



**YUROK TRIBE/FOREST CARBON PARTNERS
CKGG IMPROVED FOREST MANAGEMENT PROJECT**

Offset Project Data Report

Version 1.8b (Final), March 20, 2014

for

Improved Forest Management Projects on Private Land

for

Air Resources Board

Compliance Offset Protocol – U.S. Forest Projects

Adopted: October 20, 2011

YUROK TRIBE/FOREST CARBON PARTNERS CKGG IMPROVED FOREST MANAGEMENT PROJECT

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The reporting period for this Offset Project Data Report is 12 months (3/31/2012 – 3/31/2013).

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

Note to Reader Regarding Differences Between OPDR and Listing Documents

There are differences between the listing documents and this final OPDR as a result of responding to verification findings and due to small changes in the way acres and plots have been accounted for. The changes between the listing documents, which refer the reader to Yurok Tribe CKGG IFM Project OPDR 071113, and this version of the OPDR (version 1.8b, identified in the table below as “OPDR V1.8”) are enumerated in the following table.

Ln #	Item	Where Changed	Listing Document[OPDR 71113]	OPDR, V1.8
1	slight name change	OPDR V1.8, Title Page	Yurok Tribe CKGG Improved Forest Management Project	Yurok Tribe/Forest Carbon Partners CKGG Improved Forest Management Project
2	Change in acres	OPDR V1.8, pg 6	8,489 acres	7,660 acres
3	Traditional uses	OPDR V1.8, pg 15	short discussion on traditional uses	Longer discussion of traditional uses
4	Table 3, Acres by Supersection	OPDR V1.8, pg 16	original acreage	revised per line 2 acres
5	3-J, Sustainable Harvest Documentation	OPDR V1.8, pg 19	Option 2 selected, Landowner has an approved plan	Option 3 selected, landowner using uneven-aged silviculture
6	3.K.IV, standing dead wood	OPDR V1.8, pg 23	1.085 tonnes/acre	1.85 tonnes/acre (fixed error in volume equation for cone)
7	4.B Sampling Intensity	OPDR V1.8, pg 25	673 plots	589 plots, excludes plots from legally constrained areas and from removing a small number of acres from a Tribally designated housing area
8	4.E, Standing Dead Wood	OPDR V1.8, pg 29	Explanation of carbon in standing dead wood	More detail provided as to how carbon in standing dead wood was calculated
9	4.F. Inventory Update Process	OPDR V1.8, pg 30	Explanation of inventory update process	More detailed description of inventory update process
10	Table 12, Common Practice Calculation	OPDR V1.8, pg 39	Table explaining calculation of common practice	Different acreage used in Table 12, per line 2 change in acres above.
11	Growth Multipliers	OPDR V1.8, pg 40	Brief description of growth multipliers used in ICASCA	Detailed description of each growth multiplier used in ICASCA
12	Table 16, Co2e in Baseline Harvest	OPDR V1.8, pg 46	Periodic CO2e, based on line 6 # of plots above	Revised CO2e calculations, based on line 7 # of plots above
13	Total Baseline CO2e stock calculation	OPDR V1.8, pg 47	Baseline total stock and average stock calculation from 673 plots	Revised baseline total stock and average stock calculation from 589 plots
14	All pools summary of baseline stocks	OPDR V1.8, pg 50	All IFM baseline CO2e stocks	Revised IFM baseline CO2e stocks
15	6.A, Actual On Site CO2e stocks, Table 17	OPDR V1.8, pg 52	Table of on-site CO2e stocks, based on 673 plots	Revised Table of on-site CO2e stocks based on 589 plots
16	Table 18, Statistical Calculation	OPDR V1.8, pg 53	Summary of Standard Error Calculation	Revised Summary of Standard Error Calculation
17	Table 20, CO2e reported from project activity harvest	OPDR V1.8, pg 55	Table 20 CO2e values from project activity harvest schedule	Revised Table 20 CO2e values from project activity harvest schedule
18	6.C, Quantifying Secondary Effects	OPDR V1.8, pg 58	Calculation of secondary effects	Revised calculation of secondary effects
19	Forest Project Calculation Worksheet	OPDR V1.8, pg 59	Forest Project Calculation Worksheet	Revised Forest Project Calculation Worksheet
20	8.A. Financial Risk	OPDR V1.8, pg 61	Financial risk calculation	Revised financial risk calculation based on ARB clarification
21	APD Designation	OPDR v1.8, Contact information page	APD designation	While originally the APD, Forest Carbon Partners is listed in the final OPDR as Project Developer and not APD because, as per ARB guidance, APDs must be listed as AARs on the OPO's CITSS account, and CITSS does not yet have the functionality to allow AARs for individual projects, and the Yurok Tribe has multiple projects.

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1. Introduction

The Yurok Tribe/Forest Carbon Partners CKGG Forest Carbon Project (hereafter Yurok CKGG Project) is an Improved Forest Management (IFM) project developed under the California Air Resources Board Compliance Offset Protocol – U.S. Forest Projects. The project site is on private land owned in fee by the Yurok Tribe of California in northeast Humboldt County, California.

The Project is located on recently acquired land within and adjacent to the nearly 56,000 acre Yurok Reservation. The Yurok Reservation was created by the Hoopa-Yurok Settlement Act of 1988 and is composed of the former Klamath River Reservation and Hoopa Extension. The Project Area is located entirely within the Lower Klamath River watershed and Yurok Ancestral Territory. Management of the property is designed to improve cultural and ecological values while at the same time generating income from carbon offset sales and logging, with the aim of developing higher value and larger trees.

2. Ownership Interest

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

The Yurok Indian Tribe is the owner in fee of the real property involved in the Yurok CKGG Project, which includes interest in the trees and timber on the property. The name derives from the previous owners of the various tracts of fee land, namely Cook, Koppala, Gerber, and Gleason. As the single owner of the real property, the Yurok Tribe is identified as the Offset Project Operator with the legal authority to implement the offset project.

As the Offset Project Operator the Yurok Tribe has contracted with Forest Carbon Partners, L.P., a limited partnership managed by New Forests, for project development services related to project listing, monitoring, reporting, record retention, verification, credit issuance and credit sales.

3. Project Eligibility

3-A: Project Type

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

The Yurok CKGG 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 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 practicing selection management and thinning on suitable sites. Hardwood challenged stands will be treated using group selection on all

suitable timber stands within the project area, with the goal of eventually bringing the even-aged portions of the property under selection management over the long term.

The Tribe intends to practice uneven-aged management and/or thinning that will result in 40% cover or more when measured at the 20 acre “unit” level. The goal of uneven-aged (selection) and thinning management is to maintain timber stands containing trees of a variety of ages and sizes on site, in perpetuity. Trees are harvested periodically (typically, every 15-20 years) from the stand as they reach their optimum size and value and/or as needed to maintain favorable growing conditions. Over time, selection management promotes the development of high-value and larger trees with higher carbon stocks. In addition, this process leads to more cost-effective harvests (i.e., fewer trees need to be cut each entry to attain the same financial value, by lowering logging costs per tree and accessing a higher price at the mill).

Selection management, as prescribed for the CKGG project, will not follow the stricture of a defined rotation age as is typically used for even-aged management. As noted, selection management will favor the development of a stand containing larger and older trees than are commonly harvested under even-aged management.

The Tribe plans that stands that are not suitable for single tree selection (i.e. understocked conifer stands or stands with high hardwood to conifer ratio) may be treated with a Group Selection silvicultural prescription with retention. At a minimum, 1 >36” diameter sound green conifer and 2 of the largest hardwood trees per acre are planned to be retained in Group Selection harvest units, which would meet the stocking requirements as described in the California Forest Practice Rules.

The Tribe intends that all group selection harvest would be planned to ensure that conifer crop trees (whether planted or residual) are maintained in a free to grow condition for the 15 years following harvest. Such harvest would be conducted such that the proportion of conifers to hardwoods is increased through a combination of residual stocking control and/or planting of conifers. Residual conifer and/or planted conifer stock would be comprised of currently healthy conifers that would be maintained in a free to grow condition for the 15 years following harvest.

Commercial thinning across the diameter classes is planned for use in young conifer stands to develop an uneven-aged structure for future management.

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. Figure 1 below shows the location of the Project.

The Yurok CKGG project is located in Humboldt County in California. The Klamath River, the largest river in Northern California, divides the project roughly in half. The project is located in the Township, Ranges, and portions of Sections noted below – all in the Humboldt Base Meridian (See Project Vicinity and Location maps below).

Township and Range	Sections
9N, 3E	1, 2, 11, 12, 13, 14, 23
9N, 4E	5, 6, 7, 8, 9, 10, 17, 18
10N, 3E	3, 12, 13, 23, 24, 25, 26, 35, 36
10N, 4E	4, 5, 6, 7, 8, 9, 18, 30, 31
11N, 3E	23, 24, 25, 26, 27, 28, 33, 34, 36
11N, 4E	31

II. Located on Forested Land

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

The Yurok CKGG project takes place on land that has greater than 10 percent tree canopy cover. 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 have been excluded from the project because they have, or are expected to have, less than 10 percent tree cover, or for other reasons (e.g., not suitable for timber management due to low productivity and stocking). See Figure 3 - Forest Vegetation Type Map.

III. Land Ownership Category

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

The project is located on private, fee land owned by the Yurok Tribe (land that is owned by, or subject to an ownership or possessory interest of an Indian Tribe). (See deeds and deed of trust). The Reservation boundary shown in Figure 2 is a political boundary and does not indicate any particular ownership within it.

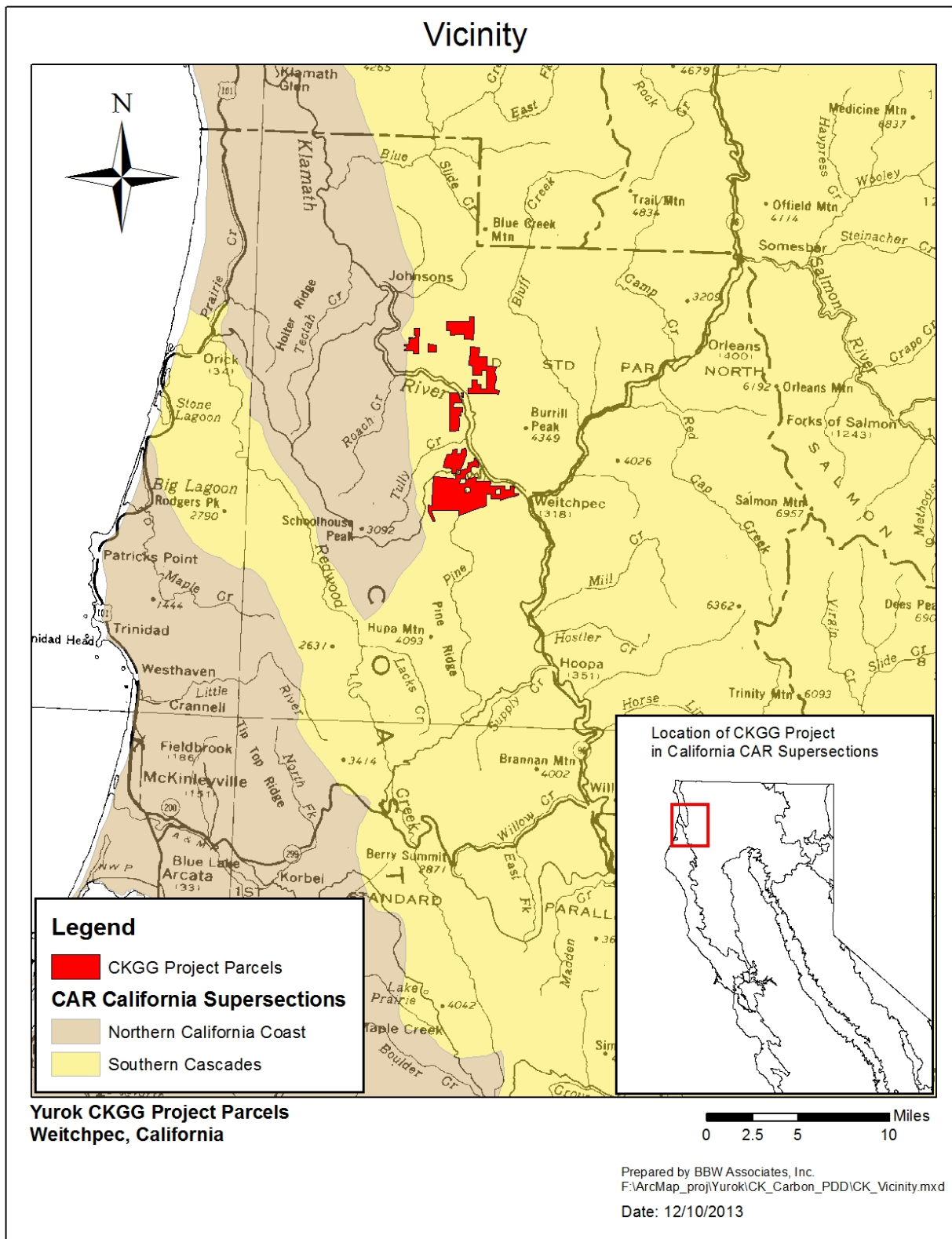


Figure 1 - Vicinity Map

This topographic map displays the Klamath River and surrounding terrain. The map includes a legend in the bottom left corner with the following entries:

- CKGG Project Parcels:** Indicated by yellow outlines.
- Yurok Reservation Boundary:** Indicated by a thick black line.
- Public Roads:** Indicated by blue lines.
- Private Roads:** Indicated by thin black lines.

Key locations and features labeled on the map include:

- Locations:** Upper Cappell, Lower Cappell, Tower, Waukell, Mahwah, Pine Creek, and Surgone.
- Roads:** Metlaw Rd, McKinnon Mill Rd, Gibbs Rd, Cappell Rd, Tully Creek Rd, Ruben Rd, State Hwy 69, Pine Creek Rd, Lake Prairie Rd, State Hwy 96, Bloody Camp Rd, and Bull Creek Rd.
- Geographic Features:** Klamath River, Klamath Falls, and various creeks and rivers.
- Infrastructure:** Forest Route 13401, Forest Route 11N05, and Forest Route 11N04.

A north arrow is located in the top right corner of the map.

Prepared by BBW Associates, Inc. Date: 12/11/2013
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Yurok CKGG Project Page 5

IV. Any Previous Status as an Offset Project
(*Forest Offset Protocol §2.1.2, §9.1.1.1(8)*)

None of the lands 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

The CKGG Project is located in the Klamath Mountains, within Northern California. The project area contains moderate to steeply rugged terrain with a few downslope creekside areas forming large benches. French Camp Ridge is a major ridgeline that borders the western side of the Pine Creek Tract. A named peak is Bee Mountain, which at 4,384 feet elevation is a major promontory above the Mawah Tract and the northern portion of the project area. The Klamath River, which bisects the project area, is the dominant geographic feature. Several large creeks which feed into the Klamath are geographic and cultural markers used for location purposes within the area. These streams include (from downriver to upriver) Cappell Creek, Mawah Creek, Waukell Creek, and Pine Creek. Elevations range from around 100 feet to 4,384 ft.

