being the second most common species at 22.6%. As can be seen in Table 6 above, no single species represents higher than 35.7% of the project basal area per acre. Over 15 species, all native, are represented in the basal area numbers. As a result the project area clearly meets the requirement that no single species prevalence exceed the 65% species diversity index (by basal area) for the project area.

III. Distribution of Age Classes

(Forest Offset Protocol §3.8.2, Table 3.2, §9.1.1.1(14.b))

Field data collected during the 2013 inventory was used to analyze the distribution of age classes in the Project Area. Age class was based on gathering age from potential site trees at 145 of the 689 plots within the project area to determine an average age for each stratum (only 106 site trees were ultimately identified and used for determining site index). Only the XO1 stratum turned out to be less than 20 years old. The Project area was broken into the HUC 10 watersheds so that less than 10,000 acres of Project fell within each watershed. The analysis determined that at the level of the timber strata approximately 3% of the Project acreage in the Lower South Fork Trinity River, 29% of the Project acreage in the Middle Mad River, and 11% of the Project acreage in the Middle South Fork Trinity River could be considered to be less than 20 years old. Because this is much lower than the 40% threshold from the Protocol, Trinity Timberlands University Hill IFM Project meets the

Trinity Timberlands University Hill Improved Forest Management Project

criteria of the Forest Offset Protocol. Table 1 above shows the average age by strata derived from field data collected within the project area. The project area clearly meets the requirement in Table 3.2 of the protocol that no more than 40% of the forested acres on a watershed scale are in age classes less than 20 years of age. See Figure 6 – Age Class Analysis below.

IV. Structural Elements (Standing and Lying Dead Wood)

(Forest Offset Protocol §3.8.2, Table 3.2, §9.1.1.1(14.c))

No salvage logging has occurred in the past year within the project area. No active removal of down dead wood is conducted in the project area. Therefore, the project must maintain or demonstrate ongoing progress toward an average of at least:

- a. one (1) metric ton of carbon (C) in standing dead wood per acre; or
- b. 1% of standing live carbon stocks, in standing dead wood, whichever is higher.

The current standing dead wood stocks are 2.69 metric tons of carbon per acre, which is higher than 1% of standing live carbon stocks (0.53 metric tons of C per acre) and is above the target of one (1) metric ton per acre. Since the current carbon stocks in standing dead wood exceed the minimum requirements, the project must maintain an average of at least one (1) metric ton of carbon (C) in standing dead wood per acre.

Down dead wood was not quantified as it was not a required pool. Standing dead wood was estimated by sampling standing dead trees in the inventory and applying the biomass estimates as described in the inventory calculation section.

3-L: Ongoing Management Activities

(Forest Offset Protocol §3.8.3)

The Forest Offset Protocol requires that standing live carbon stocking be maintained and/or increased during the life of the project unless the reduction meets one of the 5 possible causes listed in section 3.8.3 of the protocol. The project activity modeling (described in Section 6 of this report) predicts that total standing live carbon stocks will gradually increase over the life of the Project. Overall stocks will never drop below the level of standing live carbon stocks at the initiation of the project. Stocks will always be maintained at a level that assures all credited standing live carbon stocks are permanently maintained. Stocks will be monitored over the life of the project by re-measuring the permanent plots and tracking disturbances, with appropriate changes made to the harvest schedule to ensure compliance with this requirement.

4. Inventory Methodology

4-A: GHG Assessment Boundary

(Forest Offset Protocol §5.2)

The carbon sources, sinks and reservoirs accounted for in the Project for quantifying Project CO2e reductions and removals are listed in Exhibit 1 at the end of this document.

4-B: Inventory Design and Sampling Process

(Forest Offset Protocol §9.1.1.1(19), Appendix A.3)

The following inventory methodology has been used to quantify the protocol carbon pools for Project registration:

A fishnet grid was created in ArcMap 10.1 that was 200 m by 250 m across the Trinity Timberlands rectangle area which resulted in over 1,000 points. The point grid associated with the fishnet was then clipped to the Trinity Timberlands PARCELS boundary, which was the working boundary at the time instead of the OWNERSHIP boundary supplied by Green Diamond Resource Co (GRDCO). Further boundary work determined that the property boundary supplied by GRDCO was more accurate than the county parcels layers. Point locations were adjusted accordingly by dropping nine points and adding 22 points.

It was determined that 800 plots would be used to sample Trinity Timberlands. In order to ensure random sampling of the proposed points, the program R (R Core Team 2013) was used to select points. Selected plots were identified by numbers 1 to 800; the remaining non-selected for sampling plots were numbered 801 to 1,036. Part way through the inventory, the landowner acquired more land within the external property boundaries and plots were added on the same grid. The same randomization procedure was employed to select which plots to sample on the new property.

The final result was a set of 820 permanent forest inventory plots which were installed in July-October of 2013 that covered all of the property anticipated to become part of the carbon project.

During the time of the 2013 inventory, vertical air photos at a nominal scale of 1:12,000 were flown and the entire property was timber typed using stereo pairs to a minimum polygon size of 5 acres (see Trinity Timberlands Timber Typing Task Order V2 (BBW 2013a)). A description of the typing process and how the strata were created is found earlier in this document under Forest Vegetation Types.

Almost a year after the inventory was done and processed, the landowner decided to not include the most northern parcels in the carbon project and the plots from these parcels

were removed from the database. The total number of plots was reduced further by eliminating those which fell in NSO core areas as well as the core zones of Class I and II streams and the inner buffer zones of Class I and IIL streams.

A thorough field checking effort was conducted to determine which plots actually fell in the stream zones to be removed. The stream layer as described in the Legal Constraints section was overlaid with the plots, and any plot which fell within 100 ft of a Class II or 150 ft of a Class I was either dropped or was visited to see where the actual plot was on the ground. If the plot center was within 15 ft of a Class IIs or 100 ft of a Class I or IIL, it was dropped. All plots mapped as being within 1,000 ft of an NSO activity center were dropped without field checking. These steps resulted in 46 plots being dropped. The resulting number of plots actually used to quantify carbon pools for the project is 689 as shown in Table 1. Figure 7 - Inventory Layout (below) shows the final inventory plot layout for the Project Area.

4-C: Field Measurement and Plot Monumenting

(Forest Offset Protocol §9.1.1.1(19), Appendix A.3)

The plot design is a set of nested fixed-area plots with the largest plot being 1/5 acre in size. Small tree (5.0" to 10.95") information was collected on a 1/50th acre circular plot for all live and dead trees. Data on each tree included diameter to the nearest 1/10th inch, crown ratio, damage code and defect. Heights were measured on all species other than tanoak, madrone, chinkapin, white fir and Douglas-fir. The same information was collected on trees 11.0-20.95" on a 1/20th acre plot. Trees > 21.0" were recorded if they fell within a 1/5th acre plot. For dead trees, the tree's decay class was assigned. On every 4th plot, all tree heights were measured and the radial increment for the first conifer to the right of north was collected in order to get growth data. If a potentially suitable site tree was found at the measure plot, it was selected for measurement. Regeneration data for trees between 1" and 5" DBH were also collected at the measure plots using a 1/100th acre (11.8 ft radius) plot. These trees were grouped by 1" diameter class, and average height was recorded for the class.

The mapped grid of plots was loaded onto GPS units for all cruisers, and plot centers were located in the field using GPS. Plot centers were permanently monumented using a 2' long 3/8" piece of rebar painted blue and driven into the ground. Pink flagging was tied to a branch about 7 feet high near the plot center and to the plot pole. Standard timber cruising tools were used, which included laser range finders for determining distances and measuring tree heights. The details of the methodology are contained in the "TT Inventory Manual" (BBW 2013b) found in Exhibit III. The manual was provided to the crew that installed the inventory.

Check cruising was conducted by a forester from BBW who did not install any of the plots. This was done on 9.3 percent of the plots (76 plots total out of 820) according to the parameters in the inventory manual to ensure quality measurements and feedback to field

crews during data collection. Most of the time plots fell within the measurement standards, but if not then the checker reviewed the mistakes with the cruiser who then returned to the plot to make corrections. This pattern continued until all cruisers consistently passed their plots. The corrected plot data was used in all modeling and analysis.

