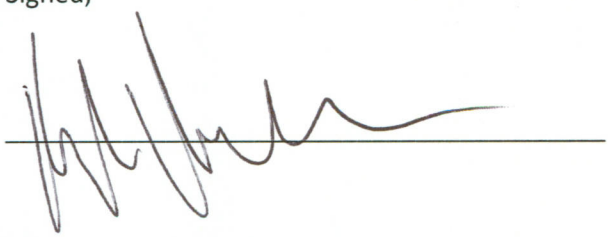
I, Kyle Holland hereby attest that I have reviewed all reports which reference carbon stocks, including the U.S. Forest Offset Project Data Report (OPDR), for the Blue Creek Forest Carbon Project (ACR282, CAFR5232), as required under Section 9 of the Compliance Offset Protocol U.S. Forest Projects, adopted November 14, 2014, for the reporting period starting on March 19, 2015 and ending on June 30, 2016.

I attest, to the best of my knowledge that all information pertaining to carbon stocks referenced throughout reports (including the OPDR) for the Blue Creek Forest Carbon Project in the aforementioned reporting period are truthful, accurate and have been submitted with my oversight.

I attest that I hold current certification as a Registered Professional Forester in the State of California through the Office of Professional Foresters under California Board of Forestry and Fire Protection.

Signed,



Date: 3/10/17

Kyle Holland
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Field Measurement Protocol

YUROK TRIBE

ATTACHMENT B
Field Measurement Protocol
Version 1.2

March 10, 2017

Field Measurement Protocol
Version 1.2

March 10, 2017

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TABLE OF CONTENTS

1 INTRODUCTION

While those collecting the inventory data for this project may have knowledge and experience in forest mensuration and timber cruising, this document provides explicit guidelines for measurement that should be adhered to for the following reasons:

1. Care and consistency in the measurement of plots is imperative to obtain the quality of data necessary for inventories used for forest carbon measurements.
2. Moreover, clarity for all parties involved in the collection and analysis of the data about the way that data was collected is crucial. A seemingly minor difference in the way data was understood to have been collected and was actually collected, multiplied across plots and applied to the forest area can give results that are clearly unrealistic, or worse, misleading.

Data should be recorded in pen whenever possible. When this is not possible and pencil is used (for instance, when using write in the rain paper), recorded measurements should not be erased to change them but rather crossed out once and the new measurement written in the margin. All data should be recorded on the Measurement and r_3 Datasheets, printed from those provided by ecoPartners.

2 PLOT OVERVIEW

At each plot location, living and standing dead trees will be measured in three nested plots: an outer nest with radius of 37 feet (denoted as r_1 in Figure 1), a middle nest with radius of 17 feet (r_2 in Figure 1) and an inner nest with radius of 12 feet (r_3 in Figure 1). Note that the outer nests include the area occupied by the nest(s) inside them. Table 1 indicates which tree sizes are included in each nest. Measurements in Section 3.7 will be taken on all trees included in nests r_1 and r_2 and recorded on the Measurement Datasheet. Tallying of trees in nest r_3 is described in Section 3.8.1, and lying deadwood in nest r_3 is described in Section 3.8.2; data from both are recorded on the r_3 Datasheet. Some additional measurements will be taken once per plot location.

Plot Nest	Radius	Tree Sizes Included	Treatment	Datasheet
r_1	37’	DBH ≥ 12” and height > 15’	Measure each tree	Measurement
r_2	17’	DBH ≥ 5” and < 12” and height > 15’	Measure each tree	Measurement
r_3	12’	DBH < 5”	Tally trees	r_3
r_3	12’	Lying deadwood ≥ 5” in diameter and ≥ 3’ in length	Tally deadwood	r_3

Table 1: Tree sizes included in each nest and sampling treatment of each.

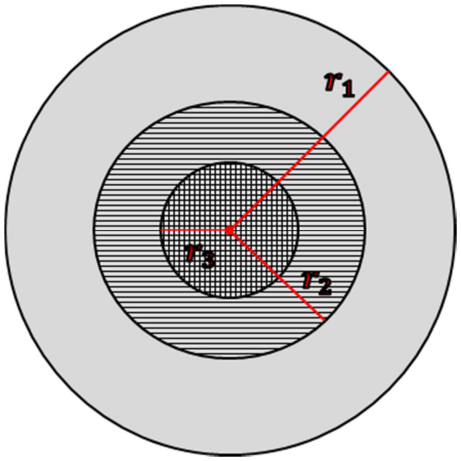

Figure 1: Nested plot configuration.

3 PLOT MEASUREMENTS AND OTHER TASKS

3.1 PLOT MONUMENTATION

Each plot center will be located using a hand-held GPS unit with pre-loaded plot coordinates. Once the plot center has been located as precisely as possible with the GPS unit (usually within a few feet), one member of the team should close his eyes, spin around, and randomly throw a hat or other object over his shoulder; the hat's landing point is the plot center. If plot center falls on an area that cannot be monumented such as a rock or log, move plot center just downslope of the obstruction. If there is no slope, move plot center just north.

