

State of California
California Environmental Protection Agency
California Air Resources Board
U.S. FOREST OFFSET PROJECT DATA REPORT
INITIAL REPORTING PERIOD - IMPROVED FOREST MANAGEMENT

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Project Operators submitting the project's first Offset Project Data Report must submit both the **Initial Reporting Period** and the **Annual Reporting** forms to the appropriate offset project registry. For every reporting year thereafter, submit only the Annual Reporting Period form.

OPR Staff Use Only	Date Supplement Received:	OPR Tracking Number:	Date Supplement Reviewed:	OPR Staff Use Only
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PART I. ENTITY SUBMITTING REPORT

Is this form being submitted by the Offset Project Operator (OPO) or by the Authorized Project Designee (APD)? <i>Note: The person completing this form should be an OPO/APD employee.</i>			☐ OPO ☒ APD
Name of Person Completing Form: Joshua Strauss		Organization, if applicable: Blue Source LLC	
Date Form Completed: 06/19/2013: Updated 5/29/2014	Phone Number: 949-233-1501	Email Address: jstrauss@bluesource.com	

PART II. OFFSET PROJECT INFORMATION

Offset Project Name: Blue Source – Bishop Improved Forest Management Project		OPR Project ID#: CAR973	ARB Project ID# (if known): CAFR5003
Offset Project Commencement Date: 08/08/2012	First Reporting Period Start Date: 08/08/2012	First Reporting Period End Date: 06/23/2013	
Provide an explanation and justification for the commencement date. Specify the action(s) that identify the offset project commencement date. Initial submittal of project listing form to CAR (originally listed as an Early Action Project). Per page 15 of the Air Resources Board's ("ARB's") Compliance Offset Protocol U.S. Forest Projects ("the Protocol"), an IFM project commencement dates can be signified by the submittal of the project's listing information. Much of the information submitted in the original Project Listing Form has been updated in the course of project verification. The changes between the listing document and the final OPDR are catalogued in Appendix L.			
Provide the nearest town/city to the Project Area: Marquette, Michigan			

PART III. OPO/APD INFORMATION

A. OPO			
OPO Name: Heartwood Forestland Fund IV Limited Partnership			OPO's CITSS ID#: CA 1433
Mailing Address: 1512 East Franklin	City: Chapel Hill	State: NC	Zip: 27514
Contact Person: Kaarsten Turner Dalby	Phone Number: 303-838-2512	Email Address: Kaarsten@forestlandgroup.com	
B. APD (if applicable)			☐ No APD/Not Applicable
APD Name: Blue Source LLC			APD's CITSS ID#: CA 1228
Mailing Address: 1935 E. Vine Street	City: Murray	State: UT	Zip: 84121
Contact Person: Jeffrey Cole	Phone Number: 415-637-5333	Email Address: jcole@bluesource.com	

PART IV. LAND OWNERSHIP

A. Is the Offset Project Operator (OPO) the owner in fee for the Project Area?

Further documentation is required for all projects. Submit as attachment labeled "Attachment A." See Part X of this OPDR document for more information.

If "no," explain how the entity identified as the OPO has the right to undertake and list the project.

☒ Yes
☐ No

B. Optional: List all Forest Owners. This includes owners in fee as well as third parties with existing property interests within the Project Area that affect the trees and standing timber located in the Project Area (e.g. mineral rights, timber rights, easements, rights of way, leases, etc.).

Forest Owner: Heartwood Forestland Fund IV

Between the offset project commencement date (8/8/2012) and the end of the first reporting period (6/23/13) the Forest Owner has acquired no new lands and has disposed of 10,124 acres.

C. Does the offset project occur on public or private lands?

If the project occurs on public lands, proceed to questions C1 and C2. Otherwise, skip to question D. Further documentation is required if project occurs on public lands. Submit copies of documentation demonstrating explicit approval of the project's management activities and baseline, as well as the public vetting process used; attachment should be labeled "Attachment B." See Part X of this document for more information.

☒ Private ☐ Public

1. Describe the public process that was used to evaluate the forest management activities and policy decisions concerning the offset project.

2. Describe the explicit approval process obtained by the public entity to initiate and maintain this offset project, including the offset project's management activities and baseline.

D. Does the project employ a Qualified Conservation Easement (QCE)?

If employing a QCE, proceed to questions D1, D2, and D3. Otherwise, skip to question E. Supporting documentation for a QCE is required. Submit as attachment labeled "Attachment C." See Part X of this document for more information.

☐ QCE
☐ Public Ownership

1. Date that the QCE was recorded.

2. Optional: Is the project located in a state that requires third-party beneficiaries to sign the easement (i.e., to "accept and record that acceptance"), such as Arizona, Pennsylvania, or West Virginia?

☐ Yes
☐ No

3. Optional: Provide the terms within the easement that affect forest management.

E. Does the offset project occur on any of the following categories of land? (check all that apply)

- ☐ Land that is owned by, or subject to, an ownership of possessory interest of a Tribe
☐ Land that is "Indian lands" of a Tribe as defined by 25 U.S.C. §81(a)(1)
☐ Land that is owned by any person, entity, or Tribe, within the external borders of such Indian lands
☒ None of the above

If "none of the above," skip to Part V. Otherwise, proceed to Optional questions E1 and E2.

Further documentation is required for projects occurring on land listed in the first three categories. Submit supporting documents as attachments labeled "Attachment D." See Part X of this document for more information.

1. Optional: Does a limited waiver of sovereign immunity between ARB and the governing body of the Tribe exist?

☐ Yes
☐ No

2. Optional: Provide a description of land ownership within the Project Area.

PART V. OFFSET PROJECT AREA

Maps depicting specific elements of the Project Area are required for all projects.

Submit supporting documentation as attachments labeled "Attachment E." See Part X of this document for more information.

Latitude of Offset Project Location:
46.5620

Longitude of Offset Project Location:
-87.8520

Project Area Total Acreage:
229,601

A. Identify the assessment area (or assessment areas, if project crosses more than one) that contain Project Area lands and list the acreage of project lands within each assessment area.

Supersection	Assessment Area	Acres
Laurentian Mixed Forest NLP/EUP	Northern Hardwoods	154,666
	Conifer Bog	17,984
	Pine Forests	4,373
	Non-Forested	8,967
Laurentian Mixed Forest Southern Superior	Maple-Beech-Birch	39,034
	Conifer Bog	2,760
	Pine-Oak-Hickory	387
	Non-Forested	1,430
Total		229,601

The Assessment Areas listed in the table above were used in assessing the native species requirements prescribed in the Protocol. No individual species accounts for more than 65% of the total carbon stock in any of the six Assessment Areas encompassed by the project. 65% represents the lowest Composition of Native Species percentage value established in Assessment Area Data File for any of the project's Assessment Areas.

B. Identify and describe the governing jurisdiction(s) applicable to the Project Area.

The State of Michigan (USA)

C. Describe how the Project Area was determined.

Heartwood Forestland Fund IV elected to implement an IFM carbon project on all of their eased forested landholdings, less excluded portions of Restricted Development Parcels (RDP) (i.e. potential RDP acreage with the clearest development potential), major roads, aspen stands, and all areas outside of the Assessment Areas listed in Part V-A. Note that only the portions of potential total RDP acres under each easement having the clearest development potential were actually removed from the Project Area.

The following table provides a breakdown of the forested acreage by easement:

Easement	Total Easement Acreage	Excluded RDP Acreage	Additional Exclusions (Aspen, Roads, Areas Outside Project Supersections)	Total Project Acreage	Non-Forested Acreage	Total Forested Acreage
Easement 1	49,008	1,457	1,116	46,435	1,627	44,808
Easement 2	47,807	3,578	877	43,352	2,673	40,679
Easement 3	53,169	5,158	646	47,365	3,390	43,975
Easement 4	36,716	2,237	847	33,632	1,135	32,497
Easement 5	30,343	580	688	29,075	1,171	27,904
Easement 6	30,803	460	601	29,742	401	29,341
Total	247,846	13,470	4,775	229,601	10,397	219,204 ¹

D. Describe the existing land cover, and land use of the Project Area.

The Project Area is under forest cover. The Project Area has remained working timberland for over 100 years, and no regulations would prevent the owner from continuing this management.

E. Describe the forest vegetation types within the Project Area boundary.

The Project Area is dominated by northern hardwoods (maple, beech, and birch) in various uneven-aged stands with a smaller component of other stands of native species mixes including upland softwoods (red/white pine), lowland softwood (cedar/spruce/fir), and aspen-birch. (See management plan for greater detail)

¹ Total forested acreage does not include non-forested acreage

F. Describe the site classes within the Project Area boundary.

All portions of the Project Area are considered low site class. This was established based on an analysis of the soil types underlying the Project Area. A detailed description of the site class identification process titled *Bishop Site Class NRCS Soil Analysis* has been provided separately for verification purposes.

G. Describe the land pressures and climate zone/classification applicable to the Project Area.

Land pressures include: Intensive forestry, along with recreational, residential, and commercial development, as occurring in adjacent areas. Lake, trout stream, and road frontage would make development attractive in the Project Area.

The climatic zone: The Project Area falls almost entirely within zones 4b and 5a of the USDA plant hardness map of upper peninsula Michigan with mean annual extreme minimum temperatures between -20 and -15 degrees Fahrenheit. (Source: <http://planthardiness.ars.usda.gov/PHZMWeb/#>). Winters are moderately long and somewhat severe, but more than 120 days have temperatures above 50°F (10°C). Average annual temperature ranges from 39 to 43°F (4 to 6°C). A short growing season imposes severe restrictions on agriculture; the frost-free season lasts from 100 to 140 days. Snow usually stays on the ground all winter. Average annual precipitation, which ranges from 27 to 34 in (680 to 1090 mm), is evenly distributed throughout the growing season. Lake-effect snowfall is considerable in some parts, ranging from 70 to 250 in (1800 to 8330mm) across the Upper Peninsula. Proximity to the Great Lakes results in a cool lacustrine climate, with moderated minimum and maximum temperatures.

H. Describe the historical land uses, current zoning, and projected land use within the Project Area and surrounding areas.

The Project Area was originally logged over 100 years ago for its white pine and hemlock, with a shift to hardwood logs as demands rose. Overall, the land has remained working timberland throughout the last century, and projecting forwards no regulations would prevent the owner from continuing with these forestry activities. The vast majority of the Project Area is currently zoned for timber/resource production with small pockets of rural residential. Timber management and low-density residential development are common land uses in the area surrounding the project. In the absence of the project activities, the Bishop lands would be subjected to intensive timber management and select portions of the property would likely be converted to low-density residential development.

I. Describe the forest conditions within the Project Area, including species composition, age class distribution, and management history.

The Project Area is dominated by northern hardwoods (maple, beech, and birch) in various uneven-aged stands with a smaller component of other stands of native species mixes including Pine Forests (red/white pine), and Conifer Bog (cedar/spruce/fir).

Species Composition²

Species	Basal Area (sq. ft./ acre)	%
American Beech	8.8	8.1%
American Elm	0.2	0.2%
Balsam Fir	5.6	5.2%
Balsam Poplar	0.0	0.0%
Basswood	0.8	0.7%
Bigtooth Aspen	0.2	0.2%
Black Ash	0.7	0.7%
Black Cherry	2.3	2.1%
Black Spruce	1.3	1.2%
E. Hemlock	11.7	10.7%
E. Hophornbeam	0.6	0.6%
E. White Pine	2.9	2.7%
Jack Pine	0.1	0.0%
N. Red Oak	0.3	0.3%
N. White Cedar	5.5	5.0%
Other Hardwoods	0.1	0.1%
Paper Birch	0.8	0.7%
Quaking Aspen	0.7	0.7%
Red Maple	28.2	25.9%

² Please note: Totals appearing in some tables of this document may not sum due to rounding. Underlying calculation workbooks which do sum have been provided separately for verification purposes

Red Pine	0.1	0.1%
Silver Maple	0.0	0.0%
Sugar Maple	30.5	28.0%
Tamarack	0.4	0.4%
White Spruce	2.1	1.9%
Yellow Birch	5.0	4.6%
Total	109.1	100.0%

Age Class Distribution

The age class distribution across the Project area was determined by analyzing the average age associated with different amounts of CO₂e/acre for each age class, based on age estimates for each stratum's stocks from the Carbon Online Estimator (COLE), which is based off of FIA data. The following parameters were used to calibrate COLE for each stratum: Maple/Beech/Birch Group (hardwood), White/Red/Jack Pine Group (pine), Spruce/Fir Group (conifer bog); low productivity (USFS productivity classes iv-vii); private land; nonstocked, seedling/saplings, poletimber, sawtimber; naturally originating stands; disturbed and undisturbed land.

The plots were distributed into each age class based on how their CO₂/acre compared with the COLE data. This analysis revealed that the vast majority of the Project Area is in age classes older than 20 years. The following tables and histograms shows the age class distribution found for each stratum:

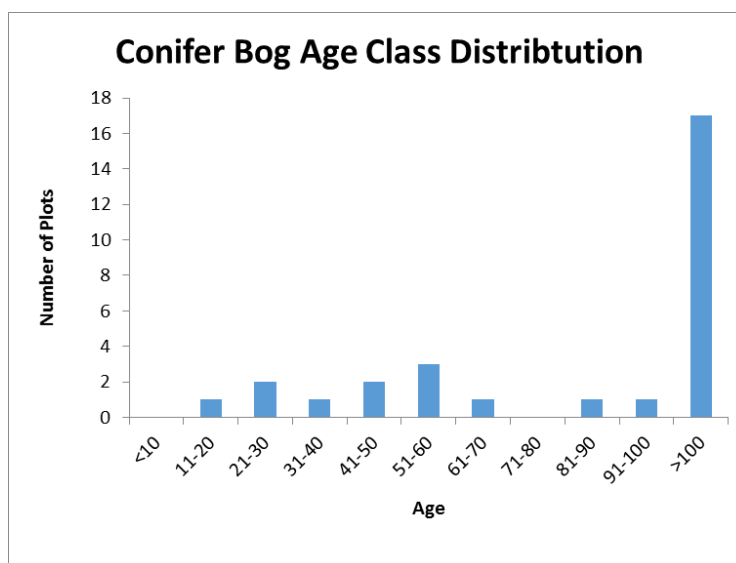
Hardwood Age Class Distribution

Age	% of Project Basal Area
<10	0.2%
11-20	1.9%
21-30	5.4%
31-40	11.2%
41-50	15.1%
51-60	15.6%
61-70	13.2%
71-80	9.5%
81-90	6.5%
91-100	4.5%
>100	16.8%



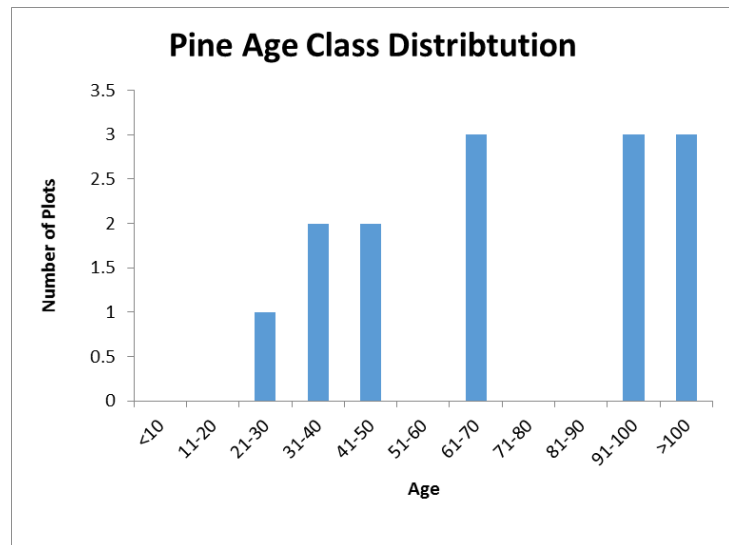
Conifer Bog Age Class Distribution

Age	% of Project Basal Area
<10	0.0%
11-20	3.4%
21-30	6.9%
31-40	3.4%
41-50	6.9%
51-60	10.3%
61-70	3.4%
71-80	0.0%
81-90	3.4%
91-100	3.4%
>100	58.6%



Pine Age Class Distribution

Age	% of Project Basal Area
<10	0.0%
11-20	0.0%
21-30	7.1%
31-40	14.3%
41-50	14.3%
51-60	0.0%
61-70	21.4%
71-80	0.0%
81-90	0.0%
91-100	21.4%
>100	21.4%



Management History

Throughout past management, the Project Area has been managed as working timberland. As stated above, it was originally logged over 100 years ago for white pine and eastern hemlock with a shift to hardwood logs as demands rose. Modern commercial operations commenced in the 1960's utilizing more of each tree as pulp and paper markets developed.

PART VI. OFFSET PROJECT ELIGIBILITY

A. Does the Project Area have a canopy cover that is greater than 10 percent?

See Attachment F.

- ☒ Yes
☐ No

B. Optional: Is the Forest Project's associated project lands currently in compliance with all local, state, and federal regulatory requirements?

- ☒ Yes
☐ No

Optional: If no, provide an explanation of the non-compliance.

C. Does the entity submitting this report declare that the offset project has not and does not employ broadcast fertilization?

- ☒ Yes
☐ No

D. Indicate how the offset project meets the definition of Natural Forest Management per Table 3.2 in the Compliance Offset Protocol US Forest Offset Projects, October 20, 2011:

1. Native species:

a) Does the project consist of at least 95% native species based on the estimated sum of carbon in the standing live carbon pool?

If "no," proceed to question 1b. Otherwise, skip to question B2.

- ☒ Yes
☐ No

b) Describe how the project meets this requirement. (Improved Forest Management Projects are assessed using estimates of basal area per acre.)

The Assessment Areas listed in the table above were used in assessing the native species requirements prescribed in the Protocol. No individual species accounts for more than 65% of the total carbon stock, the maximum Composition of Native Species percentage allowed.

2. Composition of native species:

a) Does the Project Area naturally consist of a mixed species distribution where no single species' prevalence, measured as the percent of basal area of all live trees in the Project Area, exceeds the percentage value of standing live carbon shown under the heading 'Species Diversity Index' in the Assessment Area Data File?

If "no," proceed to questions 2b and 2c. Otherwise skip to question B3.

- ☒ Yes
☐ No

b) Explain how the project will demonstrate a trend toward achieving the Species Diversity Index of native species and meet this requirement within 25 years.

c) If the Project Area does not naturally consist of a mixed species distribution: Will or have you provided a written statement from the government agency in charge of forestry regulation in the state where the project is located stipulating that the Project site is not capable of meeting the requirement of mixed species distribution.

- ☐ Yes
☐ No

3. Distribution of age classes/sustainable management:

- a) Indicate how the project will meet the requirement for sustainable management if regeneration or commercial harvesting is either planned or initiated within the Project Area demonstrating sustainable long-term harvesting practices. This applies to all forest landholdings of the Forest Owner(s) (check one of the boxes).

- ☐ Not applicable; no commercial harvesting is occurring within the Project Area.
- ☒ Third party certification under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System, whose certification standards require adherence to and verification of harvest levels which can be permanently sustained over time.
- ☐ Adherence to a renewable long-term management plan that demonstrates harvest levels which can be permanently sustained over time and that is sanctioned and monitored by a state or federal agency.
- ☐ Employ uneven-aged silvicultural practices and maintain canopy retention averaging at least 40% across the forest, as measured on any 20 acres within the entire forestland owned by the Forest Owner, including land within and outside of the Project Area (areas impacted by Significant Disturbance may be excluded from this test).

- b) On a watershed scale up to 10,000 acres (or the Project Area, whichever is smaller), projects must maintain, or make progress toward maintaining, a maximum of 40% of the project's forest lands in ages that are less than 20 years old. (Areas impacted by Significant Disturbance are exempt from this test until 20 years after reforestation of such areas.) Does the acreage within this project meet this requirement?

☒ Yes
☐ No

If "no," proceed to question 3c. Otherwise, skip to question B4.

- c) Explain how the project demonstrates continuous progress toward meeting this requirement within the next 25 years.

4. Structural elements (standing and lying dead wood):

Based on 2009-2013 inventory data, standing deadwood accounts for 0.650 mt C/acre or 2.36 % of the total carbon in standing live trees on portions of the property not subject to salvage harvests. On 9,972 of the property's beech bark disease afflicted acres, salvage harvests were carried out via beech bark disease thinning, in order to capture the remaining wood product value in the declining beech population. Standing deadwood accounts for 0.651 mt C/acre or 2.35% of the total CO₂e/acre in standing trees in the salvage harvest areas of the property.

Harvest Type	Standing Dead C (mt C/acre)	Acres	% of Standing Live C
Non Salvage	0.650	209,232	2.36%
Salvage	0.651	9,972	2.35%

The project does not currently meet the structural elements criteria of the COP for U.S. Forest Projects on both the salvage and non-salvage areas of the forest (1 mt C/acre and 2mt C/acre respectively) but the Project will continue to progress towards meeting this criteria based on the standing deadwood retention requirements laid out in the Project's forest management plan (see below for detail).

How does the project ensure that structural elements are retained in sufficient quantities throughout the project life?