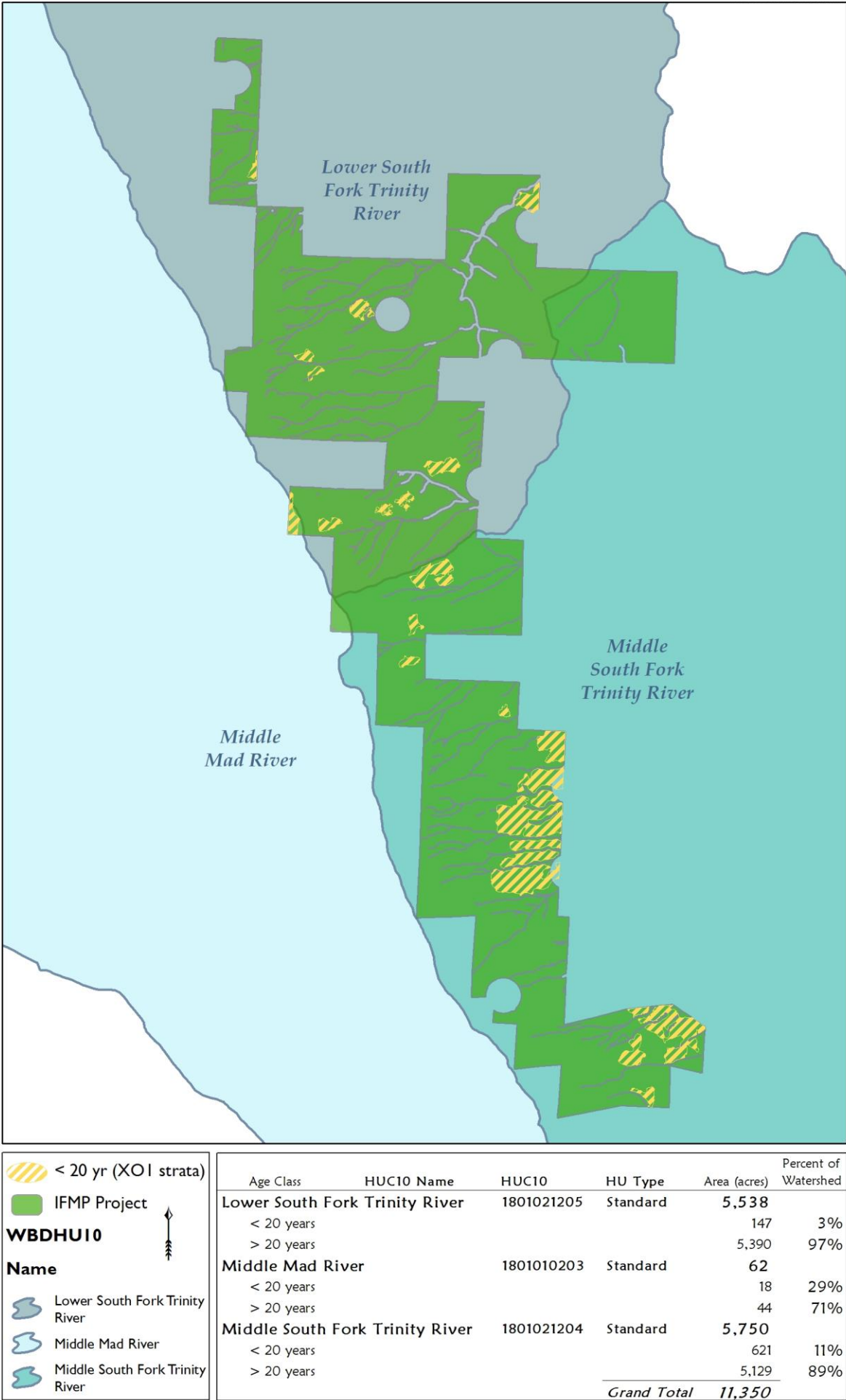


Figure 6 – Age Class Analysis

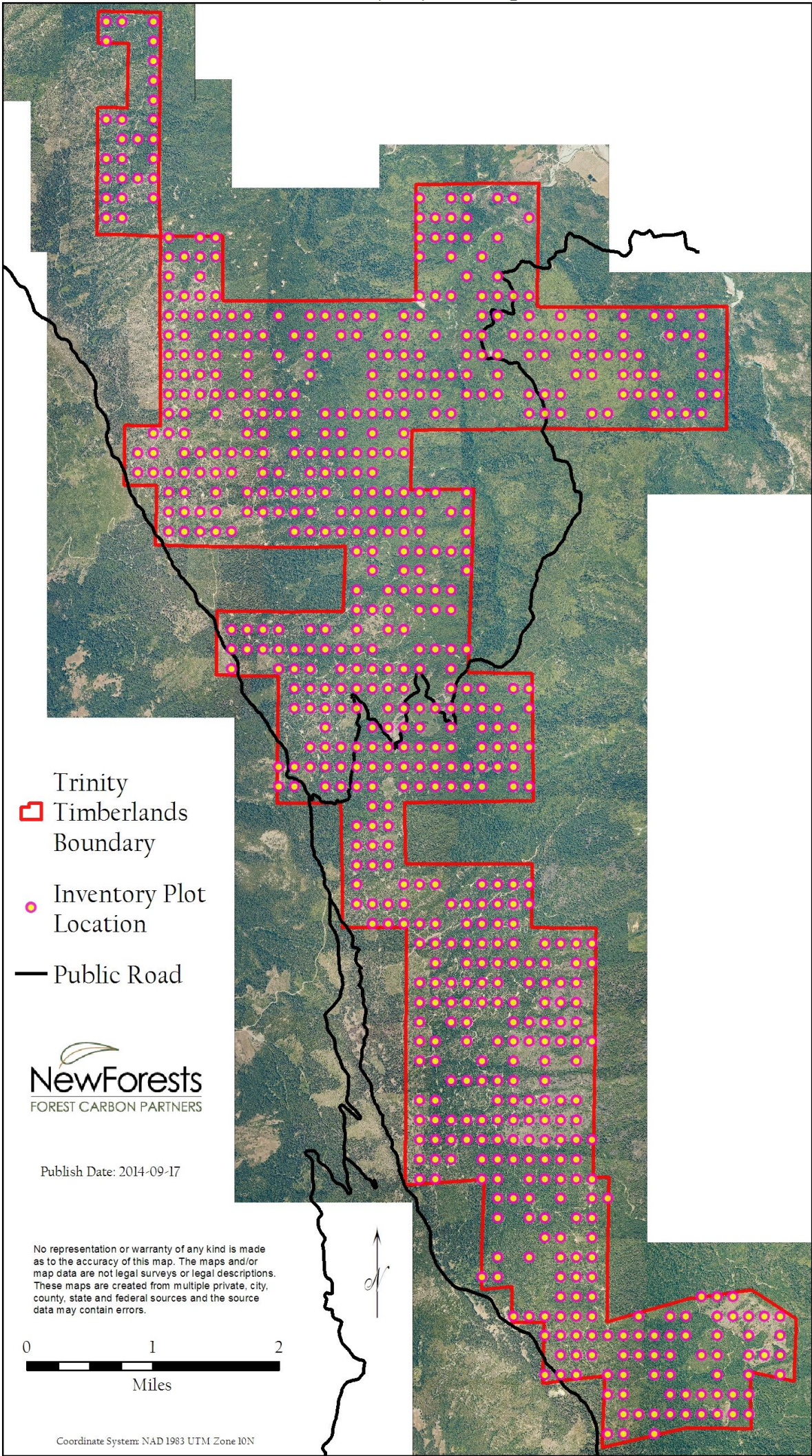


Figure 7 - Inventory Layout

4-D: Data Management System

(Forest Offset Protocol §9.1.1.1(19), Appendix A.3)

The 2013 inventory data were collected using paper plot sheets and the data were double key-punched into MS EXCEL by RAM data processing in Cameron Park, CA. Double key punching ensures that keypunch errors are reduced to a very low number, typically less than 0.1% of all entries according to RAM.

One hundred percent of all data entry was machine checked to see whether coding was within acceptable limits (e.g. no trees > 200" in diameter, species codes were correct, etc.). Further data quality checking was done by the RPF running the silvicultural prescriptions while formatting the data for processing by FVS.

The data were analyzed in Microsoft Excel, Microsoft Access and the Forest Vegetation Simulator (FVS) ICASCA variant (Keyser 2014). This variant was used because of the large number of species it tracks and its regional applicability. The Suppose user interface for FVS V2.02 (Crookston 1997) and FVSSTAND were also used. The "Build Standard Treelist and Cutlist" keyword was used to send the treelists to an Access database (Crookston et al. 2011). A unique Access database was created for every strata/prescription/timing choice combination.

All data, growth and yield simulation results, and carbon calculations remain stored on personal computers and back-up drives at New Forests' offices.

4-E: Quantification Methodology

(Forest Offset Protocol §9.1.1.1(20), Appendix A.3)

The above ground standing live tree portion of carbon was calculated using the approved species-specific FIA equations and methodology for cubic foot volume and biomass of tree bole, bark and branches as required by ARB (FIA 2010a, b). This was done through a series of Access database queries. These queries were applied to the individual tree records at each 10-year time period for the 100-year projection period for each strata/prescription/timing choice combination. All databases for the baseline simulation have been provided to the verifiers as part of the verification process.

Above ground standing dead wood was estimated using the snag data collected in the inventory for all standing dead trees greater than 5" DBH and 15' in height. Gross bole volumes were calculated volumetrically and net volumes were estimated by subtracting a tree's percent defect as estimated during the inventory from the total gross volume. Carbon per acre for each standing dead tree was calculated by multiplying the net bole volume by the specific gravity from Harmon et al. (2008) by decay class. Bark was adjusted for decay and missing volume and was added in for decay classes 1 and 2. Crown was

adjusted for decay and missing volume and was added in for decay class 1 only. For hardwood species where bark and crown were already incorporated into the volume equations, then these components were present for all decay classes and were adjusted for decay and missing volume as described above. This methodology is explained in more detail in “Modeling Methods for Trinity” and “Broken Top Tree Analysis” (Robards 2014, 2015).

Below ground standing live and dead tree carbon was estimated by using the protocol stipulated equation (Cairns et al. 1997). This equation uses plot-level above ground biomass density in tonnes per hectare to predict the below ground biomass in tonnes per hectare. Per guidance from ARB, the Cairns equation was applied to the sum of live and dead aboveground biomass by plot to calculate live and dead belowground biomass. This was then converted to CO₂e and subsequently divided into live and dead belowground carbon pools by applying the proportion of live or dead aboveground carbon to total aboveground carbon to total belowground carbon. Thus, the carbon pools could be represented by total live and total dead carbon independently, as required by the Protocol.

All biomass estimates were converted to carbon by multiplying by 0.5 and to CO₂e by multiplying by 3.664, which is the conversion factor specified in the Protocol.

Harvested wood products pools require an estimate of the average amount of carbon that is likely to remain stored in wood products over a 100-year period. This was done according to the steps outlined in Appendix C of the protocol, which utilize the average DOE (2007) wood products factors for accounting for the long-term storage of wood products. The procedure begins with an estimate of the total harvested carbon that will be delivered to a mill to be turned into wood products (row 11 of the Offset Credit calc worksheet). Next, the series of worksheets from Appendix C in the Protocol were used to determine the amount transferred to wood products, the amount stored in in-use wood products, and the amount stored in landfills. The carbon stored in wood products and landfills are summed to determine the total average annual carbon storage in wood products over 100 years.

For the calculation of secondary effects, the above and belowground carbon of all harvested live trees is determined using the same equations and methods for determining standing live tree carbon over time. This was done by running the same Access queries used for live trees on the FVS cutlists (treelist output tables for all harvested live trees) for each strata/prescription/timing choice combination.

4-F: Inventory Update Process

(Forest Offset Protocol §9.1.1.1(19), Appendix A.3)

All modeling required for this report has been conducted by Registered Professional Foresters at Baldwin, Blomstrom, Wilkinson and Associates, Inc., Arcata, California,

Trinity Timberlands University Hill Improved Forest Management Project

specifically by Mr. Paul Harper, RPF # 2672, with oversight by Dr. Timothy Robards of New Forests Inc., RPF #2521. In addition, Dr. Robards oversaw all other elements of the OPDR; thus, this report has been prepared with the oversight of a Professional Forester as required in Section 9.1 of the Protocol.

Annual monitoring of the Project is required to ensure up-to-date estimates of project carbon stocks and provide assurance that GHG reductions achieved by the project have not been reversed. A re-inventory will comply with the requirement that no field inventory data will be more than 12 years old; as such the 689 project plots will be re-inventoried no later than 2025. Because the plots are permanently located, it is anticipated that the 12 year re-measurement will use the existing plot locations as the basis for establishing project stocks in 2025.

For reporting stocks on an annual basis until the next inventory, when no harvesting is expected, the intention is to rely on growth projections from FVS, which have already been done. If any timber harvesting occurs in the project area, other than salvage, the timber harvest area will be re-inventoried. Timber harvests in the project area shall be designed to treat plots the same as the surrounding stand. Effort will be made to limit knowledge of exact plots locations from the foresters designing and implementing timber harvests, so that the risk of bias is minimized during harvest planning. In addition, a post-harvest review of recent harvested areas shall be conducted by a RPF and if a plot appears, based on professional judgment, to no longer be representative of the surrounding stand due to being treated differently than prescribed in the harvest plan, then the plot will be moved to a random distance and direction within a 2.5-acre area around the plot.

At the occasion of a disturbance event other than planned timber harvest, such as fire or windthrow, that appears to alter more than 5% of carbon stocks, 5% of project acreage, or result in a reversal under the protocol (e.g. reduction is greater than annual growth if project is verified annually) then the plots in the affected area will be re-measured. If the disturbance appears to meet the specified threshold, but does not affect any of the permanent plots in the inventory, new plots will be established in the affected area in sufficient quantity and distribution to account for the disturbance. The newly measured plots will be installed consistent with the inventory manual used to establish the original inventory; any improvements or changes to inventory methods or calculations would be documented and justified in the change log. Once the plot data has been gathered, a new calculation of the section 6 - Actual On-Site Carbon Stocks will be completed in order to revise the section 7 - GHG Reductions and Removals as well as a new calculation of the confidence deduction. The effects of disturbances on the carbon stocks of the project area will be estimated by monitoring the acreage affected utilizing the average per acre carbon stocks for the applicable strata. If the disturbance affects more than 5% of the strata acreage, then a new stratum will be delineated and the project stocks and confidence deduction calculated using the new strata.