In the case that the plot center falls on a stand boundary, do not relocate the plot center and measure the plot as-is. As the plots were allocated by stratum boundaries (separate from forest type boundaries) and the plots are point samples, no adjustment needs to be made.

In the case that the plot falls within the project area but in a non-forested or zero carbon area, monument and sample the plot as normal.

Once the plot center has been located, it should be monumented by hammering a piece of rebar firmly into the ground. When ready to move on to the next plot, firmly attach a 50' piece of galvanized wire to the piece of rebar and run it directly away from plot center on the way out; this will make it easier to relocate the plot in future years. A large quantity of flagging tape should also be hung from shrubs or branches above the plot center.

While the plot is being measured, an orange stake or other clearly visible marker should be placed at plot center with the rebar. This marker should be taken from plot to plot.

3.2 GPS COORDINATES

Record a new waypoint of the monument plot center in the GPS memory by averaging several readings. Record the new waypoint number onto the Measurement Datasheet as it appears on the GPS.

3.3 PLOT NUMBER

Record onto the Measurement Datasheet the plot number given on the GPS unit.

3.4 SLOPE AND ASPECT

To measure the slope for each plot, the observer should start by fixing a point that creates an imaginary line between the observer and the point. The line should be parallel to the aspect at the site (*i.e.*, looking directly uphill or downhill) and **at the observer's eye level**. It is crucial that the point be at the same height relative to the ground's surface as the observer's eye level. This can be achieved by marking and measuring an object in the plot or by finding the corresponding height on someone else's body if cruisers work in pairs. The slope and aspect should then be recorded with a hypsometer and compass, if the hypsometer does not have a digital compass. The slope should be recorded in degrees. If slope within the plot is variable, measure the predominant slope. The aspect should be recorded as a cardinal or ordinal direction (N, NW, S, SE, etc).

3.5 GENERAL NOTES

Record any unique and useful information about the plot such as proximity to visible roads or streams on the plot datasheet. If the plot falls into a recently harvested area or the edge of forest, record this information into the plot datasheet.

3.6 DETERMINING "IN" TREES

When determining whether a tree is within a plot, measure the distance from the plot center to the **center** of the tree **at breast height**. (Note that trees that are partially within the plot radius but do not have their centers within this radius are not included. To ensure an accurate measurement, one person can hold a notebook or other object even with the center of the tree, providing a 'target' for another person measuring distance from plot center with the rangefinder.) Measurements of plot radius should be taken horizontally by using an optical or ultrasonic range finder with slope adjustment or a slope correction table. **Always correct for slope.** If a given tree is "borderline"—that is, very near the plot edge—a note should be made on the datasheet.

3.7 MEASUREMENTS ON TREES IN NESTS r_1 AND r_2

Measurements are only performed on trees **at least 15 feet in height** and within the following diameter ranges:

- Within 37 feet of the plot center (r_1): all trees with DBH ≥ 12".
- Within 17 feet of the plot center (r_2): all trees with DBH ≥ 5".

For all trees meeting these diameter requirements, the following measurements shall be taken and recorded on the **Measurement Datasheet**:

Measurement/ Observation	Living Trees (Status L)	Commercial Species* (Group A species)	Merchantable Size (Group A, >6" top)	Standing Dead

Species 3.7.1	*	*	*	if discernible
Diameter (DBH) 3.7.2	*	*	*	*
Status Code 3.7.4	*	*	*	*
Total Height 3.7.5	*	*	*	*
Live Crown Height 3.7.6		*	*	
Merchantable Height 3.7.7			*	
Taper Height 3.7.8		*	*	
Crown Class 3.7.9	*	*	*	
Merchantable Defect 3.7.10			*	
Missing Biomass 3.7.11	*	*	*	*
Diameter (top) 3.7.12				*

Table 2: Measurements taken on each tree class.

*Use the following definitions for commercial species and merchantable trees:

- Trees with commercial value are Group A species (listed below).
- Trees of merchantable size have at least one 16 foot log with a minimum top diameter of the log greater than six inches inside bark.

Group A Species:

-Coast Redwood (Sequoia sempervirens)
-Douglas Fir (Pseudotsuga menziesii)
-Grand Fir (Abies grandis)
-Western Hemlock (Tsuga heterophylla)
-Western Redcedar (Thuja plicata)
-Bishop Pine (Pinus muricata)
-Monterey Pine (Pinus radiata)
-Sitka Spruce (Picea sitchensis)
-Noble Fir (Abies procera)
-Incense Cedar (Libocedrus decurrens)
-Port Orford Cedar (Chamaecyparis lawsoniana)
-California Red Fir (Abies magnifica)
-White Fir (Abies concolor)
-Jeffrey Pine (Pinus jeffreyi)
-Ponderosa Pine (Pinus ponderosa)
-Sugar Pine (Pinus lambertiana)
-Western White Pine (Pinus monticola)
-Lodgepole Pine (Pinus contorta)

3.7.1 TREE SPECIES

The species of each tree should be recorded on the datasheet. For standing dead trees, it is acceptable to forego recording species if it is indiscernible.