Per the management plan, harvesters are required to retain all standing dead trees that do not pose a safety hazard to workers. Additionally, all snags that are felled for safety purposes must remain on site as downed woody debris. Through these efforts, standing dead levels across the property will steadily progress toward the quantities called for in the Protocol. These practices will continue throughout the life of the carbon project, thereby ensuring that after the structural element retention requirements are met, deadwood stocks will be maintained for the required 30 years following salvage harvest.

E. Describe the management activities that will result in increased carbon stocks in the Project Area, compared to the baseline.

Management practices employed under the Project Activity will lead to significant increases in carbon stocks in the Project Area compared to the baseline. Planned silvicultural practices are primarily beech bark disease thinning in beech-dominant stands, and single-tree selective harvesting in maple-dominant stands. All even-aged harvesting limits covered in section 3.8.4 (Balancing Age and Habitat Classes) of the Protocol will be adhered to throughout the life of the Project.

The goal is to increase stand health and quality by removing dead, diseased, and inferior trees so a healthy understory can develop below large diameter trees that can eventually be harvested for saw-timber. Over the life of the Project, non-salvage harvests will account for approximately 50% of annual growth. Though the initial project crediting period is only 25 years (2012 – 2037), the project will continue to monitor and verify carbon reductions for 100-years following any issuance of offset credits for GHG reductions or GHG removal enhancements achieved by the project.

In the absence of the Project (i.e. the baseline scenario), these lands would be managed down to the average common practice stocks in the region. Removals would be carried out in compliance with FSC protocols per the requirements of the easement on the Project Area. Despite FSC management constraints, these cuts would be more intense than those planned in the project scenario for most years.

F. Is this project being implemented and conducted as the result of any law, statute, regulation, court order, or other legally binding mandate? If "yes," explain:	☐ Yes ☒ No
G. Does the offset project take place on land that was part of a previously listed and verified Forest Offset Project? If "yes," proceed to questions E1 and E2. Otherwise, skip to Part VII.	☐ Yes ☒ No
1. Was the previous Forest Offset Project terminated due to an Unintentional Reversal?	☐ Yes ☐ No
2. Is the project transitioning to the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011, after previously being listed as an early action offset project?	☐ Yes ☐ No

PART VII. CARBON STOCK INVENTORY

A. Provide a description of the inventory methodology used to quantify carbon stocks for each required carbon pool in the forest project's offset boundary. The inventory methodology must describe the information required in Appendix A.3 of the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011.

(Please note the general inventory methodology description following IFM-17 below)

IFM-1 Standing Live:

Height was measured to the nearest foot for all of the 2012 and 2013 sampled trees with a diameter at breast height ("DBH") greater than 4.5". Balsam fir, northern white cedar, white spruce, basswood, and black cherry heights were measured to a 4" top in the 2013 plots in accordance with the parameters of the Scott volume equation, required for use on these species. All other trees were measured to their true top. This 2012 and 2013 plot data was used as a representative subset of plots to develop functions for developing regressions to estimate total height and 4" height (for the species noted above) for trees measured in the 2009-2010 inventory sampling. Only the height regressions developed from the measured height plots were utilized in the modeling effort (i.e. No FVS predicted heights were used). All future heights were estimated from FVS predicted diameters using the DBH-height regressions from the height plots.

DBH measurements for all saplings between 1.0"-4.5" were recorded on 1/100th acre plots at all inventory sampling locations. Saplings with DBH measuring greater than 4.5" and less than 5.0" were recorded on 1/20th acre plots at all inventory sampling locations. As the CRM biomass equations for saplings do not incorporate height data, heights were not collected for trees on the 1/100th acre plots. The CRM method outlined in Appendix J requires the use of the sapling equations for all trees with a DBH greater than or equal to 1 inch and less than 5 inches (page 3 of Appendix J).

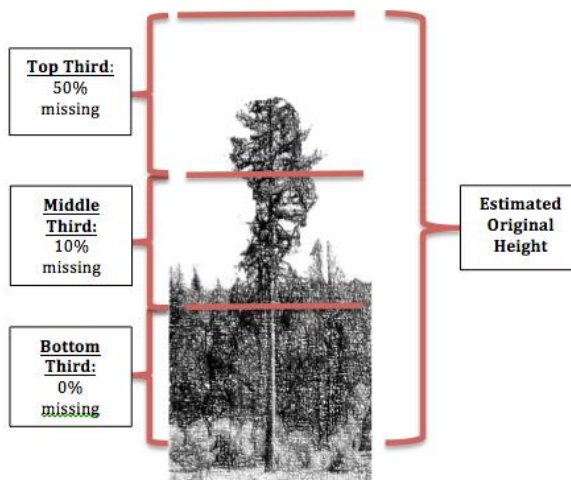
DBH growth was estimated from the beginning of the inventory period through the project commencement date using Forest Vegetation Simulator ("FVS") default growth rates calibrated with diameter increment growth samples for the predominant species in the Project area. 132 growth increment samples were collected from a portion of the 2012 and 2013 sampled plots using increment cores taken from randomly selected trees. Samples from multiple diameter classes were collected across all tree species representing >0.5% of the total tree population across the Project Area. Following the project commencement date, FVS default growth rates, calibrated based on location code and site index, were used for the 100-year projections to allow FVS to modify growth rates based on future stand conditions.

Live and dead standing tree defect (missing and rotten wood) was estimated from a sub-sample of 1,097 trees from 44 plots sampled in 2013. Missing and cull deductions were calculated by dividing each damaged tree into thirds (considering the height of the tree as it originally stood, based on the height of similar nearby trees) and estimating the percentage that was missing or rotten in each third (see example pictures below). This percentage figure was then multiplied by the approximate percentage of tree biomass found in each third of a typical tree (65% in the bottom third, 25% in the middle third, and 10% in the top third according to CAR's FPP 3.3 Quantification Guidance document) to get the deduction percentage.

Healthy Ponderosa Pine



Defect Ponderosa Pine



The average defect percentages from live trees in the 2013 sample were applied to all live trees from the 2009 - 2012 inventories. For tree species in the 2013 sample with 0% average defect, we conservatively applied the average live-tree defect of (1.1%).

The following table shows average live defect for each species:

Species	Defect %
American Beech	5.11%
American Elm	1.10%
Black Ash	0.41%
Black Cherry	1.10%
Balsam Fir	0.58%
Black Spruce	0.36%
Bigtooth Aspen	3.25%
Basswood	1.10%
E. Hemlock	0.79%
E. Hophornbeam	1.10%
Jack Pine	2.00%
Non-Commercial HW	1.10%
Paper Birch	0.88%
Quaking Aspen	1.10%
Red Maple	1.00%
N. Red Oak	1.10%
Red Pine	1.10%
Sugar Maple	0.63%

Tamarack	1.10%
N. White Cedar	1.74%
E. White Pine	0.69%
White Spruce	1.10%
Yellow Birch	2.60%

The following table shows average dead defect for each species. For dead trees in the 2013 sample with 0% average defect, the model conservatively applied the average dead-tree defect of (15.1%).

Species	% Defect
American Beech	15.13%
Balsam Fir	17.56%
Black Spruce	12.34%
Eastern Hemlock	26.80%
Paper Birch	17.85%
Red Maple	29.35%
Sugar Maple	15.83%
Tamarack	11.79%
N. White Cedar	10.27%
Yellow Birch	9.04%

IFM-3 Standing Dead:

All standing dead trees of at least 15' in current height (i.e. if the top was broken, the highest remaining portion was considered the top) >5" DBH were inventoried. Because heights were not recorded in 2009-2012 inventory sampling, dead tree average defect percentages from standing dead trees in the 2013 inventory were applied to all dead trees in the 2009-2012 inventories.

All standing dead beech recorded prior to the start date of the project were not included in the starting stock calculation as they were assumed to have fallen down due to beech bark disease, which causes the trees to snap and fall relatively quickly. This assumption is also conservative because it is likely that some of the standing dead beech was still standing at the start date, but was not included in the starting stock calculations. Please see Part VII Section B for a description of how standing dead beech was modeled for the reporting period calculations.

For non-beech standing dead, density reduction factors from Harmon et al. 2011, "Differences between standing and downed dead tree wood density reduction factors: A comparison across decay classes and tree species," were utilized to calculate standing dead tree volume. This paper provides density reduction factors for both soft and hard wood species based on five distinct decay classes. (Document provided separately for verification purposes.)

In the Conifer and Pine Strata, decay class of standing dead trees was recorded based on which of the five categories in Harmon et al. 2011 best represented each dead tree measured. A detailed *Missing_Defect_and_Deadwood_Methodology* document has been provided separately for verification purposes.

After individual tree decay class data was gathered in the 2013 inventory, it was determined that the average decay class was 3 for hardwood species and 2.1 for softwoods, based on the analysis of average decay class for hardwoods and softwoods.

IFM-6 Soil (if applicable): NA**IFM-7 Carbon in in-use forest products:**

Carbon in in-use forest products was calculated based on standing tree inventory data, harvest data, and baseline harvest scenarios. No specific inventory processes apply.

IFM-8 Forest product carbon in landfills (if applicable):

Forest product carbon in landfills was calculated based on standing tree inventory data, harvest data, and baseline harvest scenarios. No specific inventory processes apply.

IFM- 9 Biological emissions from site preparation: NA**IFM-14 Biological emissions/removals from change in harvesting on forestland outside the Project Area: NA****IFM-17 Biological emissions from decomposition of forest products:**

Biological emissions from decomposition of forest products were calculated based on standing tree inventory data, harvest data, and baseline harvest scenarios. No specific inventory processes apply.

General Inventory Design and Methodology

For all applicable carbon pools, the following inventory methodology was employed:

Number of Sample Plots

From October 2009 to November 2010, 824 continuous forest inventory plots were established on Heartwood Forestland Fund IV's Bishop property. The goal was a stratified random sample to create forest stand statistics and monitor these attributes over time. An additional 86 plots were taken between March and May 2012 to improve inventory accuracy and develop regression equations to estimate total height. Growth increment data was also collected to help update the inventory for recent growth.

In July of 2013, 44 plots from the Conifer and Pine Strata were re-visited to further improve regression equations of species most pertinent to those strata and to collect additional increment cores. After all plot data was collected, a spatial analysis was done to determine which plots were included in the final project boundaries. Of the total 910 plots that were sampled, 506 plots fell within the final project boundaries and were used in final inventory calculations.

Inventory Sample Size

Area	2009-2010 Plots	March 2012 Plots	May 2012 Plots	Total Plots
Project Area	444	47	15	506
Non-Project Area	380	18	6	404
Total	824	65	21	910

Distribution of Plots (2009-2010 Inventory Sampling)

The centroid of each stand's polygon was calculated as a point layer and served as a pool of potential sample positions. Each centroid possessed the same attributes as the stand(s) layer, including identification code and stratum. Using this point pool as a basis, a random point selection tool (Hawth's or NOAA) was then used to select points from each stratum so that each represented ~400 acres.³ In this way, 444 plots were established in the Project Area.

Distribution of Plots (2012 Inventory Sampling)

In March 2012 and May 2012, 86 additional plots were established in the Project Area to develop total height regressions and improve inventory confidence. The locations of these plots were generated when the Bishop carbon project was split up into 5 different projects, based on easement dates and supersections. For each project area, the number of additional plots sampled was determined by calculating the number of plots needed to reach <5.1% sampling error. All of the plots were randomly placed within each stratum.

Additional data was collected from a subset of these plots in 2013 and 2014 to collect additional increment cores, improve regression equations, update carbon stock estimates, and better reflect current conditions on the ground.

³ Since plots were established based on total property acreage rather than easement and Project Area acreage, actual acres/plot vary.

Pre-Sampling Stratification

The Owner received historic inventory records at the time of purchase in 2003. Using this information, the area was stratified based on species type (hardwood, lowland softwood, upland softwood) and merchantability (pre-merchantable, merchantable). If a forest stand was missing its cover type in the historic inventory, one was assigned to it through photo interpretation of aerial imagery (i.e. supervised classification).

Pre-Sampling Stratification	Total Acres
Pre-Merchantable Hardwood	602
Merchantable Hardwood	193,098
Pre-Merchantable Upland Softwood	1,366
Merchantable Softwood	3,394
Pre-Merchantable Lowland Softwood	394
Merchantable Lowland Softwood	20,350
Non-Forest	10,397
Total Forested Acres	219,204

Post-Sampling Stratification

If during sampling a forester found that stand species and merchantability did not match the previously assigned strata, they either relocated or reclassified that plot. If the correct strata could be found within 5 chains of original plot location in a cardinal direction, the plot was moved to that location. If not, the plot remained in its original position with change of strata recorded in the field notes. Strata boundaries were later modified accordingly in data management and mapping.

For the forest carbon inventory, merchantable and pre-merchantable strata were combined as additional stratification was not necessary to achieve desired confidence levels. The Lowland Softwood and Upland Softwood classes were re-titled: *Conifer Bog* and *Pine Forest* respectively to better conform to the nomenclature used in the FIA Assessment Areas representative of their species makeup.

Post-Sampling Stratification	Total Acres
Hardwood	193,700
Conifer Bog	20,744
Pine Forest	4,760
Total Forested Acres	219,204

Maps of pre and post sampling strata are displayed in **Attachment E**.

Tools Used to Monument Plots

Plot locations were loaded on GPS units to navigate to the point center. Once the GPS indicated a distance within <10' of the point a ½" metal post was driven into the ground and capped. All trees >4.5" DBH were painted with a line (at breast height) facing plot center, and most trees were painted with its number within the plot.

Sampling Method and Measurement Methodologies

Field crews were provided a field instruction manual and all equipment:

- Hand Held Data Recorder
- DME
- Loggers Tape (>75 foot recommended)
- Increment borer
- Compass
- Clinometer
- Pencils and permanent marker
- Flagging
- Cover type Maps and Aerial Photographs
- GPS units with point locations
- Paint tubes (for marking DBH measurement and tree number.
- Approx. 5' pole for measuring plot from center

- Permanent plot stakes
- Paper tally sheets (for when handheld fails to work)
- Plot record form – records plot specific information (age, total ht, stand conditions)
- Overview and point location maps.
- Point strata records (lists what strata the point should be representing)
- Point change forms (used to record when points need to be relocated, or a strata change indicated)
- Recommended: Metal detector to find stakes at previously sampled plots

Dimensions of Plots

The inventory program is based upon a system of three nested fixed radius plots.

Inventory Plot Dimensions and Parameters

Plot	Plot Radius	Trees Included	Parameters Collected
1/5th Acre	52.7'	Standing live and dead >10.5" DBH	Species
1/20th Acre	26.3'	Standing live and dead >4.5" to 10.5" DBH	Quality Grade DBH Saw/merchantable/total height ⁴ Soundness Age/height of dominant ⁵
1/100 th Acre	11.77'	Standing live from 1" to 4.5" DBH	Species DBH Stem count

B. Describe the calculation methodologies used to determine metric tons per acre for each of the carbon pools included in the Offset Project Data Report.

IFM-1 Standing Live:

Biomass was computed using the component ratio method and Jenkins coefficients following the procedures and equations outlined in "The Forest Inventory and Analysis Database: Database Description and User's Manual Version 4.0 for Phase 2," and as specifically described in Appendix J Tables 1 through 4.

Gross cubic foot volume was calculated using equations developed by McClure and Cost (2010) and Hahn (1984), and Scott (1981), with appropriate coefficients by species and DBH (ARB, Cubic Foot Volume Equations for the United States outside of California, Washington, Oregon, Alaska, and Hawaii, 9/23/10).

Adjustments for Sampling and Start Dates

To determine CO₂ stocks at the Start Date, inventory plots collected prior to the Start Date were "grown-forward" to 8-8-2012. Pine and Conifer Bog plot data collected in July-August 2013, were "de-grown" to the same date. This adjustment took place in two steps: 1) individual trees were grown forward or backward at the appropriate rate based on growth increment data, and 2) individual trees were removed from harvested plots so that the tree list reflected the post-harvest conditions.

Step 1) Growth

For trees (DBH ≥ 5.0"): Individual tree DBH growth was estimated using FVS default growth rates calibrated with increment growth samples. 132 growth increment samples were collected from a portion of the 2012 and 2013 inventory samples using increment cores taken from randomly selected trees. Samples from multiple diameter classes were collected from each tree species representing >0.5% of the total tree population across the Project Area. These samples were used to determine each species' average annual growth increment. Based on our analysis of increment cores taken from our permanent plots, we found that FVS was growing slightly slower than what was found in the increment core data. As a result, there was a need to calibrate the FVS model for growing 2009-2010 data accurately to the site visit date. A detailed description of this calibration entitled *Increment FVS Calibration Explanation* has been provided separately for verification purposes.

⁴ Total height not measured in the 2009-2010 inventory which was modified for 2012 samples by adding total tree height (nearest foot), eliminating coarse woody debris (under snow), and measuring DBH to the nearest 10th of an inch (vs. nearest inch).

⁵ In even-aged stands (i.e. aspen and softwoods) total age and total height was collected from a dominant tree on the 1/5th or 1/20th acre plot (or 1/100th acre plot if pre-merchantable).

For saplings (DBH 1.0" to <5"): Average annual tree sapling growth rate was determined by growing each sapling forward 5 years in FVS using the FixMort keyword which prevented mortality from occurring in this 100 year growth. No increment data was used to calibrate the sapling growth rates, so FVS defaults were used. The DBH of every sapling was measured at the time that it was inventoried. Every tree was then grown forward from the inventory date to the start date using the average annual growth rate established in FVS for each individual tree. For the 100-year baseline, the DBH for every tree at the start date was used as the input data into FVS and was grown forward from there.

Step 2) Harvests

Losses due to harvest activities were estimated using actual timber harvest records. The amount of timber removed from harvests was recorded in total sawtimber (thousands of board feet) and cords. These harvest records were used to calculate total carbon losses by converting harvest volumes into the amount of carbon that was lost, which was then used to calculate the average amount of carbon that was harvested per acre. Current carbon stocks (reflecting the post-harvest conditions) were calculated by removing the appropriate number of trees from the harvested plots in the inventory so that the post-harvest plots reflected the total amount of carbon that was removed from the harvests. Assumptions about which trees to remove were based on conversations with local foresters. Most harvests targeted beech, so beech was the highest species removal preference. Large diameter sugar maple was the next targeted species for removal, as it is the highest value species. Red maple had the third-highest species removal preference.

Step 3) Mortality

Non-Beech Mortality: Each sapling and tree was grown from the inventory date for 5 years to calculate the annual reduction in tree per acre ("TPA") for each plot. The TPA per plot was reduced subject to the specific mortality days each plot was subject to. This method for determining individual tree mortality was done separately for trees and saplings. The default mortality settings for the Lake States Variant of FVS were used for all of the baseline modeling.

Beech Mortality (Pre-Start Date): Because of the presence of Beech Bark Disease on the property, special measures had to be taken to appropriately reflect beech mortality. Beech mortality rate was modeled from the beginning of the inventory to the project commencement date by specifying a 25% mortality rate over a 5-year period and then proportionately adjusting the number of dying trees based on the exact number of days between the inventory and the start date. This approximately linear mortality rate (5% annual mortality) was chosen based on research by David R. Houston (USDA FS 2004) and Michigan DNR's 2012 Forest Health Highlights Report. (A document titled *Beech Mortality Explanation* has been provided separately for verification purposes.) This 5% annual mortality was distributed evenly to all live beech trees through a reduction in trees per acre based on the days of mortality from the inventory date to the Start Date.

Standing Dead Beech Decay: Standing dead beech increases each year in proportion to the amount of annual mortality that occurred (5%). The same number of trees per acre that die due to beech mortality are added to the dead pool for that year. Dead beech remain standing for 5 years with increasing decay classes (year 1: class 1; years 2-3: decay class 2; years 4-5: decay class 3; tree falls in year 6). Beech defect also increases annually (year 1: 5.1%; year 2: 12.6%; year 3: 20.1%; year 4: 27.5%; year 5: 35%; tree falls in year 6). (A document titled *Progression of Beech Decay Following Mortality* has been provided separately for verification purposes.)

Beech Mortality (Post-Start Date)

Following the project commencement date, the beech mortality rate was conservatively increased to 10% per year for the first decade of the project period, after which live beech is projected to be absent from the property. A document titled *Beech Mortality Explanation* has been provided separately for verification purposes.

Following project commencement, standing dead beech continues to degrade in the same manner described above (under "Beech Mortality (Pre-Start Date), Standing Dead Beech Decay").

Reporting Period CO2 Stocks

Actual harvest volumes were used for the reporting period CO2 calculations. First the start date data was grown in FVS using default FVS growth rates (no increment calibration was used after the start date). Next, the actual harvest volumes for each species (in MBF and cords) were converted to CO2 to determine the amount of CO2/acre that was harvested during the reporting period. The per acre harvest volume was then subtracted from the unharvested reporting period stocks to arrive at actual reporting period stocks.