Disturbance events will be monitored as part of normal management activities, as well as through an annual review of aerial imagery and local and state disturbance reports (e.g. fire maps). Given the plot density (approximately 1 plot/16 acres) any disturbance that affects less than 16 acres (e.g. salvage of burned trees) is assumed to have a diminutive effect on project carbon stocks given that each plot represents 0.15% of the entire stock calculation. Thus, any disturbance that is not large enough in scope to affect a plot, by definition would only affect less than 0.15% of the carbon stocks on the project area.

If, in the process of re-measuring plots after a significant disturbance, the plots cannot be relocated, new plots will be established in the same locations as the old plots. The replacement plot data will replace the old plot data for the purposes of calculating project carbon stocks.

5. Baseline Carbon Stocks – Improved Forest Management Projects

5-A: Legal Constraints

(Forest Offset Protocol §6.2.1.2, §9.1.1.3(4))

The following are the Forest Practice Rule legal constraints modeled for the Project baseline scenario.

- The project is located in the Coastal Anadromy Zone of the Coast Forest Practices District and as such all practices within the Watercourse and Lake Protection Zones (WLPZ) fall under the Anadromous Salmonid protection regulations (916.9 hereafter ASP rules) of the California Forest Practice rules (California Code of Regulations 14). Developing an accurate map of stream locations and classifications on such a large property is a very complex task. Fortunately, much of the property has had THPs filed on it and hence reasonable watercourse mapping is available. The hydro layer developed for Trinity Timberlands was based on Humboldt and Trinity Counties Hydro layers created and maintained by the State of California and the Department of Forestry and Fire Protection (CALFIRE). Both county hydro layers were downloaded from CALFIRE's FTP site. Hydro areas that were near or crossed Trinity Timberlands were merged into one layer, hereafter referred to as the Trinity Timberlands Hydro layer. This feature class was further modified using visual inspection and comparisons with 1:24,000 topographic map DRGs, National Hydrography Dataset 1:24,000 watercourse features, and NAIP imagery to eliminate "doubled" watercourses.

The Hydro layer has many Class 5 streams (unclassified perennial). The most conservative default would be to treat these as Class I, but many are clearly too steep and high up the slope to ever support fish. For Class 5 streams on and near the property a procedure was undertaken to calculate the gradient of sections of these watercourses in order to identify them as Class II or leave open the potential for them to be a Class I (no change to Class 5 designation). A 20% gradient was chosen as the cutoff for fish

based on work by Bliesner and Robison (2007). The results of this exercise informed the identification of Class IIL streams. Streams were assigned the designation Class IIL based on their proximity to a Class I or Class 5 stream (within 1,000 feet) and their flow direction. This is conservative as some of these streams, while within 1,000 ft. of the class I do not have a large enough bed width or mid-summer flow to be classified as IIL. Stream Classes were also modified from 5 or 6 (unclassified intermittent) to I or II, if a THP was used as a source map and the stream was coded I or II on that THP map. Additionally, in some areas field reconnaissance was used to more accurately locate watercourses and wet areas as necessary.

In order to create a GIS layer of hydro constraints based on California's Forest Practice Rules, all Class I or Class 5 streams within the Trinity Timberlands Hydro layer were buffered to 30 feet, 100 feet, and 150 feet. These buffer distances correspond to WLPZ core, inner, and outer buffers for Class I streams respectively. Class IIL streams were buffered by 30 feet and 100 feet, which corresponds to WLPZ core and inner buffers for Class IIL streams. The remaining Class II streams (Class IIS streams) were buffered by 15 feet for the Class IIS core buffer. Class IIS inner buffers were based on percent slope and were designated as follows: Class IIS streams on slopes less than 30% were buffered 50 feet, IIS streams on slopes between 30% and 50% were buffered 75 feet, and IIS streams on slopes greater than 50% were buffered by 100 feet. Percent slope was calculated in ArcMap 10.0 using a 10 meter or better National Elevation Dataset (NED) Digital Elevation Model (DEM) originating from the USDA/NRCS National Geospatial Center of Excellence and downloaded from the USDA Data Gateway website. Also included in the WLPZ areas within the Project Area were any wet areas designated as WLPZ in the THP maps.

All WLPZ core buffers and Class I and IIL inner buffers were removed from the Project Area. While the FPRs allow harvesting to an 80% canopy in the inner buffers, to be conservative, these areas were removed from the Project Area. Class I outer buffers and Class IIS inner buffers were retained and assigned a selection prescription leaving a minimum 50% canopy post-harvest.

- Wildlife buffers for Northern Spotted Owls (NSO) were determined and the core zones removed from the operable acreage. This was done following the guidance in Attachment B from the US Fish and Wildlife Service intended for use by RPFs in the interior district. The interior district for owls does not directly overlap with the Northern Region of the FPRs because it is based on the geographic extent of the redwood forest type. It was assumed that under a baseline scenario harvest plans would be filed using 14CCR 919.9 (e) in order to get a determination from the USFWS that take of NSO would be avoided. There are 9 Activity Centers (AC) from the CNDDDB whose core buffers at least partially overlap the property. The NSO Protocol stipulates 3 concentric buffers consisting of a 1,000 ft Core, a ½ mile radius Inner buffer, and a 1.3 mile Outer buffer, each having different levels of harvest restriction and habitat retention. One thousand ft. no harvest buffers around the NSO activity centers were

intersected with the property boundary to clip acreage from the project area. This was done to meet the guidelines in Attachment B of no harvesting in this zone, even though evidence that previous landowners clearly have harvested within the core zones of several of the ACs would indicate that some regulatory flexibility exists.

Within the ½ mile Inner buffer existing habitat was typed for all the ACs as meeting or eventually meeting either the nest/roost or foraging requirements. These requirements are to retain 250 acres of nest/roost and 150 acres of foraging habitat. As is customary, some of this acreage was allocated to areas within the buffers outside of the property. Almost all the surrounding property is US Forest Service or other land not being managed for timber and consequently has been better habitat in most cases than the Project area. Stream zones on the property within the ½ mile buffer were considered to contribute toward the acreage requirements. The results of the typing indicate that 593 acres of foraging and 209 acres of nest/roost habitat on the property in addition to stream zones would need to be maintained. This represents all the habitat that would need to be retained if the landowner wanted to harvest across the entire property in the first 5 years. However, the baseline harvest schedule spreads harvest out over multiple periods such that substantially more owl habitat than this is maintained throughout the planning horizon. Stand age is generally used as a surrogate for NSO habitat in Habitat Conservation Plans developed by large landowners, and therefore is also appropriate for this analysis. Documentation in the “Green Diamond Resource Company HCP Annual Report” states that foraging and roosting habitat is met in stands 31-45 years old, and prime nesting and roosting habitat occurs in stands over 45 years old. In order to be conservative and based on professional understanding of the forest types on Trinity Timberlands, we chose 60 years as the age where it was safe to assume habitat qualities for NSO nesting, roosting and foraging would exist. The area of stands within the managed forest matrix (outside stream zones) over 60 years old remains well over 802 acres at all times, which is sufficient to cover the 593 acres of foraging and 209 acres of nest/roost that would be required. Therefore since the required habitat acreage will always exist on the Project area under the baseline, no further constraints need to be applied to the ½ mile inner buffers.

In the 1.3 mile outer buffer, Attachment B recommends retention of 935 acres of foraging habitat, which represents 32% of this zone. However, only about 1/3 of this zone overlaps the property, meaning that all the necessary habitat could easily be supplied from off the property. Especially since nearly all the surrounding land is national forest or other private land not being managed for timber. No constraints to the baseline modeling were applied in this outer zone.

- Clearcutting, commercial thinning, shelterwood removal, selection and variable retention were the FPR silvicultural prescriptions modeled in the baseline. Modeling incorporated all age and stocking standards specified by the California forest practice rules (CCR 14) as summarized in Table 11 and Table 12. Selection prescriptions retained greater than 75 ft² of group A species in the Site 3 stratum and 50 ft² on the rest of the

strata as well as 15 ft² or 12 ft² (based on Site class) in trees (group A species) greater than 18" as per 14CCR 913.2(a)(2)(A)4. Commercial thinning prescriptions retained 100 ft² of group A species in the Site 3 stratum and 75 ft² on the rest of the strata as per 14CCR 913.3(a)(1)(A). The shelterwood removal prescription complies with the requirement to cut less than 32 dominant trees per acre and less than 100 ft². Compliance with these standards was accomplished by examining the FVS output tables each time a prescription was run and adjusting the parameters in the command file if necessary. Clearcutting in all strata was delayed until the strata reached 60 years old or 80 years in the case of site IV and lower lands (most of the project lands). Regeneration in clearcuts and VR harvests were simulated to undergo hardwood control and to be planted to fully occupy the site and pass point count stocking.

- The impact of adjacency requirements was addressed by examining the even-aged acres harvested and restricting any 5-year period to no more than 25 percent area harvested, which resulted in a spatially feasible harvest schedule. The shelterwood removal prescription in DFp retains greater than 75 ft² and consequently the adjacency limits do not apply as per 14CCR 913.1(d)(3).
- There are no active THPs within the Project Area.

5-B: Financial Constraints

(Forest Offset Protocol §6.2.1.3, §9.1.1.3(5))

The overriding assumption is that harvest plans conducted on the property and nearby lands must have been financially feasible enough to do them. Therefore, as long as projected harvests in the Baseline scenario are sufficiently comparable to actual past harvest plans, then the modeled prescriptions are also financially feasible. The most compelling argument that the harvesting regime modeled for the baseline is financially feasible is that the former landowner implemented intensive harvesting practices over most of the property in the recent past. The silviculture practiced was very similar to the prescriptions modeled for the baseline. However, section 6.2.1.3 of the Protocol requires evidence that activities comparable to the baseline have taken place on *other* properties within the Forest Project's Assessment Area. To fulfill this requirement, option two in Section 6.2.1.3 was selected for demonstrating that the proposed baseline is financially feasible by demonstrating that harvesting similar to that proposed in the baseline has occurred on at least one other similar property in the past 15 years.

An analysis of THP's filed within the past 15 years was undertaken and THP (1-12-005MEN) was selected for comparison. This THP was filed in 2012 and is located on private land within the Southern Cascades Supersection. The 3 particular criteria for comparison required by the Protocol are slopes, zoning and species composition. The Mendocino THP is zoned as TPZ. The Trinity Timberlands University Hill IFM Project is nearly all (97 percent) designated as Timber Production Zone, with the remainder split between Timber Production/Agricultural Exclusive and Unclassified.

The silvicultural approach in THP 1-12-005MEN is similar to the Project baseline in that it is designed to get the most volume out of the forest that is legally allowed. The landowner scheduled alternative prescription across 100% of the plan area with a goal to meet the FPR minimum 300 point count stocking or commercial thinning stocking standard. This is similar to the baseline thinning and clearcut and plant prescriptions. The stream zones were slated for selection harvests as described in Item 26 of the THP.

The other two criteria are addressed in the following paragraphs.