3.7.2 MEASURING DIAMETER

Breast height is defined as 4.5 feet from the base of a tree on the uphill side (Figure 2b). All cruisers should find 4.5 feet on their own bodies before taking field measurements to avoid any inconsistencies and time spent in measurement. Use a diameter tape with English (imperial) gradation for tree measurements. When measuring a tree, make sure the tape is flat and not twisted. Record tree diameter to the nearest tenth inch (one decimal place).

In the simplest case, trees should be measured at breast height on the uphill side, with the tape run perpendicular to the tree's bole and pulled snugly against the bark of the tree. To ensure accuracy, it may be necessary in some cases to use a tape or a 4.5-foot-long pole to determine the point at which diameter should be measured. Chalk should be used to mark the uphill side of the tree while the diameter tape is on the tree, just above the diameter tape.

Trees with butt swell or buttressing at breast height should be measured above the butt swell at approximately 5 feet (Figure 2e). If there is an irregularity at breast height, measurements above and below the irregularity should be taken and the average of the measurements recorded (Figure 2c); in this case, put the RFID nail tag above the irregularity and make a note on the datasheet. It is acceptable to measure diameter up to 2 inches above breast height if the irregularity does not exist there. If the tree has bear damage at breast height extending too far upward to take an accurate measurement, measure the inside-bark diameter at breast height and make a note on the datasheet.

If a tree is forked below breast height, it is treated as two separate trees, each with its own RFID tag and entry on the datasheet. If the fork is above breast height, the tree is treated as one individual (Figure 2f). However, if the fork occurs near breast height such that the trunk is swollen at breast height, treat each stem is an individual tree and measure above the fork.

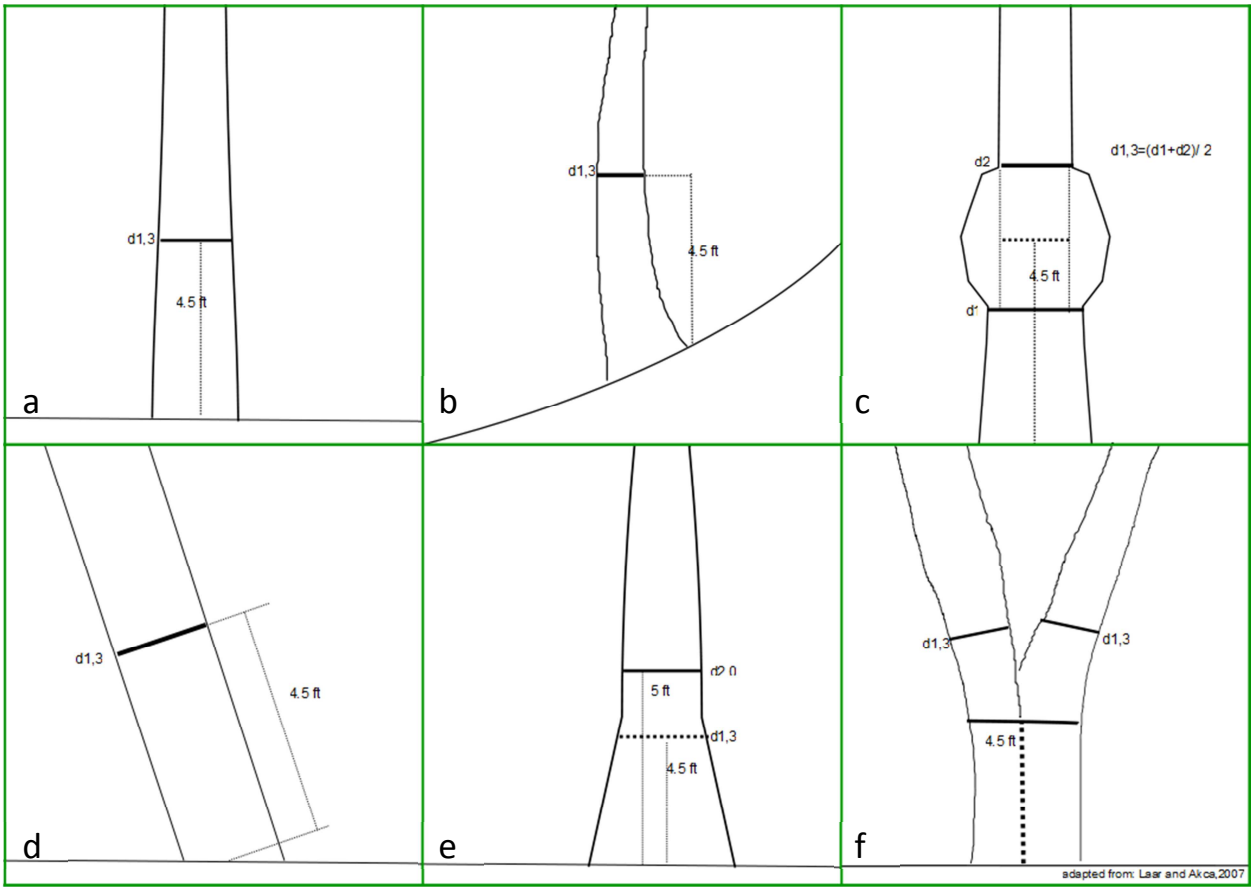

FIGURE 2: MEASUREMENT OF TREE DIAMETER.