The Project is located between 41° 19'34.056 N - 41° 9'36.317 N latitude and 123° 50'32.825 W - 123° 42'58.284 W longitude.

General Location, Towns and Roads

The southern boundary of the project is located approximately 20 miles (32 km) north of the community of Hoopa on California Highway 96 near its junction with California Highway 169. Highway 169 parallels the Klamath River and bisects the project area in a generally SE to NW direction. The community of Weitchpec is located at the confluence of the Trinity and Klamath Rivers which is also the junction of Highway 96 and 169. The south side of the project area borders the Hoopa Valley Indian Reservation and is partly contained within the external borders of the Yurok Indian Reservation. (See Figure 2 - Location Map).

Watercourses and Watersheds

The project is located within Mettah Creek-Klamath River (HUC 180102091005), Pine Creek (HUC 180102091001) and Tully Creek-Klamath River (HUC 180102091002) watersheds as defined by the National Hydrologic Dataset. The most prominent watershed is the Klamath River, which bisects and flows northwest through the Project Area. As noted above (from downriver to upriver), Cappell Creek, Mawah Creek, Waukell Creek, Tully Creek and Pine Creek are major tributaries of the Klamath that run through the project area . (See Figure 2 - Location Map).

Existing Land Cover and Land Use

The Project Area includes 7,660 acres, with the majority of the project area being in forest cover for the past 100 years or longer. Commercial timber harvesting has long been practiced in the project area as evidenced by decaying stumps, logging roads, and residual timber damage from past operations. The surroundings are a mixture of tribal and private lands with a sparse but occasionally concentrated density of homes and other human development. The developed areas near the project area include the Yurok Tully Creek tribal office, tribal villages at Wautek, Kanick, and Kepe'l, homesteads on the many private properties along the river and on benches above the river.

Forest Vegetation Types in the Project Area

The forest components of the 7,660-acre Project Area include the nine vegetation types shown below, which were stratified from the delineation of vegetation polygons made on 2010 and 2011 NAIP aerial ortho-imagery. Strata boundaries were visually assigned on a large computer screen using such imagery and delineating geographically identifiable groups of trees that are similar by composition and structure. Such delineation uses homogeneity of color and texture as well as basal area differences evident on the NAIP imagery to establish boundaries. Guidance from CALFIRE states that besides color and texture, vegetation should be differentiated into different strata when basal area from the two potentially different strata polygons varies by 20% or more using the higher density polygon, such that the corresponding growth and harvest levels would likely be sufficiently different that combining both polygons to reflect a single polygon would not be justified. Since this 20% cannot be quantitatively determined when looking at an aerial image, the analyst's professional judgment and familiarity with the CKGG forest was used when assessing density differences between polygons. The 20 percent basal area threshold was used as professional guidance and is a general standard used by CALFIRE in distinguishing strata ("A reasonable starting point for defining density thresholds is around 15 to 20%.", Source: Non-industrial Timberland Management Plan, GROWTH AND YIELD GUIDELINES, Department of Forestry and Fire Protection, March 2006). Basal area is correlated with canopy cover where less than a closed canopy exists. Ground truthing was done during field inventory to aid in species and size determination which resulted in minor adjustments

being made to some strata boundaries as well as the re-labeling of some polygons. This was done before any inventory data was processed and without any consideration of the actual plot data. Therefore, no post-stratification was employed.

Residual Conifer
Klamath Mixed Conifer Sparse
Very Young Conifer
Residual Hardwood
Alder

Klamath Mixed Conifer
Young Conifer
Mixed Hardwood Conifer
Young Hardwood

Residual Conifer (RC) can be found at any elevation within the project area, and is characterized by a relatively heavy component of large trees that were not logged during the last several decades of logging activity. The dominant conifer species within this type is Douglas-fir, but redwood, Port Orford-cedar, incense-cedar, western red cedar and western hemlock may also be present. There is also a substantial portion of large, old tanoak in the RC stands found in the Pine creek tract. This forest type is found on 395 acres (160 ha) representing 5% of the Project Area.

Klamath Mixed Conifer (KMC) is generally found above the 500 ft (152 m) elevation and only within the Mawah Tract of the project area. The dominant species are Douglas-fir, Port Orford-cedar, incense cedar and tanoak. The majority of the overstory is about 40 years old, but there are also scattered residual trees that were not cut during the last logging. This forest type is found on 706 acres (286 ha) representing 9% of the Project Area.

Klamath Mixed Conifer Sparse (KMCs) is very similar to the Klamath Mixed Conifer Forest as described above, except it is slightly younger at about 34 years old and has substantially lower stocking than the remainder of the KMC type. This is possibly a result of being logged more intensively. It has been broken out separately for analysis purposes. This forest type is found on 330 acres (134 ha) representing 4% of the Project Area.

Young Conifer (YC) is dominated by Douglas-fir with a significant component of tanoak and madrone as well. In most stands the conifer is beginning to overtop the hardwoods and occupy the site. It will continue to increase in dominance even without management. The overstory canopy is generally 38 years of age comprised of trees which regenerated after the last logging. This forest type is found on 2,147 acres (869 ha) representing 28% of the Project Area.

Very Young Conifer (YYC) is comprised of even-aged stands on better site with good conifer stocking. It is found almost entirely on the Tower Tract and is dominated by Douglas-fir but also includes a minor but consistent component of redwood. The overstory canopy is stocked with trees averaging 29 years in age that regenerated after logging. This forest type is found on 130 acres (53 ha) representing less than 2% of the Project Area.

Mixed Hardwood Conifer (MHC) This type currently has greater hardwood stocking by basal area than conifer, but the relative canopy positions and conifer trees per acre make development into a conifer dominated stand achievable in the foreseeable future. The dominant conifer species in this type is Douglas-fir with a minor component of western hemlock and Port Orford-cedar. It is characterized by abundant stocking of native hardwoods, which in some areas represent the majority of stocking. This type is unique to the Upper Cappell tract. Native hardwoods include a predominance of golden chinquapin as well as tanoak, California bay laurel and others. The average stand age is 32. This forest type is found on 384 acres (155 ha) representing about 5% of the Project Area.

Residual Hardwood (RH) is characterized by heavy stocking of larger tanoak trees that were retained after much of the conifer component of these stands was removed during logging, mostly in the 1980s and 1990s. There are also scattered residual Douglas-fir. The dominant residual hardwood species tends to be tanoak but other native hardwoods are also common. Areas between the hardwood overstory trees are stocked with younger conifers and hardwoods that regenerated after logging. This forest type is found on 1,397 acres (566 ha) representing about 18% of the Project Area.

Young Hardwood (YH) are timber stands that have been logged within the last 25 years where the bulk of the regeneration is hardwood species dominated by tanoak, although there is significant, if spotty, conifer stocking, dominated by Douglas-fir. This type has the lowest average conifer stocking of any of the major types and is in need of rehabilitation. This forest type is found on 1,954 acres (791 ha) representing 25% of the 7,660 acre Project Area.

Alder (Alder) is the designation given to timber stands where most of the volume has been removed recently, and regeneration is largely alder with Douglas-fir saplings coming in underneath. This has occurred primarily in relatively wet areas with lower slopes. These stands also contain a mix of the conifer and other hardwood species noted above. They generally range from 10-30 years in average age of trees. This forest type is found on 216 acres (87 ha) representing about 3% of the 7,660 acre Project Area.

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 (14 CCR §1060) have been converted to 50-year breast-high age base equivalent break points by Krumland and Eng in California Forestry Report No. 4, April 2005. Table 1 below is from that report. The appropriate site class values for this project are in the column titled North Coastal Douglas-fir.

Table 1 - 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

A sampling effort was conducted to generate site index values that would provide the basis for modeling growth and harvest. Site trees were measured as a systematic sub-sample of the inventory. Sampling included tree height, species, diameter and age. Data was collected from 116 trees during the 2012 inventory. Although none of the strata averages turned out to be above 120 (Site Class II), there were 22 site trees with an index above 120, indicating that at least a portion of the Project Area is indeed site class II. The areas of such site appear to be scattered and hard to define geographically, but the proportion of 22 out of 116 is used in determining a weighted Common Practice value (as described in that section). In some cases there were not enough site trees collected within a strata to accurately reflect its true growth potential. In these instances, a site index was assigned to that type based on its similarity to other types and professional judgment. The average measured site index, modeled site index and estimated site class by vegetation type is shown below in Table 2:

Table 2 - Measured Site Index Values

Vegetation Strata	# of Site Trees	Average Site Index	Modeled Site Index	Site Class
Alder	4	90	110	III
KMC	10	75	75	V
KMCS	6	69	69	V
RC	7	110	110	III
RH	20	104	104	III
YC	27	110	110	III
YH	14	101	100	III
MHC	2	96	100	III
YYC	7	114	114	III

The Forest Vegetation Type Map below shows the location and extent of these vegetation types.

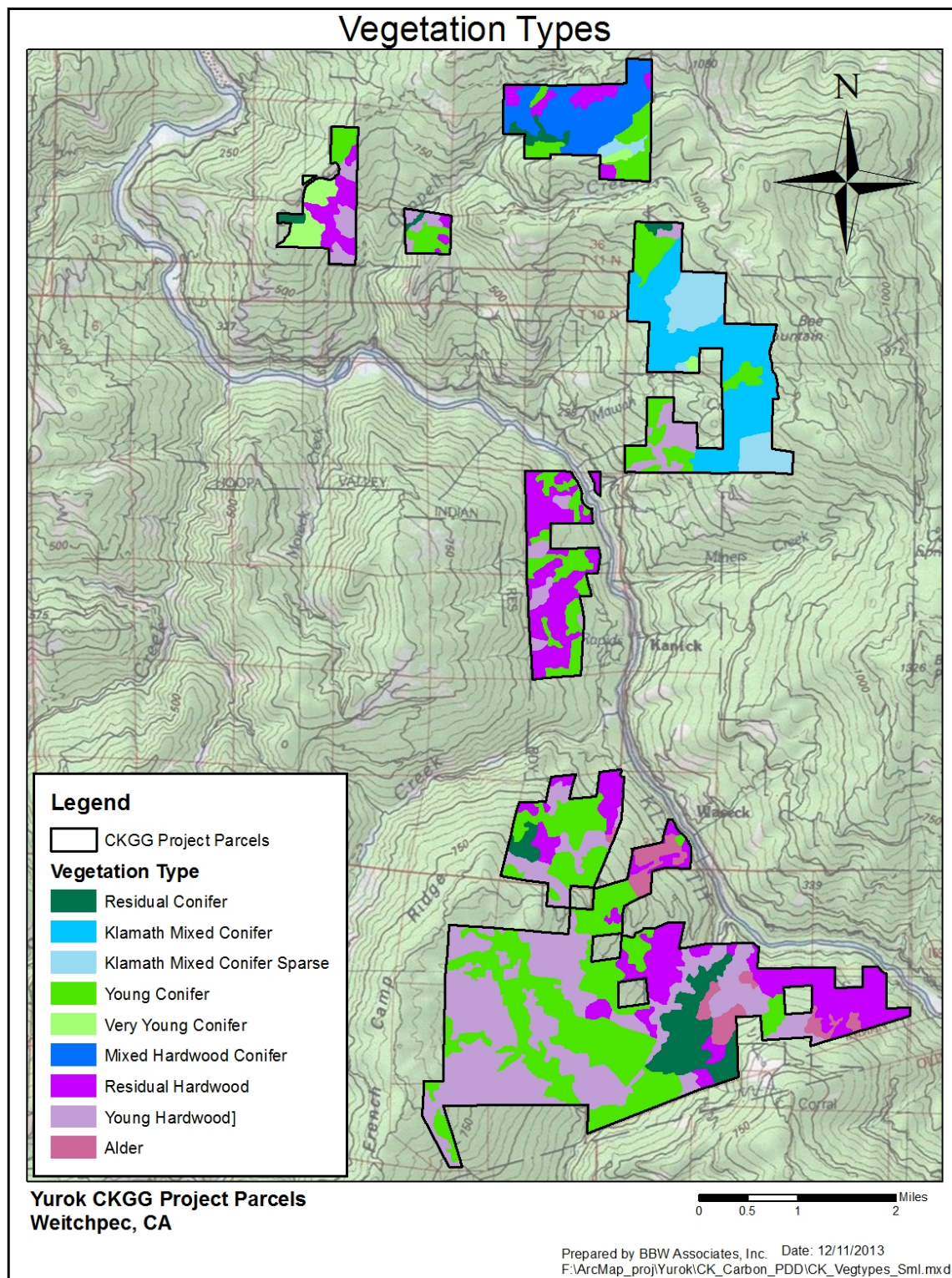


Figure 3 - Forest Vegetation Type Map

Geology and Soils

Below river mile (RM) 40 (from the town of Weitchpec to the Pacific Ocean) the Klamath River traverses the Coast Range province. The geology of this area is underlain mostly by the Eastern Belt of the Franciscan Complex and a sliver of the Central Belt along the coast. The Eastern Belt is composed of schist and meta-sedimentary rocks (mostly metagraywacke) with minor amounts of shale, chert, and conglomerate. The Central Belt is principally an argillite-matrix mélange that contains kilometer-sized slabs of greenstone, serpentinite, graywacke, and abundant meter-size blocks of greenstone, graywacke, chert, higher-grade metamorphics, limestone, and lenses of serpentinite (Jayko and Blake 1987). The Franciscan Complex generally consists of sandstone with smaller amounts of shale, chert, limestone, conglomerate, as well as serpentine and blueschist. Movement of the tectonic plates results in faulting in the Coast Range and the continued uplifting of the relatively young Franciscan rocks. This movement in conjunction with high precipitation rates and weak nature of the rocks has resulted in high erosion rates that create steep hillslopes and high sediment yields (FERC 2007). Source: (http://klamathrestoration.gov/sites/klamathrestoration.gov/files/3.11_Geology%20Soils%20and%20Geologic%20Hazards.pdf)

According to the NRCS soil erosion hazard ratings for soils in the Project Area, the hazard of erosion on roads and trails, ranges from “Moderate” to “Very Severe”- with the majority of soil types within the project area in the “Severe” category (NRCS, 2008). The risk of surface erosion and landslide initiation increases on steeper slopes, particularly where slopes exceed 60 percent. A slope analysis was conducted using ArcGIS Spatial Analyst (explained in section 5-B) in order to determine if any acres should be removed from the operable area due to landslide potential. The Project Area contains very few slopes in excess of 50 percent and even fewer greater than 70% (See Figure 4 –). The narrow bands indicated on the map are not sufficient to trigger logging restrictions inconsistent with the prescriptions modeled in the baseline. The acres removed due to each constraint category are shown in Table 13, section 5-C.