Slope Analysis

An analysis of slope was performed for the Project Area and comparison THP. A digital elevation model (DEM) was obtained from the USGS National Elevation Dataset (NED) and analyzed using the Spatial Analyst extension in ArcGIS 10.0. Slopes within the Project Area and THP 1-12-005MEN were classified into 3 slope classes corresponding to the slope cutoffs in the FPRs and the proportion of each analysis area that fell within the slope classes was calculated. The mean slope of the entire THP and the Project area was calculated as well and is shown in Table 7 below.

The distribution of slope classes within the Project Area and THP 1-12-005MEN was quite similar (Table 7). The difference between the average percent slope of the comparison THP and the Project area is less than 10% and therefore meets the guidelines as specified in section 6.2.1.3(2a) of the ARB protocol.

Table 7 - Comparison of slopes for Project Area and Comparison THP

	1-12-005MEN	Trinity Timberlands
Slope Class	Percent Total Area	
Less than 30%	46%	54%
30% to 50%	44%	35%
Greater than 50%	11%	11%
Mean % Slope	36.0	33.0

Vegetation Type Analyses

Vegetation of THP 1-12-005MEN is similar to the Project vegetation and does not vary by more than 20% of the species composition of the Project (Table 8).

Table 8 – Comparison of Species Composition

	Trinity Timberlands Uhill IFMP		THP 1-12-005-MEN		
<i>Species Group</i>	Basal area (ft ² /ac)	Percent Basal Area per Acre	Basal area (ft ² /ac)	Percent Basal Area per Acre	Percent Difference
<i>Conifer</i>	117	67%	123	76%	9%
<i>Hardwood</i>	57	33%	38	24%	-9%

5-C: Estimate Baseline Onsite Carbon Stocks

(Forest Offset Protocol §6.2.1, §9.1.1.1(21, 22, 25), §9.1.1.3(2, 3), Appendix B)

Step 1: Determining the Common Practice (CP) Carbon Stocks for the Project's Assessment Area. The Project is entirely within the Southern Cascades Supersection and is split between the Mixed Conifer and High Elevation Conifer Assessment Areas. The Project Area was determined to be primarily low site based on averaging measured site tree site index values by soil type for the property, as defined by the NRCS Web Soil Survey data (Soil Survey Staff) and then converting average site index to timber site class using the Krumland and Eng (2005a) 50 year approximation of the CALFIRE site class system published in California Forestry Report No 4 (Table 2). Site index plots can characterize 90% of the soil types within the project area. By extrapolating to the missing acreage based on the proportion of measured high to low site class within the same assessment area, site class values were assigned to the 10% of acreage without measured site index data. Based on the acreage in each Assessment Area and the site class, the table below was constructed to determine Common Practice for the Project.

Table 9 - Common Practice Calculation

Ecosection / Super-section	Assessment Area	Site Class	Acres	Common Practice: Aboveground CO₂e (tonnes/acre)
Southern Cascades	Southern Cascade High Elevation Conifer	All	4,853.6	72.0
Southern Cascades	Southern Cascade Mixed Conifer	High	165.9	128.4
Southern Cascades	Southern Cascade Mixed Conifer	Low	6,330.7	86.4
Total Acres / Weighted Avg Common Practice			11,350.2	80.9

Common practice was calculated by weighting the common practice values by acres in each assessment area and site class combination. The weighted average common practice was 80.9 tonnes/acre of above-ground standing live carbon stocks in CO₂e. This is well below the average above-ground live carbon stocks in the baseline at 96.9 tonnes CO₂/acre.

$$CP = ((4,853.6 \text{ ac.} \times 72.0 \text{ t/ac.}) + (165.9 \text{ ac.} \times 128.4 \text{ t/ac.}) + (6,330.7 \text{ ac.} \times 86.4 \text{ t/ac.}) / (11,350.2 \text{ total ac.}) = 80.9 \text{ tonnes/acre CO}_2\text{e}$$

Step 2: Determining if the Project Area's Initial Carbon Stocks (ICS) are above or below the Common Practice (CP). Based on the initial forest carbon inventory for the Project Area, the carbon stocks of the aboveground live tree component are calculated to be 155.31 tonnes CO₂e per acre. The ICS is greater than the CP, therefore the minimum baseline level (MBL) is equal to the CP or 80.9 tonnes per acre CO₂e in the aboveground live tree component. Note: When ICS are above CP, it is not necessary to estimate the High Stocking Reference (HSR) or Weighted Average Above-Ground live carbon stocks per acre for all Forest Owner and affiliate landholdings within the same logical management unit (WCS).

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 and averaging the model results over the 100-year timeframe, so that the baseline is expressed as a single (average) value for above-ground standing live carbon stocks per acre in every year. The baseline simulation incorporates all legal and financial constraints as discussed in section 5-A and 5-B. Consideration was given to financial, legal, and regulatory constraints by assigning acres constrained for various reasons to certain silvicultural prescriptions (Table 11 and 12).

The ICASCA variant of the Forest Vegetation Simulator (FVS) was used to model forest growth, mortality and harvest over time (Keyser 2014). FVS is an ARB approved growth and yield model designed for these sorts of applications. FVS is an individual tree growth model that accepts direct input of the inventory data, once the data has been formatted correctly and missing heights filled in. Prior to running FVS, missing heights in the inventory data were determined by developing a regression equation based on DBH for each species or logical species/site class grouping (Table 10). The model also can incorporate growth increment data collected during the inventory to calibrate the projected growth rates. However, when growth projections with and without the on-site 10 year increment data were compared, the difference was so minimal that a decision was made to not utilize the growth data. No calibrations were made to the growth model.

For the stream zone prescriptions where maintaining a certain canopy cover was a constraint, the 'STRCLASS' keyword was applied. This keyword sends calculated canopy

cover data to a spreadsheet where it can be averaged across the plots to verify that post-harvest canopy cover exceeds the minimum specified in Table 12.

FVS will report at a minimum cubic volume, board foot volume, trees per acre and basal area of live and harvested trees over time. The individual tree data output by FVS to the treelist is the basis for calculating individual tree biomass as described in section 4-E. Simulations were conducted in 5-year increments with harvests simulated at the start of the period and pre-harvest stocking reported at the start of the period.

The total tree height imputations were done using simple linear regression models where the DBH was the independent variable. The DBH was transformed using a natural logarithm. The models are best linear unbiased estimators. This may be summarized as:

- Best: The squared deviation is minimized.
- Linear: The model is linear in the parameters which makes solving mathematically feasible if the design matrix can be inverted (i.e. the matrix is not singular or the model is not over-parameterized).
- Unbiased: The average residual (actual minus predicted value for each tree) is zero.

Model fit may be evaluated using measures of fit such as the R-squared, which we displayed with each fit. Final regression equations were as follows:

Table 10 - Regression Formulas for Estimating Total Height from DBH

Species Group	Formula	R-squared Value
Red fir	$y = 41.424\ln(x) - 45.075$	$R^2 = 0.7479$
Pine spp.	$y = 52.468\ln(x) - 67.696$	$R^2 = 0.8489$
Canyon live oak	$y = 20.584\ln(x) - 6.9409$	$R^2 = 0.621$
Douglas-fir higher site	$y = 46.758\ln(x) - 40.354$	$R^2 = 0.8114$
Douglas-fir lower site	$y = 46.343\ln(x) - 45.857$	$R^2 = 0.819$
White fir higher site	$y = 45.078\ln(x) - 43.51$	$R^2 = 0.7063$
White fir lower site	$y = 45.941\ln(x) - 52.672$	$R^2 = 0.8201$
Tanoak higher site	$y = 35.053\ln(x) - 26.18$	$R^2 = 0.7789$
Tanoak lower site	$y = 23.097\ln(x) + 0.8947$	$R^2 = 0.4823$
Madrone higher site	$y = 30.058\ln(x) - 16.245$	$R^2 = 0.5165$
Madrone lower site	$y = 24.394\ln(x) - 8.1697$	$R^2 = 0.522$
Golden chinquapin	$y = 21.899\ln(x) - 0.2342$	$R^2 = 0.2808$

The FVS treelist output for each strata/prescription/timing choice combination was then run through a set of Access queries to generate yield streams containing plot-level tree data and harvest data, including above-ground live CO₂/acre and harvest volumes. These plot-level yield streams were imported into Excel and analyzed through a series of pivot tables, which averaged the plot-level data by strata/prescription/timing choice. The baseline harvest

schedule then allocated strata acres to silvicultural prescriptions with the objective of optimizing the baseline such that the 100-year average aboveground live tree pool was equal to or greater than the minimum baseline level (MBL). For the baseline modeling, common and legal harvesting practices were assigned to strata.

The results of the constraints and modeling assumptions are given in Table 13 and Table 14. The following two tables shows the silvicultural prescriptions modeled; the last column indicates whether it was used in the baseline or project modeling.

Table 11 - Silvicultural Prescriptions Modeled for Baseline and Project activity

Strata	Rx ID	Rx Description	Stocking Trigger	Residual Stocking of Group A species (unless otherwise noted)	Species Retention Preferences	Regeneration	Sprouting (on/off)	Use in Baseline (BL), Project Activity (PA)
DFp	X5	Shelterwood removal with hack & squirt of big hdwds in period 1 or 2 then clearcut 20 yrs later, thin regen stand at age 50, 60 & 70	4 MBF/ac hvst for comm. Thin	0 for clearcut (except trees< 3"); 75 for thin & shelterwood removal	spray hdwd sprouts after CC; otherwise retain species in proportion to pre-harvest stand	Plant 200 TPA post clearcut - 50 PP, 150 DF	On	BL
DFHW	X4	thin 10 or 15 yrs b4 1st CC except 1st timing choice; Clearcut at age 60 (period 2, 3, 4 or 5); thin regen stand at 40 & 50 years; CC again at age 60	4 MBF/ac hvst for comm. Thin	0 for CC (except trees< 3"); 100 for thin	spray hdwd sprouts after CC; otherwise retain species in proportion to pre-harvest stand	Plant 300 TPA post clearcut - 100 PP, 200 DF	On	BL
DFHWp	X4	Clearcut period 2 or 3, thin regen stand at 50 & 65 yrs, CC again age 80	4 MBF/ac hvst for comm. Thin	0 for CC (except trees< 3"); 75 for thin	spray hdwd sprouts after CC; otherwise retain species in proportion to pre-harvest stand	Plant 175 TPA post clearcut - 50 PP, 125 DF	On	BL
MHC	X4	Variable retention with hack & squirt big hdwds in period 1, 2, or 3; thin regen stand at 45 & 65; CC at 80 yrs.	4 MBF/ac hvst for comm. Thin	VR - 15 sqft (all species); 75 for thin; 0 for CC (except trees< 3")	spray hdwd sprouts after VR; otherwise retain species in proportion to pre-harvest stand	Plant 175 TPA post clearcut - 50 PP, 125 DF	On	BL
MHW	X4	Clearcut period 5 or 6; thin regen stand at 50 & 65 yrs	4 MBF/ac hvst for comm. Thin	0 for CC; 75 for thin (actual residual stocking slightly higher)	spray hdwd sprouts after CC; otherwise retain species in proportion to pre-harvest stand	Plant 175 TPA post clearcut - 50 PP, 125 DF	On	BL
TF	X3	heavy selection start period 1,2 or 3; 20 yr cutting cycle	4 MBF/ac hvst for selection	50 sqft & 12 sqft over 18"	thin all species throughout the diameter range	Natural Regen 50 WF, 25 DF, 25 RF per acre post harvest	ON	BL
TF	X4	thin period 1&4; CC 15 yrs later; thin regen stand at 45 and 60 yrs (other timing choices do everything 5 yrs later)	4 MBF/ac hvst for thin	0 for clearcut (except trees< 3"); 75 for thin	thin all species throughout the diameter range	Plant 175 TPA post clearcut - 50 DF, 125 WF	ON	BL