3.7.3 TAGGING

Each tree should be tagged using a single RFID nail tag. A ¼-inch-wide hole should be drilled on the uphill side of the tree at the DBH chalk mark, just above the DBH measurement, to ensure that re-measurement takes place at the same place on the bole. A tag should then be gently hammered into the hole.

With the RFID reader, scan the RFID code of the tag and record on the datasheet. This should be done after the tag is pounded into the tree.

3.7.4 STATUS CODE

Mark the status code of each tree on the Measurement Datasheet as follows:

STATUS CODE	DESCRIPTION
L	Living
D1	Dead, with large and small branches and twigs
D2	Dead, with large and small branches and no twigs
D3	Dead, with large branches only
D4	Dead, with no branches

Table 3: Status code and description.

3.7.5 MEASURING TOTAL TREE HEIGHT

A tree's total height is the vertical distance between the uphill side at the tree's base and the tip of the crown. Tree heights should be taken using an optical or ultrasonic hypsometer/rangefinder. When performing the height measurement, the observer should stand at a distance equivalent to 2/3 (or more) of the tree's height away from the base of the tree (as shown in Figure 3). The observer should make every effort to stand in a location that permits a direct view of the base and the top of the tree. If that is not possible the observer should stand such that the top of the tree is visible. The top of the tree is the highest branch or foliage whether belonging to the tree whether dead or alive. Observers should take care that they follow exactly the manufacturer's directions for the device used – for instance, for ultrasonic devices the sensor must be re-calibrated for each plot and if significant temperature or humidity changes occur while measuring one plot. When using a laser rangefinder it is very important that the view from the observer to the tree bole be unobstructed by leaves or brush so that spurious measurements are not taken. If a tree's crown is intertwined with other crowns, it may be necessary for one person to shake the tree's base so the person taking the measurement can discern the tree top.

When the bole is visibly leaning, measurements should be made perpendicular to the ground (Figure 3).

Total tree height is measured on all trees with diameter greater than or equal to five inches. All height measurements are recorded in feet to the nearest foot (no decimal place).

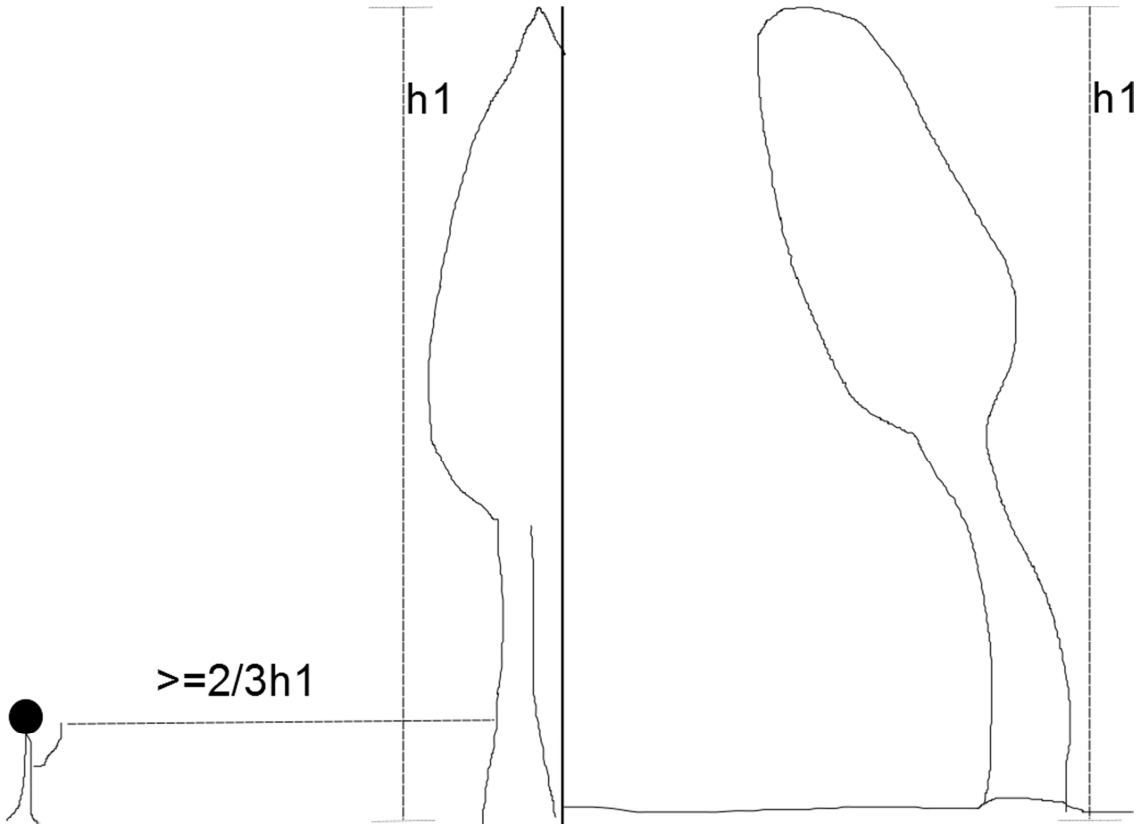

FIGURE 3: MEASURING TREE HEIGHTS.