Estimation of Total Height

Total Height was measured in all of the 2012 and 2013 samples. Balsam fir, northern white cedar, white spruce, basswood, and black cherry heights were measured to a 4" top in the 2013 samples in accordance with the parameters of the Scott volume equation. All other trees were measured to their total top height. Leaning trees were measured by estimating where the top would be if the tree was standing upright, and aiming a clinometer at that point. Missing tops were accounted for using the method described in the *Missing_Defect_and_Deadwood_Methodology* (provided separately for verification purposes). These height plots were used as a representative subset of plots to develop a function for estimating total height from DBH. This function was developed using a regression analysis of the plot data. The following DBH-height functions were developed using this representative subset of data, and were used to estimate the heights of all trees sampled in the 2009-2010 inventory. Only project-specific height data were used as inputs for the model.

Height Function Parameters and Statistics

Prediction	Species	Parameters			.lin	MSE (feet)	Degrees Freedom
		b0	b1	b2			
Total Height (feet)	316-Soft Maple	4.931	-2.8276	-0.4738		9.585	408
	318-Sugar Maple	4.5262	-3.1553	-0.8142		9.706	449
	371-Yellow Birch	4.03385	-306.73152	-3.69137		11.45	112
	531-American Beech	4.6359	-3.5511	-0.7215		8.639	99
	Misc. Hardwoods	4.4018	-4.2523	-1.0199		10.44	1250
	261-E. Hemlock	4.3479	-5.216	-0.89		10.6	136
	Misc. Conifers	5.0274	-3.312	-0.3915		10.73	992
4" top height (feet)	N. White Cedar	3.0923	-29.8938	-1.4315	2.4992	5.333	379
	Balsam Fir*	4.8723	-5.0746	-0.573		11.24	105
	White Spruce (same as Balsam Fir)	4.8723	-5.0746	-0.573		11.24	105
	Basswood	3.71566	-84.24851	-2.80999		10.82	1212
	Black Cherry	3.7223	-31.0909	-1.961		7.172	41

*The balsam fir equation was slightly adjusted to lower the predicted 4" top values for lower DBH classes. A detailed explanation of this procedure titled *Balsam Fir 4 Inch" Adj Explanation* has been provided separately for verification purposes.

Equation Form: Height = 4.5 + EXP(b0 + b1*DBH^b2)

Projected Growth

The Lake States variant of FVS (Keyser 2010) was used to model forest growth, mortality, and harvest over 100 years. Plot data was entered into a Microsoft Access database readable by FVS, with each plot entered as an individual stand and each tree record multiplied by the trees per acre. After entry into FVS, the "forest" was grown 100 years and the resulting Tree List used to calculate biomass.

Volume Equation Substitutions

The following species did not have volume equations provided for the project supersections, so the following substitutions were made, following guidance from ARB:

Inventory Species	Substitute Species
Bigtooth Aspen	Paper Birch
American Basswood	American Beech
Black Ash	Green Ash
Black Spruce	E. Hemlock
Jack Pine	E. White Pine
Other Hardwoods	Paper Birch
Red Pine	E. White Pine
Tamarack	E. Hemlock
White Ash	Green Ash

Site Index

Site index was determined from USDA NRCS soil series information overlaid with plot locations. In this process site index for each inventory plot was based on the dominant species' potential for growth on the underlying soils. An explanatory document titled *Bishop Site Index NRCS Soil Analysis* has been provided separately for verification purposes.

Silvicultural Methods Modeled

A no harvest, or “let grow,” prescription was modeled for each strata. This prescription modeled what would happen in the absence of harvesting. Single-tree selection prescriptions were modeled for the hardwood and conifer bog types. These were implemented using the single-tree selection routine available in FVS with the following specifications: 2 inch diameter class, Q-Factor of 1.4, minimum DBH of 2.0 inches and maximum DBH of 24.0 inches. The clearcut prescriptions were implemented in FVS by harvesting all the trees. The easements require buffers between clearcuts and 5-year restrictions for green-up and adequate regeneration. Based on this adjacency constraint it would take 20 years to cover an area in clearcuts and implement this constraint in the harvest schedules. We constrained the harvest schedule to allocate acres to the clearcut prescriptions, by 5-year period, so that this constraint was not violated. The acreage allocated to each harvest prescription is also provided. Harvests required a minimum of 1,000 cu. ft. per acre (7-8 total cords/acre; 1000 BF=2.3 cords) to be implemented, so that only economically viable harvests were simulated.

The seed-tree prescriptions were implemented in FVS using a seed step and a removal step ten years apart. The seed step was simulated by harvesting from below to 15 sq. ft. per acre of residual basal area. The removal step was simulated by harvesting from above to 10 inches DBH. Commercial thins were simulated 40 years after the regeneration cut, every 10 years.

Record tripling was turned off in FVS to minimize the number of tree records to process and because it was not needed due to there being sufficient plots to express the variability of the strata. The default mortality models were used including random and density-induced mortality.

(Please see Silvicultural Methods table under Part VIII.A.1)

Modeling Natural Regeneration:

Natural regeneration was modeled utilizing the sprouting feature of FVS for sprouting species. Non-sprouting species were modeled using regeneration Tree Lists, which varied by forest type. These were selected to emulate densities post initial stem exclusion; in other words after seedling mortality.

Belowground Live/Dead

The belowground portion of live and dead trees is calculated using the component ratio method (“CRM”) described in Appendix J of the FIA documentation cited in the Protocol.

IFM-3 Standing Dead:

Standing dead CO₂ was calculated in the same manner as live trees. The estimates of standing dead wood were calculated on a per acre basis for each stratum.

The quantity of standing dead trees for all species but beech was held constant from the beginning of the inventory through the end of the reporting period. Standing dead is held constant in this manner because it is assumed that mortality rates on the Project Area are approximately commensurate with the rate at which standing dead trees fall out of the canopy.

Standing dead beech trees measured in the inventory process prior to the project commencement date were assumed to have fallen before the Start date and were not included in the standing dead pool during the project reporting period. This assumption is reasonable because it is expected that mortality was due to beech bark disease, which causes the trees to snap and fall relatively quickly. This assumption is also conservative because it is likely that some of the standing dead beech would have been standing at the start date, but these trees were not included in the starting stock calculations. Future standing dead beech stocks for the project and the rate at which beech are dying and falling will be measured during the re-inventory process.

For reporting period calculations, the constant level of standing dead stocks applied to all other species was not deemed to be appropriate in the case of beech. Instead, as standing dead beech stocks rapidly increased due to the beech bark disease mortality, it was necessary to establish a rate at which standing dead beech trees fell out of the standing dead pool.

Based on conversations with regional forest experts, it was established that standing dead beech would fall five years after mortality. During this five-year period, the following progression of decay class was modeled:

Year	Decay Class	Density Adjustment Factor	Description
1	1	99%	All limbs and branches are present; the top of the crown is still present; all bark remains; sapwood is intact, crown is still present; all bark remains; sapwood is intact, with minimal decay; heartwood is sound and hard, with minimal decay; heartwood is sound and hard.
2-3	2	80%	There are few limbs and no fine branches; the top may be broken; a variable amount of bark remains; sapwood is sloughing with advanced decay; heartwood is sound at base but beginning to decay in the outer part of the upper bole.

4-5	3	54%	Only limb stubs exist; the top is broken; a variable amount of bark remains; sapwood is sloughing; heartwood has advanced decay in upper bole and is beginning at the base.
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As defect increases along with decay, modeled defect increased linearly over the five-year period from 5.1%, the average defect for live beech across the property, to 35%, the defect percentage equivalent to having the top 2/3 of the tree broken off (65% of the carbon would remain in the bottom 1/3 of the tree per CAR's FPP 3.3 Quantification Guidance document).

IFM-6 Soil (if applicable): NA

IFM-7 Carbon in in-use forest products:

The wood products calculations were performed using an excel model based on the CAR Forest Project Calculation worksheet. The following six inputs were needed for the spreadsheet; all the data was derived from the cut list produced by the FVS simulations.

- **Average annual harvested CO₂e from whole tree:** Calculated using the same methods as for live trees in the inventory.
- **Average annual harvested CO₂e from merchantable part of tree:** Calculated using the same methods as for live trees in the inventory except only the merchantable bole was included.
- **Average annual harvested cubic foot volume from softwood sawtimber:** Calculated using the same volume equations used in the biomass calculations. Harvested trees with FIA species codes less than 300 and with DBH greater than or equal to 9 inches were included.
- **Average annual harvested cubic foot volume from softwood pulpwood:** Calculated using the same volume equations used in the biomass calculations. Harvested trees with FIA species codes less than 300 and with DBH less than 9 inches were included.
- **Average annual harvested cubic foot volume from hardwood sawtimber:** Calculated using the same volume equations used in the biomass calculations. Harvested trees with FIA species codes greater than or equal to 300 and with DBH greater than or equal to 11 inches were included.
- **Average annual harvested cubic foot volume from hardwood pulpwood:** Calculated using the same volume equations used in the biomass calculations. Harvested trees with FIA species codes greater than or equal to 300 and with DBH less than 11 inches were included.

The default regional values were used for mill efficiency and product mix.

IFM-8 Forest product carbon in landfills (if applicable)

Forest product carbon in landfills was calculated in accordance with the procedures described in Appendix C of the Protocol. These calculations were carried out in the same excel model used for carbon stored in in-use forest products (IFM-7).

IFM- 9 Biological emissions from site preparation: NA

IFM-14 Biological emissions/removals from change in harvesting on forestland outside the Project Area: NA

IFM-17 Biological emissions from decomposition of forest products:

Biological emissions from decomposition of forest products was quantified as a component of calculating carbon stored in in-use forest products (IFM-7) and landfills (IFM-8)

Provide a summary of the inventory of carbon stocks for each carbon pool (or approach used, if inventory is not applicable).

IFM-1 Standing Live:

Start Date

Strata	Average tCO ₂ e/acre	Acres	%	Total
Hardwood	94.33	193,700	88%	18,272,039
Conifer Bog	93.08	20,744	9%	1,930,852
Pine Forest	87.38	4,760	2%	415,894
Project Area	94.06	219,204	100%	20,618,785

End of Reporting Period

Strata	Average tCO ₂ e/acre	Acres	%	Total
Project Area	94.28	219,204	100%	20,666,803

IFM-3 Standing Dead:
Start Date

Strata	Average tCO ₂ e/acre	Acres	%	Total
Hardwood	2.24	193,700	88%	433,023
Conifer Bog	4.48	20,744	9%	92,873
Pine Forest	2.99	4,760	2%	14,209
Project Area	2.46	219,204	100%	540,105

End of Reporting Period

Strata	Average tCO ₂ e/acre	Acres	%	Total
Project Area	2.89	219,204	100%	633,313

IFM-6 Soil (if applicable): NA
IFM-7 Carbon in in-use forest products

The information in the tables below was generated from a tool based on the CAR harvested wood products calculation worksheet. The table figures were used to generate the inputs for the ARBOC Calculation Worksheet provided separately for verification purposes. Harvests occurred on a continual basis until the end of the reporting period.

The wood products pools require an estimate of both the merchantable portions and the whole tree portions. The former is used to estimate long-term storage in in-use and landfill pools while the latter is used to estimate leakage.

Summary of Reporting Period Harvest Volumes

The reporting period harvest volumes were calculated by summing all of the cords and MBF harvested between August, 1 2012 and July 1, 2013, and then subtracting out the proportion that would have been harvested between August 1-7, 2012 and June 25-30, 2013

Actual Carbon in Harvested Wood Products: End of Reporting Period

Hardwood						Softwood					
Units	Lumber	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper
tCO ₂ e	7,571	63,250	1,525	8,155	-	213	2	2,242	43	169	-
% Product	9%	76%	2%	10%	0%	0.3%	0.0%	2.7%	0.1%	0.2%	0%
Long-term storage in in-use wood products (tCO ₂ e)	1,893	36,811	579	1,435	-	99	1	1,305	16	30	-
Long-term storage in wood products in landfills (tCO ₂ e)	3,134	14,737	525	3,702	-	63	1	522	15	77	-

Harvested Wood Products Summary	Total (tCO ₂ e)	tCO ₂ e / acre
Total Harvested Wood Products	83,169	0.38
Long-term storage in in-use wood products	42,169	0.19
Long-term storage in wood products in landfills	22,776	0.10

Inputs Summary	Total (tCO ₂ e)	tCO ₂ e / acre
Actual Carbon in Harvested Wood Delivered to Mill	133,409	0.61
Actual Carbon in Trees Harvested for Wood Products	250,146	1.14
Actual Carbon Stored Long-term in Wood Products - Excl Landfill	42,169	0.19
Actual Carbon Stored Long-term in Wood Products - Incl Landfill	64,945	0.30

IFM-8 Forest product carbon in landfills (if applicable):

See IFM-7

IFM- 9 Biological emissions from site preparation: NA

IFM-14 Biological emissions/removals from change in harvesting on forestland outside the Project Area: NA

IFM-17 Biological emissions from decomposition of forest products:

Quantified as a component of calculating carbon stored for 100 years in wood products (IFM-7) and landfills (IFM-8)

Summary of Applicable Carbon Pools

Carbon Pool	tCO2e/acre
IFM-1 Standing Live:	94.02
IFM-3 Standing Dead:	2.46
IFM-7: Long-term storage in in-use wood products	.19
IFM-8: Long-term storage in wood products in landfills	.10

C. Provide a summary of inventory confidence statistics.

Total (tCO2e)	n	Stratified Std Error	Bound	Sampling Error	Confidence Deduction
21,158,890	506	395,961	651,355	3.08%	0%

The inventory sampling error is calculated as follows:

1) $395,961 * 1.645 = 651,355$

2) $(651,355 / 21,158,890) * 100 = 3.08\%$

The calculated sampling error of 3.08% is below 5.1%, so no confidence deduction is applied to the inventory results.

D. Provide the calculation of the offset project's reversal risk rating and contribution to the Forest Buffer Account.

Risk Category	Rating
Financial Failure	5% (Default Value)
Illegal Forest Biomass Removal	0% (Default Value)
Conversion	2% (Default Value)
Over-harvesting	2% (Default Value)
Social	2% (Default Value)
Wildfire	4% (Default Value)
Disease or Insect Outbreak	3% (Default Value)
Other Catastrophic Events	3% (Default Value)

Reversal Risk Rating =

$100\% - (1 - \text{Financial Failure}\%) \times (1 - \text{IllegalForestBiomassRemoval}\%) \times (1 - \text{Conversion}\%) \times (1 - \text{OverHarvesting}\%) \times (1 - \text{SocialRisk}\%) \times (1 - \text{Wildfire}\%) \times (1 - \text{Disease/Insect Outbreak}\%) \times (1 - \text{OtherCatastrophicEvents}\%) =$

$100\% - ((100\% - 5\%) \times (100\% - 0\%) \times (100\% - 2\%) \times (100\% - 2\%) \times (100\% - 2\%) \times (100\% - 4\%) \times (100\% - 3\%) \times (100\% - 3\%))$

$= 19.2\%$

This risk rating resulted in a buffer contribution of 415,479 ARBOCs for the project's first reporting period.

$2,163,951 \times 19.2\% = 415,479$

PART VIII. OFFSET PROJECT BASELINE

A. Required for ALL Improved Forest Management Projects

1. Describe the project's modeling plan, following the requirements and methods in Appendix B, Section B.3 of the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011.

The Lake States variant of FVS was used to model forest growth, mortality and harvest over 100 years.

Plot data was entered into a database readable by FVS, with each plot entered as an individual stand and each tree record multiplied by the appropriate factor to determine trees per acre. After entry to FVS, the "forest" was grown 100 years and the resulting Tree List used to calculate biomass. Simulations were conducted in 5-year increments with harvests simulated mid-decade.

The default settings for the simulator are shown in the following table.

Parameter or Attribute	Default Setting	
Number of Projection Cycles	1 (10 if using Suppose)	
Projection Cycle Length	10 years	
Location Code (National Forest)	907 – Ottawa	
NPV Code	FDn12 (Northern Dry-Sand Pine Woodland)	
Slope	5 percent	
Aspect	0 (no meaningful aspect)	
Elevation (default location)	14 (1400 feet)	
Latitude (default location)	46.45	
Longitude (default location)	90.17	
Site Species	3 (red pine natural)	
Site Index	60 feet (total age; 50 years)	
Maximum Stand Density Index	Species specific	
Maximum Basal Area	Species specific	
Volume Equations	National Volume Estimator Library	
Pulpwood Volume Specifications:		
Minimum DBH / Top Diameter Inside Bark	Hardwoods	Softwoods
903 – Chippewa (aspen, balsam poplar)	6.0 / 4.0 inches	5.0 / 4.0 inches
903 – Chippewa (all other species)	5.0 / 4.0 inches	5.0 / 4.0 inches
909 – Superior	6.0 / 4.0 inches	5.0 / 4.0 inches
All other locations	5.0 / 4.0 inches	5.0 / 4.0 inches
Stump Height	1.0 foot	1.0 foot
Sawtimber Volume Specifications:		
Minimum DBH / Top Diameter Inside Bark	Hardwoods	Softwoods
903 – Chippewa (aspen, balsam poplar)	11.0 / 9.6 inches	9.0 / 7.6 inches
903 – Chippewa (all other species)	9.0 / 7.6 inches	9.0 / 7.6 inches
907 – Ottawa (aspen, balsam poplar)	9.0 / 7.6 inches	9.0 / 7.6 inches
907 – Ottawa (all other species)	11.0 / 7.6 inches	9.0 / 7.6 inches
All other locations	11.0 / 9.6 inches	9.0 / 7.6 inches
Stump Height	1.0 foot	1.0 foot
Sampling Design:		
Large Trees (variable radius plot)	40 BAF	
Small Trees (fixed radius plot)	1/300 th acre	
Breakpoint DBH	5.0 inches	

These defaults are modified based on three key calibration components:

- 1- The Project Area's location code (Hiawatha 910)
- 2- Site index values derived from NRCS soils data
- 3- Onsite increment core data (132 cores were collected from a representative sample of project species and diameter classes)

These three inputs improve the model's results by refining its projections to reflect salient Project Area site parameters.

All legal requirements and voluntary BMPs were modeled in both the baseline and project scenario.

Because the easements were conveyed more than 6 months before the Start Date, their management constraints were included in the baseline modeling. These include:

- No plantation forestry
- No clearcuts over 40 acres in the hardwood stratum unless necessary to salvage dead and dying timber (from blowdown, fire, disease, insect) or mitigate greater harm to natural/scenic/recreational values
- 200 foot separation zones (buffers) around clearcuts
- No clearcutting within a separation zone for a period of five years from the date of completion of the most recent adjacent clearcut

A no harvest, or “let grow,” prescription was modeled for each strata. This prescription modeled what would happen in the absence of harvesting. Single-tree selection prescriptions were modeled for the hardwood and conifer bog types. These were implemented using the single-tree selection routine available in FVS with the following specifications: 2 inch diameter class, Q-Factor of 1.4, minimum DBH of 2.0 inches and maximum DBH of 24.0 inches.

The clearcut prescriptions were implemented in FVS by harvesting all the trees. The easements require buffers between clearcuts and 5-year restrictions for green-up and adequate regeneration. Based on this adjacency constraint it would take 20 years to cover an area in clearcuts and implement this constraint in the harvest schedules. We constrained the harvest schedule to allocate acres to the clearcut prescriptions, by 5-year period, so that this constraint was not violated.

The seed-tree prescriptions were implemented in FVS using a seed step and a removal step ten years apart. The seed step was simulated by harvesting from below to 15 sq. ft. per acre of residual basal area. The removal step was simulated by harvesting from above to 10 inches DBH. Commercial thins were simulated 40 years after the regeneration cut, every 10 years.

Record tripling was turned off in FVS to minimize the number of trees records to process and because it was not needed due to there being sufficient plots to express the variability of the strata. The default mortality models were used including random and density-induced mortality.

The following table shows the silvicultural methods used for the project and baseline harvest and management prescriptions including retention criteria and harvest frequency. The acreage allocated to each harvest prescription is also provided. Harvests required a minimum of 1,000 cu. ft. per acre (7-8 total cords/acre; 1000 BF=2.3 cords) to be implemented, so that only economically viable harvests were simulated.