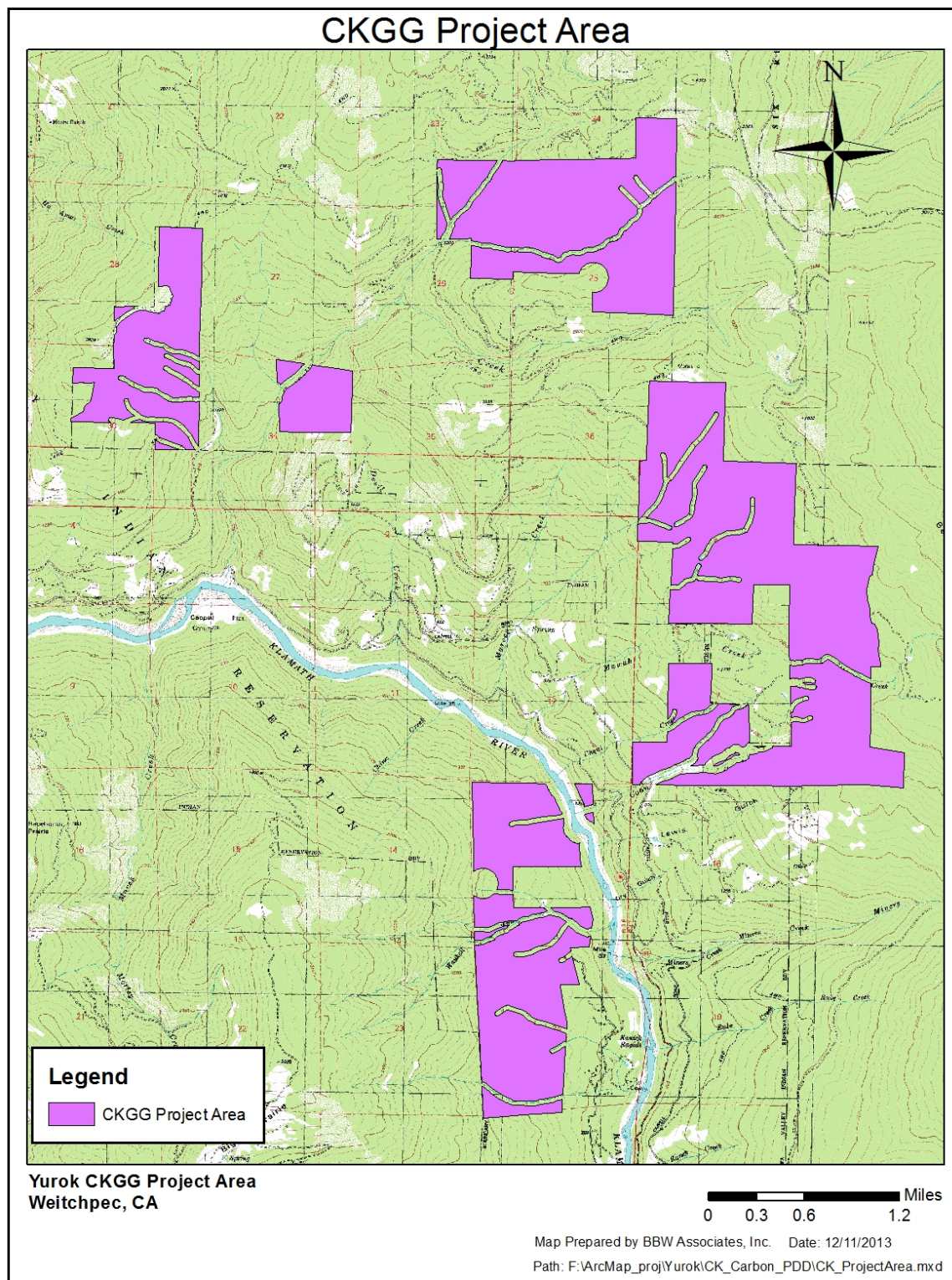


Figure 4 – Yurok CKGG Project Area

Land Pressures

The Project is located in an isolated rural area with limited road access. There is little development of any sort in the area. There is some recreational use including fishing and rafting on the Klamath River and facilities that support them. Highway 169 dead-ends at the community of Johnsons about 20 miles downstream of the Project Area. Timber management is expected to remain the primary land use on the majority of the local landbase.

Climate Zone Classification

The climate of the project is Mediterranean, consisting of warm, dry summers and cool, wet winters. The annual precipitation measured at Weitchpec is approximately 80 inches (Rantz 1964) with 98 % of the precipitation occurring between November and April. Temperatures range from the high 90°s (F) in summer to below freezing in winter. However, most of the Project Area receives substantial amounts of fog in the late summer. The Project Area covers a wide range of elevations and aspects, which strongly influence the microclimate and vegetation types in this ecosystem.

Historical Land Use

The land within the boundaries of the Project has been occupied by the Yurok Indians from time immemorial. The pre-contact Yurok were hunter-gatherers whose major subsistence foods included fish from the abundant anadromous fish runs, acorn gathering, and hunting game.

Traditional Native American land uses were heavily curtailed with the Gold Rush and the beginnings of white settlement in the early 1850s. The land has largely been managed for timber since that time. Beginning in the early 1990's illegal marijuana grows were found (and are currently being found on the property). During the field verification in 2013, one marijuana grow was found near plot 444. During the 2012 field inventory indications of small-scale marijuana growing were found in the vicinity of plots 72-74, 604-606 and 696. These grow operations are typically ¼ acre in size or smaller, and in aggregate are estimated at less than 10 acres in total. No other grow operations were discovered during the extensive inventory process or in any GIS analysis. The vast majority of marijuana grows result in manipulation of understory brush and do not result in removal of merchantable trees or grading of the landscape. Some diversion of creeks have taken place but not at a scale to affect the carbon project. Many grow scenes leave behind evidence of fertilizer use, but the impact of such use is certainly *de minimis* given the scale of the grow plots relative to the total project area. We are not aware at this time of any published literature on the impact of trespass marijuana plantations on forest carbon stocks.

Shape Files

Relevant Shape Files generated in ArcGIS are available for distribution to the Verifying Body and the Reserve. The shape files are in the *.shp format and include files that geographically describe the following:

- Project Boundary and Vicinity
- Assessment Area (Supersection) Delineation
- Inventory Point Locations
- Vegetation type boundaries

II. Assessment Areas

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

The vast majority of the 7,660-acre Project Area is located within the Southern Cascades supersection, with the exception of a small corner of the Tower tract, which laps over into the Northern California Coast supersection. The proportion of the project area in high versus low site was determined as described above under Site Classes.

Table 3 - Acres by Supersection & Assessment Area

Supersection	Assessment Area	Site Class	Acres
Northern California Coast	Coast Redwood/Douglas-fir Mixed Conifer	Low	27
Southern Cascades	Southern Cascade Mixed Conifer	High	1,455
Southern Cascades	Southern Cascade Mixed Conifer	Low	6,177
Total			7,660

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 30% Douglas-fir (*Pseudotsuga menziesii*) and 43% Tanoak (*Lithocarpus densiflorus*). No other species comprises more than 10% of the forest by basal area, although there are many other conifer and hardwood species present in small amounts. 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 also a significant component of older trees up to 125 years old, which are more prevalent in some veg types than others. The average

age for each vegetation strata is between 29 and 41 years old with the exception of RH and RC. Both of these types have an overstory that averages 70-100 years old.

All of the tracts 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 in the 1970's through 90's. With the exception of a small portion of the Waukell Tract logged by the Yurok shortly after being purchased, no logging has occurred since the properties were purchased in 1998.

Table 4 - Species Composition by Basal Area, Volume, & Native Species Proportion

Species (common)	Species (scientific)	Trees per Acre	Basal Area per Acre	Board Feet per Acre	Percent by Basal Area	Native Species	Percent by Native
Port Orford cedar	<i>Chamaecyparis lawsoniana</i>	5.3	4.5	291	2.9%	Yes	2.9%
Douglas-fir	<i>Pseudotsuga menziesii</i>	82.9	55.1	7,561	30.3%	Yes	30.3%
Tanoak	<i>Lithocarpus densiflorus</i>	151.2	78.7	5,979	43.3%	Yes	43.3%
Red alder	<i>Alnus rubra</i>	30.0	13.4	1,336	7.4%	Yes	7.4%
Pacific madrone	<i>Arbutus menziesii</i>	8.8	9.9	1,158	5.4%	Yes	5.4%
Golden Chinquapin	<i>Chrysolepis chrysophylla</i>	11.4	6.3	715	3.5%	Yes	3.5%
Other species		22.4	14.0	1,156	7.7%	Yes	7.7%
Total		312	181.9	18,196	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 Yurok Tribe has incorporated the Project into the Tribe’s forest management plan submitted to the Bureau of Indian Affairs pursuant to the National Indian Forest Resources Management Act of 1990 (NIFRMA), Pub. L. 101-630 and 25 C.F.R. § 163.11. For that portion of the Project Area within the Yurok Reservation, the Yurok Tribe manages the property in accordance with federal standards detailed in NIFRMA, 25 C.F.R. § 163.11, and the Tribe’s forest management plan. The off-reservation portion of the Project Area is managed according to the Yurok Tribe’s forest management plan and applicable provisions of California state law, including the Z’berg Nejedly Forest Practice and the Porter-Cologne Water Quality Control Act.

The California Forest Practice Rules incorporate the vast majority of federal and state law affecting forest management, such as compliance with the Clean Water Act, the Endangered Species Act, and the California Endangered Species Act. Because the California Forest Practice Rules are more stringent than federal forest practice requirements for lands within the Yurok Reservation, all Project modeling is based on the more restrictive legal constraints imposed by the California Forest Practice Rules.

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

3-E: **Regulatory Compliance**

(Forest Offset Protocol §3.6, Regulation §95973(b))

For Project activities, the Yurok Tribe complies with applicable provisions of the following federal and state laws

- National Indian Forest Resources Management Act of 1990
- 25 CFR 163.11
- Federal Endangered Species Act
- National Environmental Policy Act
- Federal Clean Water Act
- 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)

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 3.1.2.2. 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))

The Yurok Tribe 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 §3.5, §9.1.1.1(7))

The commencement date of this project is March 31, 2012, which is the valid date of the inventory conducted for the purpose of registering a carbon project. The decision to undertake a carbon project coincides with the Tribe's commitment to incorporate their fee lands into a carbon project, as evidenced by a contract with New Forests Advisory, Inc that committed the Tribe to offset project development on the CKGG acreage, and concrete actions taken by the Tribe and New Forests Advisory, Inc. to design and install a forest carbon inventory in December 2011-March 2012. The end of the initial reporting period is March 31, 2013.

3-J: Demonstration of Sustainable Harvesting Practices

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

Since commercial harvesting has been employed on the project area and will continue to be implemented, it is necessary for the project to satisfy (at the time of commercial harvest) the Forest Offset Protocol §3.8.1 – Sustainable Harvesting Practices. The Yurok Tribe CKGG IFM Project meets the requirements of §3.8.1 through option 3:

“The Forest Owner must employ uneven-aged silvicultural practices (if harvesting occurs) and must maintain canopy cover averaging at least 40 percent across the entire forestland owned by the Forest Owner in the same Assessment Areas covered by the Project Area, as measured on any 20 acres within the Forest Owner’s landholdings found in any of these Assessment Areas, including land within and outside of the Project Area (areas impacted by Significant Disturbance may be excluded from this test).”

The Tribe intends to practice uneven-aged management and/or thinning that results in 40% cover or more when measured at the 20 acre “unit” level. The goal of uneven-aged (selection) and thinning management is to maintain timber stands containing trees of a variety of ages and sizes on site, in perpetuity. Trees are harvested periodically (typically, every 15-20 years) from the stand as they reach their optimum size and value and/or as needed to maintain favorable growing conditions. Over time, selection management promotes the development of high-value and larger trees, making for more cost-effective harvest (i.e., fewer trees need to be cut each entry to attain the same financial value, by lowering logging costs per tree and accessing a higher price at the mill).

Selection management, as prescribed for the CKGG project, will not follow the stricture of a defined rotation age as is typically used for even-aged management. As noted, selection management will favor the development of a stand containing larger and older trees than are commonly harvested under even-aged management.

The Tribe plans that stands that are not suitable for single tree selection (i.e. understocked conifer stands or stands with high hardwood to conifer ratio) may be treated with a Group Selection silvicultural prescription with retention. At a minimum, 1 >36” diameter sound green conifer and 2 of the largest hardwood trees per acre are planned to be retained in Group Selection harvest units, which would meet the stocking requirements as described in the California Forest Practice Rules.

The Tribe intends that all group selection harvest would be planned to ensure that conifer crop trees (whether planted or residual) are maintained in a free to grow condition for the 15 years following harvest. Such harvest would be conducted such that the proportion of conifers to hardwoods is increased through a combination of residual stocking control and/or planting of conifers. Residual conifer and/or planted conifer stock would be comprised of currently healthy conifers that would be maintained in a free to grow condition for the 15 years following harvest.

Commercial thinning across the diameter classes is planned for use in young conifer stands to develop an uneven-aged structure for future management.

To demonstrate compliance with Sustainable Harvesting Practices, we analyzed canopy cover on all forestland owned by the Yurok Tribe in the Southern Cascades and Northern California Coast Assessment Areas.

Data Used

- 2003 CALVEG layer with CWHR Crosswalks
- 2010 LANDFIRE EVT downloaded from the LANDFIRE Website
- 2012 NAIP 1-meter resolution imagery

Methods

Using ArcGIS, the 2003 CALVEG existing vegetation layer was analyzed for total area within each WHR Density class > 40% cover for polygons >20 acres. The LANDFIRE 2010 layer and the 2003 CALVEG existing vegetation layer were compared as a check on the results from the 2003 CALVEG layer alone. To do this the 2003 CALVEG layer was converted to a raster which was snapped to the LANDFIRE 2010 Existing Vegetation Cover layer. These layers were combined in ArcGIS using the combine raster tool and analyzed for total area (acres) within each WHR type (e.g. Klamath Mixed Conifer) and each WHR Density class.

Areas identified as potentially violating the 40 percent canopy requirement were visually analyzed using the 2012 NAIP imagery. If a subjective evaluation of canopy cover was felt to be inadequate then canopy was estimated using a 64 dot per inch dot grid.

Results

The algorithmic analysis identified five forested polygons >20 acres in size that were flagged as potentially failing the 40% canopy cover test, totaling 132.3 acres (.34% of the total 38,396.5 acres held by the Yurok Tribe in the Assessment Areas). Analyst examination of the failed polygons determined that the polygons were improperly flagged, primarily because the polygons included non-forested acreage such as roads or permanently open sand bar near the Klamath River. In one case, a subjective review was determined to be insufficient and a Mylar dot grid was overlaid on the NAIP imagery. In this case only 37 out of 167 dots were found to not be forested, for a pass rate of 78 percent, which passed the 40 percent criteria.

Documentation of the analytical tools for demonstrating adequate canopy cover across the entire Yurok forestland ownership for SHP Option 3 have been provided under separate cover to the Yurok CKGG verifier.

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 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 measured using basal area per acre. 100% of the project is comprised of native species based on the 2012 inventory. Table 4 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 Cook & Koppala Project tanoak represents the highest proportion of the total stocks at 43% of the average basal area with Douglas-fir being the second most common species at 30%. As can be seen in Table 4 above, no single species represents higher than 65% of the project basal area per acre. In fact, over 18 species are represented in the basal area numbers.