3.7.6 MEASURING LIVE CROWN HEIGHT

The live crown is defined as beginning at the base of the lowest major live branch and ending at the highest live branch on the crown (see Figure 4). The height of both these branches should be measured with a hypsometer/rangefinder and recorded. Live crown height is typically observed from the same location as total tree height. Live crown height is measured on all living trees within the plot. All live crown measurements are recorded in feet to the nearest foot (no decimal place). In the case of trees forked above breast height, do not average measurements across forked stems but rather consider both stems as though they were one stem.

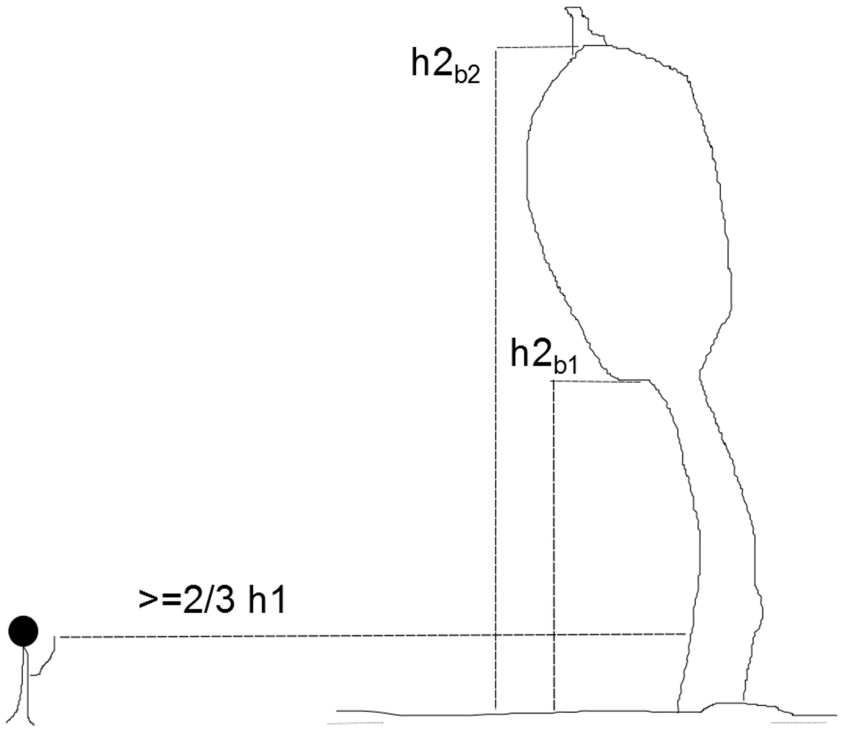

FIGURE 4: MEASURING THE LIVE CROWN.

3.7.7 MEASURING MERCHANTABLE HEIGHT

The merchantable height is defined as the height of the stem where the stem is approximately 6 inches inside bark diameter. Merchantable height measurements are made only on living trees whose species have commercial value and are of merchantable size. Merchantable height measurements are typically taken from the same location as total tree height and only on trees which have total height of at least fifteen feet. All merchantable height measurements are recorded in feet to the nearest foot (no decimal place).

3.7.8 MEASURING TAPER HEIGHT

The taper height is defined as the height of the stem where the diameter of the stem is approximately 80% of DBH. Taper height measurements are made only on living trees at least 15 feet tall and whose species have commercial value. This measurement is taken on such trees even if the tree is not of merchantable size. Taper height measurements are typically taken from the same location as total tree height but also may be observed from a distance closer to the tree. All taper height measurements are recorded in feet to the nearest foot (no decimal place). If a tree is forked, measure the taper height on the larger of the stems.

3.7.9 OBSERVING CROWN CLASS

Crown class for all living trees with diameter greater than 5 inches and total height of at least 15 feet should be recorded. Tree classes are as follows and are illustrated in Figure 5:

- Dominant (DOM): receives light from above and on the sides of its crown
- Codominant (CO): extends into the overstory, but is partly shaded on the sides by dominants
- Intermediate (INT): only receives sunlight from directly above
- Suppressed (SUP): overtopped, receives no direct sunlight

