Application for Listing: Bluesource – Edge of Appalachia Improved Forest Management Project

Contents

Part I. Entity Submitting Report

This form being submitted by the contact person for the Authorized Project Designee (APD).

Part II. Offset Project Information

Project Name: Bluesource – Edge of Appalachia Improved Forest Management Project
Registry: American Carbon Registry
Compliance Offset Protocol: U.S. Forest Projects
Version: June 25, 2015

Start Date: 11/06/2018
Reporting Period End Date: 9/30/2019
Crediting Period: 11/06/2018 to 9/30/2043
The commencement date is signified by the submittal of the project listing form to ACR. Per page 81 of the ARB 2015 Compliance Offset Protocol for U.S. Forest Projects, an IFM project's commencement date can be signified by the submittal of the project's listing information**.**

The reporting period end date is expected to be 6 months from project commencement.

OPR Project ID: ACR439
CAFR5439

Part III. OPO/APD Information

Offset Project Operator
OPO Name: The Nature Conservancy
CITSS ID#: CA1571
Mailing Address: 4254 North Fairfax Drive, Suite 100, Arlington, VA
Contact Person: Greg Meade
Phone Number: 276-676-2209
Email: gmeade@TNC.ORG

Authorized Project Designee
None

C. Technical consultants
Bluesource LLC
2825 E. Cottonwood Parkway, Suite 400
Cottonwood Heights, UT 84121
Contact Person: Liz Lott
Phone: 415-434-4165
Email: llott@bluesource.com

Part IV. Land Ownership

1. **Whether the Offset Project Operator is the owner in fee for the project area.** Yes
    a. **If yes, provide documentation (e.g. deed of trust, title report) showing the Offset Project Operator's ownership interest in the property and its interest in the trees and standing timber on the property.**

Please see provided deeds.

b. Are there other forest owners including in fee as well as third parties with existing property interests within the project area that may have an effect on the trees and standing timber located in the project area or parties with a material interest in the real property in the forest project?
No.

2. **A description of forestland and resource ownership for the real property within the project area.**
The property is owned by The Nature Conservancy.

3. **Offset project type (reforestation, improved forest management, or avoided conversion).**
Improved Forest Management

4. **A description of the management activities that will lead to increased carbon stocks in the Project Area, compared to the baseline.**

Project Activities: All forest management activities on the project area are intended to meet or surpass all Best Management Practices (BMPs) and/ or Forest Practices Acts (FPAs). The harvest plans for the property are limited to a small amount of harvesting for the purposes of restoring age and diameter classes. As stocking shifts to a more ideal age and diameter distribution, carbon levels maintained across the property will increase.

Baseline Activities: Baseline harvesting activities would include meeting Ohio DNR's Best Management Practices (BMPs). Outside of these constraints, all hardwood stands could be managed aggressively, mimicking past management activities (see section 8c) and harvesting at or above annual growth. Overall, despite the constraints of Ohio BMP's, the project activities will lead to an increased carbon stock as compared to the baseline.

5. **Indicate if the offset project occurs on public or private lands, and further specify if the offset project occurs on any of the following categories of land:**
Private Lands

a. Land that is owned by, or subject to an ownership or possessory interest of a Tribe; No
b. Land that is "Indian lands" of a Tribe, as defined by 25 U.S.C. §81(a)(1); or No
c. Land that is owned by any person, entity, or Tribe, within the external borders of such Indian lands. No

Part V. Offset Project Area

1. Governing jurisdictions, and latitude/longitude coordinates

Governing Jurisdiction: Adams Pike, and Highland Counties, Ohio
Latitude/ Longitude: 38.82'N -83.44'W

2. Existing land cover and land use

Land Cover: Northern hardwoods/mixed conifer forestland
Land Use: Commercial timber production

All non-forested acres will be removed from the project to a 2.5-acre minimum mapping unit.

3. Forest vegetation types

The project area is predominantly northern/upland hardwoods, oak-hickory, and mixed conifer forest types.

4. Site classes

The Project Area has approximately 2,168.1 acres (16.6%) in high site class, with the remainder in all or low site classes as the annual forest productivity is < 85 cubic feet/ acre. Site class was determined in an analysis using tree cores collected during the inventory.

5. Land pressures and climate zone/classification

The primary land pressure is intensive forestry operations and agriculture/cattle rearing.

Climactic Zones: The climate of southern Ohio is classified as humid continental with cold winters and warm, moist summers (Lucht and Brown, 1994). In winter, the average daily temperature is approximately 32 F. In summer the average daily temperature is 72 F degrees. Extremes in temperature range from -25F to +105F. Average annual precipitation is about 41 inches. Average annual snowfall is 22 inches, although it rarely accumulates to any degree. Adams County has a southwesterly prevailing wind with the highest average windspeed of 11 MPH, although seasonal storm events can see sustained winds up to 25 MPH and gusts of 40 MPH, or potentially more. These events typically fall in the spring month and can sometimes develop into tornadoes. These high wind events are another source of forest disturbance which aids in the creation of overstory gaps.

6. Historical land uses, current zoning, and projected land use within project area and surrounding areas

Historically, the bulk of the preserve system was utilized for timber harvesting, haying, cattle rearing, and residential purposes. Some parcels were heavily logged resulting in significant loss of desirable overstory hardwoods such as hickory, black cherry, walnut and oaks (see 'EoAManagementPlans.docx' for more detail). Over the past 150 years, the primary use of land within the preserve area has been that of subsistence farming, industrial iron, and charcoal production.