III. Distribution of Age Classes

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

BBW Associates used field data collected during the 2012 inventory to analyze the distribution of age classes in the Project Area. The analysis determined that approximately 3% of the forested acreage in the Project Area, at the level of the timber strata, could be considered to be less than 20 years old. The Alder strata has been subjected to even-age harvests in the past 15 years, and though it has substantial levels of retention reflected in the inventory data, the primary age class is less than 20 years old. This 3% falls below the requirement for age class distribution for Natural Forest Management. Therefore the Yurok CKGG Project meets the criteria of the Forest Offset Protocol. The table below shows the average age by strata derived from field data collected within the project area.

Table 5 - Average Age by Vegetation Strata

Stratum	Average Age
Alder	10-15
KMC	41
KMCS	34
RC	60+
RH	60+
YC	38

YH	39
MHC	32
YYC	29

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 on the project area. Therefore, the project must maintain or demonstrate ongoing progress toward an average of at least:

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

The current standing dead wood stocks are 1.85 metric tons of carbon per acre, which is higher than 1% of standing carbon stocks and is above the target of one (1) metric ton. Since the current carbon stocks in standing dead 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. Since the protocol has no explicit direction regarding the below ground portion of snags and in order to be conservative, only the above ground portion of standing dead trees was included in the dead carbon stocks calculation.

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 might decrease over a ten year period 10 to 30 years in the future commensurate with exception #2 as depicted in Figure 3.1 of the Protocol. This decrease would be the result of silvicultural applications intended to balance age classes and restore species composition in hardwood dominated stands. Implementing these management practices, although temporarily reducing carbon

stocks, will result in greater carbon stocking over the long-term and allow for a higher level of financially feasible sustainable harvesting in the future. This decrease is planned for and a description of this potential stocking trajectory is included in the Yurok FMP, which is sanctioned and monitored by the BIA. Any 10 year decrease in stocks is predicted to be less than 5%, and overall stocks would 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.

This will be monitored over the life of the project by incorporating new inventories and disturbances into the model, 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, §9.1.1.1(19))

The carbon pools and sources 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 sampling design is a stratified sample of systematically installed plots. Plot locations were determined by applying a random start systematic grid on the property. The Project Area includes nine vegetation types which were stratified according to overall level of biomass stocking as well as species composition and age. Plot spacing was decreased for smaller strata in order to achieve adequate sampling intensity. A precruise indicated that around 900 plots would achieve the standard error desired for the project, but professional judgment led the analysts to presume that fewer plots would be necessary. Therefore, a grid of 881 plots (adjusted as described above) were laid on the property, and lines of plots were held back as determined by a random number generator to arrive at a fixed grid stratified random sample with 673 plots (see Figure 5 below). Whole lines rather than individual plots were held back for the sake of sampling efficiency in case these plot lines turned out to be necessary. Once the final Project area was determined, all plots outside of this were dropped from the analysis. This included plots in stream zones and in the area reserved by the Tribe for housing development, resulting in a total of 589 plots within the Project which were used as the basis for all carbon calculations.

The inventory data was collected in late winter and spring of 2012, primarily before the growing season; the inventory shall be considered to have an official date of March 31, 2012 for analysis purposes. The following table is a summary of the sampling intensity by vegetation strata.

Table 6 - Sampling Intensity by Strata

Strata	Acres	No. of Plots
Alder	216	36
KMC	706	48
KMCs	330	36
RC	395	49
RH	1,397	106
YC	2,147	140
YH	1,954	124
MHC	384	24
YYC	130	26
Total	7,660	589

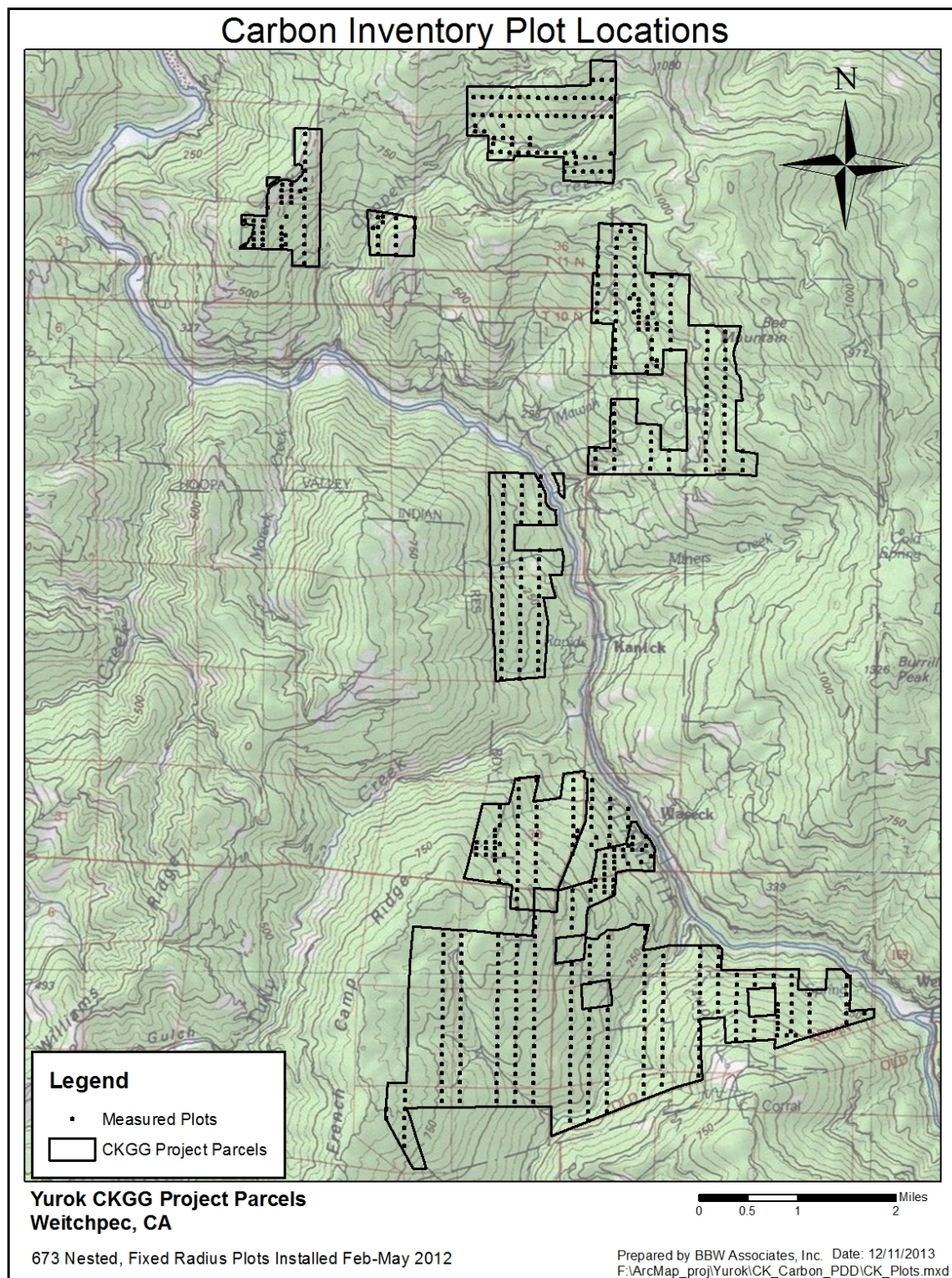


Figure 5 - Inventory Layout

4-C: Field Measurement and Plot Monumenting

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

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 white fiberglass pole painted blue. Pink flagging was tied to a branch about 7 feet high near the plot center and to the plot pole. Trees greater than 5" dbh were measured using 3 concentric fixed radius plots depending on their diameter. 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 Inventory Manual found in Exhibit III. The manual was provided to the crew that installed the inventory.

4-D: Data Management System

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

The inventory data was collected using paper plot sheets and transferred to a Microsoft Access database. Data were checked for errors in the field, during data entry, and during analysis. Check cruising was conducted by BBW foresters on 9 percent of the plots (63 plots total) to ensure quality measurements and feedback to field crews during data collection. Documentation of the check cruise results is on file at the offices of New Forests. Generally, the basal area of all trees on the cruise plots that were checked was within 0.2% of the check cruise, and the total height of the 200 trees checked for height on the 63 cruise plots was within 2.3% of the check cruise results. These results easily fall within the tolerance classes published in the field manual.

The data were analyzed in Microsoft Excel, Microsoft Access and the Forest Vegetation Simulator (FVS) ICASCA variant. 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 Excel spreadsheet. The treelist spreadsheets were imported into an Access database to create a table 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)

All modeling required for this report has been conducted by Registered Professional Foresters at Baldwin, Blomstrom, Wilkinson and Associates, Inc. (BBW Associates), Arcata, California, consulting foresters, specifically by Mr. Paul Harper, RPF # 2672 and Mr. Jared Gerstein, RPF # 2826, with oversight by Dr. Timothy Robards of New Forests Inc., RPF #2521, and this report has therefore been prepared with the oversight of a Professional Forester as required in Section 9.1 of the Protocol.

The above-ground live tree portion of carbon was calculated using the FIA equations and methodology for cubic foot volume and biomass (FIA 2010a, b) as required by the ARB. This was done in the Access database referred to above. There are 3 different methods to calculate cubic volume, depending on the species. Both the equations and the method for calculation of volume and biomass vary by species and sometimes diameter. This requires a complex set of IF/THEN statements to assign equations, create temporary variables, and filter records. This was done through a succession of queries built on top of each other and applied to all the records in the treelists for every strata/prescription/timing choice combination. These queries were applied to all the individual tree records at each 5 year time period for the 100-year projection period.

Broken topped trees were recorded during the inventory. Their carbon was calculated using the regressed height (based on dbh) and multiplying this total by the BT height divided by the regressed height.

A description of the specific calculations carried out by each of the queries, as well as the complete database for the baseline and project simulations is available on New Forests servers.

Below ground live tree carbon was estimated by using the protocol stipulated equation (Cairns et al. 1997). This equation uses the above ground biomass density in tons per hectare to predict the below ground biomass. For the calculation of total current stocks, this was applied at the plot level, meaning that it was calculated for every plot to get the total live carbon per acre represented by that plot before averaging them for the strata. For all future periods in the projection, the equation was applied to the per acre value after plot averaging for each particular strata/prescription/timing choice combination by period. This was done to simplify applying the formula to the projected yield streams of above ground live carbon. The difference is negligible (0.28% higher stocks), and calculations of current stocks for the purpose of generating credits will always be done by applying the formula at the plot level before averaging.

All biomass estimates were converted to carbon by multiplying by 0.5 and to CO₂e by multiplying by 3.664, which is the ratio of the atomic weights of CO₂ to C.

The standing dead wood was estimated using the snag data collected in the inventory, which included total height, dbh, and top diameter for all standing dead trees greater than 5" dbh and 15 ft tall. The snags were assigned decay classes based on Harmon et al (2008); these 5 classes were combined into the 3 classes used on the CKGG project as follows: 1&2= CKGG 1, 3= CKGG 2, 4&5= CKGG 3. Refer to the Inventory Manual in Exhibit III for the exact procedures used in measuring snags and the 3 decay class descriptions.

All snags were imported to a separate spreadsheet independent of the growth modeling, where volume and biomass of each one was calculated. The volume of the stem was estimated using the Smalian formula for a cone, assuming that ground level diameter was 2" greater than dbh. This was then multiplied by the wood density for the species by decay class as per Harmon et al (2008). It was not necessary to track standing dead trees over time for the baseline analysis as it is assumed that the average level of standing dead carbon over the 100-year baseline analysis would be the same or less than the current level. SNAG volumes are generally tied to the age of stands and their density which is related to the stage of stand development. The baseline scenario is comprised, at any point in time, of the existing stands growing forward as well as regenerated stands after being clearcut. These regenerated stands range in age from 0 to 80 and some of them are commercially thinned during their rotation. In our professional opinion, it is reasonable to expect that the existing stands growing from 1 to at most several decades would have similar levels of standing dead wood as they do today. Also, the current ages of the strata are representative of the range of ages the regenerated stands go through during the 100 year projection. Finally, the project area excludes inoperable areas that would have a 'let grow' scenario in the baseline and therefore accumulate more standing dead wood. Therefore, since all acres in the project area are allocated for harvest in the baseline, inclusive of commercial thinning, the average stocking of SNAGS over the 100 year baseline projection is modeled to remain the same as today.

This assumption is also supported by the Climate Action Reserve policy issued to a project prior to October, 2011 that documents how to model standing dead wood. This policy was confirmed in a 9/5/13 email exchange between CAR and the APD.

Results from the snag calculations were imported into the 'stocking2012.mdb' database, where they were added into the plot level carbon calculations in order to determine total current stocks.

The 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, which in the CKGG project is only the conifers (row 11 of the Offset Credit calc worksheet). However, for the calculation of secondary effects, the total harvested carbon in all trees to be sold is considered, which includes the hardwoods being sold for biomass (row 9 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.

4-F: Inventory Update Process

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

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 589 project plots, or a sub-set sufficient for achieving the desired standard error, will be re-inventoried no later than 2024. 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 2024.

For reporting stocks on an annual basis until the next inventory, when little or no harvesting is expected, the intention is to rely on growth projections from FVS which have already been done. At the occasion of a disturbance event that alters the carbon stocks in the Project Area, such as fire or timber harvest, the plots in the affected area will be re-measured and the corresponding plots in the project carbon calculations will be replaced by the newly measured plots. The newly measured plots will be installed consistent with the inventory manual and supplement 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 project GHG Reductions and Removals as well as a new calculation of the confidence deduction. If disturbance or timber harvest affects more than 5% of the strata acreage, then a new strata will be delineated and the above procedures will be carried out using the the new strata to calculate the GHG Reductions and Removals. Disturbance and timber harvest will be monitored as part of normal management activities.

5. Baseline Carbon Stocks – Improved Forest Management Projects

5-A: Legal Constraints

(Forest Offset Protocol §6.2.1.2, §9.1.1.1(25), §9.1.1.3(4))

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

- Watercourse and lake protection zones (WLPZ) required by the California forest practice regulations (California Code of Regulations 14). The WLPZ rules in the FPR's are 37 pages long and extremely complex. Stream locations were identified using a GIS overlay developed from the CalFire database, Yurok GIS department, and field reconnaissance conducted during the inventory. Class I and II streams were given an effective no-cut buffer width based on the level of canopy retention required. Because of the complexity of the rules with respect to the allowable silviculture within the three WLPZ zones required on Class I and II watercourses, for modeling purposes it was decided that all Class I streams in the Yurok CKGG project area would be modeled using a 125 ft. no-cut buffer on each side of all such streams, while Class II streams were assigned a 75 ft. no-cut buffer on each side of all such streams. This is a conservative approach to estimating the legally available operable ground for baseline calculation purposes. No distinction was made between Class II-L and Class II-S, since mapping was not done at that level of precision. No-cut buffers were calculated by strata using the GIS overlay and removed from the operable acreage.
- Wildlife buffers for Northern Spotted Owls (NSO) were estimated and removed from the operable acreage. This was done using a 500 ft. buffer around known NSO activity centers. This resulted in 46.1 acres being removed from the project.
- A Wild and Scenic River buffer of 300' was applied to the Klamath River, and this area was entirely removed from the project boundary.
- Clearcutting, commercial thinning and rehabilitation were the only silvicultural prescriptions modeled in the baseline. Modeling incorporated all age and stocking standards specified by the California forest practice rules (CCR 14). Rehabilitation, which has no minimum age limitation, was only applied to strata with less than 50 sq.ft. per acre of conifers (RH & YH & Alder). Even-aged harvesting in all other strata was delayed until the strata reached 60 years old or 80 years in the case of site IV and lower lands (KMC & KMCs). Regeneration in clearcuts 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 spreading out the initial harvesting of a given strata over 10-20 years depending on the overall acreage of the strata.