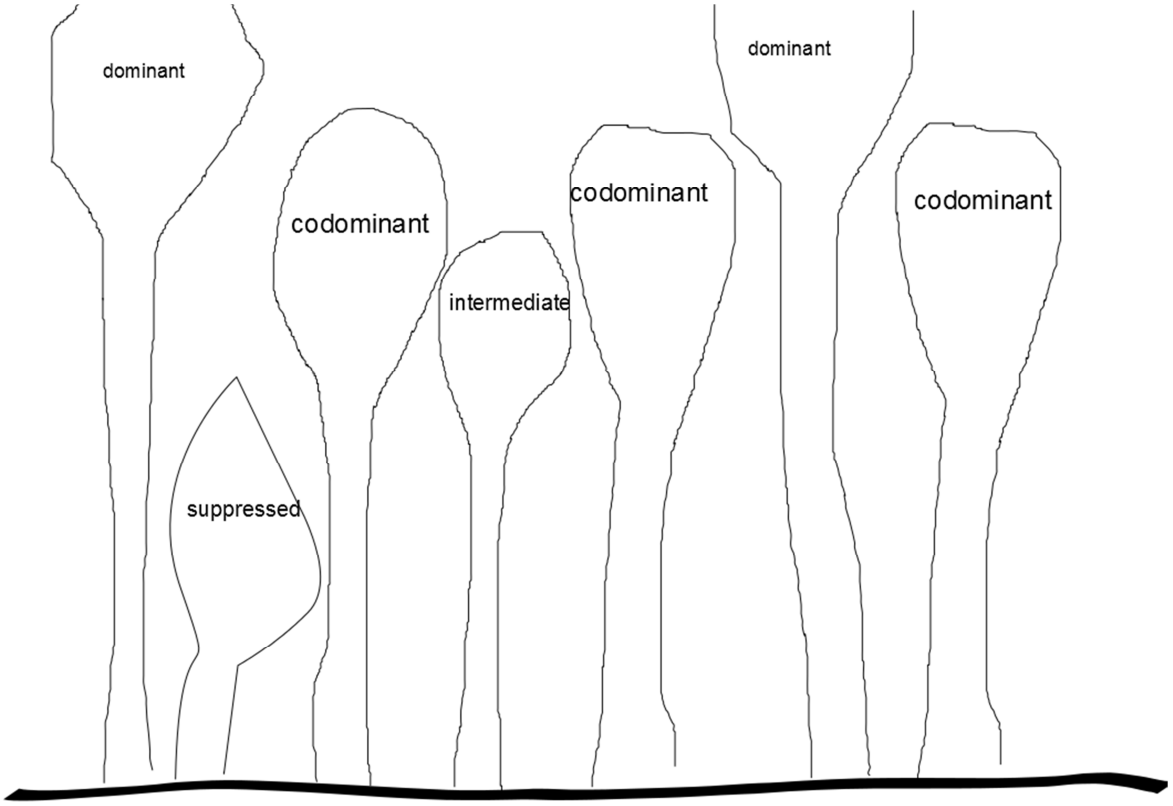

FIGURE 5: CROWN CLASSES.

Note that if a tree has a dead top, only the living portion of the crown should be considered.

3.7.10 ESTIMATING MERCHANTABLE DEFECT

Merchantable defect estimates are made only on living trees whose species have commercial value and are of merchantable size. Record the percent defect in volume for the bottom, middle and top thirds of the tree to the nearest 10%. Account for sweeps, crooks, hollows and large knots. Consider the total height when estimating merchantable defect, not logs.

3.7.11 ESTIMATING MISSING BIOMASS

Missing biomass includes breakage and cavities. It is visually estimated for all trees greater than or equal to five inches in diameter. It is estimated on the entire tree and not in thirds of the tree. Record the portion of biomass to the nearest 10% that is missing from the tree if the tree were otherwise whole.

3.7.12 ESTIMATING TOP DIAMETER OF STANDING DEAD TREES

For standing dead trees, provide an ocular estimate of the diameter of the top. The top diameter may be zero if the top of standing dead tree is intact.

3.8 MEASUREMENTS IN NEST r_3

Small living trees are tallied and lying deadwood recorded on the inner nest (12' radius). All measurements should be recorded on the r_3 Datasheet.

3.8.1 TALLYING SMALL TREES

All living trees less than 5 inches in diameter within nest r_3 should be tallied by height class, diameter class, and species in the Living Trees section of the r_3 Datasheet. Do not include standing deadwood less than 5 inches in diameter.

3.8.2 RECORDING LYING DEADWOOD

All lying deadwood with length of at least 3 feet and diameter of at least 5 inches at any point on the log within nest r_3 should be tallied by diameter class, length **falling inside** the r_3 nest of the plot, and status code (using Table 3). Record this information in the Lying Dead section of the r_3 Datasheet.

3.9 WITNESS TREES

At each plot location, select 3 prominent trees within the plot as witness trees in order to allow the plot center to be located at a later date. For each of the witness trees, record its RFID number and its azimuth from the plot center on the Measurement Datasheet.

3.10 MANAGEMENT TREE

At each plot location, one management tree is measured for age. The management tree is the one closest to plot center with a diameter ≥ 5 inches, and should be cored to the pith using an increment borer. Trees should be aged from cores while in the field or the cores should be placed in a standard drinking straw and brought back from the field to age the tree. Also note the tree's RFID number on the Measurement Datasheet.

If no trees in the plot are large enough to be cored (if the plot is in a clear-cut area), estimate age using an alternative metric such as number of whorls.

3.11 SITE TREE

At each plot location, one site tree should be selected and its age, species and height determined. The site tree should be the most dominant tree in or near the plot; this tree may or may not be inside the plot but must be visible from plot center. It is possible that the site tree will be the same tree as the management tree. Record the distance and azimuth *from* plot center *to* the tree.

Every plot must have a site tree. If the plot falls into a recently harvest area, select a dominant tree from the nearest forested area. A residual tree retained after harvest may be used as a site tree.