All lands within Adams County occur within the Virginia Military District, where property lines are defined by meets and bounds. This differs from regular boundary delineation practices, giving rise to disputes on confirmation of parcel boundaries.

7. Project Area Assessment Areas

Supersection	Assessment Area	Site Class	Acres
Southern Allegheny Plateau	Lowland Hardwoods	All	-
	Mixed Pine-Hardwoods	All	-
	Northern Conifer	All	-
	Oak-Hickory	High	-
		Low	-
	Upland Hardwoods	High	1,224.1
		Low	4,546.6
Central Interior Broadleaf Forest Eastern Low Plateau	Cove Forest	High	75.8
		Low	334.8
	Lowland Hardwoods	All	154.5
	Mixed Upland Hardwoods	High	631.3
		Low	2,812.8
	Northern Hardwoods	High	236.9
		Low	90.6
	Oak-Hickory	High	-
		Low	-
	Oak-Pine	All	2,985.2
	Pine	All	-
		TOTAL	**13,092.7**

8. General description of the forest conditions within the Project Area:

a. Species (tree) composition;

This project meets the natural forest management eligibility requirement of at least 95% native species based on the sum of the carbon in standing live tree carbon stocks, as 100% of the species in the inventory are native.

Species	BA/Acre	%
yellow poplar	18.7	16.4%
sugar maple	14.3	12.6%
eastern redcedar	12.3	10.8%
chestnut oak	11.5	10.1%
red maple	10.4	9.2%
northern red oak	6.2	5.5%
white oak	4.8	4.2%
chinkapin oak	4.0	3.5%
pignut hickory	3.5	3.1%
black oak	2.8	2.5%
Virginia pine	2.8	2.5%
American beech	2.4	2.1%
white ash	2.3	2.1%
sycamore	2.0	1.7%
blackgum	1.8	1.6%
American basswood	1.4	1.3%
sassafras	1.4	1.2%
black cherry	1.1	1.0%
sourwood	0.9	0.8%
bitternut hickory	0.8	0.7%
yellow buckeye	0.6	0.6%
redbud	0.6	0.5%
blue ash	0.6	0.5%
black walnut	0.6	0.5%
boxelder	0.5	0.5%
dogwood spp.	0.5	0.4%

shagbark hickory	0.5	0.4%
scarlet oak	0.5	0.4%
slippery elm	0.4	0.3%
black locust	0.4	0.3%
green ash	0.3	0.3%
American elm	0.3	0.3%
musclewood (Carpinus)	0.3	0.3%
pawpaw	0.3	0.2%
hackberry	0.2	0.2%
swamp chestnut oak	0.2	0.2%
honeylocust	0.2	0.1%
pin cherry	0.2	0.1%
bigtooth aspen	0.1	0.1%
Ohio buckeye	0.1	0.1%
shellbark hickory	0.1	0.1%
cucumbertree	0.1	0.1%
shingle oak	0.1	0.1%
serviceberry spp.	0.1	0.1%
rock elm	0.1	0.1%
Alianthus (tree of heaven)	0.1	0.1%
mockernut hickory	0.1	0.1%
commercial hardwoods	0.1	0.0%
ironwood (Ostrya)	0.1	0.0%
common persimmon	0.1	0.0%
catalpa spp.	0.0	0.0%
bur oak	0.0	0.0%
quaking aspen	0.0	0.0%
alder spp.	0.0	0.0%
black ash	0.0	0.0%
paulownia	0.0	0.0%
apple spp.	0.0	0.0%
sweetgum	0.0	0.0%
flowering dogwood	0.0	0.0%
blackjack oak	0.0	0.0%
mulberry spp.	0.0	0.0%

b. Age class distribution;

An analysis of age class on HUC10 watersheds shows that the project meets the age class requirements on a watershed-scale. Histogram distributions were created for each watershed using COLE 1605(b) Report for Ohio filtered for Forest Type: Oak / pine group, Loblolly pine / hardwood, Other pine / hardwood, Oak / hickory group, Chestnut oak, White oak / red oak / hickory, Yellow-poplar /white oak / northern red oak,

Yellow-poplar, Red maple / oak, Mixed upland hardwoods. The watersheds overlapping the project area and corresponding percentage of the project area less than 20 years old based on this analysis are:

Age	Acres	%
<10	266	2.0%
11-20	160	1.2%
21-30	213	1.6%
31-40	426	3.3%
41-50	692	5.3%
51-60	266	2.0%
61-70	1,064	8.1%
71-80	639	4.9%
81-90	532	4.1%
91-100	426	3.3%
>100	8,409	64.2%
Total	13,093	

c. Management history;

Considering past use of the land in farming, cattle rearing and residential purposes, the region has been managed for timber and fuel with an aggressive harvest plan.

9. Indicate whether the project will employ a Qualified Conservation Easement.
No.

Part VI. Offset Project Eligibility

1. A statement as to whether 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, including;

a. Have any lands within the Project Area ever been listed or registered with an offset project registry or program in the past?

b. 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?

c. If yes, identify the registry or program (include vintages and reporting period).

None of the Project Lands have ever been listed, registered with, or otherwise claimed by, another registry or program. No greenhouse gas emission reductions or removal enhancements associated with lands within the Project Area have ever been credited or claimed for the purpose of greenhouse gas mitigation or reduction goals, whether in a voluntary or regulatory context.

2. A statement as to whether the project is being implemented and conducted as the result of any law, statute, regulation, court order, or other legally binding mandate? If yes, explain.

The project is not being implemented and conducted as the result of any law, statute, regulation, court order, or other legally binding mandate.