Silvicultural Methods

Strata	Rx ID	Rx Description	Residual Stocking (sq. ft. BA)	Acreage	Species Retention Preferences	Use in Baseline (BL), Project Activity (PA)
Northern Hardwoods	GROW	Let grow with no harvesting	N/A	37,655		BL
	GROW	Let grow with no harvesting	N/A	65,858		PA
	STS50BA10YRCC	Single-Tree Selection at 10 yr Interval	50	143,076	HM, SM, BC, YB RO, WA	BL
	STS70BA10YRCC	Single-Tree Selection at 10 yr Interval	70	10,459	HM, SM, BC, YB RO, WA	BL
	STS70BA15YRCC	Single-Tree Selection at 15 yr, Interval	70	1,255	HM, SM, BC, YB RO, WA	BL
	STS80BA15YRCC	Single-Tree Selection at 15 yr interval	80	1,255	HM, SM, BC, YB RO, WA	BL
	STS80BA15YRCC	Single-Tree Selection at 15 yr interval	80	127,842	HM, SM, BC, YB RO, WA	PA
Conifer Bog	Grow	Let grow with no harvesting	N/A	2,169		BL
	Grow	Let grow with no harvesting	N/A	16,290		PA
	STS70BA10YRCC	Single-Tree Selection at 10 yr Interval	70	2,970	WP, WC, TA, BS	BL
	STS80BA10YRCC	Single-Tree Selection at 10 yr Interval	80	47	WP, WC, TA, BS	BL
	CC60YR	Clearcut at 60 yr Interval, start years in 2012, 2017, 2022, and 2027	0	15,558		BL
	CC90YR	Clearcut at 90 yr Interval with start years in 2017 and 2027	30	4,454		PA
Pine	Grow	Let grow with no harvesting	N/A	58		BL
	Grow	Let grow with no harvesting	N/A	2,155		PA
	CC50YR	Clearcut at 50 yr Interval with start years in 2012, 2017, 2022, and 2027	0	3,848		BL
	CC60YR	Clearcut at 60 yr Interval with start years in 2017 and 2027	0	781		PA
	CC60YR	Clearcut at 60 yr Interval with start years in 2017 and 2027	0	182		BL
	SDT90YR_TH15YR	Seed tree at 90 yrs with 3-15 year intermediate thinnings. Start years in 2017 and 2027	15 (seed tree removal) 100 (commercial thinnings)	1,824	RP, WP	PA
	SDT90YR_TH15YR	Seed tree at 90 yrs with 3-15 year intermediate thinnings. Start years in 2017 and 2027	15 (seed tree removal) 100 (commercial thinnings)	672	RP, WP	BL

Regeneration

Sprouting Species: Natural regeneration was modeled utilizing the sprouting feature of FVS for sprouting species. The following table shows the sprouting species.

FVS Parameters Applied for Regeneration of Sprouting Species (see subsequent table for non-sprouting parameters)

FVS Number	Alpha Code	Sprouting Species	Maximum Tree Height (ft)	Minimum Bud Width (in)	Minimum Planting Heights based on Location Code				
					903	909	907	910	All Other
1	JP	No	20	0.3	3.33	3.33	4.00	4.00	5.00
2	SC	No	20	0.3	3.33	3.33	4.00	4.00	5.00
3	RN	No	20	0.2	1.33	2.00	3.00	3.00	3.00
4	RP	No	20	0.3	1.67	2.30	4.00	4.00	4.00
5	WP	No	20	0.3	1.17	2.50	3.00	3.00	3.00
6	WS	No	20	0.3	1.50	2.00	3.00	3.00	3.00
7	NS	No	20	0.3	1.50	2.00	3.00	3.00	3.00
8	BF	No	20	0.3	1.00	1.00	1.00	1.00	1.00
9	BS	No	20	0.3	1.33	1.67	2.50	2.50	2.50
10	TA	No	20	0.3	2.00	3.00	4.00	4.00	4.00
11	WC	No	20	0.3	1.00	1.00	1.00	1.00	1.00
12	EH	No	20	0.3	2.00	2.00	1.00	1.00	1.00
13	OS	No	20	0.3	1.50	1.50	1.50	1.50	1.50
14	RC	No	20	0.3	1.50	1.50	1.50	1.50	1.50
15	BA	Yes	20	0.3	1.50	1.50	2.00	2.00	2.00
16	GA	Yes	20	0.3	1.50	1.50	2.00	2.00	2.00
17	EC	Yes	20	0.3	4.00	4.00	2.00	2.00	2.00
18	SV	Yes	20	0.3	5.00	4.00	2.00	2.00	2.00
19	RM	Yes	20	0.3	4.67	4.17	2.00	2.00	2.00
20	BC	Yes	20	0.3	4.67	4.17	2.00	2.00	2.00
21	AE	Yes	20	0.3	3.33	4.00	2.00	2.00	2.00
22	RL	Yes	20	0.3	3.33	4.00	2.00	2.00	2.00
23	RE	Yes	20	0.3	3.33	4.00	2.00	2.00	2.00
24	YB	Yes	20	0.3	1.67	1.67	2.00	2.00	2.00
25	BW	Yes	20	0.3	5.00	4.00	2.00	2.00	2.00
26	SM	Yes	20	0.2	1.83	2.00	2.00	2.00	2.00
27	BM	Yes	20	0.2	1.83	2.00	2.00	2.00	2.00
28	AB	Yes	20	0.2	1.83	2.00	2.00	2.00	2.00
29	WA	Yes	20	0.2	4.00	4.00	2.00	2.00	2.00
30	WO	Yes	20	0.2	2.83	2.83	2.00	2.00	2.00
31	SW	Yes	20	0.2	2.83	2.83	2.00	2.00	2.00
32	BR	Yes	20	0.2	2.83	2.83	2.00	2.00	2.00
33	CK	Yes	20	0.2	2.83	2.83	2.00	2.00	2.00
34	RO	Yes	20	0.2	3.33	3.00	2.00	2.00	2.00
35	BO	Yes	20	0.2	3.33	3.00	2.00	2.00	2.00
36	NP	Yes	20	0.2	3.33	3.00	2.00	2.00	2.00
37	BH	Yes	20	0.2	4.00	4.00	2.00	2.00	2.00
38	PH	Yes	20	0.2	4.00	4.00	2.00	2.00	2.00
39	SH	Yes	20	0.2	4.00	4.00	2.00	2.00	2.00
40	BT	Yes	20	0.2	14.00	12.00	2.00	2.00	2.00
41	QA	Yes	20	0.2	14.00	12.00	4.00	4.00	4.00
42	BP	Yes	20	0.2	14.00	12.00	2.00	2.00	2.00
43	PB	Yes	20	0.2	3.67	4.00	2.00	2.00	2.00
44	CH	No	20	0.2	2.00	2.00	2.00	2.00	2.00
45	BN	Yes	20	0.2	2.00	2.00	2.00	2.00	2.00
46	WN	Yes	20	0.2	2.00	2.00	2.00	2.00	2.00
47	HH	Yes	20	0.2	2.00	2.00	2.00	2.00	2.00
48	BK	Yes	20	0.2	2.00	2.00	2.00	2.00	2.00
49	NC	No	20	0.2	2.17	2.17	2.00	2.00	2.00
50	BE	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00
51	ST	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00
52	MM	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00
53	AH	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00
54	AC	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00
55	HK	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00
56	DW	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00
57	HT	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00
58	AP	Yes	20	0.2	2.17	2.17	2.00	2.00	2.00

Submit the information in this form to
the appropriate Offset Project Registry

Non-sprouting species: Were modeled using regeneration tree lists, which varied by forest type. To emulate TPA densities post initial stem exclusion (after seedling mortality) average TPA for trees between 4.6" - 5.5" (as of Starting Date) was used to represent the background regeneration rate for each stratum.

FVS Parameters Applied for Regeneration of Non Sprouting Species

To determine the amount of additional regeneration after certain types of harvests, regeneration model input ratios for non-sprouting species from Nunery and Keeton 2010 were used ("Forest carbon storage in the northeastern United States: Net effects of harvesting frequency, post-harvest retention, and wood products", Table 4). This table (below) shows the average regeneration rates after even-aged management and single-tree selection, relative to a background regeneration rate.

Regeneration Ratios from Nunery and Keeton (2010)

Scenario	TPA	Ratio
Background	25	
Single-Tree Selection	125	5.0
Even-Aged Management	175	7.0

The background regeneration rate was used as a basis for developing ratios for estimating the increased regeneration after an even and uneven aged harvest. These ratios were input into the FVS key files for even aged/un-even aged management for each stratum.

Single Tree Selection Regeneration TPA

Strata	Balsam Fir	Black Spruce	Eastern Hemlock	White Pine	Jack Pine	White Cedar	Tamarack	White Spruce
Hardwood	23	2	12	3	0	0	0	3
Conifer Bog	41	48	21	7	0	144	24	3
Pine	21	0	14	7	7	0	43	7

Even-aged Regeneration TPA

Strata	Balsam Fir	Black Spruce	Eastern Hemlock	White Pine	Jack Pine	White Cedar	Tamarack	White Spruce
Hardwood	32	2	17	5	0	0	0	4
Conifer Bog	58	67	29	10	0	202	34	5
Pine	30	0	20	10	10	0	60	10

Monitoring Plan

Annual monitoring will be carried out across the Project Area to track changes in carbon stocks. The Project Owner will submit annual Offset Project Data Reports and undertake 6-year site verification by a third-party verifier for 100 years following ARBOC issuance. Annual monitoring reports will contain an update of the inventory reflecting growth, harvest and any significant disturbances that occur.

The entirety of the project area will be re-inventoried at least every 12 years. During the re-inventory process a subset of the current 506 permanent plots, sufficient to maintain desired inventory confidence statistics, will be visited and re-measured in accordance with the procedures outlined in the inventory methodology. As part of the owner's Continuous Forest Inventory program, it is anticipated that the current plots will be maintained and used in the next 12-year inventory update. Any updates to the inventory methodology will be approved in advance by a third-party verification body and by ARB, and documented in the project change log.

In addition to formal inventory sampling, management staff will consistently monitor the general health and condition of the forest throughout the course of normal forest management activities (e.g. road maintenance, timber harvesting, boundary marking, etc.), reducing the risk of carbon loss or reversal due to unnoticed natural disturbance, or unauthorized timber removal. Each compartment will typically be visited at least once a year under snow-free conditions, moreover road inspection and maintenance is typically conducted on primary accessroads and notable bridges/culverts annually. Each year, the forest carbon inventory and documentation will be updated via the following process:

1. Incorporating any new forest inventory data obtained from scheduled sampling during the previous year.
2. Updating the forest inventory data for disturbances that have occurred during the previous year. Annual harvests will be carefully tracked based on timber sale data used to modify current stock estimates and growth models. Plots subject to significant natural disturbance (e.g. insect infestation, fire, destructive wind storm, etc.) will be re-inventoried following the disturbance event and the resulting stocking changes will be incorporated into modeled forest growth and GHG sequestration projections.
3. After incorporating any new inventory samples or harvest data, modeling growth and disturbances since the last reporting period, using FVS or another approved growth model to calculate current carbon stocks, and confirm inventory confidence statistics.
4. Any necessary modification to spatial data based on strata boundary adjustments or other changes will also be made.
5. Results will be incorporated in the annual Offset Project Data Report and submitted to ARB.

2. Describe and estimate the project's baseline onsite carbon stocks. Explain any annual changes in baseline carbon stocks over time.

After modeling the project baseline, taking all legal and financial constraints into account, the average aboveground live baseline stocks were determined to be 70.48 tonnes CO₂e per acre for aboveground live carbon, equaling the MBL. The total live baseline stock is 84.59 tonnes CO₂e per acre and the standing dead baseline stock is 2.46 tonnes CO₂e per acre.

The standing dead baseline stock was established by the starting stock of standing dead and held constant over the life of the project. As required by section 5.2 of the COP for U.S. Forest Projects, baseline standing dead stocks must be modeled based on initial field inventory measurements. Because FVS does not have a robust model for predicting standing dead stocks after more than 10 or 20 years, standing dead beech trees measured in the inventory process prior to the project commencement date were assumed to have fallen before the start date. By conservatively assuming that all standing dead beech had fallen by the project start date, this reflects the average carbon in standing dead that will be found on the property post-beech bark disease mortality. As a result, using this level of standing dead for the baseline standing dead both meets the requirements of the protocol and is reasonable based on future projections of how beech bark disease will impact the project over time.

The total standing baseline stock is 87.06 tonnes CO₂e per acre. This baseline figure complies with section 6.2.1 of the Protocol, which requires that model results must not fall below the MBL.

At project commencement actual onsite carbon stocks are 21,158,890 tonnes CO₂e. At the end of the reporting period, the baseline onsite carbon stocks are 19,083,438 tonnes CO₂e, and will be held steady for 100 years. In the annual baseline projection of 100 years, the onsite carbon stocks sharply decline in the first few years of the project due to heavy initial harvesting efforts, though slowly increases over time as these harvests decrease in intensity.

Summary of Applicable Baseline Carbon Pools

Carbon Pool	tCO ₂ e / acre
IFM-1 Standing Live:	84.59
IFM-3 Standing Dead:	2.46
IFM-7: Long-term storage in in-use wood products	.22
IFM-8: Long-term storage in wood products in landfills	.22

See Attachment G and Attachment H for details.

3. Optional: Identify the approved growth model that will be used for the project.
FVS (Forest Vegetation Simulator)

4. Harvest Planning

a. Is harvesting planned in the Project Area?

If "yes," proceed to question 4b. Otherwise, skip to question A5.

☒ **Yes**
☐ **No**

b. Optional: Does the project use a harvest schedule model?

If "yes," proceed to question 4c. Otherwise, skip to question A5.

☐ **Yes**
☒ **No**

c. Optional: Explain how you are addressing age class and stratification as part of your harvest scheduling?
N/A

5. Provide an estimate of carbon that will be stored long-term in harvested wood products in the baseline.

Baseline Carbon in Harvested Wood Products

Units	Hardwood					Softwood					
	Lumber	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper
tCO ₂ e	67,120	15,758	13,520	2,032	-	24,784	233	5,600	5,005	422	-
% Product	50%	12%	10%	2%	0%	18%	0.2%	4%	4%	0.3%	0%
Long-term storage in in-use wood products (tCO ₂ e)	16,780	9,171	5,138	358	-	11,475	113	3,259	1,902	74	-
Long-term storage in wood products in landfills (tCO ₂ e)	27,788	3,672	4,651	922	-	7,386	67	1,305	1,722	192	-

Harvested Wood Products Summary	Totals (tCO ₂ e)	tCO ₂ e / acre
Total Harvest Wood Product (tCO ₂ e)	134,474	.61
Long-term storage in in-use wood products	48,270	.22
Long-term storage in wood products in landfills	47,703	.22

Secondary Effects

Following the calculation of carbon stored long-term in harvested wood products in the baseline, calculating secondary effects is the only stem that remains before total GHG reductions and GHG removal enhancements can be established. Secondary effects, unintended changes in carbon stocks, GHG emissions, or GHG removals caused by the project, can occur if an IFM project's reduction of harvesting in the Project Area, results in an increase in harvesting on other properties.

The equation below outlines the process by which secondary effects are calculated for IFM projects:

$$\text{If } \sum_{n=1}^Y (AC_{hv,n} - BC_{hv,n}) < 0, \text{ then } SE_y = (AC_{hv,y} - BC_{hv,y}) \times 20\%$$

Where,

SE_y = Estimated annual Secondary Effects (used in Equation 6.1.)

$AC_{hv,n}$ = Actual amount of onsite carbon harvested in reporting period n (prior to delivery to a mill), expressed in CO₂-equivalent tons

$BC_{hv,n}$ = Estimated average baseline amount of onsite carbon harvested in reporting period n (prior to delivery to a mill), expressed in CO₂-equivalent tons, as determined in Step 1 of Section 6.2.3

Y = The current year or reporting period

In the case of the Bishop project, this equation is calculated as follows:

$$\begin{aligned} &= (250,146 - 389,674) \times 0.2 \\ &= -27,906 \end{aligned}$$

Secondary Effects Inputs	Tonnes CO2e
Actual Carbon in Trees Harvested for Wood Products	250,146
Baseline Carbon in Trees Harvested for Wood Products	389,674
Difference Between Actual and Baseline Carbon in Trees Harvested for Wood Products	139,528
Secondary Effects Emissions	-27,906

Total Net GHG reductions and GHG removal enhancements (QRy) For the Reporting Period

With the secondary effects calculation complete, the wide array of preceding calculation components (project and baseline carbon stocks, project and baseline carbon sequestered in long lived wood products, project confidence statistics, and project risk rating) can be brought together to determine the total volume of GHG reductions and GHG removal enhancements achieved by the project in a given year.

This final calculation for the project reporting period is carried out in the *Bishop ARBOC Calculation Worksheet* (provided separately for verification purposes) and is summarized in the table below.

Summary	Tonnes CO2e
ARBOCs Issued	2,163,951
Buffer Pool Contributions	415,479
Annual ARBOCs Issued to Account Holder	1,748,472

6. Provide a projection of baseline and actual harvesting volumes from the Project Area over 100 years.

See Attachment I

B. Required for Improved Forest Management Projects on Private Lands ONLY

1. Provide the initial above ground standing live carbon stock (per acre) for the project.

The project's initial aboveground stocks were 78.19 tonnes CO₂e per acre. Please note that in accordance with Protocol requirements, all reports that reference carbon stocks have been submitted with the oversight of Todd Bishop, a Registered Professional Forester in the state of Michigan.

2. Provide the Common Practice statistic (per acre) associated with the Project Area.

Equation 6.5 of the Protocol requires that when initial aboveground stocks are above common practice, the minimum baseline level (MBL) is equal to common practice. MBL was set at 70.48 tonnes CO₂e per acre, which was therefore the common practice statistic associated with the Project Area.

3. Summarize how the Project's initial above-ground standing live carbon stock compares to Common Practice.

The project's initial aboveground stocks were above Common Practice at 78.19 tonnes CO₂e per acre compared to 70.48 tonnes CO₂e per acre, the common practice statistic for the Project Area.

Are the initial above-ground standing live carbon stocks above or below Common Practice?

☒ Above

☐ Below

If below Common Practice, what is the High Stocking Reference for the Project Area? Describe the Project Area's live tree carbon stocks over the previous 10 years.

4. Optional: Does the Forest Owner(s) and its affiliate (s) own land in fee or hold timber rights on land outside the Project Area, such that a weighted average carbon stock on lands in the same Logical Management Unit (as defined in Section 6.2.1.1) will be used to calculate the Minimum Baseline Level?

Optional: If "yes," is inventory data available for the LMU or will the OPO use a stratified vegetation analysis?

☐ Yes
☒ No

Optional: Identify the Minimum Baseline Level for above-ground standing live carbon stocks for the Project Area:

5. Provide a description of any and all legal constraints affecting forest management activities in the Project Area. Include documentation of legal constraints and a description of each constraint (referring to Section 6.2.1.2); for each constraint provide a narrative that constraint has on forest management.

In Michigan, Public Act 451 governs forest and natural resource management (see Attachment J). The act imposes few constraints that restrict baseline management. Best Management Practices (BMPs) address only soil and water quality, do not mandate specific forest management prescriptions, and are strictly voluntary.

Along rivers denoted as "Natural", 100' buffers and retention standards apply. Stream Management Zones are strictly voluntary and landowners may use any practice that does not cause sedimentation damage (often achieved by harvesting in winter when soil is frozen or protected by snow cover).

These requirements are overseen by two state agencies: the state Department of Natural Resources oversees critical habitat restrictions and the Commercial Forest Program, while the Department of Environmental Quality oversees water quality issues.

While the Owner receives tax incentives for voluntary enrollment in the state's Commercial Forest Program, this program requires that an approved management plan be followed, but has no specific forest management restrictions.

6. Provide a description of the modeling techniques used to simulate the effect of any constraints on carbon stocks.

All legal requirements and voluntary BMPs were modeled in both the baseline and project scenarios using the Lake States variant of FVS.

Harvests required a minimum of 1,000 cu. ft. per acre (7-8 total cords/acre; 1000 BF=2.3 cords) to be implemented, so that only economically viable harvests were simulated.

Because the easements were conveyed more than 6 months before the Start Date, their management constraints were included in the baseline modeling. These include:

- No plantation forestry
- No clearcuts over 40 acres unless necessary to salvage dead and dying timber (from blowdown, fire, disease, insect) or mitigate greater harm to natural/scenic/recreational values
- 200 foot separation zones (buffers) around clearcuts
- No clearcutting within a separation zone for a period of five years from the date of completion of the most recent adjacent clearcut

Optional: Provide a description of the modeling techniques used to simulate forest management activities that may affect carbon stocks.

7. How will the OPO demonstrate financial feasibility of the growth and harvesting regime assumed for the baseline?
(check one of the boxes)

- ☒ **Conducting a financial analysis of the anticipated growth and harvesting regime that captures all relevant costs and returns, taking into consideration all legal, physical, and biological constraints, using regional norms or documented costs and returns for the Project Area or other properties in the Forest Project's Assessment Area**
- ☐ **Providing evidence that activities similar to the proposed baseline growth and harvesting regime have taken place on other properties within the Forest Project's Assessment Area within the past 15 years**

C. Required for Improved Forest Management Projects on Public Lands ONLY

1. Provide a projection of future changes to Project Area forest carbon stocks extrapolating from historical trends.

2. Explain how current public policy affects onsite carbon stocks and how the baseline modeling incorporates constraints imposed by all applicable statutes, regulations, policies, plans, and activity-based funding.