5-B: Financial Constraints

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

Analysis of Timber Harvest Plans within the THP Analysis Area

In order to demonstrate the financial feasibility of the Project Baseline scenario, an analysis of vegetation types and Timber Harvest Plans (THPs) within the vicinity of the Project Area (known as the THP Analysis Area) was performed to determine comparability to the modeled Baseline scenario. The THP Analysis Area that was reviewed included the land within a 20 air mile radius of the Project Area that fell within the same supersection as the Project Area; the Southern Cascades supersection (Figure 6). The analyses of vegetation types, silvicultural systems and logging methods was restricted to the areas that fell within the actual boundaries of the THPs that occurred within the THP Analysis Area.

The vegetation type data was obtained from CALFIRE's Fire and Resource Assessment Program (FRAP) Multi-Source Vegetation (FRAP 2002). The FRAP (2002) vegetation type data was used for both the THP Analysis Area and the Project Area so that the data would be comparable.

The data for THPs was obtained from CALFIRE in the form of a GIS shapefile of all THPs filed from 1997 through 2012 for Humboldt County. The GIS shapefile included the acreage, year filed, silviculture and yarding types for each THP.

An analysis of slope was performed for the Project Area and THP Analysis Area. 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 Analysis Area were classified into four slope classes and the proportion of each analysis area that fell within the slope classes was calculated.

The County Zoning of both the Project Area and THP Analysis Area was analyzed by selecting all of the Humboldt County Assessor Parcels that intersected each area and examining the zoning. GIS files from the County and CALFIRE were used in this analysis.

The overriding assumption is that harvest plans conducted within the THP Analysis Area must have been financially feasible enough to do them. Therefore, as long as projected harvests in the Baseline scenario are sufficiently comparable to actual harvest plans, then the modeled prescriptions are also financially feasible.

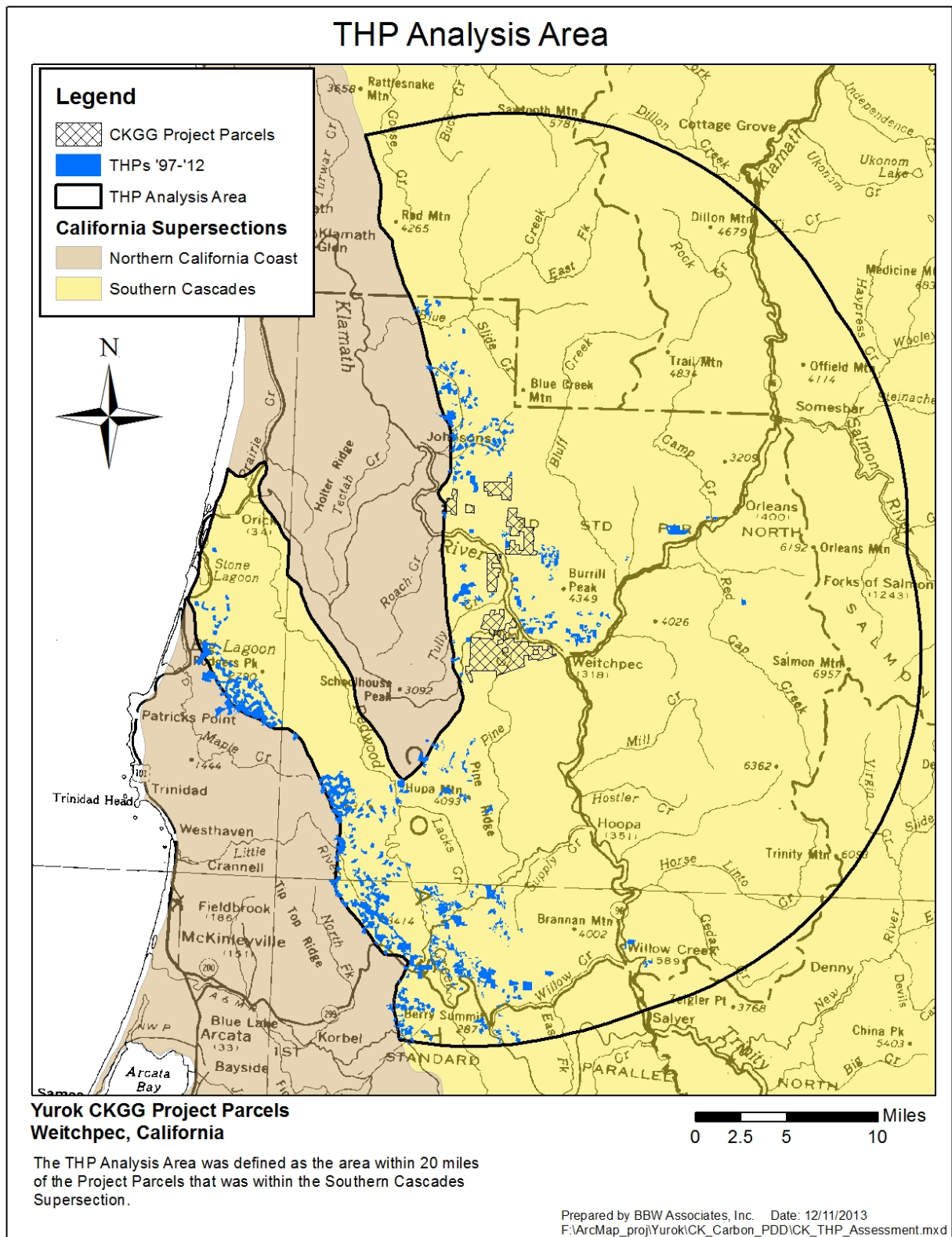


Figure 6 – THP Analysis Area Map

Vegetation Type Analyses

The two most common vegetation types within the THP Analysis Area and Project Areas were the same; Douglas-fir (DFR) and Montane Hardwood (MHW). Montane Hardwood-Conifer (MHC) was also abundant in both areas (Figure 7). The DFR, MHW and MHC vegetation types comprised 76% of the Project Area and 80% of the THP Analysis Area. The primary differences were that Coast Oak Woodlands were more abundant on the Project Area and Redwood was found on the THP Analysis Area and not in the Project Area. However, the COW designation is clearly an anomaly of the FRAP typing methodology, since there is no such vegetation type anywhere in the vicinity. Minor vegetation types (<10% cover) differed between the areas. Overall, nearly 80% of the acres in each Area were comprised of the same three vegetation types (DFR, MHW and MHC) in similar proportions, with MHW being the most abundant vegetation type in both Areas.

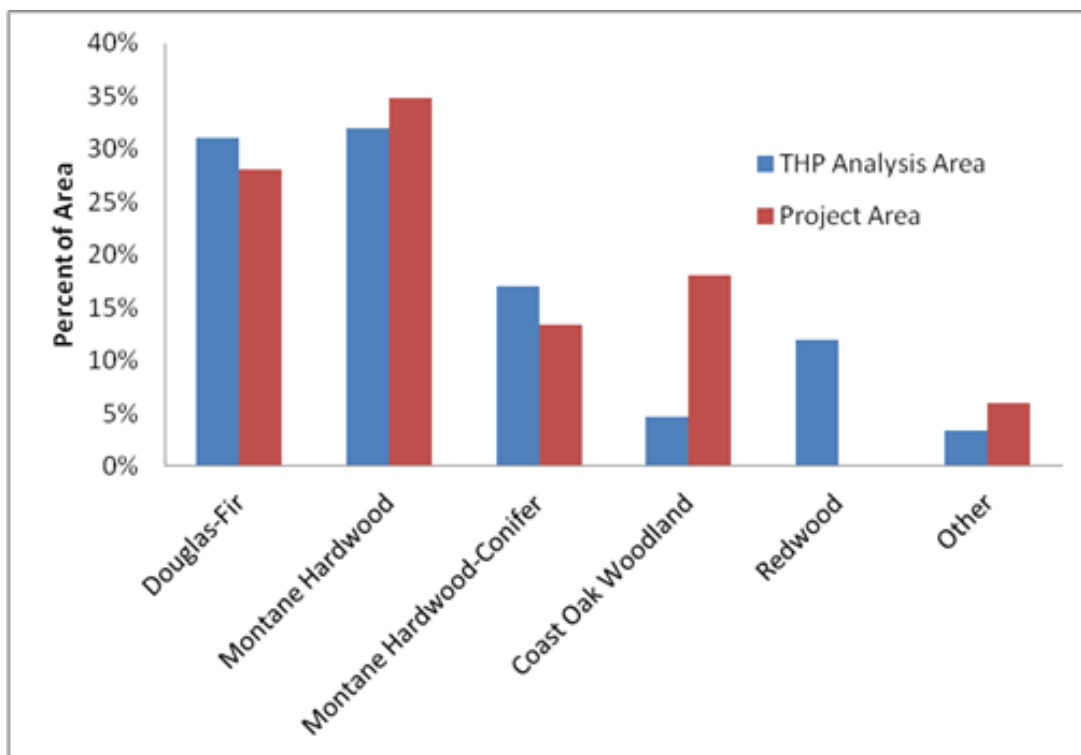


Figure 7 - Comparison of Vegetation Types in Project Area and THP Analysis Area

** based on FRAP (2002) vegetation type data - minor vegetation types (<5% cover) were categorized as "Other"*

Silviculture Analysis

Two hundred nineteen Timber Harvest Plans (THPs) covering approximately 20,000 acres were filed within the THP assessment area during the 1997-2012 time period. The five most common silviculture methods used were Clearcut, Rehabilitation, Selection, Seed Tree Removal and Alternative Prescription - which accounted for 17,674 acres of the total or 88% of all THPs (Table 7). The most common yarding method was ground based tractors (75% of acres harvested), which is the least expensive method, followed by cable yarding. Clearcut and rehabilitation silviculture methods comprised 70% of all harvested acres in the THP Analysis Area, which is very similar to the proportion of silviculture methods described in the baseline modeling scenario for this carbon project. The following table shows the comparison with the silviculture modeled in the baseline.

**Table 7. Total acreage of THPs by silviculture
THP Analysis Area compared to Baseline Modeling.**

	THP Analysis Area Harvest Acres		Project Baseline Harvest Acres <u>1/</u>	
Silviculture	Total	Percent	Total	Percent
Clearcut	9,281	53%	10,589	51%
Rehabilitation	2,936	17%	3,733	18%
Selection	2,179	12%	0	0
Other *	3,278	18%	6,372	31%
Grand Total	17,674	100%	20,694	100%

* The "Other" category includes Seed Tree Removal, Commercial Thinning, and Alternative prescription.

1/ Project area baseline harvest acres total to more than the project area because over the 100 year analysis, most project acres are harvested more than once.

Harvest intensity within the analysis area was relatively constant for the past 15 years, with an average annual harvest acreage of 1,105 acres (Table 8). Seed tree and Alternative silviculture prescriptions declined in recent years, likely because most of the large, old trees typically targeted in these prescriptions have already been harvested.

Table 8. Annual harvest by most common silviculture types in THP analysis area.

	Silviculture Type					
THP Year	Clearcut	Rehabilitation	Selection	Seed Tree	Alternative	Grand Total
1997	670	151	15	314	295	1,443
1998	389	370	33	421	433	1,646
1999	468	417	206	270	347	1,707
2000	672	530	52	485	226	1,965
2001	355	419	38	74	33	919
2002	232	252	130		73	688
2003	443	84	256	4		787
2004	915	39	138	38		1,130
2005	883	121	338			1,341
2006	640	16	156			812
2007	784	295	167	46		1,293
2008	821	156	170			1,147
2009	550		131			682
2010	710		179			890
2011	662	86	168		219	1,135
2012	87		2			89
Grand Total	9,281	2,936	2,179	1,652	1,626	17,674

Silviculture by Vegetation Type Analysis

The most commonly harvested vegetation type within the THP Analysis Area was Montane Hardwood (MHW) followed by the Douglas-fir (DFR) type (Table 9). Clearcut was the most common silviculture type across all vegetation types, followed by rehabilitation. Only the most common silviculture types and the most common vegetation types were included in Table 9 for simplicity.

Table 9. Most common silvicultural treatments in most abundant vegetation types.

	Silviculture Type					
WHR Type	Clearcut	Rehabilitation	Selection	Seed Tree	Alternative	Grand Total
Montane Hardwood	2,693	688	613	575	690	5,258
Douglas-Fir	2,523	1,345	562	489	262	5,181
Montane Hardwood-Conifer	1,271	562	362	329	203	2,726
Redwood	1,601	79	381	5	54	2,120
Coastal Oak Woodland	373	165	91	109	83	820
Grand Total	8,461	2,839	2,008	1,506	1,292	16,106

Slope Analysis

The distribution of slope classes within the Project Area and the THP Analysis Area was very similar (Table 10). The mean slope for the Project Area was 28%, while the mean slope for the THP analysis Area was 29%, well within the 10% difference guideline used to determine similarity of sites as specified in the ARB protocol.

Table 10. Comparison of slopes for Project Area and THP Analysis Area.

Slope Class (%)	Percent of Area in Each Slope Class	
	Project Area	THP Analysis Area
<30	62.3%	57.7%
30-50	33.7%	32.7%
50-70	3.2%	7.7%
>70	0.8%	1.9%

Zoning Analysis

The vast majority of both the THP Analysis Area and Project Area were zoned Timber Production Zone (TPZ), Unclassified (U) or Agriculture Exclusive; Timber Production Zone (AE;TPZ) according to the Humboldt County Assessor Parcel Number GIS layer (Table 11). There were 26 other zoning classes that comprised the balance of the two analysis areas.

Table 11. Comparison of county zoning in Project Area and THP Analysis Area

Humboldt County Zoning	THP Analysis Area	Project Area
TPZ	66.72%	72.67%
U	9.02%	23.71%
AE;TPZ	10.56%	0.77%
Total	86.3%	97.2%

Haul Distance

THPs to the north and east of the Project Area had longer haul times to the mills in the Eureka Area, while THPs to the south and west of the project had shorter haul times (Figure 6 – THP Analysis Area Map). The Project Area represents average to slightly longer haul times compared to the THP Analysis Area but still well within a reasonable hauling distance. Quite a number of THP's (3,540 acres) within the analysis area were filed by a local industrial timber company that are north of the project area and thus have a longer haul.

5-C: Estimate Baseline Onsite Carbon Stocks (Private Lands)

(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 Yurok CKGG Project has been found to be almost entirely within the Southern Cascades Supersection as described in item 3-C.II above. There is also a small portion which falls into the Northern California Coast Supersection, based on project shape files and shape files of the Supersections provided by ARB. According to Appendix F of the FPP, 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 forest inventory process. 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. As described in §3-C (I) of this document the Project Area was determined to be 19% High site and 81% Low site. However, no single strata average was high enough to consider it Site II or better. Based on the acreage in each Assessment Area and the site class, the table below was constructed to identify Common Practice for the Project.