TFp	X4	thin period 1&4; CC 15 yrs later; thin regen stand at 45 and 60 yrs (other timing choice does everything 5 yrs later)	4 MBF/ac hvst for thin	0 for clearcut (except trees< 3"); 75 for thin	thin all species throughout the diameter range	Plant 175 TPA post clearcut - 50 DF, 125 WF	ON	BL
XO1	X4	thin period 7 & 11; CC 15 yrs later (other timing choices do everything 5 yrs later)	4 MBF/ac hvst for comm. Thin	0 for CC; 75 for thin	spray hdwd sprouts after CC; otherwise retain species in proportion to pre-harvest stand	Plant 175 TPA post clearcut - 50 PP, 125 DF	ON	BL
XO2	X4	thin period 4 & 7; CC 15 yrs later; thin regen stand at 45 (other timing choice does everything 5 yrs later)	4 MBF/ac hvst for comm. Thin	0 for CC; 75 for thin	spray hdwd sprouts after CC; otherwise retain species in proportion to pre-harvest stand	Plant 175 TPA post clearcut - 50 PP, 125 DF	ON	BL
ALL	X1	Let Grow						BL, PA

Table 12 - Silvicultural Prescriptions Modeled for WLPZ Areas in Baseline

Strata	Rx ID	Rx Description	Stocking Trigger	Residual Stocking of Group A species (unless otherwise noted)	Species Retention Preferences	Regeneration	Sprouting (on/off)	Use in Baseline (BL), Project Activity (PA)
TF - WLPZ	X2	selection for outer zone of Class 1 and Class 2-S	timing coincident with adjacent X4 harvest	50% overstory canopy cover (all spec); 50 BA selection minimum; 12 sqft BA > 18"; > 25% existing overstory conifers	retain species in proportion to pre-harvest stand	Natural Regen 50 WF, 25 DF, 25 RF per acre post harvest	ON	BL
DFHW & DFp - WLPZ	X2	selection for outer zone of Class 1 and Class 2-S	timing coincident with adjacent harvest	50% overstory canopy cover; 75 or 50 BA selection minimum; 15 or 12 sqft BA > 18"; > 25% existing overstory conifers	retain species in proportion to pre-harvest stand - spray hdwd sprouts when done in adjacent harvest	Natural Regen 75 DF per acre after adjacent even-aged harvest	ON	BL
DFHWp & MHC - WLPZ	X2	selection for outer zone of Class 1 and Class 2-S	timing coincident with adjacent harvest	50% overstory canopy cover (all spec); 50 BA selection minimum; 12 sqft BA > 18"; > 25% existing overstory conifers	retain species in proportion to pre-harvest stand except hack & squirt hdwds when done in adjacent harvest	Natural Regen 75 DF per acre after adjacent even-aged harvest	ON	BL
TFp - WLPZ	X2	selection for outer zone of Class 1 and Class 2-S	timing coincident with adjacent harvest	50% overstory canopy cover (all spec); 50 BA selection minimum; 12 sqft BA > 18"; > 25% existing overstory conifers	thin all species throughout the diameter range	Natural Regen 50 WF, 25 DF, 25 RF per acre post harvest	ON	BL
MHW - WLPZ	X2	selection for outer zone of Class 1 and Class 2-S	timing coincident with adjacent harvest	50% overstory canopy cover (all spec); 50 BA selection minimum; 12 sqft BA > 18"; > 25% existing overstory conifers	retain species in proportion to pre-harvest stand except hack & squirt hdwds when done in adjacent harvest	Plant 150 TPA post clearcut - 50 PP, 100 DF	ON	BL
XO1 - WLPZ	X2	selection for outer zone of Class 1 and Class 2-S	timing coincident with adjacent harvest	50% overstory canopy cover (all spec); 50 BA selection minimum; 12 sqft BA > 18"; > 25% existing overstory conifers	retain species in proportion to pre-harvest stand except hack & squirt hdwds when done in adjacent harvest	Natural Regen 75 DF per acre after adjacent even-aged harvest	ON	BL
XO2 - WLPZ	X2	selection for outer zone of Class 1 and Class 2-S	timing coincident with adjacent harvest	50% overstory canopy cover (all spec); 50 BA selection minimum; 12 sqft BA > 18"; > 25% existing overstory conifers	retain species in proportion to pre-harvest stand except hack & squirt hdwds when done in adjacent harvest	Natural Regen 75 DF per acre after adjacent even-aged harvest	ON	BL

The following table shows the acreage allocation to each prescription by strata in the baseline. In the project scenario, all acres were allocated to the let grow prescription.

Table 13 - Baseline Acreage Allocation by prescription and strata

Strata	Prescription	Acres
DFp	Grow (X1)	-
	Lt. Sel (X2)	123.75
	Shelterwood Removal (X5)	713.27
	Subtotal	837.0
DFHW	Grow (X1)	-
	Lt. Sel (X2)	220.25
	Clearcut/VR (X4)	1,476.34
	Subtotal	1,696.6
DFHWp	Grow (X1)	-
	Lt. Sel (X2)	22.80
	Clearcut/VR (X4)	381.17
	Subtotal	404.0
MHC	Grow (X1)	(0.00)
	Lt. Sel (X2)	136.95
	Clearcut/VR (X4)	1,291.11
	Subtotal	1,428.1
MHW	Grow (X1)	-
	Lt. Sel (X2)	10.08
	Clearcut/VR (X4)	358.15
	Subtotal	368.2
TF	Grow (X1)	-
	Lt. Sel (X2)	462.72
	Heavy Sel (X3)	-
	Medium Sel (X6)	-
	Clearcut/VR (X4)	3,500.15
	Subtotal	3,962.9
TFp	Grow (X1)	-
	Lt. Sel (X2)	33.34
	Clearcut/VR (X4)	857.38
	Subtotal	890.7
XO1	Grow (X1)	15.73
	Lt. Sel (X2)	6.92
	Clearcut/VR (X4)	763.68
	Subtotal	786.3
XO2	Grow (X1)	-
	Lt. Sel (X2)	33.54
	Clearcut/VR (X4)	942.88
	Subtotal	976.4
Total		11,350.2

The results of the baseline harvest schedule used to calculate the MBL are shown in the table and figures below. Onsite carbon pools reported are graphically represented by the bar graphs in Figure 8 – Onsite Baseline Stocking as Modeled. The harvested carbon pools are represented in Figure 9 – Final Baseline Results Averaged where the static horizontal lines represent 100 year averages for those pools. Table 14 below shows the carbon pools by 10 year period for the baseline simulation.

Table 14 - Carbon (CO₂e) reported from the baseline harvest schedule

Year	AG Live Tree	BG Live Tree	Standing Dead	Cut-All	Cut-Merch
2013	1,762,804	423,183	111,719	178,459	100,760
2023	942,246	238,405	111,719	1,143,811	714,345
2033	1,139,959	283,217	111,719	500,172	284,350
2043	1,108,409	277,125	111,719	738,493	445,903
2053	724,886	179,957	111,719	529,512	285,843
2063	781,706	193,327	111,719	449,988	267,360
2073	938,252	235,386	111,719	137,103	81,722
2083	1,135,621	282,780	111,719	541,800	338,561
2093	1,168,804	291,449	111,719	560,263	319,820
2103	1,140,988	283,253	111,719	691,258	421,578
2113	1,254,038	310,755	111,719	180,170	97,515

The following figures show the final baseline modeling and resulting average onsite and harvested pools. The first figure displays the total onsite CO₂e tonnes per period for the baseline harvest schedule. The pattern over time is largely a function of the periodicity of the harvests modeled. The harvest schedule meets all legal and economic feasibility tests and is a likely scenario under a no-carbon-project scenario. The horizontal lines in the second figure are the annual averages across the planning period, which are used in the carbon credit calculations. Modeling the baseline stocking with legal and financial constraints yields an average onsite above ground standing live tree stocking of 1,099,792 total tonnes of CO₂e for

the 100 year baseline modeling scenario, or 96.9 tonnes CO₂e per acre, which is above or equal to the MBL as required by the Protocol.