3. **Declaration that the offset project does *not* employ broadcast fertilization.**

   The offset project does not employ broadcast fertilization.

4. **If the Forest Project is located on public land, a description and copies of the 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.**

   This project does not occur on public lands, so therefore this section is not applicable.

5. **If the Forest Project is located on the following categories of land, a description and copies of documentation demonstrating that the land within the Project Area is owned by a tribe or private entities:**

   This project does not occur on tribal lands, so therefore this section is not applicable.

6. **If commercial harvesting is either planned or ongoing within the Project Area, a description of how the Forest Owner satisfies one of the three requirements for employing and demonstrating sustainable long-term harvesting practices on all of its forest landholdings.**

   ☐ **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).**

7. **A description of how the offset project meets (or will meet) the definition of "Natural Forest Management", including:**
   a. **Composition of native species;**

      The project area naturally consists of a mixed species distribution where no single species' prevalence (as shown in Part V. Section 8.a. in this listing document), 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.

Assessment Area	Site Class	Acres	%	Species Diversity Index
Southern Allegheny Plateau Lowland Hardwoods	All	-	0%	60%
Southern Allegheny Plateau Mixed Pine-Hardwoods	All	-	0%	65%
Southern Allegheny Plateau Northern Conifer	All	-	0%	75%
Southern Allegheny Plateau Oak-Hickory	High	-	0%	70%
Southern Allegheny Plateau Oak-Hickory	Low	-	0%	70%
Southern Allegheny Plateau Upland Hardwoods	High	1,224.1	9%	65%
Southern Allegheny Plateau Upland Hardwoods	Low	4,546.6	35%	65%
Central Interior Broadleaf Forest Eastern Low Plateau Cove Forest	High	75.8	1%	70%
	Low	334.8	3%	70%
Central Interior Broadleaf Forest Eastern Low Plateau Lowland Hardwoods	All	154.5	1%	60%
Central Interior Broadleaf Forest Eastern Low Plateau Mixed Upland Hardwoods	High	631.3	5%	70%
	Low	2,812.8	21%	70%
Central Interior Broadleaf Forest Eastern Low Plateau Northern Hardwoods	High	236.9	2%	65%
	Low	90.6	1%	65%
Central Interior Broadleaf Forest Eastern Low Plateau Oak-Hickory	High	-	0%	70%
	Low	-	0%	70%
Central Interior Broadleaf Forest Eastern Low Plateau Oak-Pine	All	2,985.2	23%	70%
Central Interior Broadleaf Forest Eastern Low Plateau Pine	All	-	0%	75%
Total		13,092.7	100%	67.6%

b. Distribution of age classes / sustainable management;

Across the project area, 100% of the project's forestlands are currently maintained in age classes exceeding 20 years old.

c. Structural elements (standing and lying dead wood);

Live C/acre	Dead C/acre	% Standing Dead
38.36	1.08	2.81%

The quantity of lying dead wood is commensurate with recruitment from standing dead trees and lying dead trees, which are never removed from the project area. The project is working towards an average of 1 metric ton carbon/acre, which is greater than the requirement of 1% standing live C stocks.

8. All listing information that reference carbon stocks must be submitted with the oversight of a Professional Forester.

Name of Forester: Thomas Hittle, Steigerwaldt Land Services

Part VII. Carbon Stock Inventory

IFM-1 Standing Live

All live trees will be recorded for for species, DBH (to nearest 0.1 inch), % missing/rotten wood (using procedure outlined below), structural loss/density reduction (Domke et al. 2011) and decay class (using the Harmon et al. 2011 clasification system). If a tree will be snapped, the height as the tree originally stood, as well as the height in the tree's current condition (in feet), will be recorded.

Total height will be measured to the nearest foot for all trees sampled on every plot. Total heights will be recorded for each tree; however, in the instances where heights could not be recorded due to landscape limitations, the missing heights will be regressed by species using all measured total heights.

Missing and cull deductions will be 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 will be missing or rotten in each third. This percentage figure will be then multiplied by the approximate percentage of tree biomass found in each third of a typical tree (65% in the bottom third, 25% is in the middle third, and 10% is in the top third according to CAR's FPP 3.3 Quantification Guidance document) to get the total deduction percentage.

Additional detail on the measurement of standing live can be found in the Inventory Methodology below.

Biomass will be computed using the component ratio method and 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. As stated in the June 2015 protocol, biomass equations for the Midwest region directly estimate biomass and carbon and do not require tree volume to be computed prior to converting to biomass and carbon mass estimates.

The belowground portion of live and dead trees is calculated using the method outlined by Cairns, Brown, Helmer, & Baumgardner (1997) at the plot level.

IFM-3 Standing Dead

All standing dead trees of ≥5 DBH and ≥15' of height will be recorded for species (if possible), height as the tree originally stood, height in the tree's current condition (in feet), DBH (to nearest 0.1 inch), % missing/rotten wood (using procedure outlined above), and decay class (using the Harmon et al. 2011 clasification system).

IFM-6 Soil (if applicable)

Excluded.

IFM-7 Carbon in in-use forest products

Carbon in in-use forest products will be calculated based on standing tree inventory data. No specific inventory processes apply.

IFM-8 Forest product carbon in landfills

Forest product carbon in landfills will be calculated based on standing tree inventory data. 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 will be calculated based on standing tree inventory data. No specific inventory processes apply.

Gross and sound cubic foot volume was calculated using equations and coefficients developed by Hahn (1984) based on guidance from "Methods and Equations for Estimating Aboveground Volume, Biomass, and Carbon for Trees in the U.S. Forest Inventory", 2010. (Woodall, 2011).