3. Have carbon stocks in the Project Area been increasing or declining over the preceding ten-year period?

- ☐ **Increasing**
☐ **Declining**

PART IX. OTHER OFFSET PROGRAMS

A. Have any GHG reductions or GHG removal enhancements associated with the Project Lands have ever been listed or registered with, or otherwise claimed by, another registry or program, or sold to a third party prior to listing? <i>If "yes," provide details and identify the registry or program.</i>	☐ Yes ☒ No		
B. Have any lands within the Project Area ever been listed or registered with an offset project registry or program in the past? <i>If "yes," identify the registry or program and provide details on the issued credits below.</i>	☐ Yes ☒ No		
C. Have greenhouse gas emission reductions or removal enhancements associated with lands within the Project Area been credited or claimed for the purpose of greenhouse gas mitigation or reduction goals, whether in a voluntary or regulatory context? <i>If "yes," identify the registry or program and provide details on the issued credits below.</i>	☐ Yes ☒ No		
Registry/Program. If reductions are claimed for mitigation or other GHG goals, state here :	Reporting Period(s):	Vintage(s):	Indicate Number of Credits Issued:

PART X. ATTACHMENTS

- A.** If the answer to Part IV.A is "yes," provide documentation (e.g., deed of trust, title report, etc.) showing the OPO's ownership interest in the property and its interest in the trees and standing timber on the property. If the answer to Part IV.A is "no," provide documentation supporting the explanation of the OPO's right to undertake and list the project.
- B.** If the answer to Part IV.C is "public," provide documentation demonstrating explicit approval of the offset project's management activities and baseline including any public vetting processes necessary to evaluate management and policy decisions concerning the offset project.
- C.** If a Qualified Conservation Easement (QCE) has been recorded, provide a copy. The information contained in this form and the documents attached to it will be submitted to ARB so submitting a copy of the QCE as an attachment to this document fulfills the requirement in 9.1.1.1(18)(a) of the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011 to provide ARB with a copy.
- D.** If the project is located on one of the categories of Tribal land listed in Part IV.E, provide documentation demonstrating that the land within the Project Area is owned by a tribe or private entity. Also provide documentation that demonstrates the existence of a limited waiver of sovereign immunity between ARB and the governing body of the Tribe entered into pursuant to section 95975(l) of the Cap-and-Trade Regulation.
- E.** Attach map(s) of the Project Area including:
 1. Public and private roads
 2. Towns
 3. Major watercourses (4th order or greater), water bodies, and watersheds
 4. Topography
 5. Townships, ranges, and sections or latitude and longitude
 6. Existing land cover and land use (optional)
 7. Forest vegetation types (optional)
 8. Site classes (optional)
 9. Land pressures and climate zone/classification (optional)
 10. Historical land uses, current zoning, and projected land use within the Project Area (optional)
 11. A georeferenced shape file (or other electronic file that can be read in a geographic information system) that clearly identifies the Project Area and boundaries. *Note that the georeferenced shape file may constitute the required map if it includes the required map information listed above.*
- F.** Provide supporting documentation demonstrating that the offset project takes places on land that has greater than 10 percent tree canopy cover.
- G.** Attach a graph portraying the baseline onsite carbon stocks with time depicted on the x-axis and metric tons CO₂e depicted on the y-axis.
- H.** Attach a diagram of the final baseline incorporating all required carbon stocks.

- I. For IFM projects on private lands ONLY: If the Project Area's initial above-ground standing live carbon stocks are below Common Practice, submit an affidavit testifying that the inventory depicted over the past 10 years (used to determine the High Stocking Reference for the Project Area) is reasonably accurate. Also include a summary of volume harvested over the past 10 years.
- J. Attach supporting documentation identifying the legal constraints within the Project Area. A 'constraints' table with the following categories may be provided for simplicity with the following information: narrative of legal constraint, identification of specific governing law guiding the constraint, acreage, silviculture method, retention strategy.

PART XI. OPO/APD SIGNATURE

Note: The person signing this supplement should be the same person signing the accompanying U.S. Forest Offset Project Data Report.

In signing this form, I certify under penalty of perjury of the laws of California that the information contained in this form is true, accurate, and complete. I further certify that I am an Account Representative of the Offset Project Operator (OPO).

SIGNATURE:



PRINTED NAME:

Roger Williams III

TITLE:
President

DATE:
5/29/2014

Background for Supplement for an Initial Improved Forest Management U.S. Forest Offset Project Data Report

Section 95976(d) of the Cap-and-Trade Regulation specifies reporting requirements for offset projects participating in the Compliance Offset Program. Offset Project Operators (OPO) or Authorized Project Designees (APD) are required to submit an Offset Project Data Report (OPDR) within four months of the end of each (annual) Reporting Period. The Compliance Offset Protocol U.S. Forest Projects, October 20, 2011, requires additional information to be included with the initial OPDR. This form is designed to help OPOs and APDs provide the extra information required for an initial OPDR by offset projects using Compliance Offset Protocol U.S. Forest Projects, October 20, 2011. This information is submitted to the approved Offset Project Registry that is listing the offset project and should also be provided to the ARB-accredited verification body that will be verifying the Offset Project Data Report.

The information to be provided in this form closely mirrors information provided in the application for listing an offset project using the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011. OPOs and APDs may wish to copy the information in their project's application for listing to the extent that the information provided at the time of that application has not changed.

Where to Submit Information Contained in This Form

Please complete the information on the form using your computer. Then print, sign, and scan the form. The completed and signed information and all supporting documentation should be submitted to the appropriate [Offset Project Registry](#).

Copies of this form can be downloaded from the ARB website at:
<http://www.arb.ca.gov/cc/capandtrade/offsets/forms/forms.htm>

Detailed Instructions for Supplement for an Initial Improved Forest Management U.S. Forest Offset Project Data Report

Part I. Entity Submitting Report:

- Indicate whether the Offset Project Operator (OPO) or Authorized Project Designee (APD) is submitting the Offset Project Data Report and this supplement.
- List the name, organization, phone number, and email address of the person submitting the information. This person should be an employee of the OPO or APD, whichever entity is making the submission. The person submitting the information need not be the same person as the contact person listed for the OPO or APD in Part III and also need not be the person signing the form in Part XI.
- The person submitting the information should indicate the date the form is completed.

Part II. Offset Project Information:

- Provide the name for the offset project. Also provide the project's identification number from the approved Offset Project Registry listing the project. The ARB project identification number may also be provided if known.
- Indicate the offset project commencement date and the start and end dates of the first reporting period. Unlike with the listing form, approximations are no longer acceptable for these dates since precise dates should be known.
- Project commencement for an Improved Forest Management Project must be linked to a discrete, verifiable action that delineates a change in practice that increases sequestration and/or decreases emissions relative to the forest project's baseline. This date could be triggered by the transfer of property ownership, recordation of a conservation easement on the Project Area, or when submitting the offset project listing information.

Part III. OPO/APD Information:

- Enter contact information for the OPO and APD submitting the supplement. Every offset project will have an OPO. If an offset project does not have an APD, please mark the box indicating the Offset Project does not have an APD and leave the remaining fields blank.
- For both the OPO and, if applicable, the APD, enter the entity's name, its mailing address, and the name, phone number, and email address of a contact person for the entity. Also include its CITSS ID number. The CITSS ID is six characters in length, with two letters followed by four numbers (e.g.,

"CA1234"). **DO NOT PROVIDE THE CONFIDENTIAL CITSS ACCOUNT NUMBER**, which begins with the CITSS ID number followed by a hyphen and more numbers.

Part IV. Land Ownership:

- This part includes questions regarding land ownership and property interests.
- Further documentation is required based on the responses to some questions. See Part X of this supplement for more information on the precise requirements.

Part V. Offset Project Area:

- This part asks for qualitative descriptions of the offset Project Area.
- Maps are required to complement the descriptions provided in this part. See Part X of this supplement for more information on the precise requirements.
- The Project Area should be determined following the requirements of Section 4 of the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011.
- Assessment areas shall be determined by referencing the Assessment Area Data File available at: <http://www.arb.ca.gov/cc/capandtrade/protocols/usforestprojects.htm>

Part VI. Offset Project Eligibility:

- The questions in this part are designed to facilitate the determination of project eligibility for Improved Forest Management Projects.
- Further documentation is required based on the responses to some questions. See Part X of this supplement for more information on the precise requirements.
- Details on the eligibility requirements for Improved Forest Management Projects can be found in Sections 2.1.2, 3.1, and 3.8 of the Compliance Offset Protocol U.S. Forest Project, October 20, 2011.
- Details on the Natural Forest Management criteria can be found in Table 3.2 in the Compliance Offset Protocol U.S. Forest Project, October 20, 2011.

Part VII. Carbon Stock Inventory:

- Projects are required to have completed a full carbon stock inventory for the initial Offset Project Data Report. Unlike the inventory provided at the time of listing, a general description of the project's inventory methods with preliminary best estimates is no longer sufficient to meet the regulatory requirements. If the project's inventory methodology changed between the time of listing and submission of the initial OPDR, this change should be reported as a change to the information submitted at project listing when submitting the first OPDR.
- Section 6.2 of the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011 outlines the approved quantification methodologies for Improved Forest Management Projects. Further details on completing a forest project carbon inventory can be found in Appendix A of the Protocol.
- Follow the steps in Appendix D of the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011 to quantify the project's reversal risk rating.
- The project's expected contribution to the Forest Buffer Account is determined annually based upon the project's risk of reversal and is calculated by multiplying the project specific reversal risk rating by the total net GHG reductions/removals achieved by the project. Unlike the listing application, for this OPDR supplement an approximation of the contribution to the Forest Buffer Account is not acceptable.

Part VIII. Offset Project Baseline:

- For this OPDR, unlike the project listing application, projects are required to have a finalized baseline. A modeling plan with preliminary best estimates is no longer sufficient to meet the regulatory requirements. If the project's modeling plan or baseline estimates changed between the time of listing and submission of the initial OPDR, this change should be reported as a change to the information submitted at project listing when submitting the first OPDR.
- Note that IFM projects located on public land must present documentation demonstrating explicit approval of the offset project's management activities and baseline. These projects may report changes to the baseline within the initial OPDR if the changes have gone through a public review process and meet the Protocol requirements regarding explicit approval of the project's baseline.
- This part is divided into three sections: questions required for all Improved Forest Management Projects; questions for Improved Forest Management Projects on private lands; and questions for Improved Forest Management Projects on public lands. Answer the questions applicable to the project.
- Section 6.2 of the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011 outlines the approved quantification methodologies for Improved Forest Management Projects. Instructions for considering legal and financial constraints can be found in Sections 6.2.1.2 and 6.2.1.3, respectively. Further details on modeling carbon stocks can be found in Appendix B of the Protocol.

- ARB approved growth models can be found in Appendix B, Section B.1 of the Compliance Offset Protocol U.S. Forest Projects, October 20, 2011.

Part IX. Additional Questions:

- Answer both questions. If the answer to either question is "yes," identify the registry or program and provide details on the issued credits in the space provided.

Part X. Attachments:

- Provide each attachment on a separate sheet of paper and submit along with the completed application for listing.
- To aid with tracking each attachment, it is recommended that the attachments are labeled to correspond with the letter in Part X that they refer to (e.g. "Attachment B").
- When an attachment is not applicable to the project being listed, please select the "N/A" (Not Applicable) checkbox next to the requirement so that it is clear that the attachment was not inadvertently left off.

Part XI. OPO/APD Signature:

- The individual signing the document must be registered in CITSS as the OPO's Primary Account Representative or Alternate Account Representative for the entity submitting the information. The individual signing the document may be an APD employee and/or representative; but to sign the document, the individual must be an Account Representative on the OPO's CITSS account.
- Please provide the individual's signature, printed name, corporate title, and date signed.
- There are no attestations for this supplement. The attestations required for the Offset Project Data Report are included in the form U.S. Forest Offset Project Data Report.

Attachment A – Ownership Documentation

The deeds associated with ownership of the Bishop Project area have been provided separately for verification purposes.