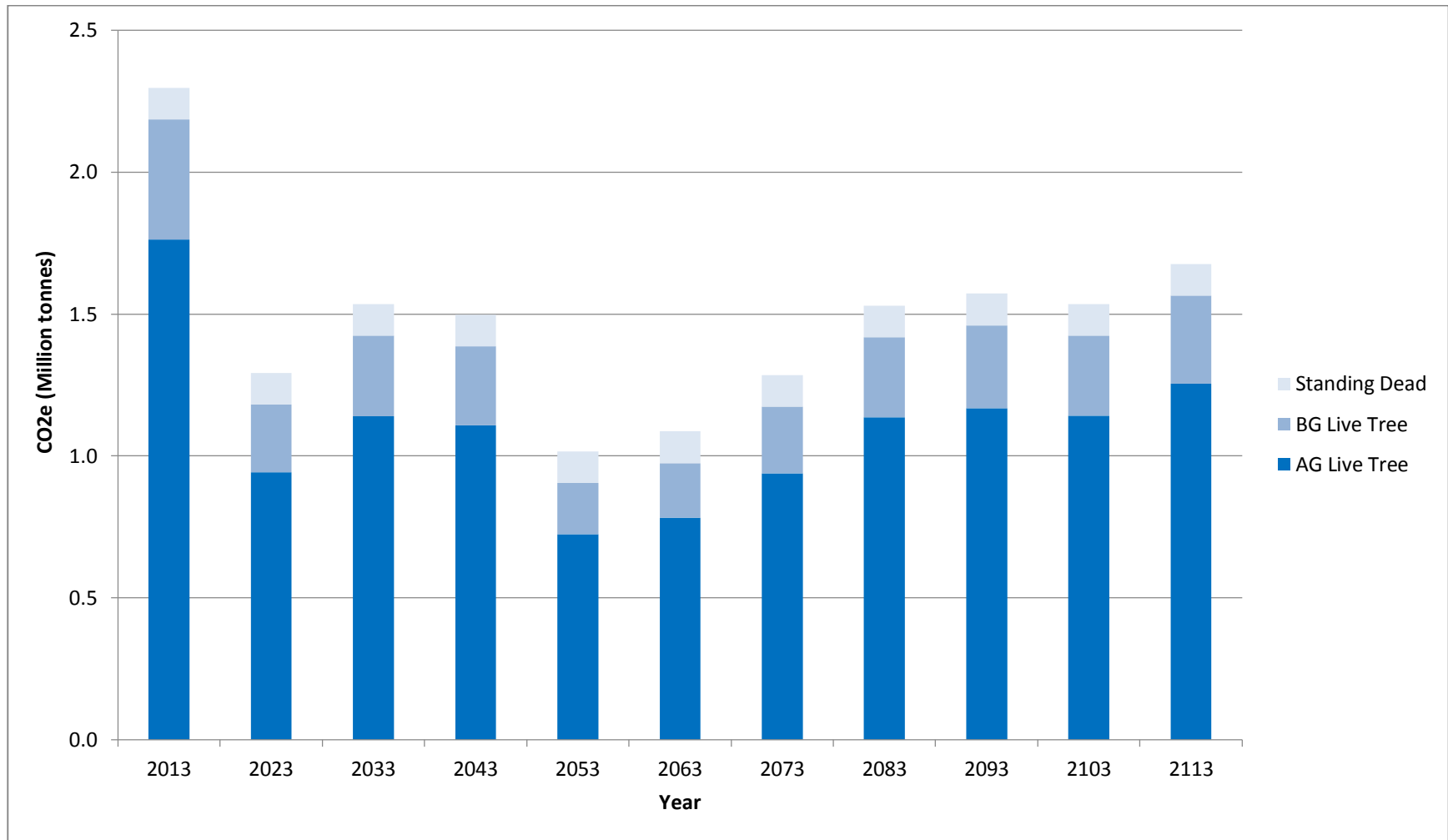


Figure 8 – Onsite Baseline Stocking as Modeled

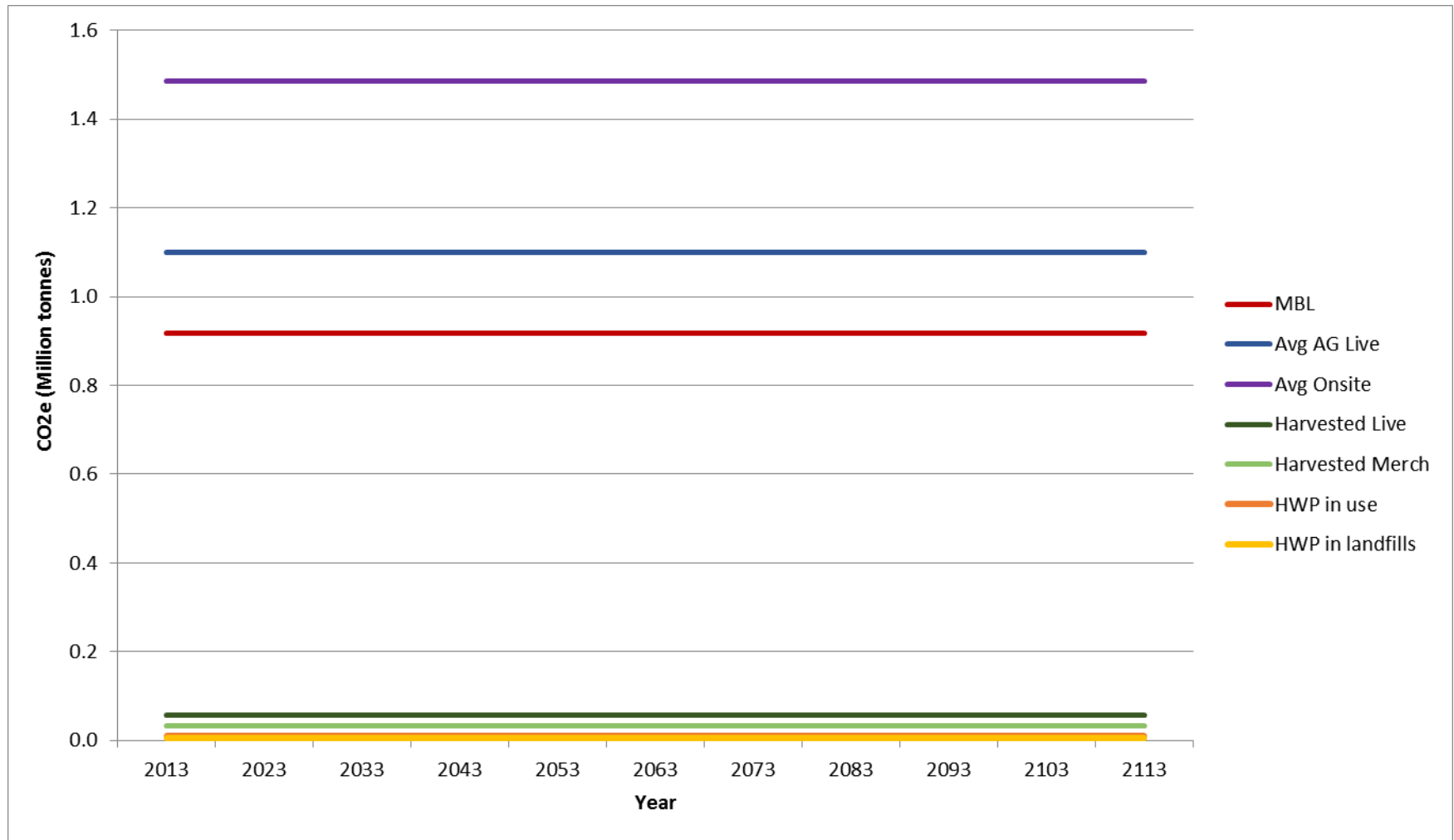


Figure 9 – Final Baseline Results Averaged

Step 4: Determine the Baseline for All Carbon Pools: There are no optional carbon pools in this Project. Standing live (IFM-1), standing dead (IFM-3), and in-use forest products carbon (IFM-7) are required pools. Forest products carbon stored in landfills (IFM-8) is also required when baseline harvesting exceeds project harvesting. In order to determine the amount of carbon stored in harvested wood products (HWP) the cut trees are further divided into Harvested Live and Harvested Merch. Harvested Live is defined as the carbon in all portions of live trees removed from the project during a harvest (including belowground carbon). Harvested Merch is defined as the carbon in the merchantable portions (bole without bark) of the commercially harvested trees that are sent to mills to be processed into wood products. These values are used in Row 9 and Row 11 respectively of the Offset Credit calculation worksheet. For the Trinity IFM Project the average annual value of the relevant baseline carbon pools are:

- Standing Live (IFM-1) – 1,372,414 tonnes CO₂e
- Standing Dead (IFM-3) – 111,719 tonnes CO₂e
- Harvested Live – 56,510 tonnes CO₂e
- Harvested Merch – 33,578 tonnes CO₂e
- HWP in-use (IFM-7) – 9,525 tonnes CO₂e
- HWP in landfills (IFM-8) – 6,018 tonnes CO₂e

5-D: Determination of Weighted Average Carbon Stocks (WCS)

(Forest Offset Protocol §6.2.1.3, §9.1.1.1(25), §9.1.1.3(5))

The weighted average carbon stocks (WCS) estimate is not needed where the minimum baseline level (MBL) is equal to or above the common practice; therefore it was not estimated.

5-E: Estimating Baseline Carbon in Harvested Wood Products

(Forest Offset Protocol §6.2.3, §9.1.1.1(26), Appendix C)

The average amount of merchantable carbon harvested each year was calculated from the baseline modeling. This was done by using the harvest yields from FVS for each strata/prescription/timing choice combination. Appendix C of the Protocol requires a different methodology for calculating the carbon in harvested wood than it does for live trees. First, the merchantable cubic foot volumes of all species that will be delivered to a mill are selected from the harvest yields. Harvested wood volumes excluding bark were calculated for softwood and hardwood, sawtimber and pulp. The minimum merchantable DBH for pulp was 6 inches DBH and the minimum merchantable DBH for sawtimber was 10 inches DBH. The volumes were multiplied by the wood density factor from Table C.1 of the Protocol for the Mixed Conifer forest type and summed to get totals pounds of harvested

wood. This total was multiplied by 0.5 to convert to carbon and divided by 2,204.6 to convert from pounds to metric tons of carbon. A weighted average mill efficiency value was used to arrive at the total carbon transferred into wood products based on the regional factors for the Pacific Southwest by hardwood/softwood and sawlog/pulpwood categories as provided from the ARB website, weighted by the percentage of merchantable volume in these categories. Next, the table C.2 worksheet was used to calculate the long-term carbon storage in In-Use wood products. Product class assumptions were based on the default values for the Southern Cascades supersection as follows: 70% softwood lumber, 1% hardwood lumber, 28% softwood plywood, 1% miscellaneous products, and 2% paper (rounded here for reporting purposes only). Long-term storage in landfills was determined using the table C.3. Worksheet and also used the same default product class percentages.

6. Project Carbon Stocks-Improved Forest Management Projects

6-A: Actual Onsite Carbon Stocks

(Forest Offset Protocol §6.2.4, §9.1.1.1(23, 24), Appendix A, Appendix B)

No harvesting has occurred between the inventory installation and the end of the initial reporting period. Since the initial reporting period started in November 2013 (end of the growing season 2013) and ended in September 2014 (end of the growing season 2014) the initial inventory was grown forward one growing season to reflect the carbon stocks at the end of the reporting period.

A summary of the required carbon pools at the end of the reporting period is as follows:

- Standing Live (IFM-1) – 2,244,045 tonnes CO₂e
- Standing Dead (IFM-3) – 111,719 tonnes CO₂e
- HWP in-use (IFM-7) – 0 tonnes CO₂e
- HWP in landfills (IFM-8) – 0 tonnes CO₂e

The results of the volume and biomass queries discussed in Section 4-E of this OPDR were analyzed for 2013 to calculate the statistics for live and standing dead carbon pools for each strata.

The sampling error at the 90% level is calculated by multiplying the total combined standard error by the t value of 1.645. The pooled standard error for all strata was determined using the following formula from Iles (*Kim Iles, Using Applied Growth and Yield Tools for Forest Land Planning and Inventory, 1996*):

$$(SE_1^2 + SE_2^2 + SE_3^2)^{0.5} = \text{Total Combined Standard Error}$$

where: SE_n = standard error for Strata n in tonnes of CO₂e

The following table summarizes the data and statistics for each of the strata and the pooled sampling error for all the strata combined.

Table 15 - 2013 Carbon Statistics by Strata

Strata	No. of Plots	Carbon (CO2/acre)						Acres	Total Carbon (CO2)
		Avg. Live AG	Avg. Live BG	Avg. Dead	Avg. Onsite	Std. Dev.	Std. Error		
DFp	44	259.7	59.5	11.1	330.3	161.2	24.30	837.0	276,431.8
DFHW	112	190.0	45.0	13.1	248.2	134.1	12.67	1,696.6	421,022.8
DFHWp	22	143.5	34.7	3.1	181.3	146.9	31.32	404.0	73,221.3
MHC	90	221.7	51.8	11.0	284.6	133.2	14.04	1,428.1	406,416.4
MHW	19	157.5	37.6	13.0	208.1	139.1	31.92	368.2	76,611.3
TF	241	148.1	36.1	5.8	190.1	106.1	6.83	3,962.9	753,234.9
TFp	55	94.2	24.0	4.9	123.1	88.1	11.88	890.7	109,660.1
XO1	53	61.3	15.5	27.4	104.2	89.1	12.23	786.3	81,954.8
XO2	53	72.9	18.8	9.8	101.5	85.8	11.79	976.4	99,152.7
Total	689							11,350.2	2,297,706.0
Average		155.31	37.28	9.84	202.44				

Total Carbon (CO2)	Mean Carbon (CO2/acre)	n	Pooled StdError (CO2)	Bound (CO2)	Percent Sampling Error
2,297,706.0	202.44	689	51,441.38	84,621.06	3.7%

Stratified Sampling Error at 90% level = **3.7%**

The sampling error of 3.7% is less than 5 percent so there is no deduction for statistical uncertainty.