Missing and cull deductions will be 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 will be missing or rotten in each third. This percentage figure will be then multiplied by the approximate percentage of tree biomass found in each third of a typical tree (65% in the bottom third, 25% is in the middle third, and 10% is in the top third according to CAR's FPP 3.3 Quantification Guidance document) to get the total deduction percentage.

Additional detail on the measurement of standing live can be found in the Inventory Methodology below.

Biomass will be computed using the component ratio method and 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. As stated in the June 2015 protocol, biomass equations for the Midwest region directly estimate biomass and carbon and do not require tree volume to be computed prior to converting to biomass and carbon mass estimates. As stated in the COP, biomass was converted into 0.5 to calculate the mass (kg) in carbon. This product was multiplied by 0.001 tons/kg to convert the mass to metric tons of carbon. Then, the product was multiplied by 3.667 to convert the metric tons of carbon into metric tons of CO2e.

The belowground portion of live and dead trees is calculated using the method outlined by Cairns, Brown, Helmer, & Baumgardner (1997) at the plot level.

	Weighted Average tCO2e/acre	**Total tCO2e**
Start Date	137.49	1,800,129
End of Reporting Period	140.68	1,841,931

Projected Growth: The Northeast (NE) Variant of the Forest Vegetation Simulator (Keyser 2010) will be used to model forest growth, mortality and harvest over 100 years. Plot data and tree 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. TPA, species, height, and DBH were used as inputs for the TreeInIt input file. After entry into FVS, the "forest" was grown 100 years and the resulting tree list used to calculate biomass. Simulations for the 100-year projection was reported in 5-year increments by setting the "TIMEINT" keyword to 5 years. The predicted DBH and heights were used for all future projections of DBH and heights

Upon future re-measurements of plots, the calculated annual growth will be input into the FVS TreeInit file in the DG column (diameter increment growth). As Essential FVS notes," If increment data are provided with the tree records, the large-tree diameter increment model and the small-tree height increment model will be scaled to reflect local deviations from the regional growth trends represented in the models." Thus, incorporating the measured growth rates will calibrate the growth models in FVS.

For newly added plots, the READCORD (READjust CORrection for Diameter) and READCORR (READjust CORrection for Regeneration) keywords may be used to alter the increment growth models for these plots to reflect the growth rates from similar plots.

Adjustments for Reporting Period Calculations: To determine CO2 stocks at the end of the reporting period, all trees will be grown forward to the reporting period end date set at the appropriate seasonal rate based on FVS predicted diameter growth rates for each tree (the same method used for the start date calculations). In addition, the mortality that occurred between the inventory and the reporting period will be simulated by decreasing or increasing the trees per acre for each tree record at the appropriate rate based on the FVS predicted mortality rate for each tree. All plots harvested during the reporting period will be re-inventoried so that all harvested trees will be removed from the inventory for the reporting period calculations.

IFM-3 Standing Dead:

Standing dead wood carbon will be calculated by estimating above and below ground biomass in the same manner it will be for live trees and then converting this figure to CO2e. Domke et al. 2011 will be used to apply Structural Loss Adjustments and Density Reduction Factors for standing dead trees. In using the thirds method, the following percentages were applied to dead trees (54% in the bottom third, 36% is in the middle third, and 10% is in the top third).

The estimates of standing dead wood will be calculated on a per acre basis for each stratum. A project-wide estimate of standing dead wood is calculated using a weighted average with weights assigned based on stratum size.

Estimates of standing dead will be updated in the project scenario every time new inventory data is collected. For the baseline, standing dead is projected to remain constant over the 100 year baseline.

	Weighted Average tCO2e/acre	Total tCO2e
Start Date	**3.95**	**51,727**
End of Reporting Period	**3.95**	**51,727**

IFM-6 Soil (if applicable):

N/A

IFM-7 Carbon in in-use forest products:

Wood products calculations will be completed using an excel model based on the ACR Forest Project Calculation worksheet. (Provided separately for verification purposes.)

A default regional value will be used for mill efficiency and product mix based on weighted average of relative acreage.

End of Reporting Period

Project Harvested Wood Products Summary	Total (tCO2e)	tCO2e / acre
Total Harvested Wood Products	0	0

Long-term storage in in-use wood products	0	0

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

Forest product carbon in landfills will be calculated in accordance with the procedures described per Appendix C of the Forest Protocol.

End of Reporting Period

Project Harvested Wood Products Summary	Total (tCO2e)	tCO2e / acre
Long-term storage in wood products in landfills	0	0

IFM- 9 Biological emissions from site preparation:

N/A

IFM-14 Biological emissions/removals from change in harvesting on forestland outside project area:

N/A

IFM-17 Biological emissions from decomposition of forest products:

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

Inventory Methodgy

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

Project Boundary: The offset Project Area will be determined using the most recent geospatial file of the of the property. All roads, right-of-ways, major water bodies, and other non-forested areas will be removed from the Project Area. Some forested areas may be removed due to management considerations.

Stratification: Strata were developed from an initial forest type shapefile. This intial shapefile used spatial Landfire data (https://www.landfire.gov/evt.php) as a starting point. The initial shapefile was then systematically modified using recently collected forest inventory data (ca. 2018) and on-the-ground knowledge of stands. This initial shapefile had 11 forest types.