Table 12 - Common Practice Calculation

Ecosection/ Super-section	Assessment Area	Site Class	Acres	Common Practice: Aboveground CO₂e (tonnes/acre)
Southern Cascades	Southern Cascade Mixed Conifer	High	1,455	128
Southern Cascades	Southern Cascade Mixed Conifer	Low	6,177	86
Northern California Coast	Coast Redwood/ Douglas-fir Mixed Conifer	Low	27	165
Total Acres / Weighted Avg Common Practice			7,660	94.2

Common practice was calculated using the weighted averages of the assessment areas. The weighted average common practice was 94.2 tonnes/acre of above-ground standing live carbon stocks in CO₂e. The weighted average of the Common Practice (CP) is computed as follows:

$$CP = ((1455 \text{ ac.} \times 128 \text{ t/ac.}) + (6177 \text{ ac.} \times 86 \text{ t/ac.}) + (27.4 \text{ ac.} \times 165 \text{ t/ac.})) / (7660 \text{ total ac.})$$

$$= 94.2 \text{ tonnes/acre CO}_2\text{e}$$

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 initial carbon stocks (ICS) of the aboveground live tree component are estimated to be 192.6 tonnes CO₂e per acre. The ICS is greater than the CP, therefore the minimum baseline level (MBL) is equal to the CP or 94.2 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 removing acres constrained for various reasons from the operable land base, which is the Project area by definition. The following table shows the constrained acres by strata.

All the figures presented in this OPDR for total carbon tons etc...represent the operable acres only. The constrained acres are not part of the project.

Table 13 - Legal and Financial Constraints

Strata	Total Acres	WLPZ Effective No-cut	NSO 500' Buffer	Project Acres
Alder	235	19.1		216
KMC	772	65.3		706
KMC sparse	345	10	5.4	330
RC	459	61.7	2.0	395
RH	1568	150.5	20.8	1397
YC	2385	233.8	4.0	2147
YH	2156	193.9	8.4	1954
MHC	425	38.4	1.8	384
YYC	145	10.8	3.8	130
Total	8,489	784	46	7,660

The ICASCA variant of the Forest Vegetation Simulator (FVS) (Keyser, 2010) was used to model forest growth, mortality and harvest over time. FVS is an ARB approved growth model designed for these sorts of applications. FVS is an individual tree growth model that accepts direct input of the 2012 inventory data, once the data has been formatted correctly and missing heights filled in. Missing heights are determined by developing a regression equation based on dbh for each species or logical species/site class grouping. The model also incorporates 10 year growth increment data collected during the inventory to calibrate the projected growth rates.

A variety of stand density index, small tree diameter growth, basal area growth and maximum height multipliers were used to tailor the ICASCA regional FVS output to more closely predict project and local area conditions. The set of multipliers used is shown in the table below:

Strata	Let Grow	Selection	clearcut
	X1	X2	X3
RC3	SDITO700		SDITO700, REGDMultTO1.4, BAImultDF0.8
RC2	SDITO700	SDITO700	SDITO700, REGDMultTO1.4, BAImultDF0.8,HGTMultHwd0.8
RC1	SDITO700	SDITO700	SDITO700, REGDMultTO1.4, BAImultDF0.8,HGTMultHwd0.8
KMC2	none		REGDMultTO1.4, BAImultDF0.8,HGTMultHwd0.8
YHUC	none		SDITO700, REGDMultTO1.4, BAImultDF0.8,HGTMultHwd0.8
KMC	none	SDITO700	
YC	SDITO700	SDITO700	
RH	SDITO700		SDITO700, REGDMultTO1.4, BAImultDF0.8,HGTMultHwd0.8
YH	SDITO700		SDITO700, REGDMultTO1.4, BAImultDF0.8,HGTMultHwd0.8
Alder	SDITO700		
YYC	SDITO700	SDITO700	SDITO700, REGDMultTO1.4, BAImultDF0.8,HGTMultHwd0.8

- SDITO700 = maximum SDI for tanoak was raised from the FVS default of 550 to 700
- REGDMultTO1.4 = small tree tanoak diameter growth was increased by 40% over FVS default rate for prescriptions only where harvest is modeled.
- BAImultDF 0.8 = Douglas-fir basal area increment was reduced to 80% of the FVS default for prescriptions where only where harvest is modeled
- HGTMultHwd 0.8 = height of all hardwoods was reduced to 80% of FVS default calculation

SDITO700 – This multiplier is applied in all Let Grow projections, except for the KMC2, MHC (YHUC) and KMC strata. The FVS default maximum SDI for the ICASCA variant varies from a low of 550 for most hardwoods to 760 for WF. The default SDIMax for TO is 550, however, based on projections made without modification to the project data, FVS starts introducing substantial mortality to tanoak such that pure tanoak stands as projected rarely exceed 250 sq. ft., yet numerous plots had well over 300 sq. ft. An analysis of 93 1/5 acre plots from an immediately adjacent 90,000 acre property shows virtually no mortality (0.7 sq. ft./acre/year) on old-growth DF stands where calculated SDI was 713 and basal area was 281 sq. ft. Based on adjacent properties, measurement of mortality from the inventory and professional experience, the maximum SDI for tanoak was raised to 700 in the strata noted above so that FVS projections of growth and yield better match local conditions. For the three strata where this multiplier was not invoked, site index was low enough that the default SDI max for tanoak seemed to represent the local conditions.

REGDMultTO1.4 – This multiplier was only applied when harvest is modeled. The ICASCA small tree height and diameter increment equations are based on small tree data from the western Sierra's and not from the ICASCA region. Based on adjacent properties, the fact that the ICASCA variant small tree growth comes from 100's of miles away from the project area and on professional experience, tanoak height growth was increased by 40% over the FVS default rates for small trees (less than 3").

BAIMultDF0.8 – This multiplier was only applied when harvest is modeled. The ICASCA large tree Douglas-fir basal area increment equations do not appear to capture large tree DF increment very well. An analysis of 93 cutover plots, including sprayed, unsprayed, and cutover with a large residual hardwood basal area showed that the ICASCA variant tended to over predict Douglas-fir large tree increment, particularly in cutover stands. Based on looking at an adjacent property with substantial data on managed stands, and on professional experience, Douglas-fir basal area increment was decreased by 20% over the FVS default rates for large trees (greater than 3”).

HGTMultHwd0.8 - This multiplier was only applied when harvest is modeled. ICASCA tends to over predict height growth of hardwoods compared to local conditions. This particularly true where early release is modeled, as the remaining hardwoods are modeled as growing nearly as fast as the balance of the stand even though the remaining hardwoods are usually under substantial overstory competition. Local experience and data from an adjacent property shows for example that young tanoak rarely get over 120’ tall yet the FVS ICASCA variant will routinely grow tanoak to heights of 140’. On an adjacent property, with over 500 continuous forest inventory plots with 16,000 tree records, of which 9,041 were hardwoods, only one tanoak over 140’ tall was measured. On the project inventory, one tanoak was measured at 146’, yet out of 3,291 tanoak, only 37 were taller than 100’. Based on looking at an adjacent property with substantial data on managed stands, and on professional experience, height growth for hardwoods was reduced by 20% to better represent local conditions, particularly with respect to managed stand hardwood height.

Data on small regeneration sized trees (1-5” in diameter) was collected in the KMCs strata due to the size, low overstory density and species composition of this strata, but not in any of the other strata. While small sized trees in the KMCs were not accounted for in current stock calculations because they don’t meet the 5” minimum size requirement of the protocol, they were used by FVS in future periods when they reached 5” in all KMCs projections for the baseline and project. Natural regeneration was simulated for the alder strata in FVS due to the low canopy density and deciduous nature of alder and a specified number of Douglas-fir were modeled for the baseline and for the project. In the majority of the strata, however, no natural regeneration was assumed to occur in baseline or project modeling. Except for Let Grow in the project, every stratum is entered within the first 30 years, and the assumption was that any natural regeneration that might occur would not have reached 5” diameter unless it occurred in the first period, given overstory density and stand basal area. As a result, no small tree natural regeneration was modeled as it would not materially contribute to baseline stocks. Any stand modeled with a harvest at any point whether in the project or baseline was either forced to “plant” conifers at specified densities, consistent with the modeled prescription, or FVS’s default hardwood sprouting introduced sufficient hardwoods to account for “regeneration”.

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 diameters, heights, and cubic foot volumes output by FVS to the treelist is the basis for calculating individual tree biomass

as described in sections 4-D and 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.

Growth and yield results for all strata/prescription/timing choice combinations were entered into a spreadsheet matrix for tracking and summarizing variables over time for the whole project. Variables tracked included above ground live carbon stocking, total merchantable harvested carbon, harvested carbon sold to a sawmill, conifer board foot harvested, below ground live carbon stocking, and acres harvested per period. It was set up so that acres could be assigned iteratively to different prescriptions and timing choices to achieve a reasonable and logical harvest flow.

The baseline harvest schedule allocated acres to silvicultural prescriptions with the objective of ensuring that the 100-year average aboveground live tree pool is equal to or greater than the minimum baseline level (MBL) of 94.2 tonnes/acre CO₂e. 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, Table 14, and Table 15. The following table shows the silvicultural prescriptions modeled; the last column indicates whether it was used in the baseline or project modeling.

Table 14 - Silvicultural Prescriptions Modeled for Baseline and Project activity

Strata Modeled	Rx ID	Rx Description	Initial Entry Choices	Residual Stocking	Trigger Condition	Cutting Cycle	Use in Baseline (BL), Project Activity (PA)
RC, YC, MHC, YYC, Alder	Clearcut	Clearcut 60 yr rotation	RC – 1, 2, 3 YC – 5, 6, 7 MHC, YYC – 7, 8,9 Alder – 10, 11	0	> Age 60	60	BL
KMC, KMC sparse	Clearcut	Clearcut 80 yr rotation	Period 9, 10, 11, or 12	0	> Age 80	80	BL
RH, YH, Alder	Rehab	Rehabilitation of hdwd dominated stands	Period 1,2, 3 or 4	0	< 50 ft ² of conifer	60	BL
RH, YC, YH, RC, YYC, Alder	Comm Thin	Thin merch trees to 135 ft ²	10-15 yrs before Clearcut	>135 ft ²	Regen stand age 45	NA	BL
YC, MHC, KMC, RC, YYC	Selection	Remove ~35% of trees > 10" – more hdwd cut 1 st entry	YC, RC, YYC – 1,2,3, or 4 MHC – 6, 8 KMC – 7, 9	>180 ft ²	>5 mbf/acre harvestable conifer	20	PA
RH, YH, RC	–Group Selection w/ retention	Clearcut < 2.5 acres w/ retention then selection on regen stand	Period 2, 3, 4, 5, 6 or 7	>15 ft ²	>5 mbf/acre harvestable conifer	NA	PA
RH, YH, KMCs, RC, Alder	Let Grow	No harvest	NA	NA	NA	NA	PA

Regenerated stands under both clearcuts and group selection prescriptions were planted with 400 DF per acre assuming 80% survival. An herbicide treatment was simulated 5 years after these harvests. In the baseline 80% of all hardwood species were assumed to be killed, while only 60% were assumed to be killed for the project activity due to the tribe's plans regarding herbicides in the project area. Group selection harvest entries were spread out over 20 years within a given strata to account for adjacency issues.

In all prescriptions with some level of residual stocking (selection, group selection, commercial thin), the species retained were directly proportional to their relative

composition in the pre-harvest stand. That is prescriptions were written to harvest in the targeted diameter classes or to the designated residual basal area without regard to species.

The live tree list output from modeling the prescriptions in FVS over 100 years was converted to CO₂e for the above and belowground pools. The standing dead tree pool was assumed to be constant over the 100-year period. The standing live and dead tree pools were summed to give the total onsite carbon stocks. The average aboveground live tree value was constrained to be greater than or equal to the MBL.

The following table shows the acreage allocation to each prescription by strata. All the operable acres were assigned a prescription in the baseline scenario.

Table 15 - Baseline Acreage Allocation by prescription and strata

Strata	Silvicultural Prescription	Acres
Alder	Clearcut w/ Comm thin	216
KMC	Comm thin w/Clearcut	706
KMCs	Clearcut	330
RC	Clearcut w/ Comm thin	395
RH	Rehab w/ Comm thin	1397
YC	Clearcut w/ Comm thin	2147
YH	Rehab w/ Comm thin	1954
MHC	Clearcut	384
YYC	Clearcut w/ Comm thin	130
TOTAL		7,660

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 in Figure 8 by the bar graphs. The harvested carbon pools are represented by symbols in Figure 9 where the static horizontal lines represent 100 year averages for that carbon pool. The following table shows the carbon pools by 5 year period for the baseline simulation. Pre-harvest stocks are reported for the year indicated, and harvested amounts occur at the beginning of the period.

Table 16 - Carbon (CO2e) reported from the baseline harvest schedule

Year	Above Ground Live	Below Ground Live	Standing Dead	Total Merchantable Harvest	Stored in Wood Products Including Landfill
2012	1,475,319	349,300	51,979	158,084	17,877
2017	1,282,973	305,961	51,979	163,598	17,592
2022	1,063,667	251,858	51,979	165,386	31,238
2027	832,067	199,215	51,979	67,457	15,524
2032	797,491	192,025	51,979	90,536	28,698
2037	717,790	173,269	51,979	95,761	31,257
2042	669,703	163,936	51,979	169,554	50,471
2047	522,372	132,199	51,979	62,364	17,168
2052	595,230	150,131	51,979	49,380	15,157
2057	700,391	172,404	51,979	74,117	32,149
2062	811,038	198,110	51,979	75,433	32,642
2067	942,481	228,464	51,979	44,404	19,705
2072	1,162,452	278,004	51,979	241,417	114,326
2077	973,856	233,041	51,979	245,153	117,367
2082	733,637	176,891	51,979	141,955	68,281
2087	648,351	156,466	51,979	53,114	25,791
2092	703,299	169,061	51,979	133,710	65,656
2097	609,859	148,448	51,979	119,278	58,738
2102	566,042	140,503	51,979	168,291	82,775
2107	443,259	114,895	51,979	54,120	26,271

The following figures show the final baseline modeling and resulting average onsite and harvested pools. They display the total onsite and harvested CO₂e tonnes per period for the baseline harvest schedule. The pattern over time is largely a function of the periodicity of the even-aged harvests modeled. For example, the baseline scenario includes a large percentage of even-aged management, which is implemented gradually over the first 30 years, although some strata are not harvested until even later. The early harvests establish well stocked conifer stands which grow until the decade of 2072 to 2082, at which time they are harvested again producing the spike in harvested wood products in that decade and the immediate decline in onsite carbon stocks. The harvest schedule meets all legal and economic feasibility tests and is a likely scenario under a no-carbon-project scenario. The horizontal lines are the 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 812,564 total tonnes of CO₂e for the 100 year baseline modeling scenario, or 106.1 tonnes CO₂e per acre, which is above the MBL as required by the FPP.