Attachment B – Public Ownership

Not Applicable

Attachment C – Qualified Conservation Easement

Not Applicable

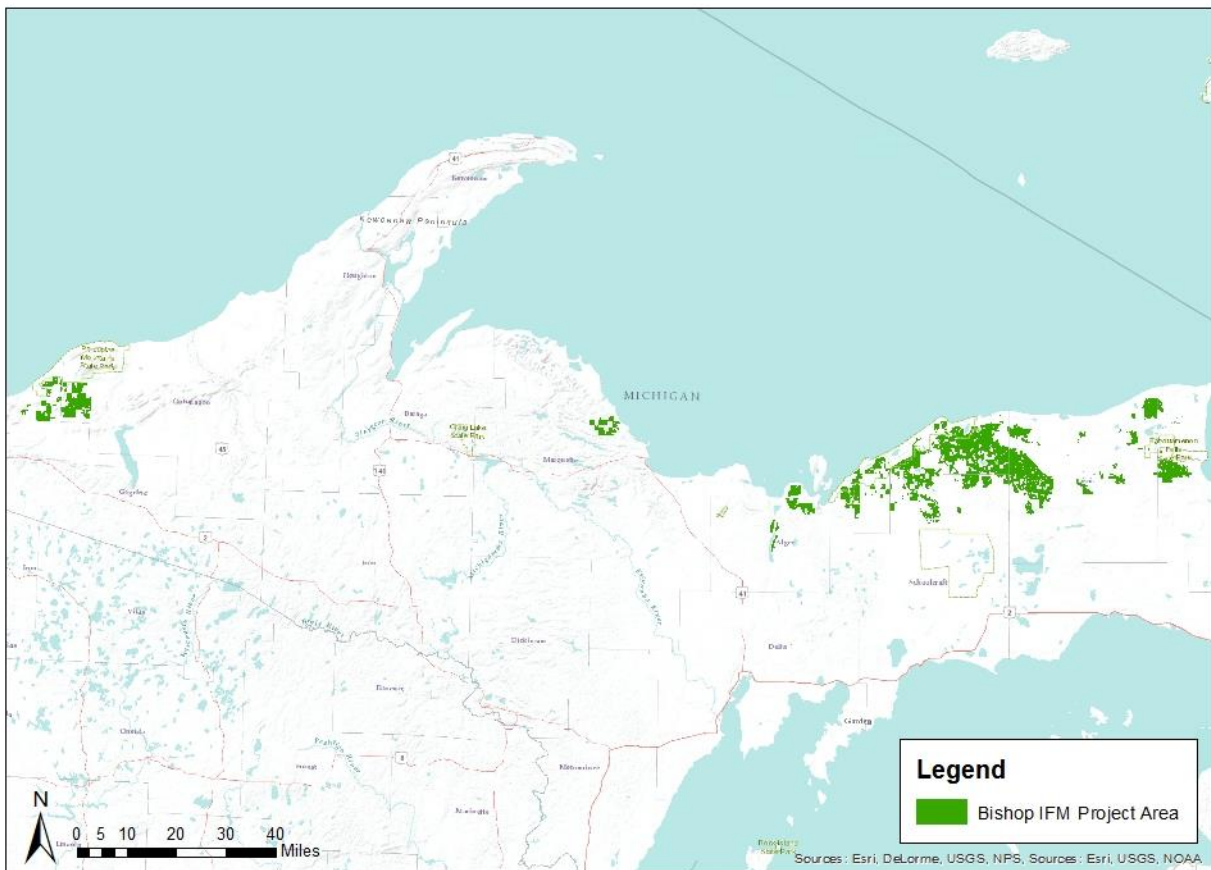
Attachment D – Tribal Land

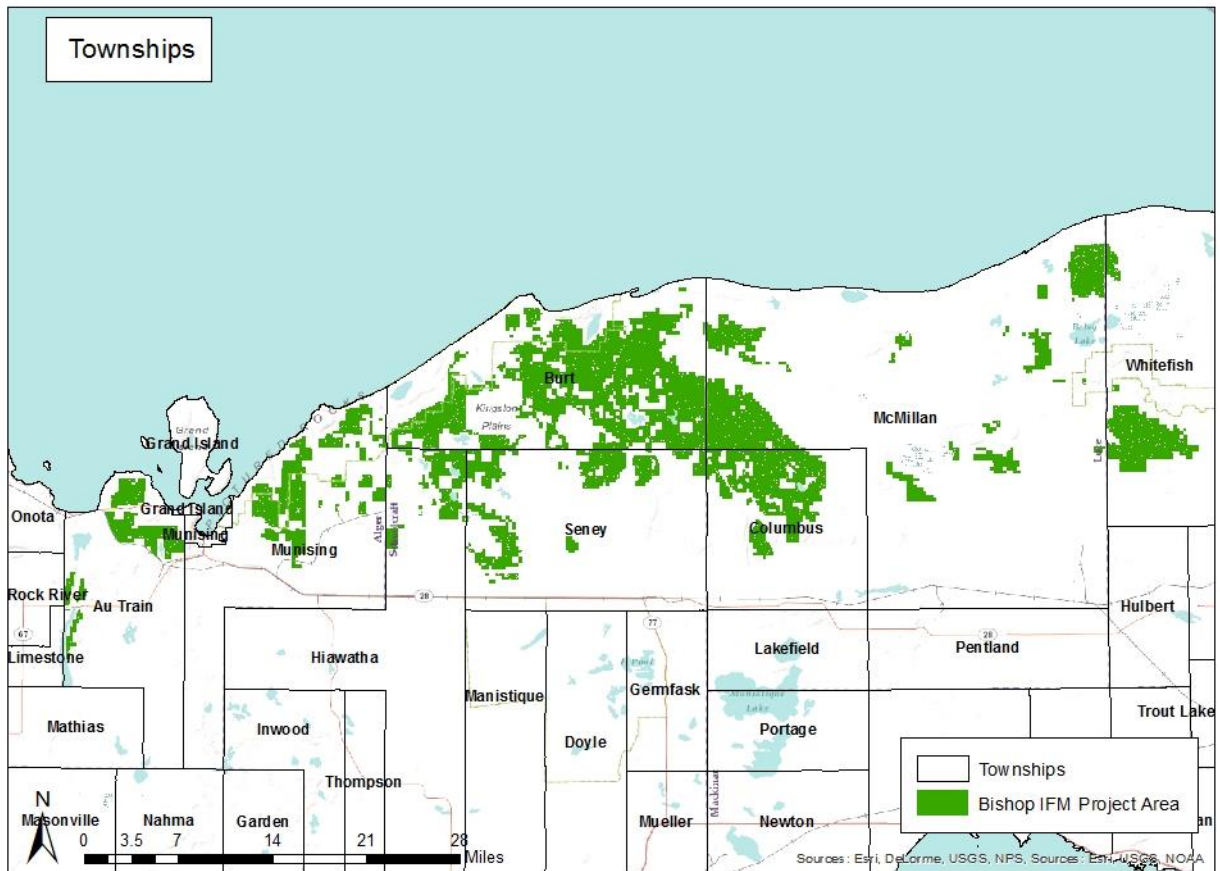
Not Applicable

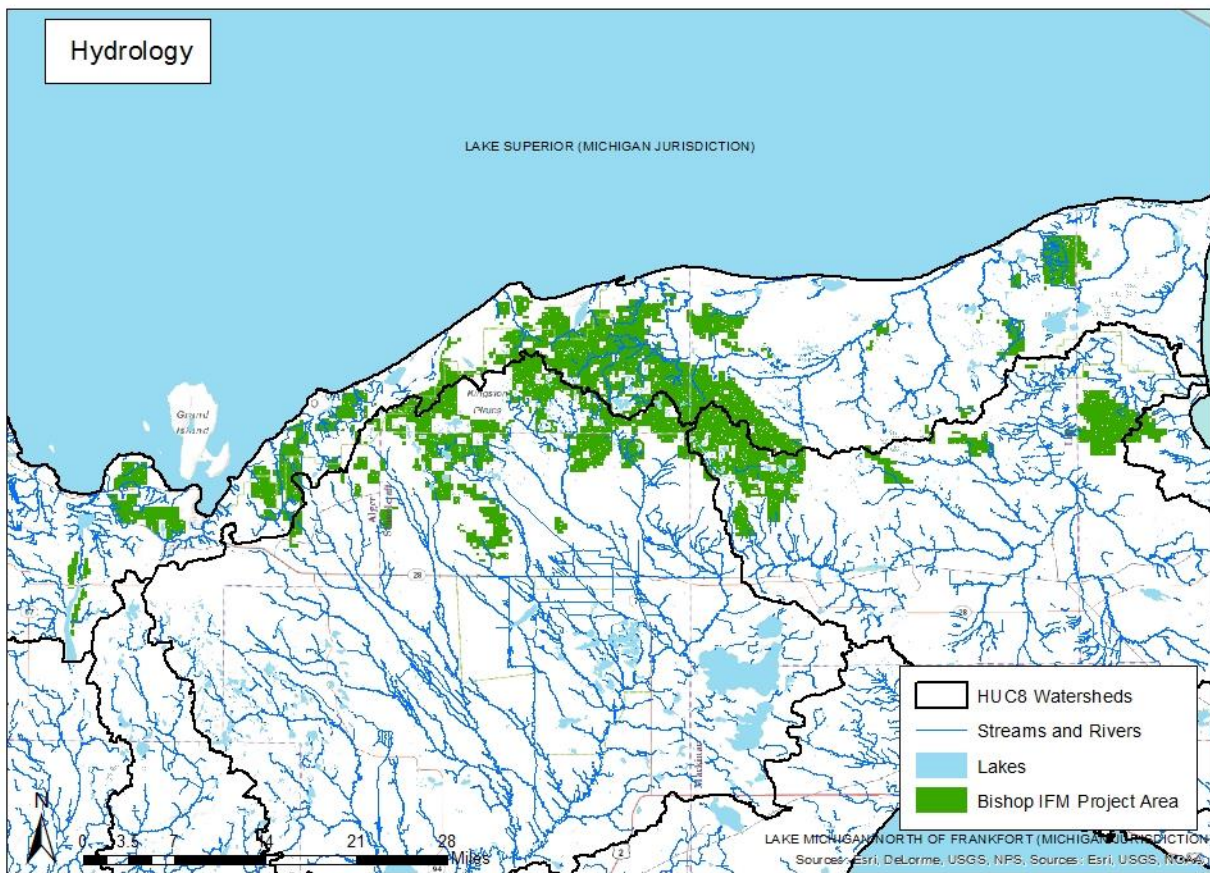
Attachment E – Project Area Maps

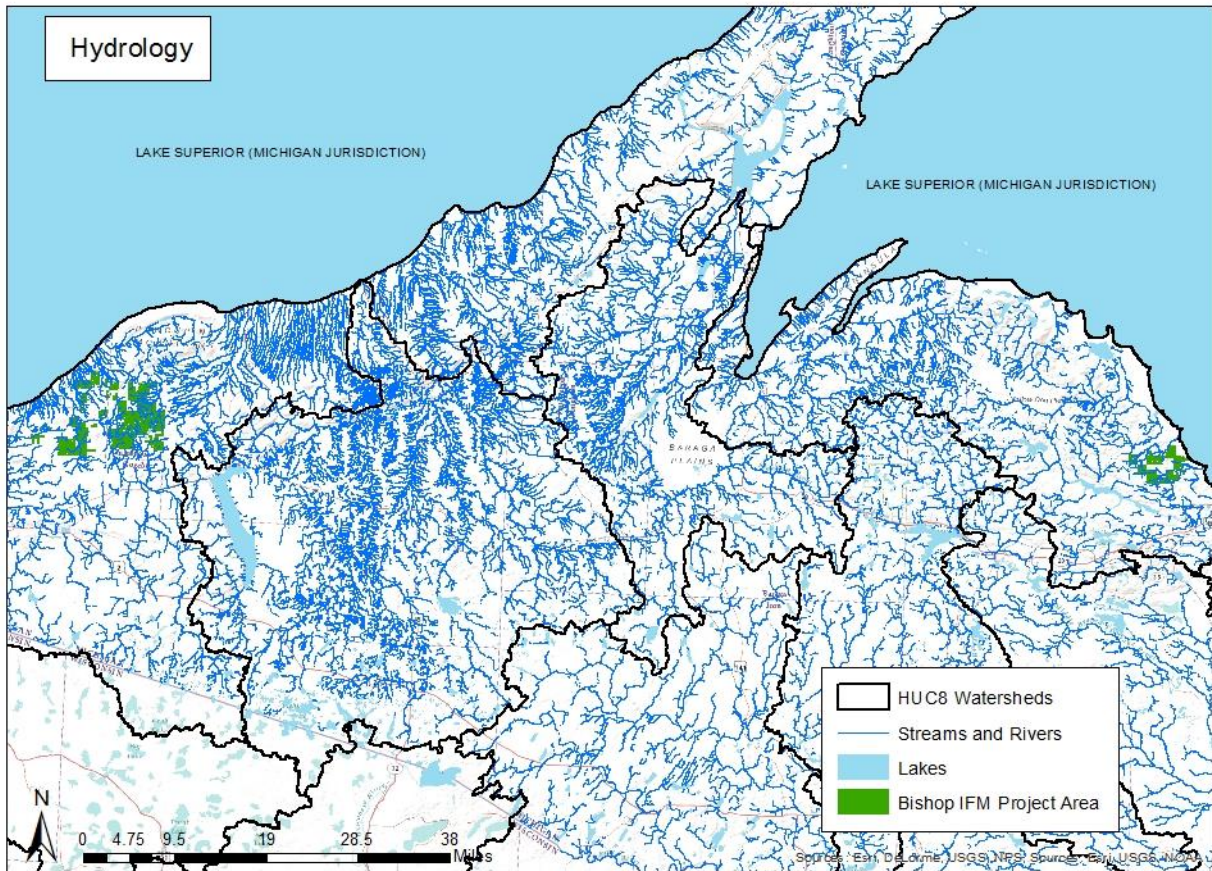
A georeferenced Project Boundary Map has been provided separately for verification purposes

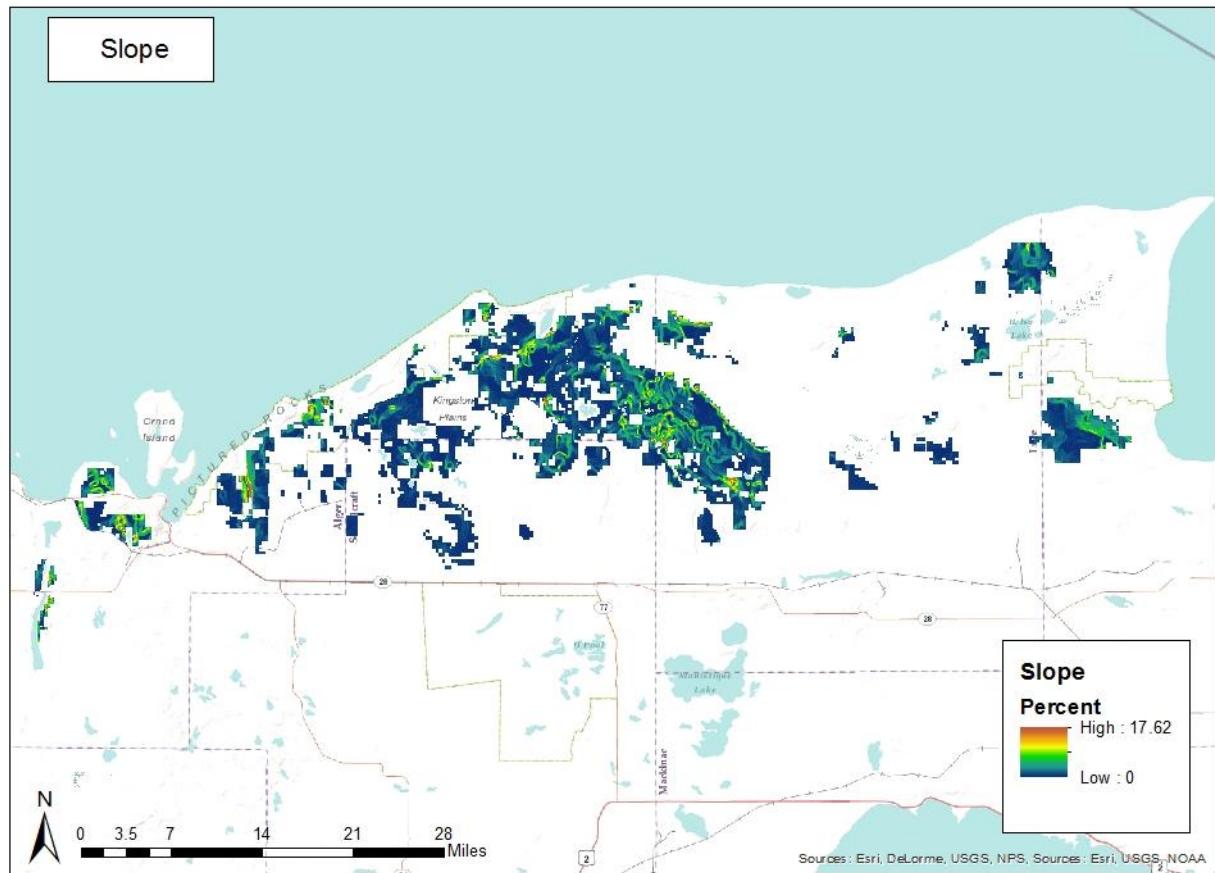
Bishop Improved Forest Management Project