The final stratification combined these 11 forest types into 4 forest types, based on species similarities between initial strata and aerial imagery. Two of the original 11 forest types were initially identified as “grassland” and “non-forested”. For these 2 types, areas were determined as forested using aerial imagery, ground-truthed using plots inventoried in these forest types, and allocated areas to one of 4 forest strata using aerial imagery of adjacent areas

Plot Number and Locations: A systematic grid of permanent inventory plots was installed across the project area. The total number of plots sampled, 246, was the number of plots needed to reach a 90% statistical confidence interval of sampling of no more than ±5% of the mean.

Monumentation: Permanent inventory plot centers will be monumented with a rebar pole pounded into the ground and topped with a small rebar cap flush with the ground. Plots that are located in areas devoid of forest cover will be recorded as such and will not be relocated. If a plot falls in an area with no trees, take a note to describe why it is non-stocked (i.e. in a field or rock outcropping).

Sampling Method: Permanent, fixed-radius plots will be established across the property to facilitate precise tracking of individual tree growth and ease of verification. At each plot location, a 1/15th-acre (30.4' radius) fixed-radius plot will be established to measure all trees greater than or equal to 5.0" in diameter at breast height (DBH); and a 1/100th-acre (11.8' radius) sub-plot will be taken to capture woody trees and saplings less than 5" (1.0 to 4.9" DBH). This plot design gave forest managers the opportunity to consistently track the growth and development of specific trees over an extended timeline and will allow for improved ease of plot location during field work and site verifications.

The protocol defines trees as "A woody perennial plant, typically large and with a well-defined stem or stems carrying a more or less definite crown with the capacity to attain a minimum diameter at breast height of 5 inches and a minimum height of 15 feet with no branches within 3 feet from the ground at maturity." As a result, please measure all species >=1" DBH that meet this definition (a master list of FIA species coeds for trees found on the property can be found on the final page of this document).

Statistical Standard: Mean biomass estimates (e.g. above ground carbon per acre) for the ownership will be reported with a minimum statistical precision of +/– 5% of the mean at the 95% confidence level. These objectives may be adjusted for more or less precision based on a property-specific analysis of data collection cost relative to return.

Sampling Frequency: Full project-level inventories of the carbon project will be conducted at 6-12 year intervals. Inventories of select portions of the Project Area will be updated periodically in response to natural disturbance or significant forest management activities. Traditional pre-and post-harvest monitoring techniques will be employed to inform land managers of potential needs to implement a more comprehensive monitoring of carbon pools (refer to Pearson, Brown, Birdsey 2007).

Harvest Re-Measurement: If a plot is harvested, the plot will be re-measured within 6 months of yarding to assess which trees will be taken out so that the inventory can be updated for the current reporting period. Bluesource will work with the landowner to determine which plots have been harvested during the reporting period.

Data Collection Materials: Data will be collected on hand held electronic data recorders. If data recorders are not available, field data can be collected on paper tally sheets and manually entered into a computer for data analysis. All data sheets will be scanned and sent to Bluesource.

QA/QC Field Procedures: At least 5% of the plots will be checked by a different forester than cruised the plot, preferably by someone senior to the field crew. This will involve full plot measurement to identify any problems with determining in/out trees, species calls, defect measurements, DBH measurements, and height measurements. Any consistent height, species, DBH, or defect errors will be resolved by talking with the foresters.

QA/QC Desk Procedures: The following QA/QC approach is designed to ensure that field data, once input, is appropriately managed and maintained, and that subsequent calculations using that data to determine onsite carbon stocks and associated ARBOC issuance are correctly implemented. A three-stage QA/QC process with a defined review group for the project will be established, engaging both personnel intimately familiar with all project files and documentation, as well as independent reviewers are able to bring "fresh eyes" to key outputs.

Independent Forester Review: The project implementation team (Bluesource) has a team of foresters with intimate knowledge of the files, models and documents. The development of quantitative components, such as Access databases, FVS model runs and Excel workbooks, are led by one of these foresters. Prior to finalization, a second forester who did not lead development of that component is tasked with a QA/QC review including random examinations and data checks to identify and fix any errors.

Technical Review: Once quantitative outputs are finalized, exported from Access/FVS to Excel, and are ready to be transferred into the Offset Project Data Report (OPDR) and other project documents, an independent manager reviewed these outputs. This individual performs data checks by tracing key outputs back from final ARBOC calculations though the chain of Excel documents to the underlying Access/FVS database.

Senior Management Review: Once outputs have been transferred from Excel to the OPDR and other project

documents, a senior manager reviews these documents and checks that all quantitative elements have been correctly exported from the underlying workbook. At this stage, the senior manager (or other individual not involved in document preparation) also reviews text, grammar and formatting for presentation and accuracy.

Data Processing and Storage: Manually and electronically filed data are stored and archived. Backup copies of all electronically stored data -are maintained in a separate data center with scheduled archiving to assure data protection. Future revisions to project documents after initial verification and registration will be clearly identified by saving them as separate files and including the date of revision in any modified documents. All data will be stored on Dropbox or similar online cloud storage service as well as on an external hard drive and kept by Bluesource for a minimum of 15 years.

Annual monitoring will be carried out to track changes in carbon stocks. The Project Owner will submit annual Offset Project Data Reports and undertake 6-year site verification for 100 years following ARBOC issuance. Annual monitoring reports will contain inventory updates reflecting growth and any significant disturbances.