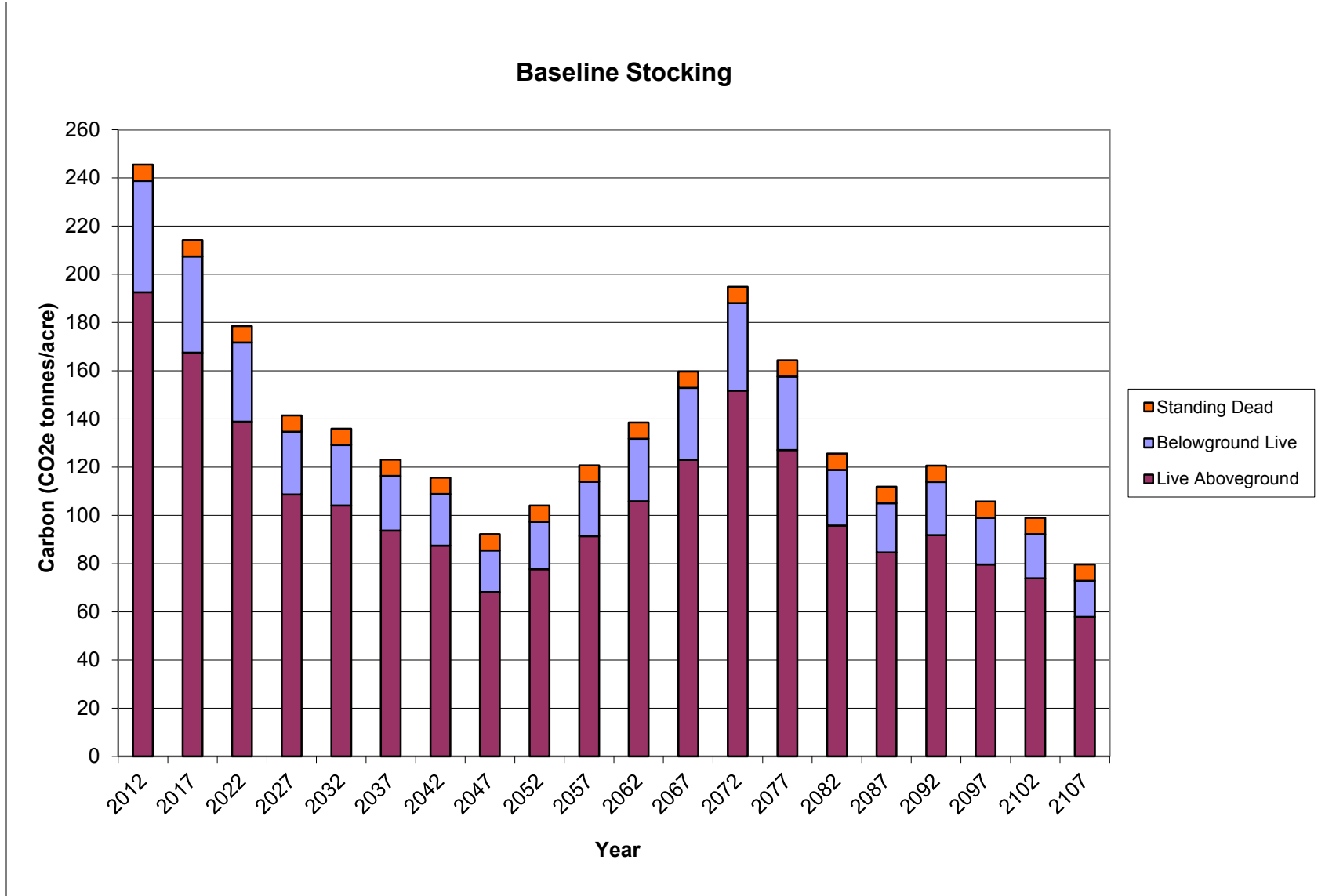


Figure 8 - Baseline Stocking as Modeled

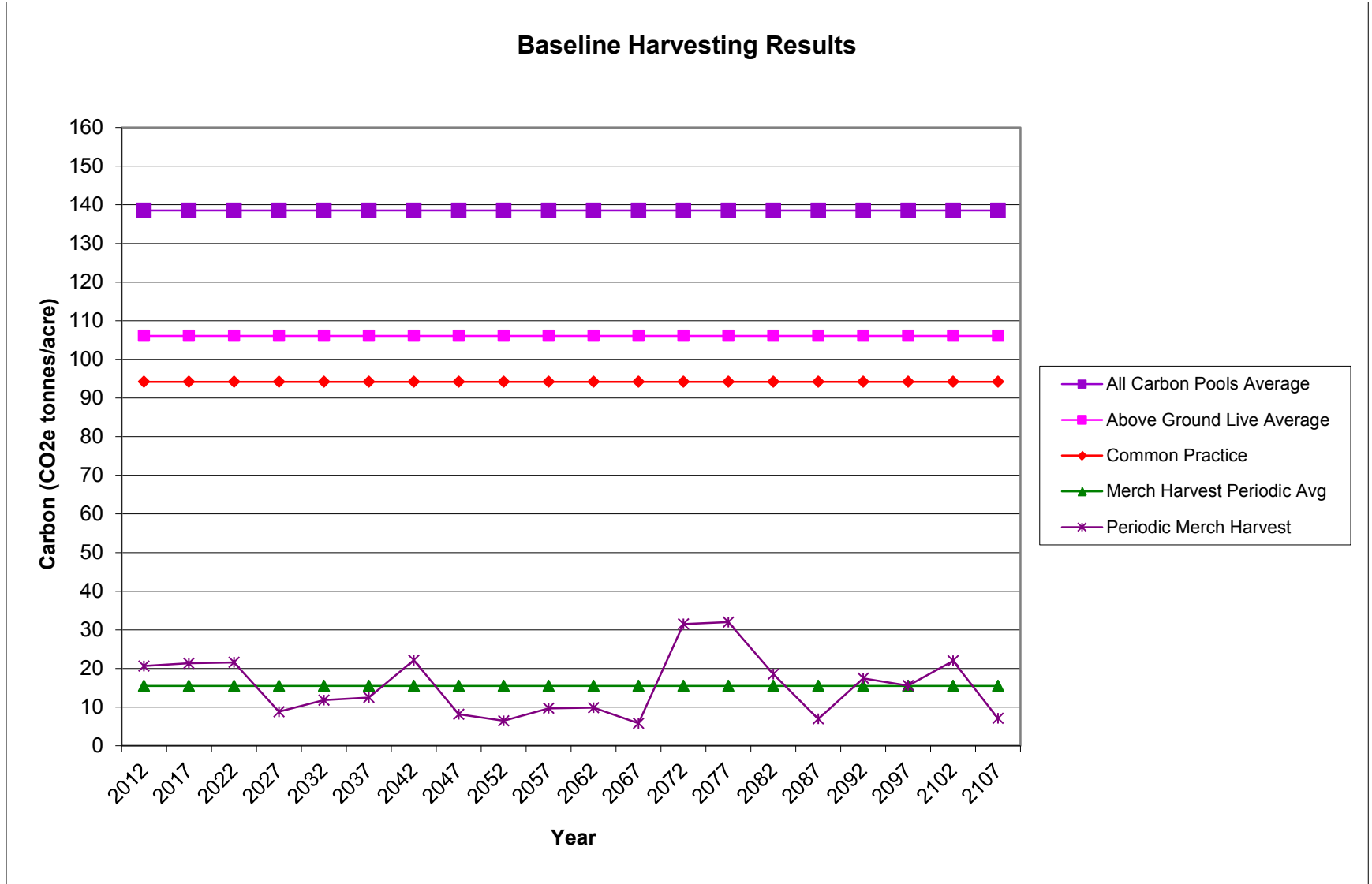


Figure 9 - Baseline Results Averaged

Step 4: Determine the Baseline for All Carbon Pools: There are no optional carbon pools in this Project. Standing live, standing dead, and in-use forest carbon are required pools. The in-use forest carbon pool is further divided into Harvested Merch (HM) and Harvested in Wood Products (HWP), defined as HM being the actual carbon in the merchantable portion of all trees harvested for sale, and HWP as the carbon stored long-term in wood products (including landfill). These values are used in Row 9 and Row 15 respectively of the Offset Credit calculation worksheet. For the Yurok CKGG Project the average annual value of the required baseline pools are:

- Standing Live – 812,564 tonnes CO₂e
- Belowground Live – 196,709 tonnes CO₂e
- Standing Dead – 51,979 tonnes CO₂e
- HM – 23,731 tonnes CO₂e
- HWP – 8,687 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 estimated from the baseline modeling. This was done by using the cut tree list output from FVS for each strata/prescription/timing choice combination. However, 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 volume of all species that will be delivered to a mill (sawmill or biomass plant) are selected from the complete cut tree list in the database. However, only conifers are assumed to be sold to a sawmill from the project area to be turned into wood products based on existing current markets. Hardwoods are also being harvested, but they will not be turned into wood products but rather burned for biomass, or left in the woods to decay naturally. Next, the following equation is used to calculate the total carbon weight in metric tons:

$$0.5 * \text{MCFper acre} * (\text{wood density by species from table C.1}) / 2,204.6$$

where MCF = merchantable cubic feet of the harvested tree excluding bark

The results are summed by period to get the metric tons of carbon harvested in each period that will be delivered to a mill. Mill efficiency data from the ARB website was used to arrive at the total carbon transferred into wood products (0.675 for the Southern Cascades). Next, the table C.2 worksheet was used to calculate the long-term carbon storage in In-Use wood products. Product class assumptions were 70% softwood lumber, 28% softwood plywood, and 2% paper. Long-term storage in landfills was determined using the table C.3. worksheet.

The amount of harvested carbon is shown in Table 16 above.

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. The results of the volume and biomass queries discussed in Section 4.E. of this OPDR were exported for the beginning period to their own database. This is where statistics for live and standing dead carbon pools for each stratum were calculated. Average per acre values along with the standard deviation by strata were copied to Excel, where the standard error, 90% sampling error, and project totals were calculated. The pooled sampling 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*):

$$(\text{SE}_1^2 + \text{SE}_2^2 + \text{SE}_3^2)^{0.5} = \text{Total Combined Sampling Error}$$

where: SE_n = total sampling error in volume units for Strata n

For the purpose of calculating inventory statistics, 3 of the strata were broken into sub-types because they consisted of polygons sampled at different plot densities. These included RC, KMC sparse, and Alder. The RC type consists of 3 sub-types which were kept separate for growth and yield projections as well, whereas the sub-types of KMC sparse and Alder were only separated for statistical calculations.

The following table summarizes the data and statistics for each of the sub-types and their pooled sampling errors, which were entered into the next table showing the final stats for all the strata independently and combined.

Table 17 - Current Inventory Stats for Strata Sub-types

Sub-Type	# of Plots	Net Acres	Cubic Ft per Acre	Conifer Basal Area	Total CO2e per acre	Std Dev	Std Error	Sampling Error @ 90%	Total CO2e	Total SE squared
RC1	8	34.5	11,262	224	435.3	199.8	70.6	26.69%	15,017	16,065,586
RC2	19	75.8	8,029	128	316.1	202.9	46.6	24.23%	23,961	33,703,856
RC3	22	285	9,554	46	374.2	154.7	33.0	14.50%	106,638	239,126,947
	Weighted Avg		9,411	77				Total	145,616	

Pooled SE at 90% level = 11.67%

Sub-Type	# of Plots	Net Acres	Cubic Ft per Acre	Conifer Basal Area	Total CO2e per acre	Std Dev	Std Error	Sampling Error @ 90%	Total CO2e	Total SE squared
KMC2L	24	278.1	1,525	38	66.6	47.6	9.7	24.00%	18,521	19,750,895
KMC2s	12	51.0	1,661	71	53.0	65.3	18.8	58.48%	2,703	2,497,936
	Weighted Avg		1,546	43				Total	21,224	

Pooled SE at 90% level = 22.2%

Sub-Type	# of Plots	Net Acres	Cubic Ft per Acre	Conifer Basal Area	Total CO2e per acre	Std Dev	Std Error	Sampling Error @ 90%	Total CO2e	Total SE squared
Alder	31	132.0	4,164	15	161.2	131.5	23.6	24.10%	21,279	26,292,198
Alder2	5	84.0	4,031	-	153.1	85.0	38.0	40.83%	12,864	27,591,642
	Weighted Avg		4,112	9				Total	34,143	

Pooled SE at 90% level = 21.5%

Table 18 - Current Carbon Statistics by Strata

Sub-Type	# of Plots	Net Acres	Cubic Ft per Acre	Total CO2e per acre	Std Dev	Std Error	Sampling Error @ 90%	Total CO2e	Total SE squared
Alder	36	216	4,112	158			21.50%	34,167	53,959,256
KMC	48	706	3,482	145	83.6	12.1	13.71%	102,229	196,571,645
KMCs	36	330	1,546	66			22.22%	21,250	23,149,015
RC	49	395	9,411	369			11.67%	145,616	288,896,389
RH	106	1,397	6,662	258	122.3	11.9	7.57%	360,599	744,689,782
YC	140	2,147	6,798	277	118.8	10.0	5.97%	593,691	1,257,010,947
YH	124	1,954	6,784	266	139.3	12.5	7.72%	520,681	1,617,525,960
MHC	24	384	4,241	163	88.2	18.0	18.17%	62,650	129,544,188
YYC	26	130	5,555	235	86.2	16.9	11.84%	30,638	13,160,438
TOTAL	589	7,660	5,662	244				1,871,521	

Pooled SE at 90% level = **3.51%**

The sampling error of 3.51% is less than 5 percent; therefore the confidence deduction applied to the project is 0%.

The following table shows the acreage allocation to each prescription by strata.

Table 19 - Project Acreage Allocation by Prescription & Strata

Strata	Silvicultural Prescription	Acres
Alder	Let Grow	216
KMC	Selection	706
KMCs	Let Grow	330
RC	Selection	111
RC	Group Selection	171
RC	Let Grow	114
YC	Selection	2,147
YH	Group Selection	1,170
YH	Let Grow	784
RH	Group Selection	840
RH	Let Grow	557
MHC	Selection	384
YYC	Selection	130
TOTAL		7,660

The following table shows the carbon pools by 5 year period for the project simulation.

The following figures show the actual CO₂e stocks for the reporting period, project activity modeling and resulting projected average onsite and periodic harvested pools.