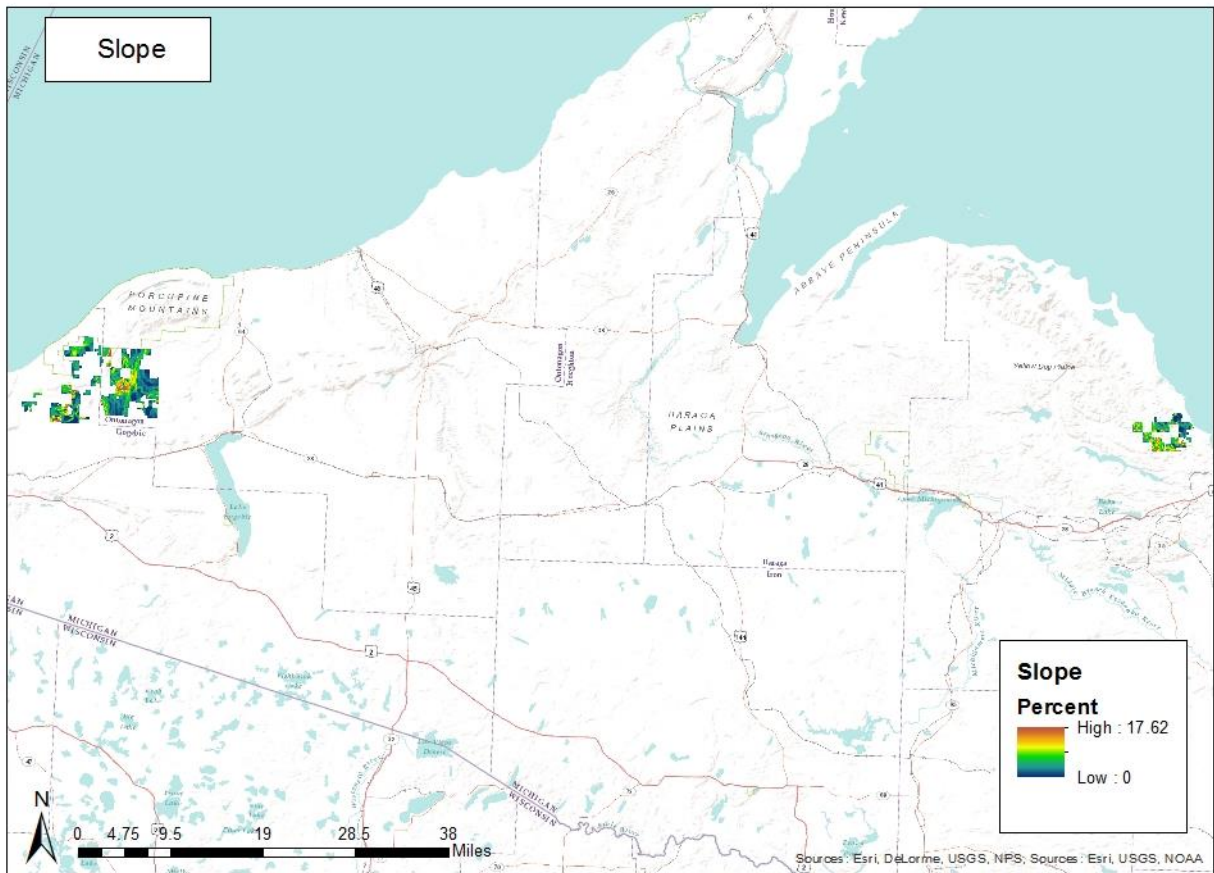




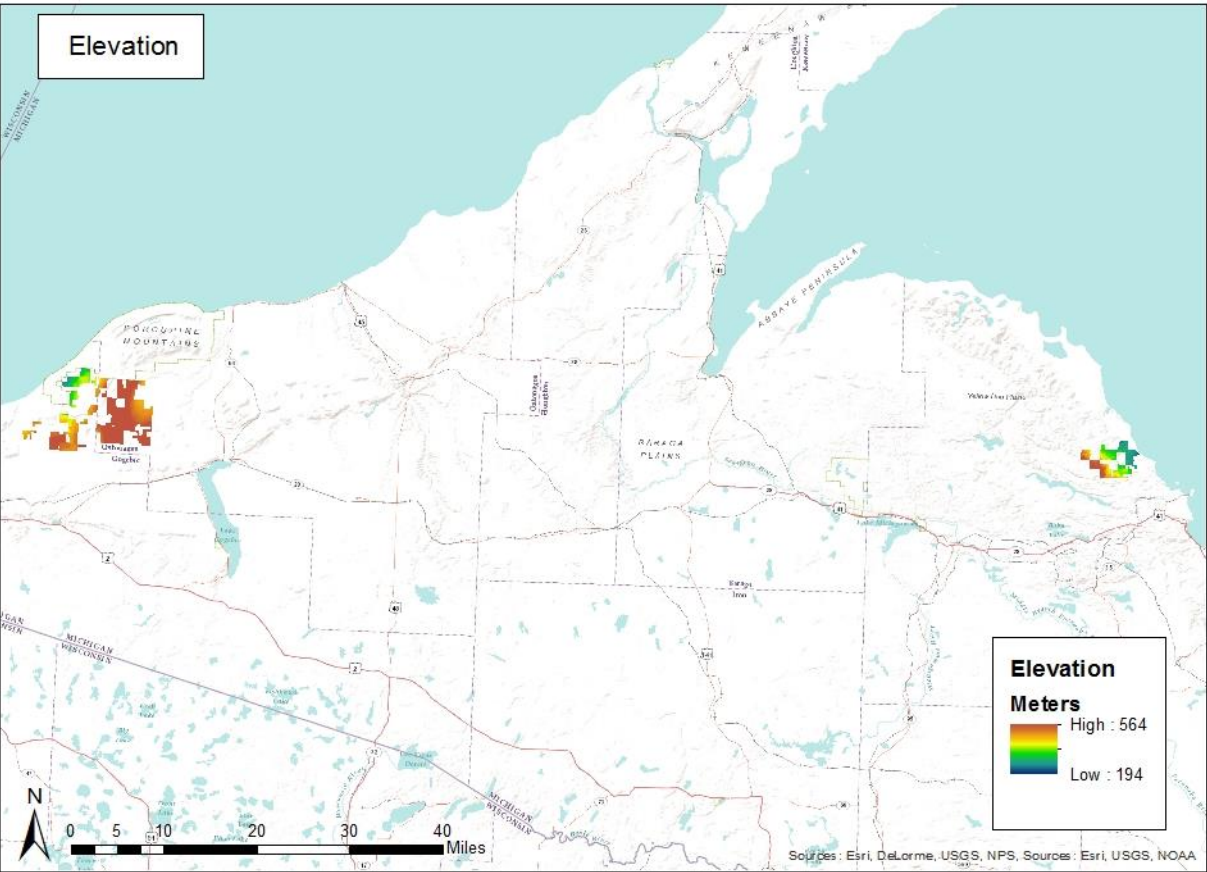


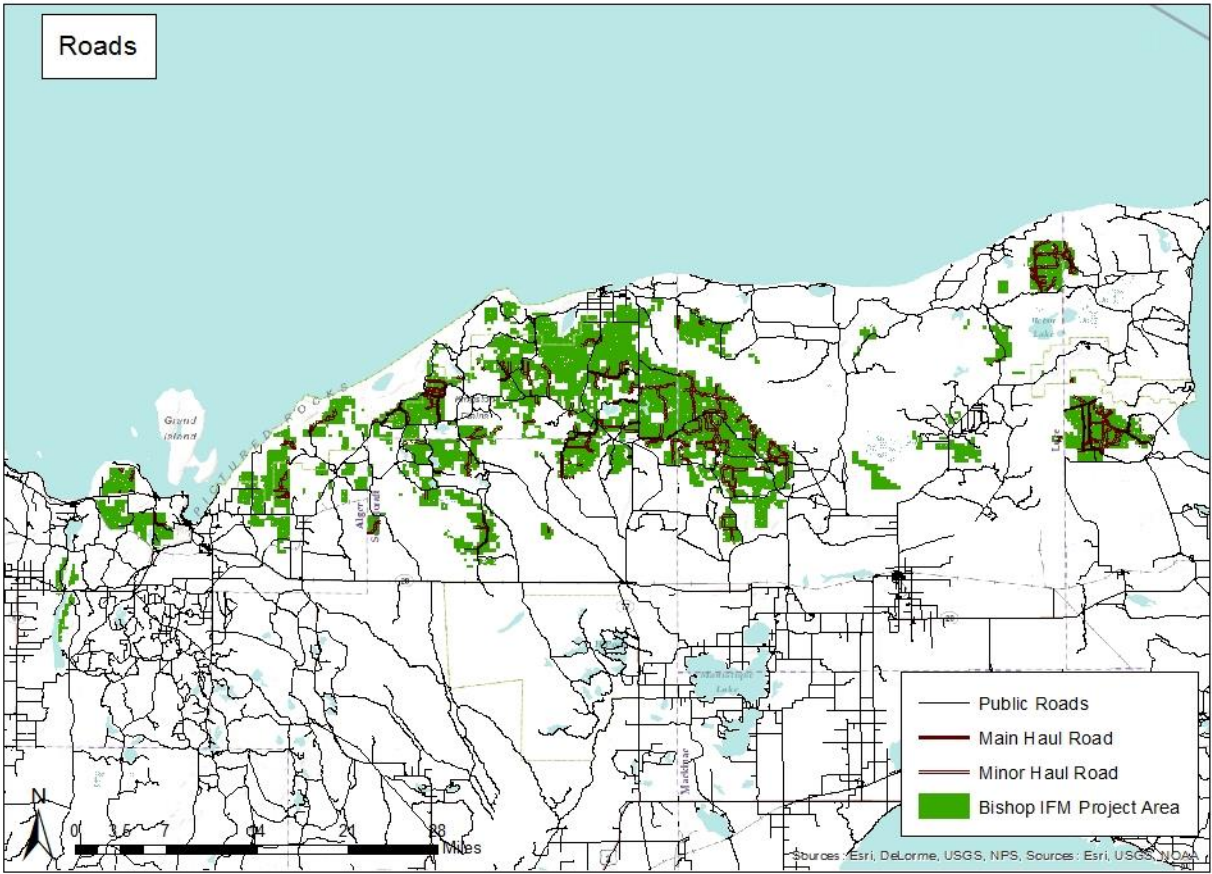


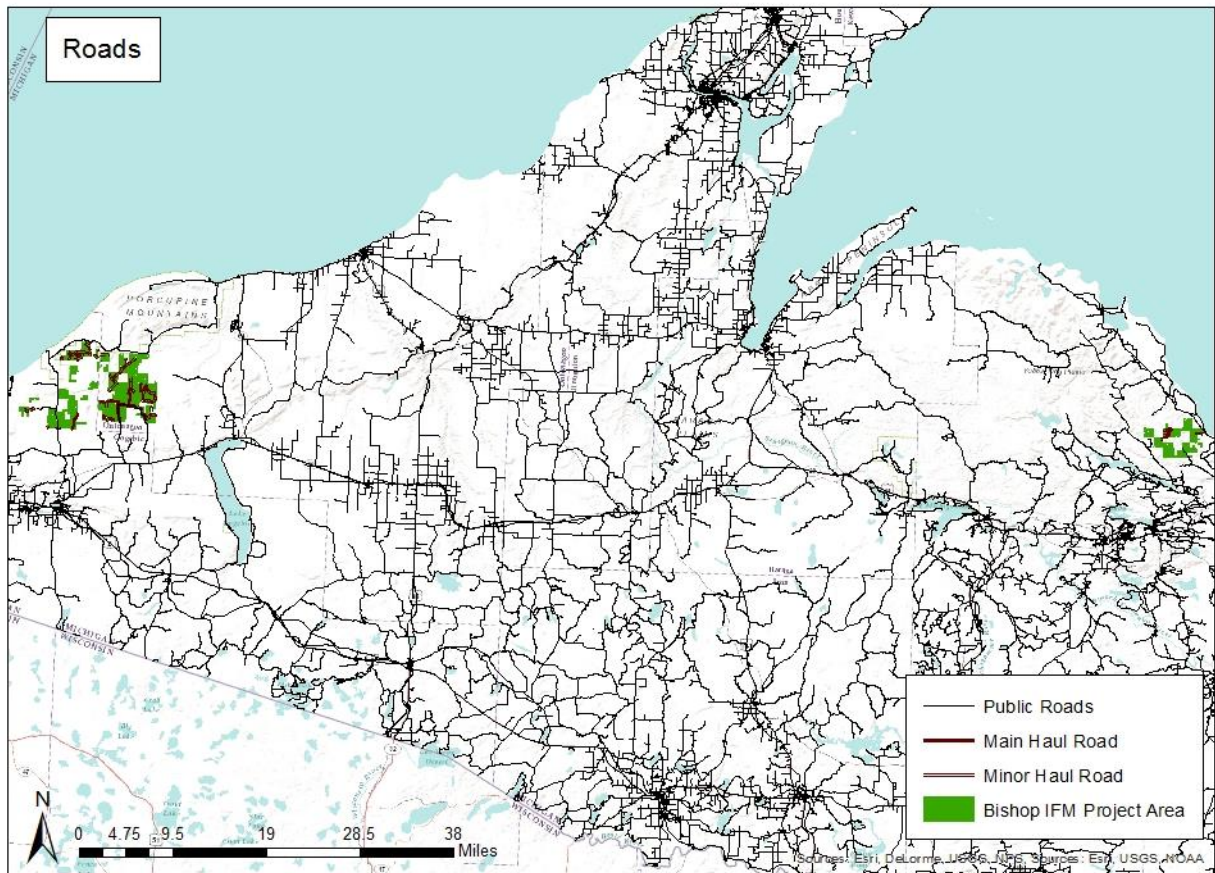


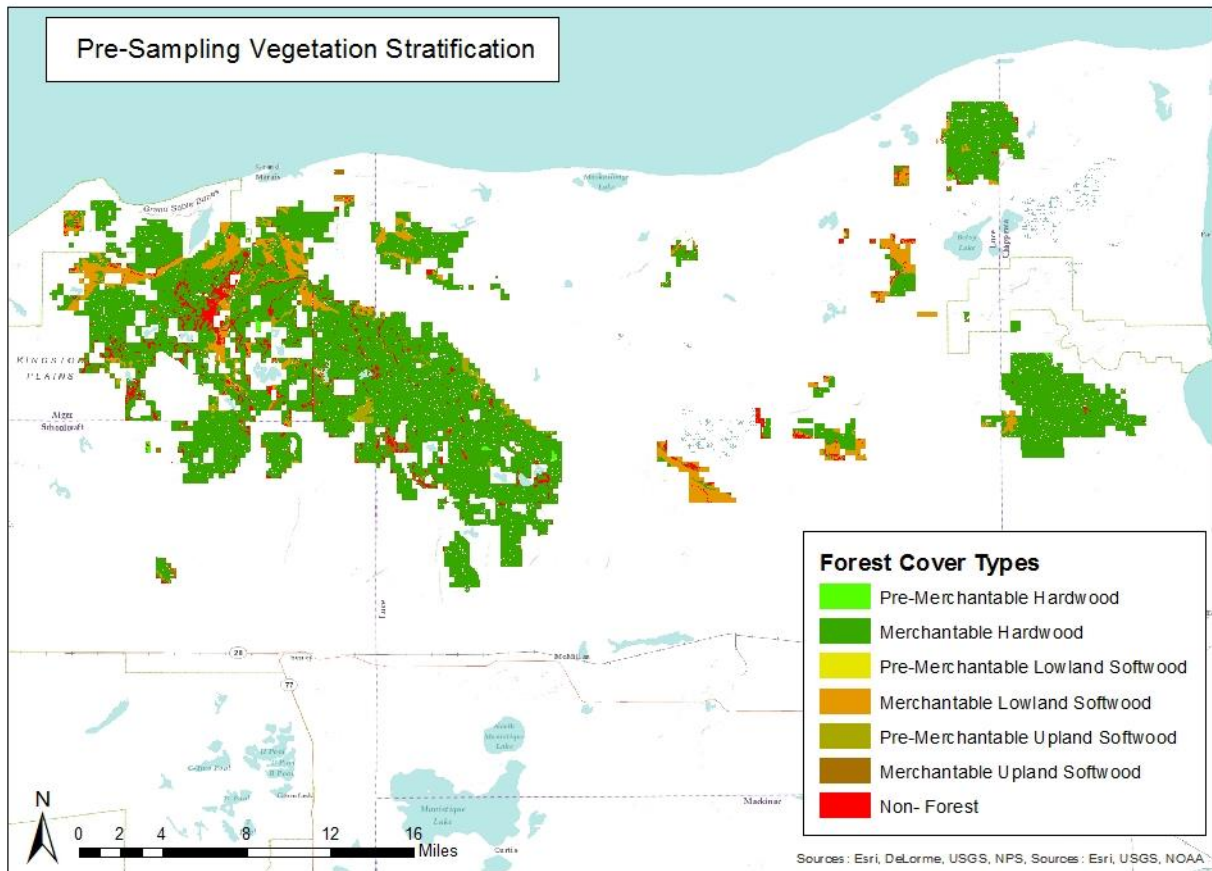


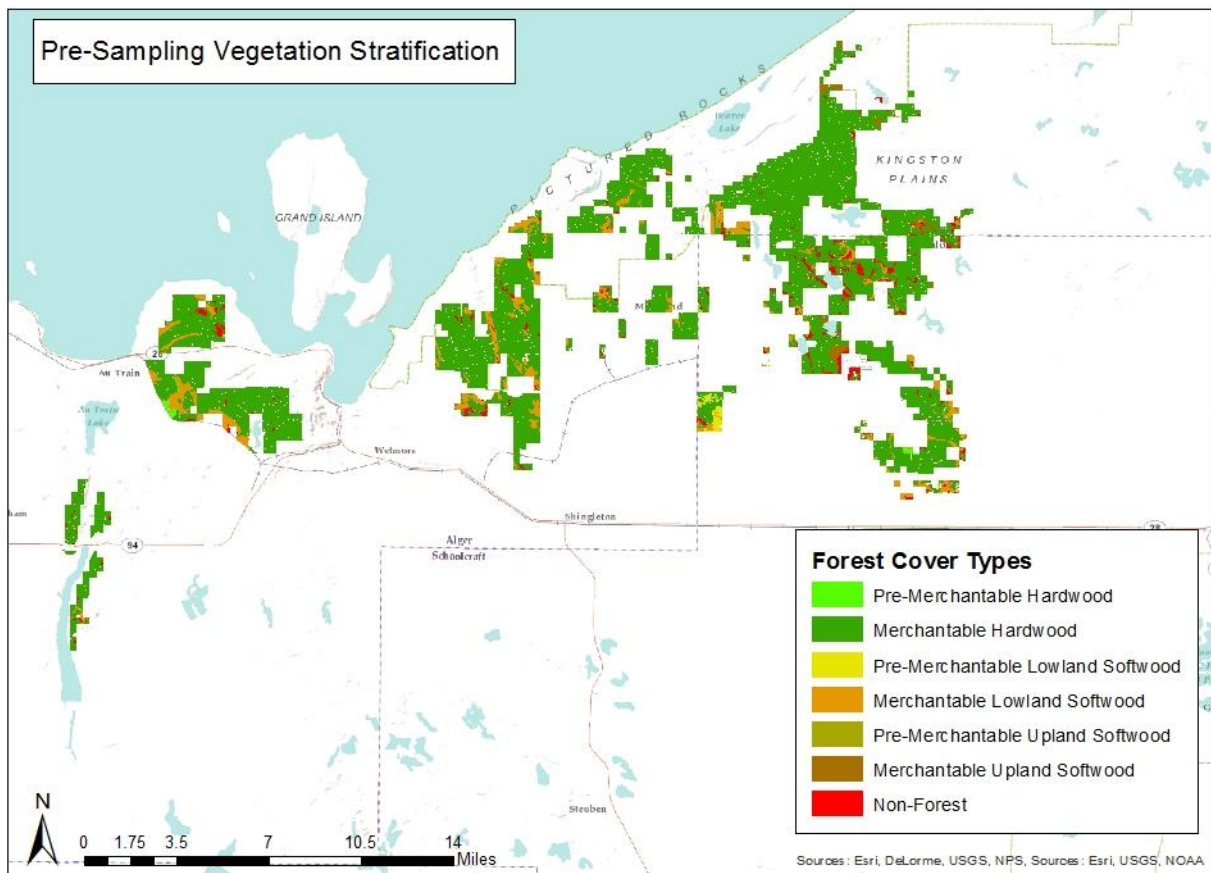


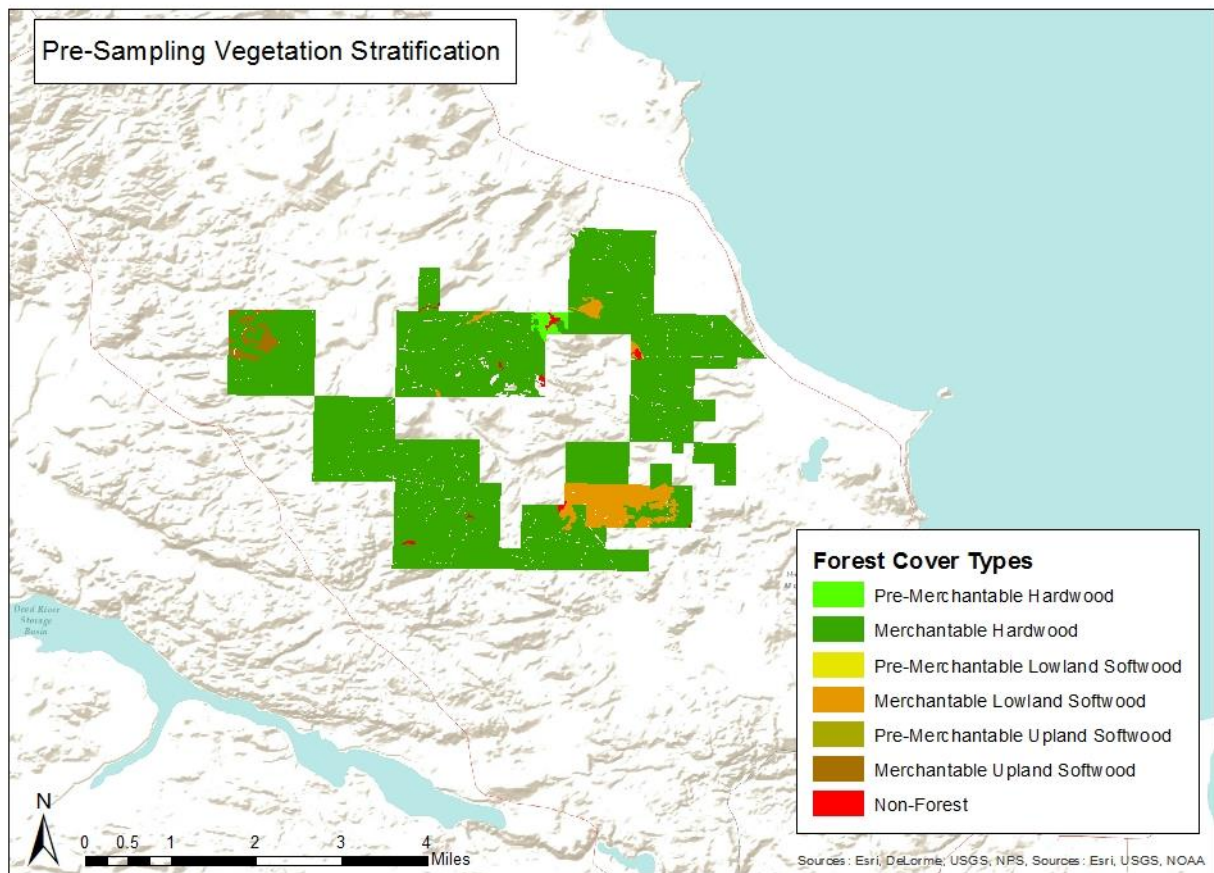


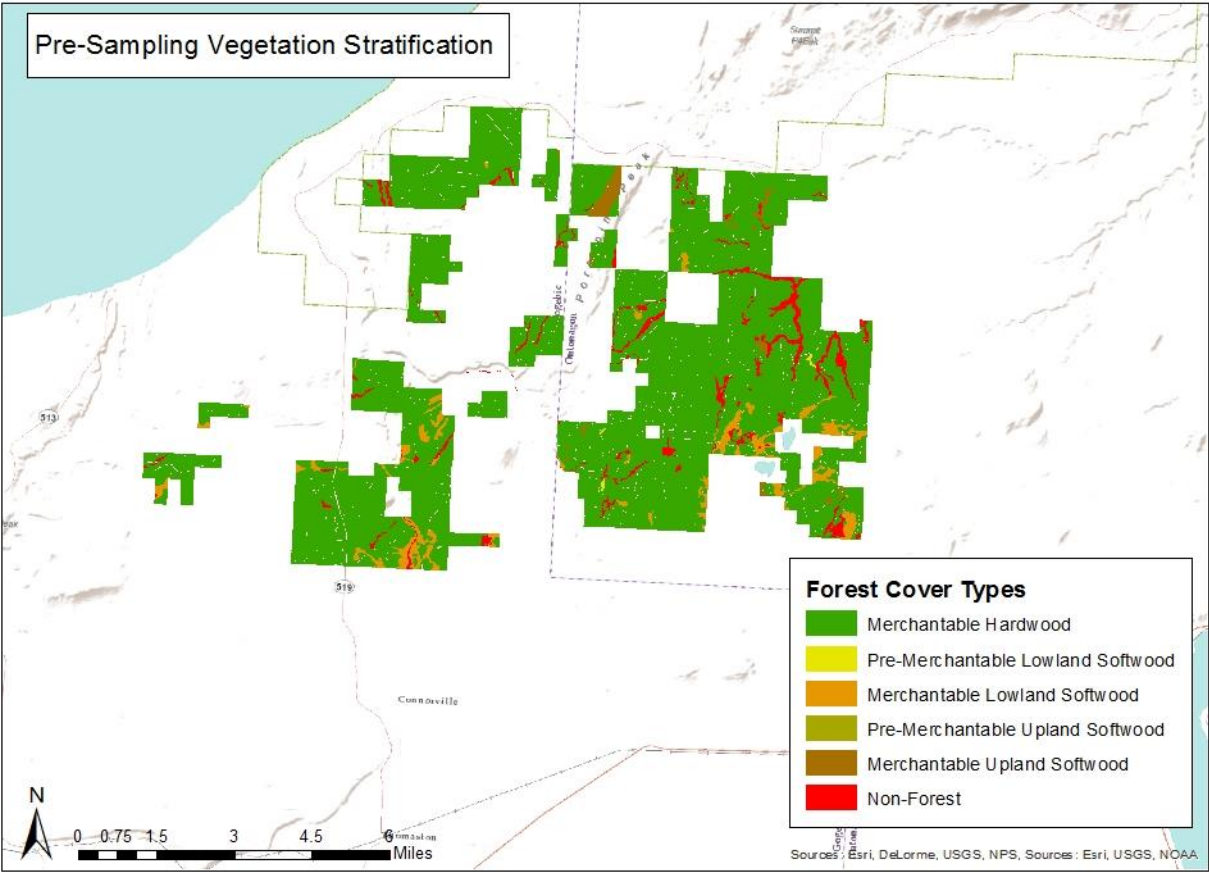


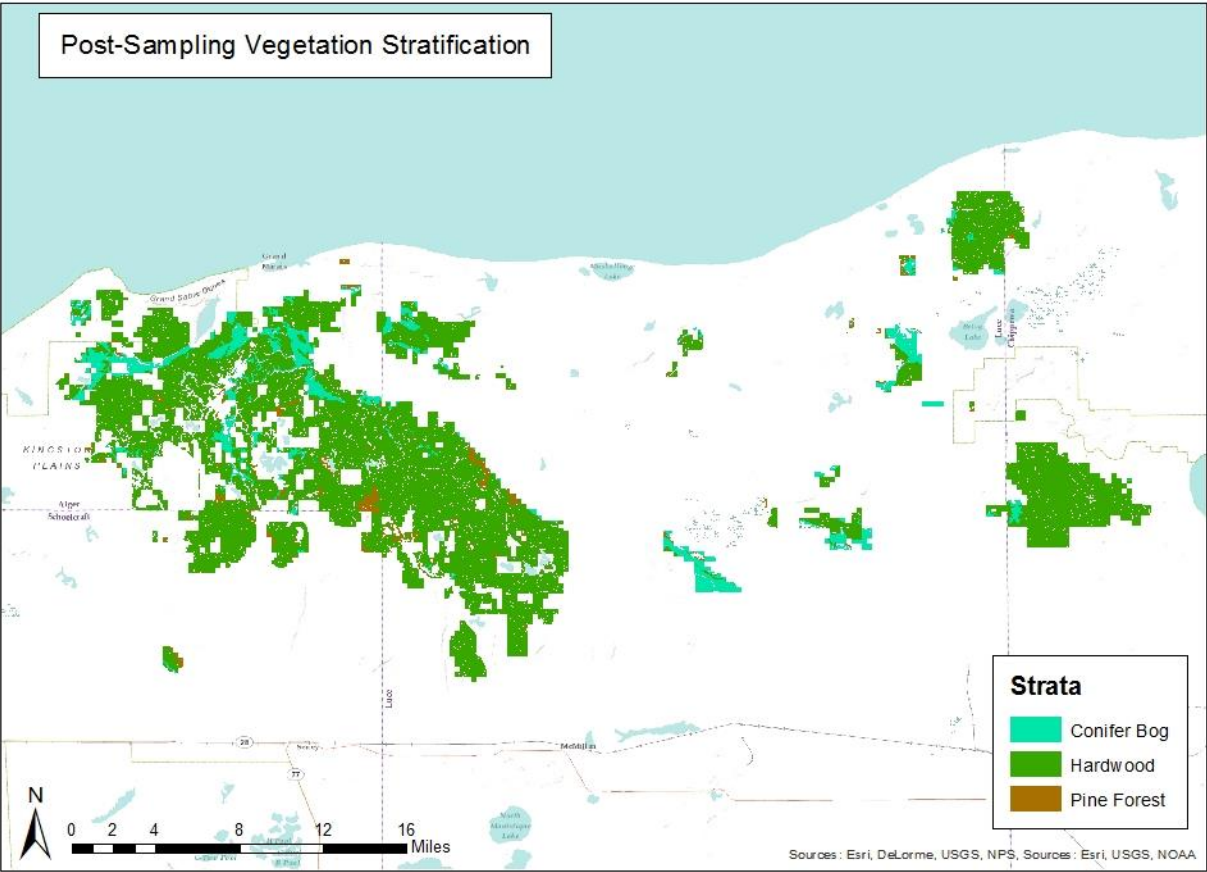


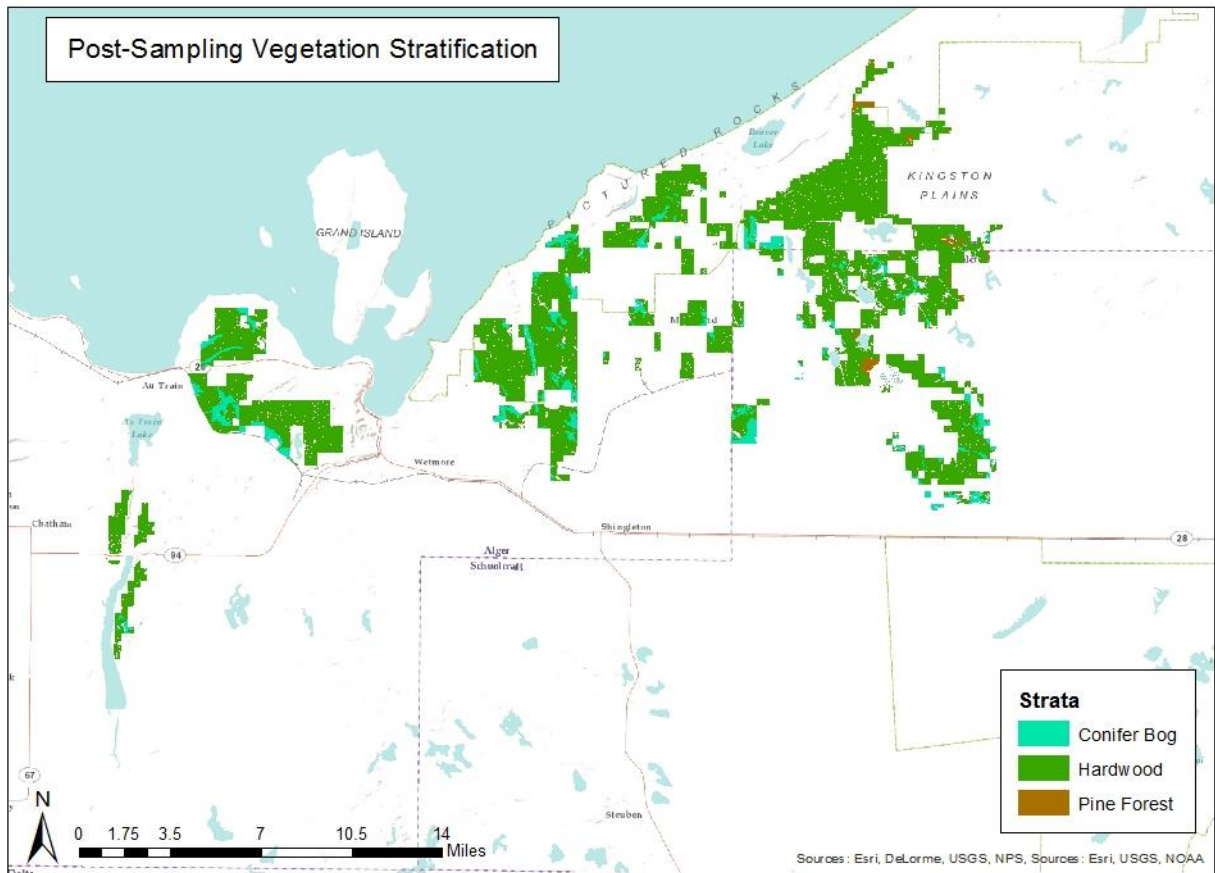


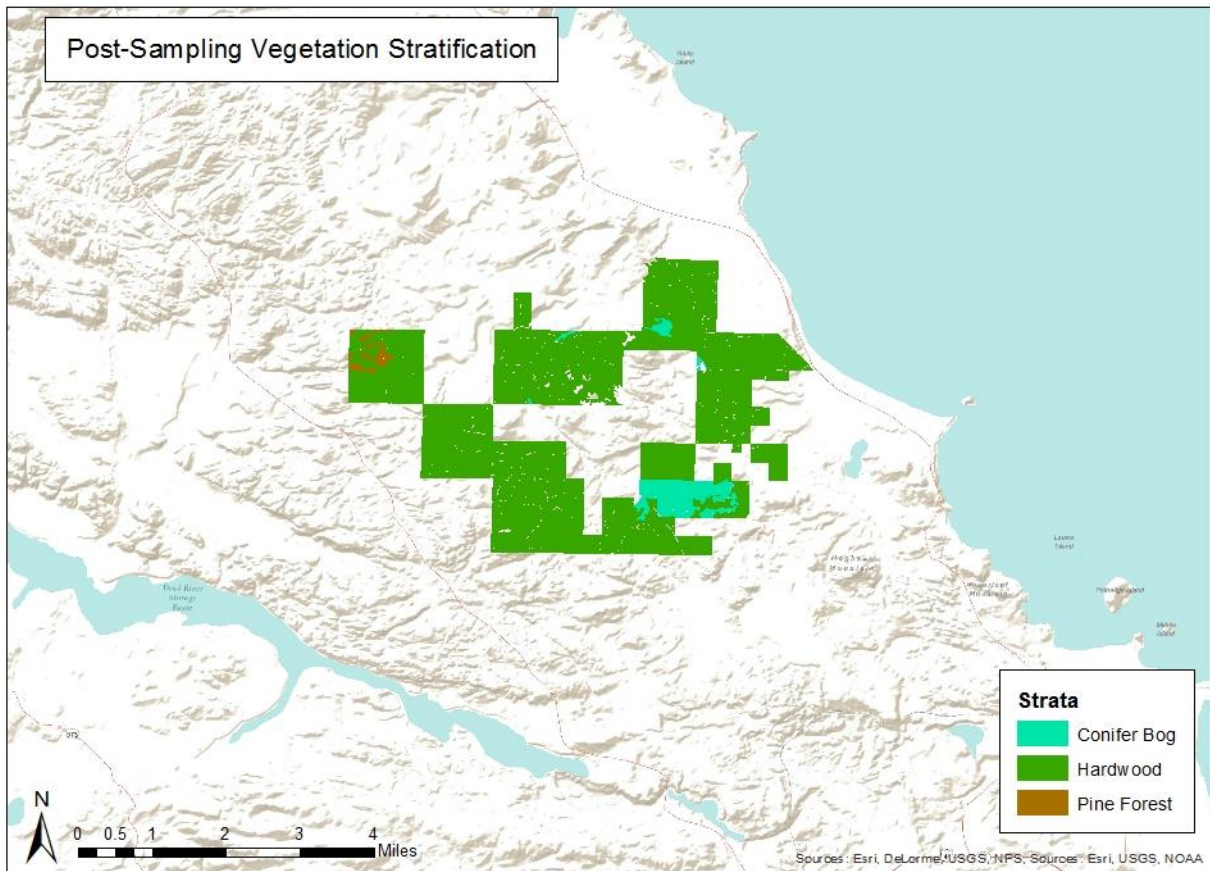


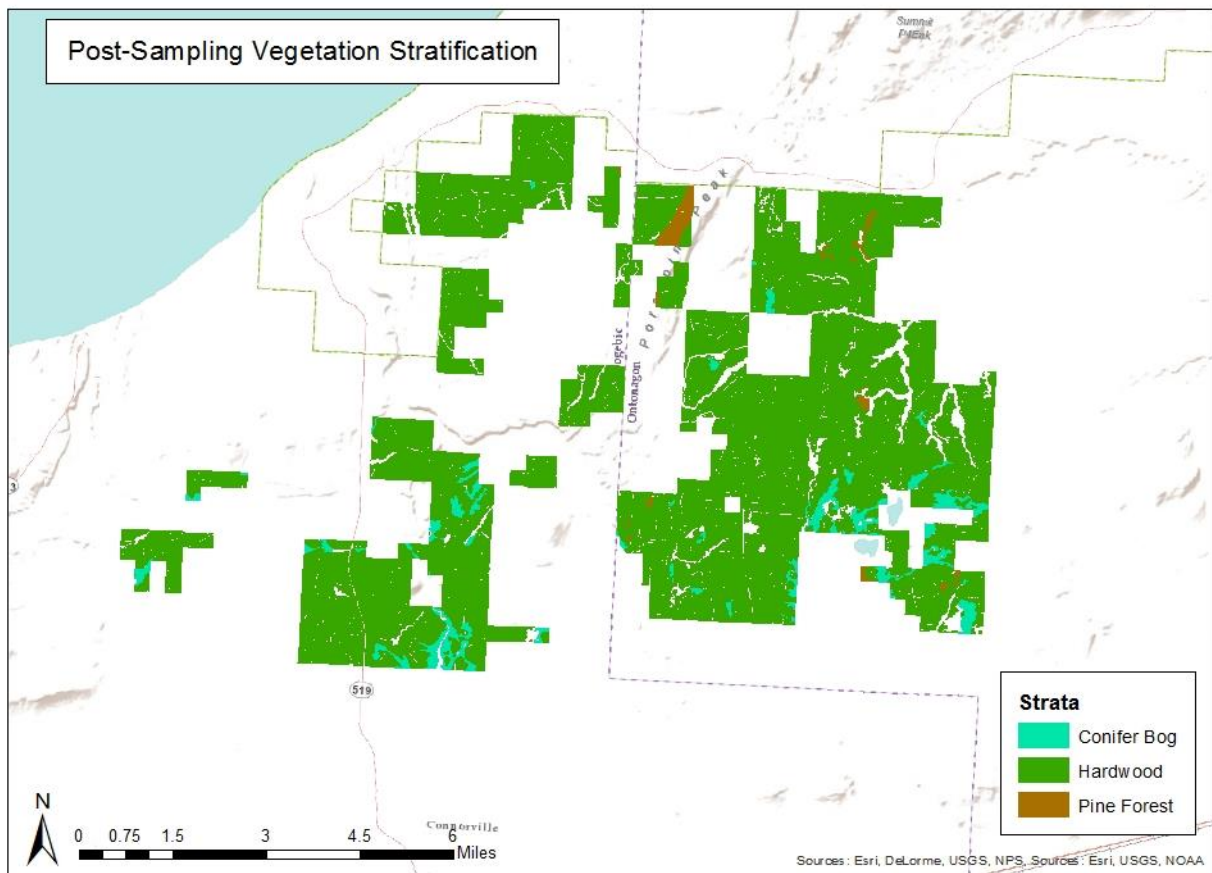










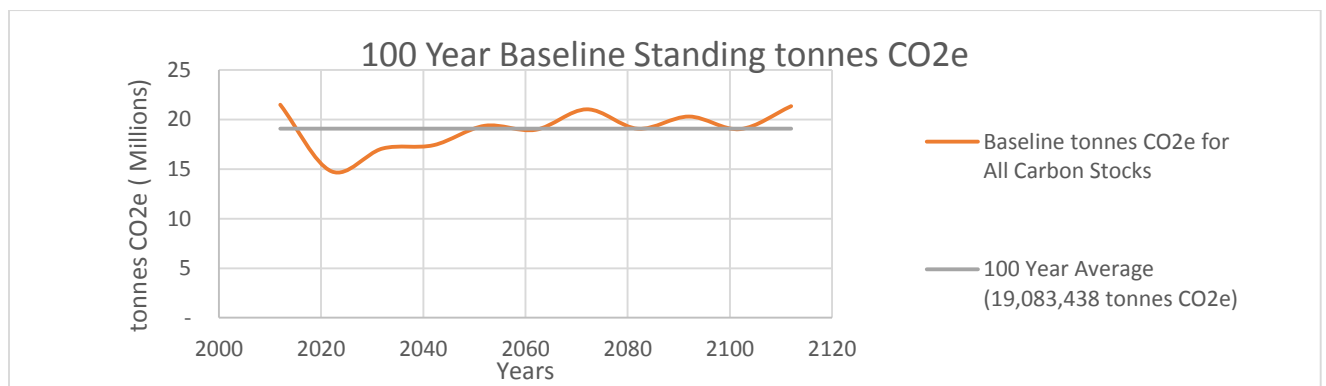


Attachment F – Canopy Cover

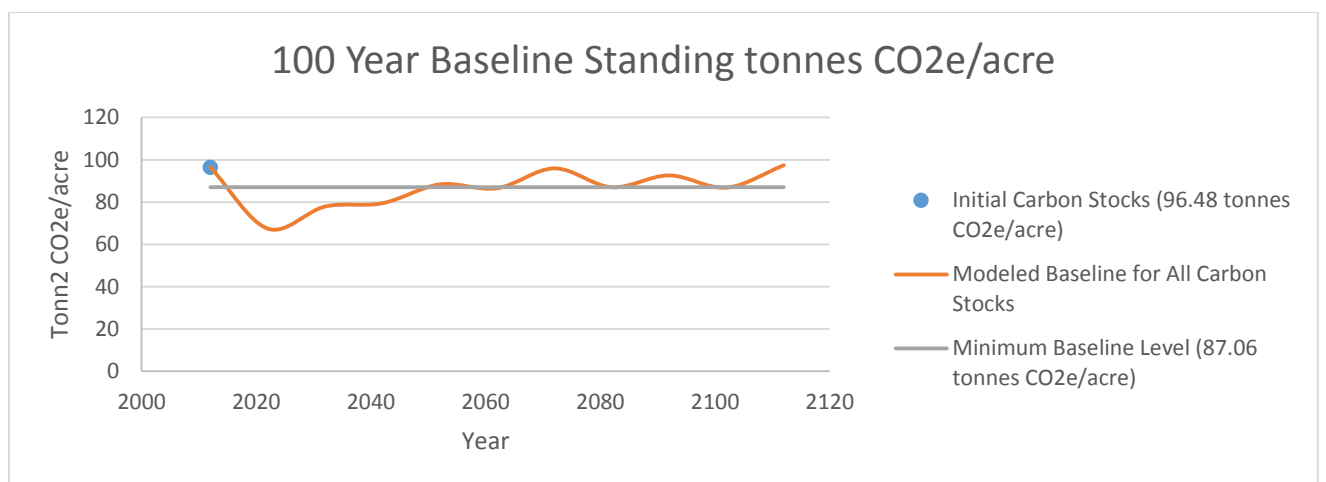
Canopy cover was calculated using the FVS STRCLASS keyword. The table below displays the average canopy cover at the project commencement date in each of the tree project strata.

Strata	Cover (%)
Hardwood	64.78
Conifer Bog	55.50
Pine	54.50

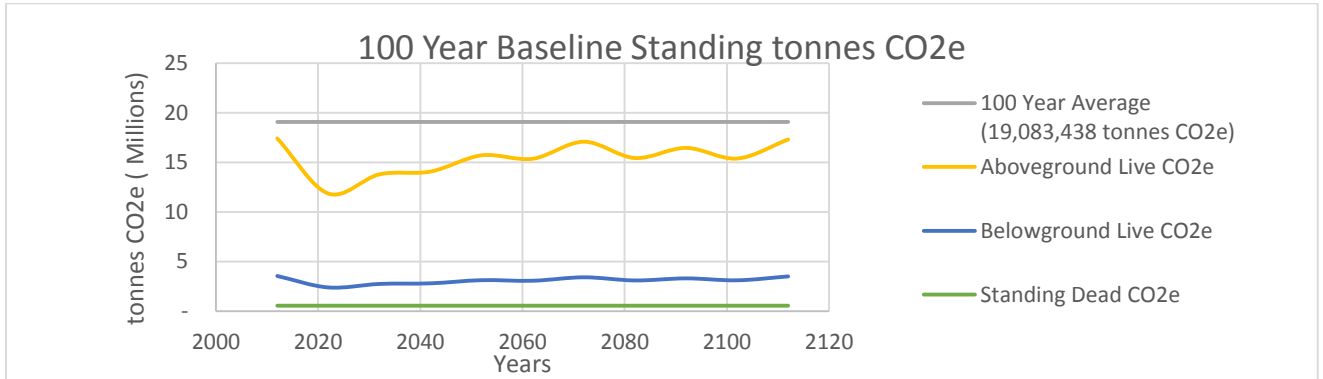
Attachment G – Baseline Onsite Carbon Stocks



The above graph reflects the growth of baseline onsite carbon stocks over time compounded with ongoing harvesting within the Project Area over 100 years. The baseline harvest scenario starts with an onsite carbon stock of 21,158,890 tonnes CO₂e, and the 100 year average of 19,083,438 tonnes CO₂e by 2022 after heavy initial harvesting efforts. Afterwards, baseline onsite carbon stocks fluctuate as additional harvesting cycles go into effect. The below graph shows these values per acre.



Attachment H – Baseline Incorporating All Required Carbon Stocks



The above diagram shows the final baseline incorporating all required carbon stocks.

Attachment I- High Stocking Reference

Not applicable

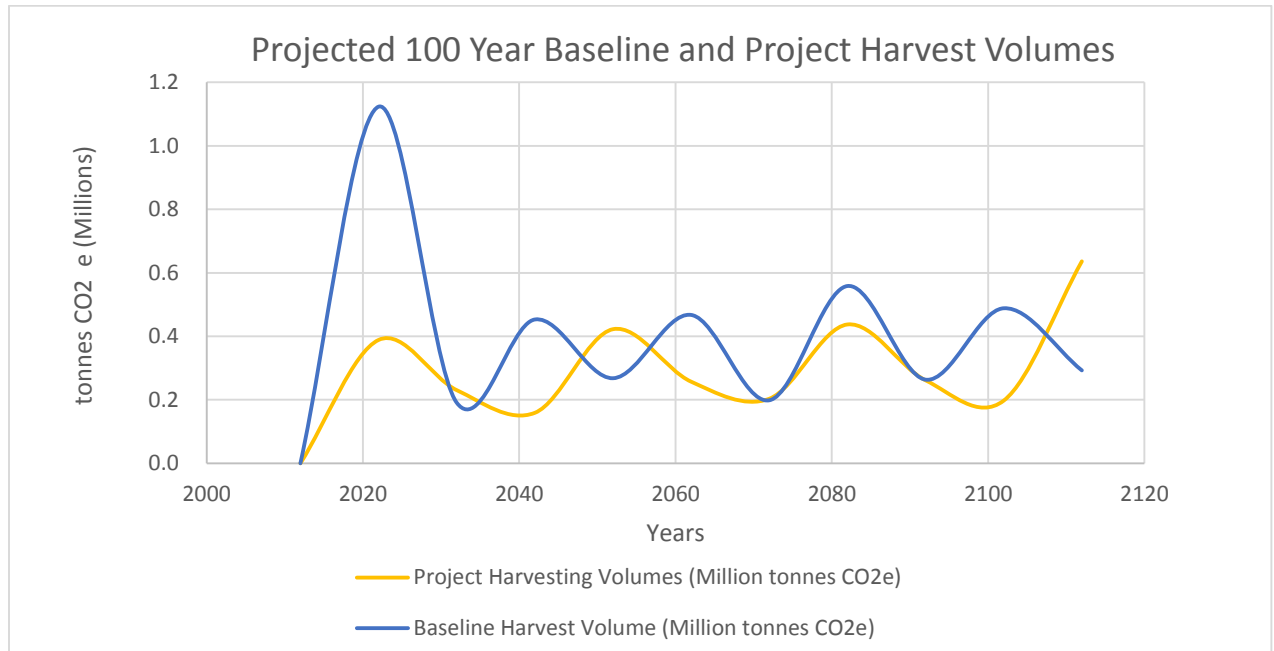
Attachment J – Legal Constraints

No explicit forest management constraints are mandated by the state in the Project Area. Voluntary BMPs were followed in the modeling of both the baseline and project scenarios and no harvesting was carried out in riparian zones.

The primary law governing natural resources and environmental protection in Michigan is Michigan Public Act 451: [http://www.legislature.mi.gov/\(S\(u2qdqf454r1yza45he4kwrry\)\)/mileg.aspx?page=getObject&objectname=mcl-act-451-of-1994](http://www.legislature.mi.gov/(S(u2qdqf454r1yza45he4kwrry))/mileg.aspx?page=getObject&objectname=mcl-act-451-of-1994)

Because conservation easements were conveyed more than 6 months prior to the Start Date, their management constraints were modelled in the baseline. All easements have been provided separately for verification purposes.

Attachment K – Baseline and Project Harvests



For northern hardwoods strata, the baseline was modeled using four prescriptions in several ways over varying areas within the Project Area. For these prescriptions, the baseline was modeled using 10 year and 15 year intervals with single tree selection to 50 ft² and 70 ft² basal area. Additionally, some acres were grown with no harvesting. Similarly, for the projected actual harvest volumes, a portion of the strata was let to grow with no harvest while the remainder was modeled under 15 year interval single tree selection to 80 ft² basal area.

The conifer bog strata baseline harvest volumes were modeled using 10 year intervals using single tree selection to 70 ft² and 80 ft² basal area as well as being clearcut at 60 year intervals with start years every five years beginning in 2012. As in the north hardwoods strata both for the baseline and projected actual harvest volumes were modeled with differing areas within the strata under a no harvest scenario. Lastly, as part of the estimates for actual harvest volume, the conifer bog strata was also modeled under a clearcut scenario at 90 year intervals in 2017 and 2027.