The following table shows the acreage allocation to each prescription by strata in the 100-year modeled project scenario.

Table 16 - Project Acreage Allocation by Prescription & Strata

Strata	Prescription	Acres
DFp	Grow (X1)	837.03
	Lt. Sel (X2)	-
	Shelterwood Removal (X5)	-
	Subtotal	837.0
DFHW	Grow (X1)	1,696.60
	Lt. Sel (X2)	-
	Clearcut/VR (X4)	-
	Subtotal	1,696.6
DFHWp	Grow (X1)	403.97
	Lt. Sel (X2)	-
	Clearcut/VR (X4)	-
	Subtotal	404.0
MHC	Grow (X1)	1,428.06
	Lt. Sel (X2)	-
	Clearcut/VR (X4)	-
	Subtotal	1,428.1
MHW	Grow (X1)	368.22
	Lt. Sel (X2)	-
	Clearcut/VR (X4)	-
	Subtotal	368.2
TF	Grow (X1)	3,962.87
	Lt. Sel (X2)	-
	Heavy Sel (X3)	-
	Medium Sel (X6)	-
	Clearcut/VR (X4)	-
	Subtotal	3,962.9
TFp	Grow (X1)	890.72
	Lt. Sel (X2)	-
	Clearcut/VR (X4)	-
	Subtotal	890.7
XO1	Grow (X1)	786.33
	Lt. Sel (X2)	-
	Clearcut/VR (X4)	-
	Subtotal	786.3
XO2	Grow (X1)	976.42
	Lt. Sel (X2)	-
	Clearcut/VR (X4)	-
	Subtotal	976.4
Total		11,350.2

The following table shows the carbon pools by 10 year period for the project simulation.

Table 17 - Carbon (CO₂e) reported from the Project Activity harvest schedule

Year	AG Live Tree	BG Live Tree	Standing Dead	Cut-All	Cut-Merch
2013	1,762,804	423,183	111,719	-	-
2023	2,238,582	527,986	111,719	-	-
2033	2,733,548	633,895	111,719	-	-
2043	3,176,410	726,371	111,719	-	-
2053	3,552,192	803,402	111,719	-	-
2063	3,851,516	863,944	111,719	-	-
2073	4,096,029	912,868	111,719	-	-
2083	4,291,521	951,664	111,719	-	-
2093	4,462,275	985,365	111,719	-	-
2103	4,609,034	1,014,131	111,719	-	-
2113	4,726,574	1,036,617	111,719	-	-

6-B: Actual Carbon in Harvested Wood Products

(Forest Offset Protocol §6.2.5, §9.1.1.1(23, 24), Appendix A, Appendix B, Appendix C)

The FVS simulation of project activity was used to estimate the wood products carbon for the next 100 years. Since all project acres were allocated to the “let grow” scenario, no harvest is currently projected for the 100 year period. If any harvesting does occur at some point in the future, the actual harvested amount will be reported and used as determined from truck scale tickets. Reported hauling weights can be converted to carbon using the methodology in Protocol Appendix C (C.1). The calculation for the wood products storage is identical to the methods used for the baseline but will be based on these actual harvested amounts rather than projections.

For the initial reporting period, there was no harvest, and thus no estimate of merchantable harvest volume or associated carbon in harvested wood products, as demonstrated in Table 17, as well as the credit calculation worksheet copied below.

6-C: Quantifying Secondary Effects

(Forest Offset Protocol §6.2.6, §9.1.1.1(23))

Secondary effects include changes in emissions due to unintended changes in regional carbon stocks that may result from the Forest Project, and are always negative. Secondary effects include activity shifting leakage that results from changes in forest management activity resulting from the Forest Project activity. The FVS baseline simulation of total harvested tree carbon was used to estimate the secondary effects. No actual harvesting is expected to occur in the project scenario, so the calculation of secondary effects is applied to the average annual harvested CO₂e from the baseline modeling. For each annual report, the actual harvested amount will be used, should any harvesting occur in the future. The calculation itself is 20% of any positive difference between actual and baseline carbon in harvested wood. For the first year of the project this is 20% x -56,510 = -11,302 tonnes CO₂e as shown in row 27 of the Offset Credit calc worksheet pasted below.

7. Calculation of GHG Reductions and Removals

(Forest Offset Protocol §6)

Equation 6.1 was used for estimating the first reporting period GHG reductions and removals. This was implemented using the Forest Project Calculation Worksheet from the CAR website, and is provided along with the project input data. This process included the changes in onsite stocks, long-term average wood product storage, and secondary effects.

	Type of Project: Improved Forest Management	
Reporting Period Data entered for <u>end</u> of each Period; after Period 2, each Period = 12 months		Initial Data at Project Start – Nov 2013 1 (Inv Date to End of Initial Reporting Period) Sept 2014
Calc Row	Calculating GHG Reductions/Removals for Onsite Carbon Stocks - All Project Types	
1	Actual Onsite Carbon Stocks (tonnes CO ₂ e)	2,297,7062,355,764
2	Confidence Deduction	0.0%0.0%
3	Adjusted Actual Onsite Carbon Stocks (adjusted for confidence deduction) (tonnes CO ₂ e)	2,297,7062,355,764
4	Increment in Actual Onsite Carbon Stocks (tonnes CO ₂ e)	58,058

5	Baseline Onsite Carbon Stocks (tonnes CO ₂ e)	1,484,133	1,484,133
6	Increment in Baseline Onsite Carbon Stocks (tonnes CO ₂ e)		-
7	Quantified GHG Reductions / Removals for Onsite Carbon Stocks (tonnes CO ₂ e)	813,573	58,058
Calc Row	Calculating Carbon Stored in Wood Products Including Market Effects and Leakage - All Project Types		
8	Actual Carbon in Trees Harvested for Wood Products in (tonnes CO ₂ e)		-
9	Baseline Carbon in Trees Harvested for Wood Products (tonnes CO ₂ e)		56,510
10	Actual Carbon in Harvested Wood Delivered to Mills (tonnes CO ₂ e)		-
11	Baseline Carbon in Harvested Wood Delivered to Mills (tonnes CO ₂ e)		33,578
12	Actual Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Excl Landfill		0
13	Actual Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Incl Landfill		0
14	Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Excl Landfill		9,525
15	Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Incl Landfill		15,542
16	Diff Between Actual and Baseline Carbon in Harvested Wood (tonnes CO ₂ e) - Excl Landfill		(9,525)
17	Difference Between Actual and Baseline Carbon in Harvested Wood (tonnes CO ₂ e) - Incl Landfill		(15,542)
18	Difference in Actual and Baseline Carbon Stored in Wood Products (tonnes CO ₂ e) - Landfill Adj		(15,542)
19	GHG Reductions / Removals for Carbon Stored in Wood Products (tonnes CO ₂ e) w/ mkt response		(12,434)
Calc Row	Calculation Other Secondary Effects - Reforestation Projects		
20	Mobile Combustion Emission Factor (average tonnes CO ₂ e per acre)		
21	Initial Site Prep Acres in Project Area (Acres)		
22	One-time combustion emissions associated with machinery use in site preparation (CO ₂ e tonnes)		-

23	Leakage Risk Percentage for Leakage from Shifting Cropland and Grazing Activities (%)		
24	Secondary Effect emissions due to shifting cropland or grazing activities (tonnes CO ₂ e)		-
25	Other Secondary Effect Emissions for Reforestation Projects (tonnes CO ₂ e)		NA
Calc Row	Calculating Other Secondary Effects - Improved Forest Management Projects		
26	Difference Between Actual and Baseline Carbon in Trees Harvested for Wood Products (tonnes CO ₂ e)		(56,510)
27	Other Secondary Effects Emissions (shifting activities/materials) IFM Projects (tonnes CO ₂ e)		(11,302)
Calc Row	Determining the Uncertainty Discount Factor and Calculating Other Secondary Effects - Avoided Conversion Projects		
28	Appraised Fair Market Value of Anticipated Alternative Land Use of Project Area (000\$)		
29	Appraised Fair Market Value of the Current Forested Land use of Project Area (000\$)		
30	Avoided Conversion Discount Factor		0%
31	Quantified GHG Reductions / Removals for Onsite Carbon Stocks (tonnes CO ₂ e)		58,058
32	Other Secondary Effect Emissions for Avoided Conversion Projects (tonnes CO ₂ e)		NA
Calc Row	Quantified GHG Reductions and Removals		
33	Annual GHG Reductions/Removals Net of Discounts and Secondary Effects (tonnes CO ₂ e)	813,573	34,322
34	Cumulative GHG Reductions/Removals; <u>not</u> incl.neg. carryover or reversals (tonnes CO ₂ e)	813,573	847,895.23
35	Cumulative Negative Carryover from Prior Year (tonnes CO ₂ e)		0
36	Credits Issued - <u>Net</u> of Negative Carryover, <u>bef.</u> Buffer or adjust for Reversals (tonnes CO ₂ e)	813,573	34,322
Calc Row	Calculation of Buffer Pool Contribution		
37	Project Specific Reversal Risk Rating	19.2%	19.2%
38	Buffer Pool Contributions (Credits)	156,206	6,590
Calc Row	Accounting for Reversals		
39	Annual Reversals (tonnes CO ₂ e)		-

40	Total "Avoidable Reversals" to be compensated (tonnes CO ₂ e)		-
41	"Unavoidable Reversals" compensated from the Buffer Pool (tonnes CO ₂ e)		-
Calc Row	Compensating for Avoidable Reversals		
42	"Avoidable Reversals" compensated from Forest Owners Account (tonnes CO ₂ e)		-
43	"Avoidable Reversals" compensated by retirement of other eligible credits or instruments (tonnes CO ₂ e)		-
44	Carryover "Avoidable Reversals" which need to be compensated (tonnes CO ₂ e)		-
Calc Row	Credits Issued to Account Holder		
45	Annual Credits Issued to Account Holder	657,367	27,732
46	Cumulative Credits Issued to Account Holder	657,367	685,099

8. Reversal Risk Rating

8-A: Reversal Risk Rating by Category

(Forest Offset Protocol §7.2.2, §9.1.1.1(27), Appendix D.1, D.2, D.3, D.4)

Financial Risk - Contributions to the buffer pool associated with financial risk come from the potential financial failure of an organization resulting in bankruptcy, which can lead to dissolution of agreements and forest management activities to recover losses that result in reversals. Forest Projects that employ a Qualified Conservation Easement, or that occur on public lands, have lower risk. The default financial risk for the US is 5%.

- Financial Risk Default Buffer Pool Contribution 5%

Management Risk: - Management failure is the risk of management activities that directly or indirectly could lead to a reversal. Forest Projects that occur on public lands, or employ a Qualified Conservation Easement are exempt from this risk category. There are three categories of management risk, Illegal Logging, Conversion to an Alternative Use, and Over harvesting. The Trinity Project is within the United States, thus the default illegal harvesting risk of 0% is used.