4 REVIEW AND UPDATING PROCESSES

Collected data will be reviewed, checked and stored using the processes outlined in the QAQC Support Document (QAQC Support Document.pdf) which is provided as an attachment to this document.

Plots will be re-measured at least every twelve years per Appendix A.3 of the FPP. Individual trees in plots will be grown using a growth model approved by ARB between re-measurements. Additional plots may be added to the inventory to improve the precision of estimates.

Upon event of natural disturbance, fire, timber harvest or other event that may alter the carbon stocks in the project area, the affected area shall be delineated into appropriate strata and all plots within the affected area shall be re-measured prior to subsequent verification. All affected areas greater than two acres must be delineated.

5 NAVIGATION TRACKS AND NOTES

When navigating to and from plots, record a GPS track. After returning to your vehicle, record notes on how to best approach the plot for future inventory crews. Mark up a paper map to indicate the best route to and from the plot. This information will be valuable to future inventory crews.

6 PEST AND DISEASE

Bear Damage: The primary agent affecting redwoods within the Project Area is black bear damage. Damaged is caused by the bears peeling the bark and then eating the cambial layer on pole-sized to 25 inch DBH redwood trees. Damaged trees may become partially or completely girdled resulting in increases susceptibility to infection, or mortality for fully girdled trees. Damage usually occurs from May through early June.

Sudden oak death: Sudden Oak Death is also a concern within the Project Area. SOD is an introduced disease that kills native oak and tanoak trees in California. SOD is caused by Phytophthora ramorum, a microscopic organism that is spread during the late spring in norther California. According to a map produced by the Berkeley Forest Pathology and Mycology Lab, average SOD infections per square kilometer are towards to lower end of the spectrum in northern Humboldt and southern Del Norte Counties.

Drought: While the Project Area has not experienced significant drought in recent years, climate change presents the possibility that drought may impact forest health in the future. Douglas fir trees are commonly affected by increased drought, and may become prone to Douglas fir beetle attacks. Similarly, drought stressed pines may be more susceptible to mountain pine beetle and western pine beetle outbreaks.

7 REQUIRED INSTRUMENTS AND FIELD EQUIPMENT

1. Clipboard
2. Pens
3. Pencil in rainy weather
4. Copies of provided plot datasheets (both Measurement and r_3)
5. Compass
6. Modern GPS unit (WAAS capable) that can achieve at least 3m accuracy and is capable of averaging several readings; examples include the Garmin Rhino series
7. Rebar for plot monumentation
8. Galvanized wire for subsequently locating plot
9. Orange stake or other clearly visible marker for marking plot center during measurements
10. Spencer or other 100 foot tape
11. DBH tape (inches with tenths)
12. Chalk
13. Modern electronic hypsometer/rangefinder, preferably ultrasonic for dense stands and optical for mature stands (examples include the Haglof Vertex series and the Nikon forestry PRO Laser rangefinder/hypsometer or Laser Ace products).
14. RFID tree nail tags
15. RFID reader
16. Hand drill or light-weight electric drill
17. ¼" drill bit
18. Small rubber mallet for hammering rebar and RFID nail tags
19. 12-17 inch increment borer
20. Straws for cores
21. Flagging tape

8 REFERENCES

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APPENDIX A: SLOPE CORRECTION TABLE

Percent of Slope	Degree of Slope	Correction Factor		Percent of Slope	Degree of Slope	Correction Factor		Percent of Slope	Degree of Slope	Correction Factor
0 to 9	0-6	1		78 to 79	38	1.27		117	49	1.54
10 to 17	7-10	1.01		80	39	1.28		118 to 119	50	1.55
18 to 22	11-12	1.02		81 to 82	39	1.29		120	50	1.56
23 to 26	13-14	1.03		83	40	1.3		121	50	1.57
27 to 30	15-17	1.04		84 to 85	40	1.31		122	51	1.58
31 to 33	18	1.05		86	41	1.32		123 to 124	51	1.59
34 to 36	19-20	1.06		87 to 88	41	1.33		125	51	1.6
37 to 39	21	1.07		89	42	1.34		126	52	1.61
40 to 42	22	1.08		90 to 91	42	1.35		127 to 128	52	1.62
43 to 44	23	1.09		92	43	1.36		129	52	1.63
45 to 47	24	1.1		93 to 94	43	1.37		130	52	1.64
48 to 49	25-26	1.11		95	44	1.38		131	53	1.65
50 to 51	27	1.12		96 to 97	44	1.39		132 to 133	53	1.66
52 to 53	28	1.13		98	44	1.4		134	53	1.67
54 to 55	29	1.14		99 to 100	45	1.41		135	53	1.68
56 to 57	29	1.15		101	45	1.42		136	54	1.69
58 to 59	30	1.16		102	46	1.43		137 to 138	54	1.7
60 to 61	31	1.17		103 to 104	46	1.44		139	54	1.71
62 to 63	32	1.18		105	46	1.45		140	54	1.72
64 to 65	33	1.19		106 to 107	47	1.46		141	55	1.73
66 to 67	34	1.2		108	47	1.47		142 to 143	55	1.74
68 to 69	34	1.21		109	47	1.48		144	55	1.75
70	35	1.22		110 to 111	48	1.49		145	55	1.76
71 to 72	36	1.23		112	48	1.5		146	56	1.77
73 to 74	37	1.24		113	48	1.51		147	56	1.78
75	37	1.25		114 to 115	49	1.52		148 to 149	56	1.79
76 to 77	38	1.26		116	49	1.53		150	56	1.8

APPENDIX B: CHANGE LOG

In accordance with Appendix A.3 of the FPP, a log has been created which documents any changes that have occurred in this field measurement protocol. Please see the table below for specific details.