Table 20 – Actual CO2e stocks for reporting period and future CO2e stocks reported from the Project Activity harvest schedule

Year	Above Ground Live	Below Ground Live	Standing Dead	Total Merchantable Harvest	Stored in Wood Products Including Landfill
2012	1,475,319	349,300	51,979	0	0
2013	1,506,117	356,592	51,979	0	0
2017	1,624,672	386,164	51,979	73,316	11,832
2022	1,639,887	388,138	51,979	86,799	15,501
2027	1,617,405	382,177	51,979	90,141	16,940
2032	1,597,537	376,983	51,979	54,860	6,843
2037	1,631,608	382,850	51,979	95,811	21,408
2042	1,591,676	373,294	51,979	116,143	26,686
2047	1,497,067	352,670	51,979	52,453	18,723
2052	1,535,430	361,625	51,979	13,635	3,689
2057	1,651,866	386,912	51,979	46,793	18,064
2062	1,715,970	401,200	51,979	65,240	25,735
2067	1,761,785	411,815	51,979	64,963	25,476
2072	1,825,150	426,157	51,979	19,091	7,338
2077	1,978,895	458,914	51,979	56,184	21,606
2082	2,061,150	476,200	51,979	86,990	35,623
2087	2,086,521	481,514	51,979	82,398	34,187
2092	2,119,991	488,520	51,979	29,087	12,308
2097	2,229,861	511,118	51,979	70,283	29,994
2102	2,273,907	519,932	51,979	101,680	44,376
2107	2,257,037	516,284	51,979	97,480	42,766

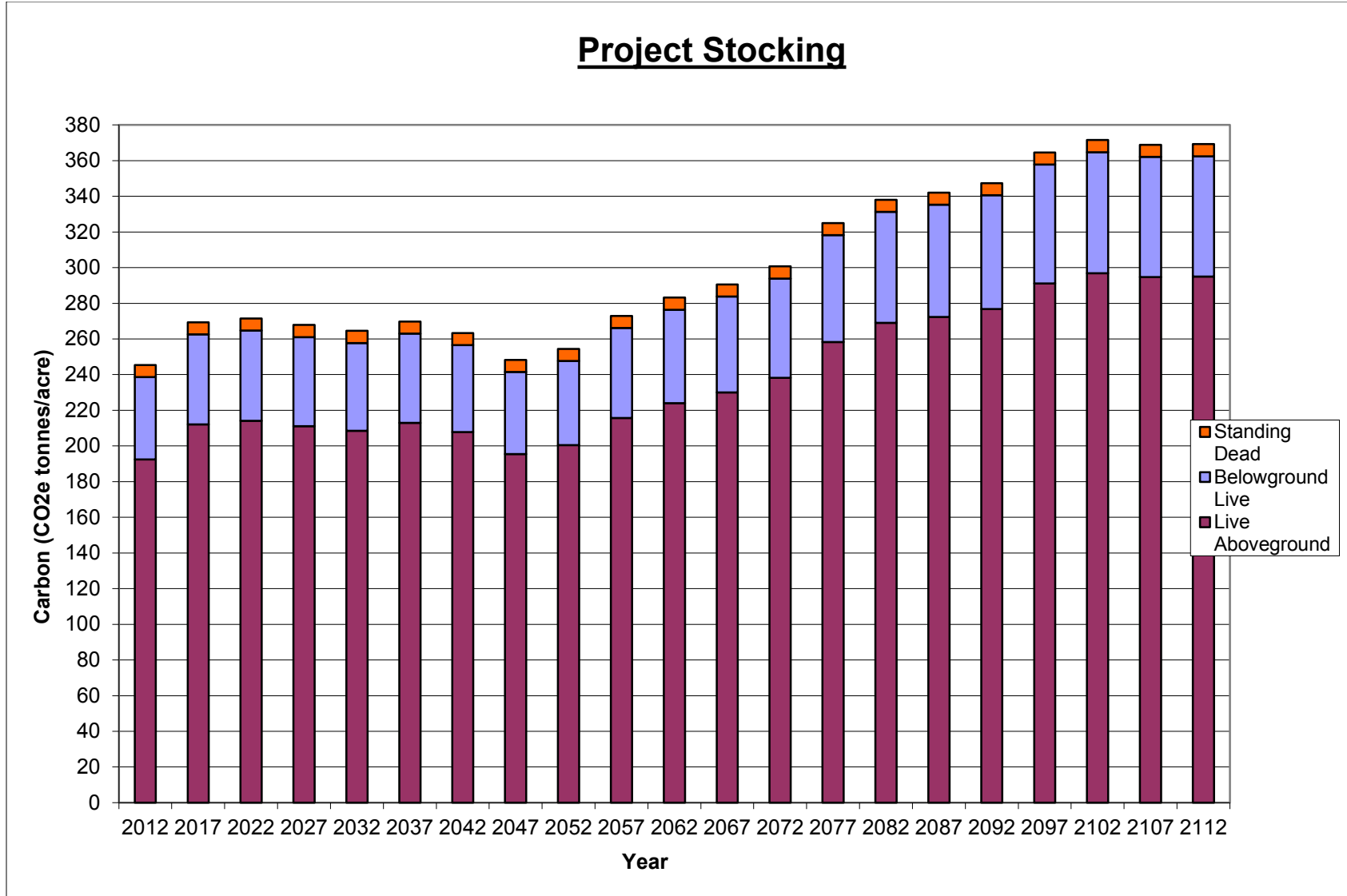


Figure 10 - Project Activity Projected Stocking

Project Harvesting Results

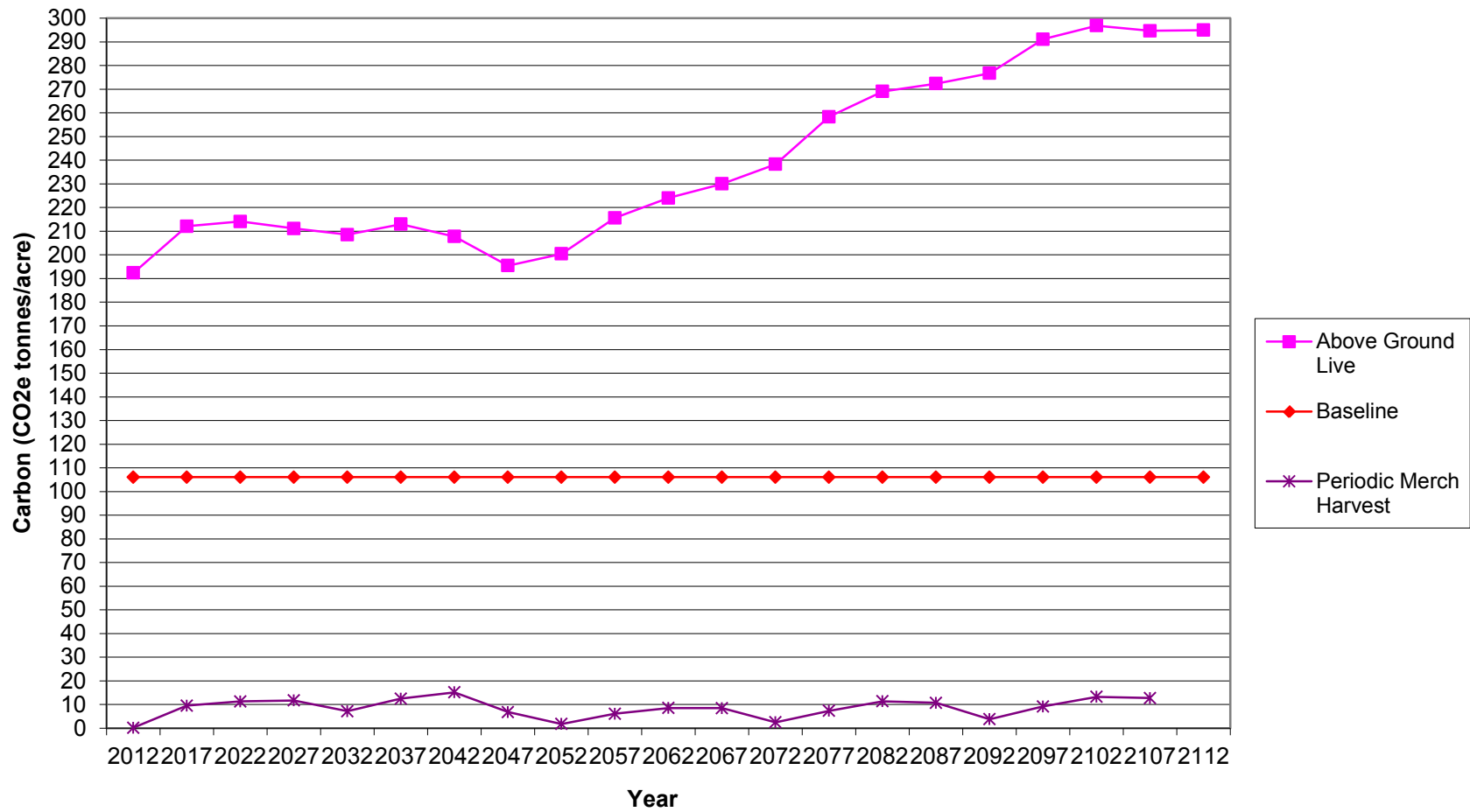


Figure 11 - Project Activity Projected Growth and Harvest

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. For each annual report, the actual harvested amount will be 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.

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 simulation of total merchantable harvested tree carbon was used to estimate the secondary effects from the initial start date through Project verification, estimated to be one year from the start date. No harvesting is expected to occur for at least the first few years, 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. 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 $20\% \times 23,727 = 4,745$ 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 year 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. Rows pertaining only to Avoided Conversion and Reforestation projects have been removed from the worksheet. As the table below illustrates, the project is claiming 836,619 tonnes CO₂e cumulative GHG reductions/removals for the reporting period (rounded down to the nearest integer), with a buffer pool contribution of 15.8% (132,187 tonnes), for a net issuance of 704,432 offset credits.

Reporting Period		Initial Data at Inv Date - 3/12	1	2
Data entered for <u>end</u> of each Period; Period = 12 months			(Inv Date to End of Initial Reporting Period) 3/13	(Can be Partial Year)
Calc Row	Calculating GHG Reductions/Removals for Onsite Carbon Stocks - All Project Types			
1	Actual Onsite Carbon Stocks (tonnes CO ₂ e)	1,871,477	1,909,567	
2	Confidence Deduction	0.0%	0.0%	
3	Adjusted Actual Onsite Carbon Stocks (adjusted for confidence deduction) (tonnes CO ₂ e)	1,871,477	1,909,567	-
4	Increment in Actual Onsite Carbon Stocks (tonnes CO ₂ e)		38,090	-
5	Baseline Onsite Carbon Stocks (tonnes CO ₂ e)	1,061,252	1,061,252	1,061,252
6	Increment in Baseline Onsite Carbon Stocks (tonnes CO ₂ e)		-	-
7	Quantified GHG Reductions / Removals for Onsite Carbon Stocks (tonnes CO ₂ e)	810,225	38,090	-
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)		23,731	
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)		17,029	
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		5,296	
15	Baseline Carbon Stored Long-term in Wood Products (tonnes CO ₂ e) - Incl Landfill		8,687	
16	Diff Between Actual and Baseline Carbon in Harvested Wood (tonnes CO ₂ e) - Excl Landfill		(5,296)	0
17	Difference Between Actual and Baseline Carbon in Harvested Wood (tonnes CO ₂ e) - Incl Landfill		(8,687)	0
18	Difference in Actual and Baseline Carbon Stored in Wood Products (tonnes CO ₂ e) - Landfill Adj		(8,687)	0
19	GHG Reductions / Removals for Carbon Stored in Wood Products (tonnes CO ₂ e) w/ mkt response		(6,950)	0

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)		(23,731)	-
27	Other Secondary Effects Emissions (shifting activities/materials) IFM Projects (tonnes CO ₂ e)		(4,746)	-
Calc Row	Quantified GHG Reductions and Removals			
33	Annual GHG Reductions/Removals Net of Discounts and Secondary Effects (tonnes CO ₂ e)	810,225	26,394	0
34	Cumulative GHG Reductions/Removals; <u>not</u> incl.neg. carryover or reversals (tonnes CO ₂ e)	810,225	836,619	836,619
35	Cumulative Negative Carryover from Prior Year (tonnes CO ₂ e)		0	0
36	CRTs Issued - <u>Net</u> of Negative Carryover, <u>bef.</u> Buffer or adjust for Reversals (tonnes CO ₂ e)	810,225	26,394	0
Calc Row	Calculation of Buffer Pool Contribution			
37	Project Specific Reversal Risk Rating	15.8%	15.8%	
38	Buffer Pool Contributions (CRTs)	128,016	4,171	-
Calc Row	Accounting for Reversals			
39	Annual Reversals (tonnes CO ₂ e)		-	-
40	Total "Avoidable Reversals" to be compensated by the Forest Owner (tonnes CO ₂ e)		-	
41	"Unavoidable Reversals" compensated by the Reserve from the Buffer Pool (tonnes CO ₂ e)		-	-
Calc Row	Compensating for Avoidable Reversals			
42	"Avoidable Reversals" compensated by retirement of CRTs in the Forest Owners Reserve Account (tonnes CO ₂ e)			
43	Avoidable Reversals compensated by retirement of CRTs issued to other Forest Projects Registered with the Reserve (tonnes CO ₂ e)			
44	Carryover "Avoidable Reversals" which need to be compensated by Forest Owner (tonnes CO ₂ e)		-	-
Calc Row	CRTs Issued to Account Holder			
45	Annual CRTs Issued to Account Holder	682,209	22,223	-
46	Cumulative CRTs Issued to Account Holder	682,209	704,432	704,432

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. Although Tribal lands are not public lands, Tribal entities are considered public entities for purposes of financial risk rating due to their relationship with the U.S. federal government, hence the default value for public lands is used for buffer pool contribution..

- Financial Risk Default Buffer Pool Contribution 1%

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 Yurok CKGG Project is within the United States, thus the default illegal harvesting risk of 0% is used.

The default 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 the Yurok Tribe 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%
- 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 Yurok CKGG 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.

The landowner 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 is the default risk:

- 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%.

The Yurok CKGG Project is within the sudden oak death zone of infestation established by the State Board of Forestry. No other insect or disease zones of infestation have been established in the project area. Because a zone of infestation has been established by the Board of Forestry, the default insect and disease buffer pool contribution is used.

- 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%.

The project area is not within an area that is subject to hurricanes or tornados. Given the low occurrence of wind events (1 in the last 50 years) and the small amount of snow

damage that has occurred the buffer pool contribution from catastrophic events is rated at the default rate of 3%.

- 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 21 below summarizes the assigned risk analysis by category for the Yurok CKGG Project.

Table 21 - 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	Calculated Risk	1%
Illegal Forest Biomass Removal	Default Risk	0%
Conversion	Calculated Risk	2%
Over-harvesting	Default Risk	2%
Social	Default Risk	2%
Wildfire	Calculated Risk	4%
Disease or Insect Outbreak	Default Risk	3%
Other Catastrophic Events	Default Risk	3%
Overall Contribution Based on Appendix D.5 Calculation		15.8%

Overall Contribution to Buffer Pool is **15.8 %** as calculated per the equation in the Forest Offset Protocol, Appendix D.5 and as shown below:

$$100\% - ((1-1\%) \times (1-0\%) \times (1-2\%) \times (1-2\%) \times (1-2\%) \times (1-4\%) \times (1-3\%) \times (1-3\%)) = \mathbf{15.8\%}.$$

EXHIBIT I: Green House 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 products	Included	Included	Baseline estimated from modeled harvesting volumes. Project estimated from measured harvest volumes.

EXHIBIT I: Green House 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-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
IFM-13 Biological emissions from	Excluded	Excluded	N/A

EXHIBIT I: Green House 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
clearing of forestland outside of the Project Area			
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 materials to forest products	Excluded	Excluded	N/A

EXHIBIT I: Green House 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-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

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Exhibit III INVENTORY MANUAL