Finally, the baseline and projected actual harvest volumes were modeled for the pine strata. Here, under the baseline a large portion within the strata was modeled under a no harvest scenario as well as clearcut scenarios at start dates every 5 years starting in 2012 to 2027. For both projections, portions of the pine strata were modeled using seed tree harvest at 90 years with 3-15 year intermediate thinning beginning in 2017 and 2027. The projected actual harvest was modeled under no harvest for a small area within the strata and a clearcut scenario at 60 year intervals starting in 2017 and 2027.

Attachment L: Change Log

#	Item	Original information (Listing document)	Where Changed (OPDR)	Listing Document: 2_2_2013	OPDR
1	Updated project commencement date	Page 1, Part II	Page 1, Part II	Feb 13, 2013	8/8/2012
2	Updated Reporting Period Start Date	Page 1, Part II	Page 1, Part II	Feb 13, 2013	8/8/2012
3	Updated First Reporting Period End Date	Page 1, Part II	Page 1, Part II	Aug 13, 2013	6/23/2013
4	Updated First Reporting Period End Date	Page 1, Part II	Page 1, Part II	Heartwood Forest Fund IV	Heartwood Forestland Fund IV Limited Partnership
5	Acres within Assessment Area	Bishop_Listing_Materials, page 4, section 5.	Page 2, Part V. A.	original Assessment Area acreage	updated Assessment Area acreage (table)
6	Forest vegetation types	Bishop_Listing_Materials, page 4, section h	Page 4, Part V, E.	Explanation of forest vegetation types	More detailed description of forest vegetation types
7	Land pressures and climate zones	Bishop_Listing_Materials, page 4, section j	Page 4, Part V, G.	Explanation of land pressures and climate zones	More detailed description of land pressures and climate zones
8	Historical land uses, current zoning	Bishop_Listing_Materials, page 4, section k	Page 4, Part V, H	Explanation of historical land uses, etc	More detailed description of historical land uses, etc
9	Species composition and age class distribution	Bishop_Listing_Materials, page 5, section 6a	Page 4, Part V, I	table of species and age class distribution	Updated tables of species and age class distribution
10	Structural Elements	Bishop_Listing_Materials, page 1, section V.A.3.c	Page 7, Part VI, section D.4	Said no salvage harvest and that the structural elements requirements were met	Clarifies that salvage harvesting did occur and the structural elements requirements will be met in the future
11	Carbon stock inventory	Bishop_Listing_Materials, page 6, section V.B.1	Page 9, Part VII A	Explanation of carbon stock inventory	Updated carbon stock inventory; Inventory Sample Size, Pre/Post Sampling Stratification, etc)
12	Inventory calculation methodology	Bishop_Listing_Materials, page 10, section V.B.2	Page 14, Part VII B	Explanation of carbon inventory methodology	Updated description of calculation methodology; mortality (live and standing dead beech), height parameters, biomass equation substitutions
13	Summary of inventory carbon stocks	Bishop_Listing_Materials, page 21, section V.B.5	Page 18, Part VII C	Summary of inventory carbon stocks	Updated and added detail re: summary of inventory carbon stocks
14	Confidence statistics	Bishop_Listing_Materials, page 21, section V.B.6	Page 20, Part VII D	summary of inventory confidence statistics	Updated data re: inventory confidence statistics
15	Baseline carbon stocks	Bishop_Listing_Materials, page 21, section V.B.7	Page 21, Part VIII A	Description and estimate of baseline onsite carbon stocks	Updated description and estimate of baseline onsite carbon stocks
16	Long term harvested wood products estimate	Bishop_Listing_Materials, page 22, section V.B.8	Page 25, Part VII 5	Estimate of carbon stored in harvested wood products	Updated total carbon stored in harvested wood products

Submit the information in this form to the appropriate Offset Project Registry