The Project Area will be re-inventoried at least every 12 years. During re-inventory, a subset of the current permanent plots, sufficient to maintain desired inventory confidence statistics, will be visited and re-measured. If it is calculated for future inventories that less than the full number of plots are needed to achieve a desired confidence statistics, then randomly selected plots will be excluded from future calculation and retired, ensuring no continually measured plots are older than 12 years. Similarly, if it is found that more plots are needed to achieve a desired confidence statistics, plot may be added into the inventory in a random design. Otherwise, if the re-inventory results in a sampling error of >=5.1%, then the appropriate confidence deduction will be applied in accordance to the requirements of the COP. Inventories of select portions of the Project Area will be updated periodically in response to natural disturbance or significant forest management activities. Any plots that are subject to harvesting activities or significant disturbances will be reinventoried.

If plot monumentation cannot be found during a re-inventory, the plots will be re-monumented using the same procedures as the original monumentation at the same GPS location of the given plot.

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 inventory sampling, management staff will monitor the general health and condition of the forest forest management activities (e.g. road maintenance, timber harvesting, boundary marking, etc.), 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:

New forest inventory data obtained from scheduled sampling during the previous year will be incorporated.

Inventory data will be updated to account for any significant natural disturbance (e.g. insect infestation, fire, destructive wind storm, etc.). A significant event is any singular event that impacts one or more of the plots, or impacts collectively 53 acres or more of the property (each plot represents ~53 acres, 13,093 acres/246 plots). If there is removal of >=50% of the standing stocks as a result of the disturbance across the affected area, then the disturbance will be considered a “significant event” and require a remeasurement or addition of plots.

In the event that a significant event occurs, but no plots are impacted, a proportional number of plots will be installed so that the inventory reflects the impacts of the event (i.e. 1 plot per 53 acres). Plots will be placed using an approved random selection method in GIS such as the random point generator tool. If plots are impacted by a significant event, they will be remeasured and incorparated into the inventory statistics, and will thus be reflective of the event.

New inventory samples or harvest data, modeling growth, and disturbances using FVS or another approved growth will be incorporated. If new individual tree growth data is available from remeasured plots, this data will be used to

calibrate the diameter increment model to the actual tree growth. If no growth data is available, or if the growth estimates seem unreasonable, all calibration parameters used in the baseline modeling will be applied to modeling the new inventory data.

Any necessary modification to spatial data based on boundary adjustments or other changes will be made.

Inventory Confidence Statistics- Estimate

Total	n	StdError	Bound	Sampling Error
1,893,658	246	68,595	112,839	6.0%

The inventory sampling error is calculated as follows:

1) 68,595* 1.645 = 112,839
2) (112,839/ 1,893,658) * 100 = 6.0%,
3) 6.0%-5.0% = 1.0%

The estimated sampling error of 6.0% is above 5.1%, so a confidence deduction of 1.0% is applied to the inventory results.

Reversal Risk Rating- Estimate

Reversal Risk Rating will be calculated using the following formula:

Reversal Risk= 100% - (1-Financial Failure) x (1-Illegal Forest Biomass Removal) x (1-Conversion) x (1-Over Harvesting) x (1-Social Risk) x (1-Wildfire) x (1-Disease/Insect Outbreak) x (1-Other Catastrophic Events)

= 1- (1-.05) * (1-0.0) * (1- 0.02) * (1-0.02) * (1-0.00) * (1-(0.04)) * (1-0.03) * (1-0.03)

=17.59%

Part VIII. Offset Project Baseline

1. The aboveground Common Practice (CP) value is 71.7 mtCO2e/acre with a live value of 85.6 mtCO2e/acre. The project's ICS aboveground value is 114.4 mtCO2e/acre with a standing live carbon stocks of 136.79 mtCO2e/acre is above the CP value.

2. Baseline Carbon Stocks

Aboveground (mtCO2e/acre)	Belowground (mtCO2e/acre)	Live (mtCO2e/acre)	Dead (mtCO2e/acre)	Standing (mtCO2e/acre)

72.23	14.05	86.27	3.95	90.22

3. Minimum Baseline Level for above-ground standing live tree carbon stocks (MBL)

The LMU extends beyond the Project Area, so additional analysis was conducted on the ECS (LMU excluding the Project Area) to determine the formula for WCS. ECS analysis was conducted in the "EdgeofAppalachia_InvCalcs_LMU.xlsx" file. Tree Data is recorded in "TreeData" tab, then processed in "Start_Calcs_CO2" tab, and summarized in "Start_Stats" tab. The AG live CO2 estimate for these plots is 100.3 tonnes CO2e/acre. The ICS estimate is 114.97 tonnes CO2e/acre. As defined in Equation 5.7 of the protocol, if abs(1-ECS/ICS) ≤ 0.2, then WCS = ICS. For this project, abs(1-ECS/ICS) = abs(1-100.3 / 115.6) = 0.13, 0hich is less than 0.2. That means that WCS = ICS in this case. Because the ICS (114.97) is above the CP (72.23), we use the equation MBL = MAX(CP, MIN(ICS, CP+ ICS -WCS)) for calculating the MBL. In this case, the MBL is the CP (Common Practice), or 72.23 ($mtCO_2e$/acre).

4. If the Forest Project's initial standing live carbon stocks are below Common Practice, a determination of the "High Stocking Reference" for the Project Area.

Because the project's initial standing live carbon stocks are above common practice, this section in non-applicable.