Document Version	Date	Changes from Previous Version	Justification
Version 1.0	9/16/2016	Original document provided to foresters for field measurements and verifiers for verification	N/A
Version 1.1	12/16/2016	1. Reference added to additional QAQC Support Document 2. Pest and disease section added 3. Appendix B: Change Log added	Clarifications have been made in order to provide greater detail about the inventory methods and sampling procedures. There have been no changes to sampling procedures, inventory methods or calculations.
Version 1.2	3/10/17	Revisions to plot monumentation	Clarifications have been provided on the plot monumentation procedure

QUALITY CONTROL AND ASSURANCE PROCEDURES

INVENTORY DATA CHECKS

Multiple data checks were performed on inventory data in order to catch and fix any potential transcription errors.

During data entry, records that were incomplete or flagged for questionable values (following inventory checks listed below) were identified to field measurement crews for clarification. If necessary, the field crews would return to the plot to complete or check these records. A check cruise may also be completed to ensure quality of inventory data.

After data entry was completed for all plots, spot checks were made on the plot data in order to verify that the data was inputted correctly from the plot sheets into the excel document. Additionally, data within the tree list was sorted for inputs like DBH, height, biomass defect, and site class in order to determine if any outliers in the data were present. Any values that appeared to be outliers were checked against the plot data sheets and corrected if they were determined to be an error in the data entry. Total height, crown top and bottom, bole height, and taper height were compared to one another to ensure that there were no values that were inputted incorrectly. Any values that were higher or lower than expected were cross-checked with the plot data sheets. If inconsistencies were still present or items were questionable, foresters were asked to return to the plot and take re-measurements.

Original datasheets were retained and the scanned versions of these datasheets were saved digitally and backed up on Dropbox.

All inventory data checks are listed as follows:

- Find outliers in dbh and correct with plot sheet data
- Find outliers in height and correct with plot sheet data
- Find outliers in site index and correct by revisiting site index curves
- Check that total height > live crown top
- Check that total height > boleht
- Check that live crown top > live crown bottom
- Check that boleht > taper ht (unless some decay/snag status is noted)
- Compare dbh to max height for outliers
- Check biomass defect to ensure no % over 100
- Check carbon calculations to ensure reasonable results
- Check to ensure no repeat plot numbers in the plot list
- Check to ensure no missing plot numbers in the plot list
- Ensure that carbon was not calculated for offsite trees

- Ensure proper formatting of site trees
- Review plot data sheet and data entry questions with foresters
- If necessary, ask foresters to return to plot to make re-measurements
- Verify with foresters that original datasheets are retained
- Ensure that scans of original datasheets are stored on Dropbox and also backed up on a remote server

FVS MODELING INPUT DATA CHECKS

Data checks were also conducted on the modeling inputs for FVS including keyword files and the optimization dashboard parameters.

Keyword files were spot-checked to ensure that the data was properly formatted to be inputted into the FVS model. In order to verify a Keyword file's formatting, keywords were inputted manually into FVS for several modeling units and the output Keyword files that were individually generated were compared with the Keyword files generated through the Optimization Dashboard. Any differences in formatting were analyzed and corrected through data formatting and the Optimization Dashboard.

The Optimization Dashboard parameters were reviewed each time the model was run to ensure that parameters matched the common practice harvesting regimes in the region.

FVS MODELING OUTPUT DATA CHECKS

Modeling output data checks:

- Treelist
    - Inventory years
    - Sum basal area
    - TPA
    - Max/min DBH
    - Carbon calculations
- Cutlist
    - Max/min DBH
    - Records match those in Treelist
- Aftertreatment list
    - Basal area retention in harvest
    - Max/min DBH
    - Records match those in Treelist

Data checks were also performed on modeling output data to ensure that carbon stocks, diameters, trees per acre, and residual basal area all either matched the optimization dashboard parameters or

were reasonable representations of forest growth and regeneration dynamics in the region. The tree lists for several modeling units were spot-checked to ensure that all project years were represented in the model; that the basal area, maximum and minimum DBH, and the number of trees per acre across the modeling unit reflected harvests and regeneration; and that the average carbon calculated for the modeling unit was representative of the carbon number calculated in the optimization dashboard.

In addition to checking outputs within the tree list, the cutlist and aftertreatment list were both reviewed in order to confirm that the model was functioning properly. The cutlist was checked for the maximum and minimum DBH of the trees harvested in order to ensure that the model was thinning from above. And the aftertreatment list was reviewed for the basal area retention post-harvest as well as the maximum and minimum DBH of trees left post-harvest. These checks were able to confirm the parameterization of the Optimization Dashboard.