The risk of conversion is assigned a default buffer pool rating of 1% since the project area is not covered by a Qualified Conservation Easement

The risk that Trinity Timberlands might overharvest as a result of high timber prices or due to fuel treatments is estimated to be the same as the default US rate and is assigned a Buffer Pool contribution of 2%.

- Default Illegal Harvesting (U.S) Buffer Pool Contribution 0%
- Default Conversion to Alternative Land Use Buffer Pool Cont. 2%
- Default Over Harvesting Buffer Pool Contribution 2%

Social Risk: - Social risks exist due to changing government policies, regulations, and general economic conditions. The risks of social or political actions leading to reversals are low, but could be significant.

The social risk for the Trinity Project is identified as 2% since the project is within the United States.

- United States Default Social Risk Buffer Pool Contribution 2%

Natural Disturbance Risk I – Wildfire –

Natural disturbances can pose a significant risk to the permanence of the GHG reductions and GHG removal enhancements. Natural disturbance risks are only partially controllable by management activities. Management activities that improve resiliency to wildfire, insects, and disease can reduce these risks. Management activities that shift harvesting practices from live sequestering trees to trees that have succumbed to natural disturbances reduce or negate the reversal depending on the size and location of the disturbance.

A wildfire has the potential to cause significant reversals, especially in certain carbon pools. These risks can be reduced by certain techniques including reducing surface fuel loads, removing ladder fuels, adding fuel breaks, and reducing stand density. However, these techniques cannot reduce emission risk to zero because all landowners will not undertake fuel treatments, nor can they prevent wildfire from occurring.

Within the Project area Trinity Timberlands has not completed a high level of fuel treatment thus the default wildfire risk of 4% is used. The resulting wildfire risk buffer pool contribution due to the low level of fuel treatment is calculated as

- Wildfire Risk Buffer Pool Contribution (as described above) 4%

Natural Disturbance Risk II: A disease or insect outbreak has the potential to cause a reversal, especially in certain carbon pools. The default assigned risk rating for disease or insect outbreak is 3%.

- Default Insect and Disease Outbreak Buffer Pool Contribution 3%

Natural Disturbance Risk III: A major wind-throw event (hurricane, tornado, high wind event) has the potential to cause a reversal, especially in certain carbon pools. The default risk contribution from other catastrophic events is 3%.

- Default Other Catastrophic Events Buffer Pool Contribution 3%

8-B: Summarizing the Risk Analysis and Calculating the Project Reversal Risk Rating

(Forest Offset Protocol §7.2.2, §9.1.1.1(27), Appendix D.5)

Table 18 below summarizes the assigned risk analysis by category for the Trinity Project.

Table 18 - Project Contribution to the Buffer Account Based on Risk

Risk Category	Contribution from Risk Descriptions Above	
	Source	Forest Project without a Qualified Conservation Easement and/or Public Ownership
Financial Failure	Default Risk	5%
Illegal Forest Biomass Removal	Default Risk	0%
Conversion	Default Risk	2%
Over-harvesting	Default Risk	2%
Social	Default Risk	2%
Wildfire	Default Risk	4%
Disease or Insect Outbreak	Default Risk	3%
Other Catastrophic Events	Default Risk	3%
Overall Contribution Based on Appendix D.5 Calculation		19.2%

Overall Contribution to Buffer Pool is **19.2 %** as calculated per the equation in the Forest Offset Protocol, Appendix D.5 and as shown below:

Trinity Timberlands University Hill Improved Forest Management Project

$$100\% - ((1-5\%) \times (1-0\%) \times (1-2\%) \times (1-2\%) \times (1-2\%) \times (1-4\%) \times (1-3\%) \times (1-3\%)) = \mathbf{19.2\%}.$$

EXHIBIT I: Greenhouse Gas (GHG) Assessment Boundaries Carbon Pools/Sources That Must Be Accounted for in Quantifying Project Reductions and Removals

Carbon Pool or Source (Forest Offset Protocol, §5.2)	Included or Optional (Forest Offset Protocol, §5.2)	Included in this project?	Justification/Quantification Method
Primary Effect Sources, Sinks, and Reservoirs			
IFM-1 Standing Live Carbon (living trees)	Included	Included	Mandatory pool for measurement – Baseline modeled using initial field inventory measurements; Project measured by field measurements and updating forest carbon inventory.
IFM-2 Shrubs and Herbaceous Understory	Excluded	Excluded	NA
IFM-3 Standing dead carbon (carbon in all portions of dead, standing trees)	Included	Included	Mandatory pool for measurement – Baseline modeled using initial field inventory measurements; Project measured by updating forest carbon inventory.
IFM-4 Lying dead wood carbon	Excluded	Excluded	NA
IFM-5 Litter and duff carbon (carbon in dead plant material)	Excluded	Excluded	NA
IFM-6 Soil Carbon	Included/ Excluded	Excluded	It is not necessary to quantify soil carbon in this project in accordance with the Protocol, as deep ripping, furrowing, plowing, soil disturbance exceeding 25% of the project area and mechanical site preparation not on contour will not be permitted on the project area.
IFM-7 Carbon in in-use forest	Included	Included	Baseline estimated from modeled harvesting volumes. Project estimated from measured harvest volumes.

EXHIBIT I: Greenhouse Gas (GHG) Assessment Boundaries Carbon Pools/Sources That Must Be Accounted for in Quantifying Project Reductions and Removals

Carbon Pool or Source (Forest Offset Protocol, §5.2)	Included or Optional (Forest Offset Protocol, §5.2)	Included in this project?	Justification/Quantification Method
products			
IFM-8 Forest product carbon in landfills	Included or Excluded	Included	Excluded when project harvesting exceeds baseline. Included when project harvesting is below baseline. Baseline estimated from modeled harvesting volumes. Project estimated from measured harvest volumes.
Secondary Effect Sources, Sinks, and Reservoirs			
IFM-9 Biological Emissions from site preparation activities	Included	Included	Biological emissions from site preparation activities are not quantified separately, but rather are captured by measuring changes in included carbon reservoirs.
IFM-10 Mobil combustion emissions from site preparation activities	Excluded	Excluded	N/A
IFM-11 Mobile combustion emission from ongoing project operation and maintenance	Excluded	Excluded	N/A
IFM-12 Stationary combustion emissions from ongoing project operation and maintenance	Excluded	Excluded	N/A

EXHIBIT I: Greenhouse Gas (GHG) Assessment Boundaries Carbon Pools/Sources That Must Be Accounted for in Quantifying Project Reductions and Removals

Carbon Pool or Source (Forest Offset Protocol, §5.2)	Included or Optional (Forest Offset Protocol, §5.2)	Included in this project?	Justification/Quantification Method
IFM-13 Biological emissions from clearing of forestland outside of the Project Area	Excluded	Excluded	N/A
IFM-14 Biological emission/removals from changes in harvesting on forestland outside the project area.	Included/ Excluded	Included	Not estimated for baseline. Estimated for project by using a default 20% “leakage” factor applied to the difference in harvest volume relative to baseline.
IFM-15 Combustion emissions from production, transportation, and disposal of forest products	Excluded	Excluded	N/A
IFM-16 Combustion emission from production, transportation, and disposal of alternative	Excluded	Excluded	N/A

EXHIBIT I: Greenhouse Gas (GHG) Assessment Boundaries Carbon Pools/Sources That Must Be Accounted for in Quantifying Project Reductions and Removals

Carbon Pool or Source (Forest Offset Protocol, §5.2)	Included or Optional (Forest Offset Protocol, §5.2)	Included in this project?	Justification/Quantification Method
materials to forest products			
IFM-17 Biological emissions from decomposition of forest products	Included	Included	For baseline, quantified as a component of calculating carbon stored for 100 years in wood products (SSR #IFM-7) and landfills (SSR #IFM-8) For project, quantified as a component of calculating carbon stored for 100 years in wood products (SSR #IFM-7) and landfills (SSR #IFM-8)

Exhibit II: REFERENCES

BBW. 2013a. Trinity Timberlands Timber Typing Task Order V2. (Revised to Trinity Timberlands Timber Typing Task Order and Stratification methodology, January 2015).

BBW. 2013b. TT Inventory Manual Final. (Revised to TT Inventory Manual revised 01132015, January 2015).

Bliesner and Robison. 2007. Detecting the Upstream Extent of Fish in the Redwood Region of Northern California. USDA PSW-GTR-194.

Cairns, M.A., S. Brown, E.H. Helmer, and G.A. Baumgardner. 1997. Root biomass allocation in the world's upland forests. *Oecologia* 111:1-11.

CALFIRE, Fire and Resource Assessment Program. 2006. fveg06_1.

Crookston, N. L. 1997. Suppose: an Interface to the Forest Vegetation Simulator, in R Teck, M Moeur, and J Adams eds., *Proceedings: Forest Vegetation Simulator Conference*. Fort Collins, CO, USDA Forest Service Intermountain Research Station, Intermountain Research Station INT-GTR-373, p. 7-14.

Crookston, N.L., D.L. Gammel, S. Rebain, D. Robinson, and C.E. Keyser. 2011. User's guide to the database extension of the Forest Vegetation Simulator version 2.0. USDA Forest Service, Forest Management Service Center. 56.

DOE. 2007. Technical guidelines, voluntary reporting of greenhouse gases (1605(b)) program. Office of Policy and International Affairs, US Dept. of Energy. 280.

FIA. 2010a. FIA Volume Equation Documentation (dated 22 March 2010). USDA Forest Service, Pacific Northwest Research Station.

FIA. 2010b. Regional biomass equations used by FIA to estimate bole, bark, and branches (updated 13-Jan-2010). USDA Forest Service, Pacific Northwest Research Station.

Harmon, M.E., C.W. Woodall, B. Fasth, and J. Sexton. 2008. Woody detritus density and density reduction factors for trees species in the United States: A synthesis. USDA Forest Service Northern Research Station General Technical Report NRS-29:90.

James, S.M. 1983. South Fork Eel River Watershed Erosion Investigation. California. Dept. of Water Resources.

Keyser, Chad E. comp. 2008 (revised May 30, 2014). Inland California and Southern Cascades (CA) Variant Overview – Forest Vegetation Simulator. Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 64 p.

Krumland, Bruce and Helge Eng. 2005a. Site Index Systems for Major Young-Growth Forest and Woodland Species in Northern California. California Forestry Report No. 4, April 2005.

Krumland, Bruce and Helge Eng. 2005b. CA_SITEINDEX Users Guide and Programming Notes. On CALFIRE website at

http://www.fire.ca.gov/resource_mgt/resource_mgt_stateforests_publications_reports_sitereports.php

R Core Team. 2013. R: A language and environment for statistical computing.

Robards, T. 2014. Modeling Methods for Trinity. Internal Document, New Forests, Inc., San Francisco, California.

Robards, T. 2015. Broken Top Tree Analysis. Internal Document, New Forests, Inc., San Francisco, California.

USDA Natural Resources Conservation Service. 2013. Soil Survey Geographic (SSURGO) database for Shasta-Trinity National Forest Area, CA. Ft. Worth, TX. Available online at <http://websoilsurvey.nrcs.usda.gov/>.

USDA Natural Resources Conservation Service. 2014. Soil Survey Geographic (SSURGO) database for Six Rivers National Forest Area, CA. Ft. Worth, TX. Available online at <http://websoilsurvey.nrcs.usda.gov/>.

Exhibit III: INVENTORY MANUAL