5. Estimated Baseline Wood Products

Carbon Pool	Total tCO2e	mtCO2e / acre
IFM-1 Standing Live:	1,129,547	86.27
IFM-3 Standing Dead:	51,727	3.95
Baseline Carbon in Harvested Wood Delivered to Mill (tCO2e)	13,104	1.00
Baseline Carbon in Trees Harvested for Wood Products (tCO2e)	25,146	1.92
Baseline Carbon Stored Long-term in Wood Products (tCO2e) - Excl Landfill	2,004	0.15
Long-term storage in wood products in landfills	2,634	0.20
Baseline Carbon Stored Long-term in Wood Products (tCO2e) - Incl Landfill	4,638	0.35

6. Baseline Modeling

All legal constraints that could affect the baseline growth and harvesting must be incorporated. Thus, all legal constraints (detailed in Attachment I) will be modeled into the baseline. Site index for each plot will be measured as outlined in Part VII IFM-1. FVS will be calibrated as described in Part VII IFM-1.

All FVS (NE variant) defaults for the will be used besides the following calibration components:

- The location code for Wayne National Forest (914)
- Regeneration Values
- The minimum acceptable harvest volume was set to 600 cubic feet per acre on the minimum harvest volumes for the property
- The TIMEINT keyword was set to 5 years for the 100-year projection. The default cycle length of 10 years was used for the Start Date calculation, as described above.

1. 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.

Submit supporting documents as attachment labeled "Attachment K". See Part X of this reporting document for more information.

As stated in section 6.2.1.2 of the protocol, all legal constraint that could affect the baseline growth and harvesting must be incorporated. Thus, all legal constraints (detailed in Attachment K) will be modeled into the baseline.

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

Site index for each plot will be measured as outlined in Part VII IFM-1. FVS will be calibrated as described in Part VII IFM-1. Similarly, FVS will be calibrated using project specific parameters collected during in the inventory.

Clearcut, shelterwood, variable thinning, and single-tree selection treatments were modeled using a harvest frequency triggered when a stand reaches the appropriate basal area targets for each treatment. Clearcuts were run in 5-year intervals for 10 time periods. Species retention post-harvest will be determined using FVS defaults. Simulations were conducted in 10-year increments.

Part IX. Attestations and OPO Signature

I certify under penalty of perjury under the laws of the State of California the GHG reductions and/or GHG removal enhancements for Bluesource – Edge of Applachia Improved Forest Management Project from 11/06/2018 to 11/05/2043 will be measured in accordance with the Compliance Offset Protocol U.S. Forest Projects, June 25, 2015, and all information required to be submitted to ARB is true, accurate, and complete.

Initial:

I understand I am voluntarily participating in the California Greenhouse Gas Cap-and-Trade Program under title 17, article 5, and by doing so, I am now subject to all regulatory requirements and enforcement mechanisms of this program and subject myself to the jurisdiction of California as the exclusive venue to resolve any and all disputes arising from the enforcement provisions in this article.

Initial:

I understand that the offset project activity and implementation of the offset project must be in accordance with all applicable local, regional, and national environmental and health and safety laws and regulation that apply to the offset project location. I understand that offset projects are not eligible to receive ARB or registry offset credits for GHG reductions and GHG removal enhancements that are not in compliance with the requirements of the cap-and-trade program.

Initial:

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: Greg Meade

Title: Conservation Forestry Program Director, The Nature Concervancy

7/9/2020

Part X. Attachments

Attachment A: Forest Owner

Please see corresponding folder containing all deed, provided separately for verification purposes.

Attachment B: Public Projects

N/A

Attachment C: Qualified Conservation Easement

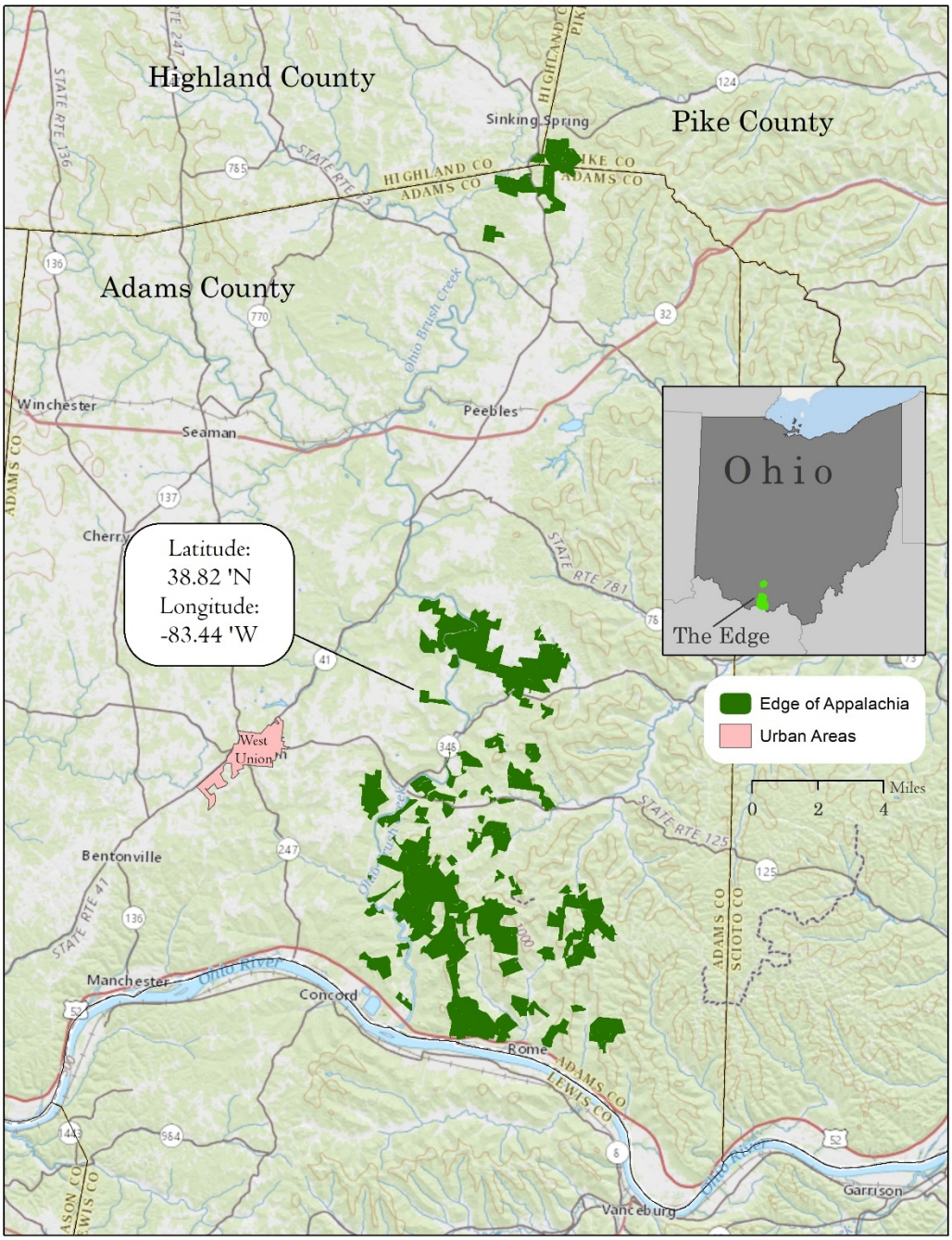
N/A

Attachment D: Tribal Projects

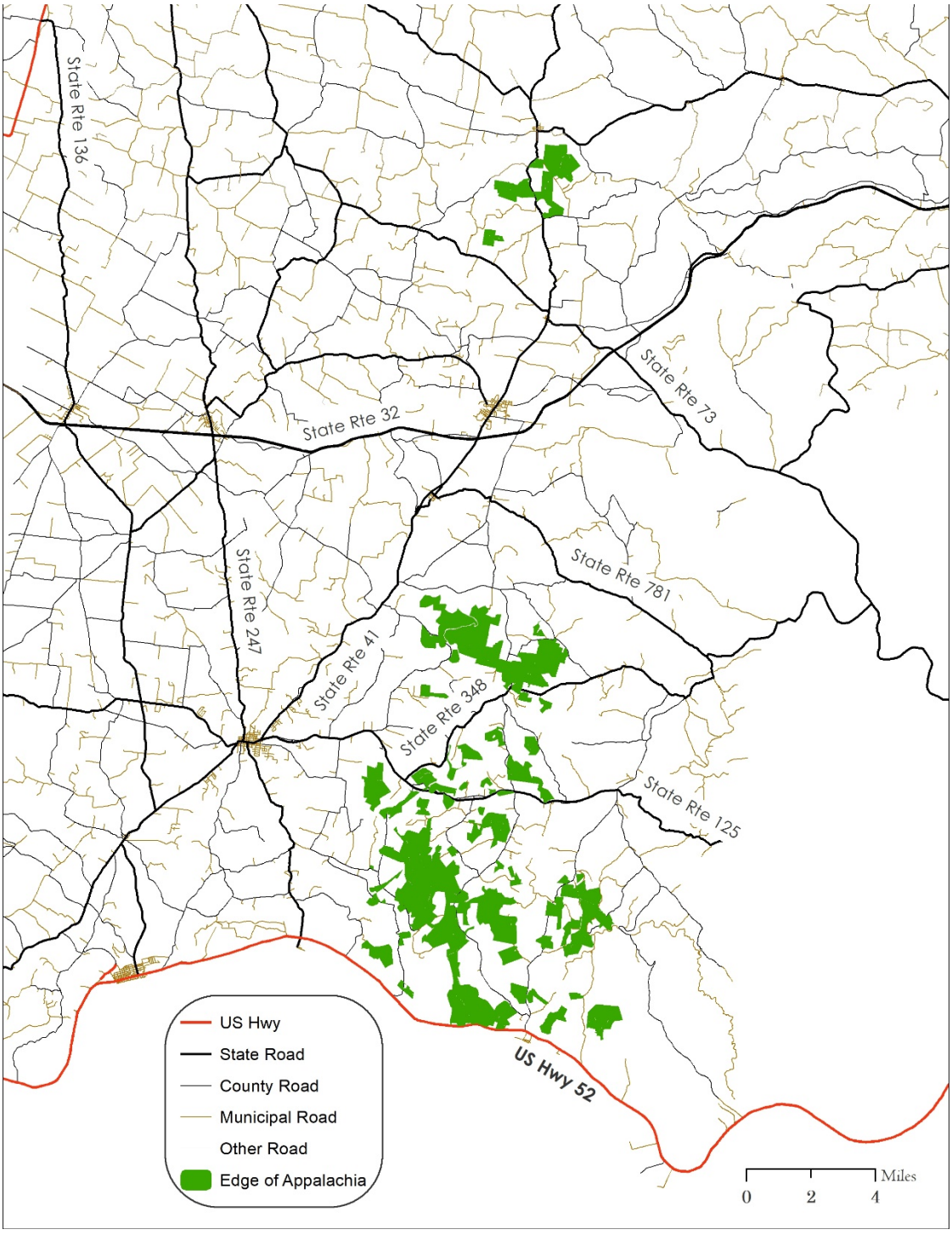
N/A

Attachment E: Project Maps

1. **Governing jurisdictions, and latitude/longitude coordinates**



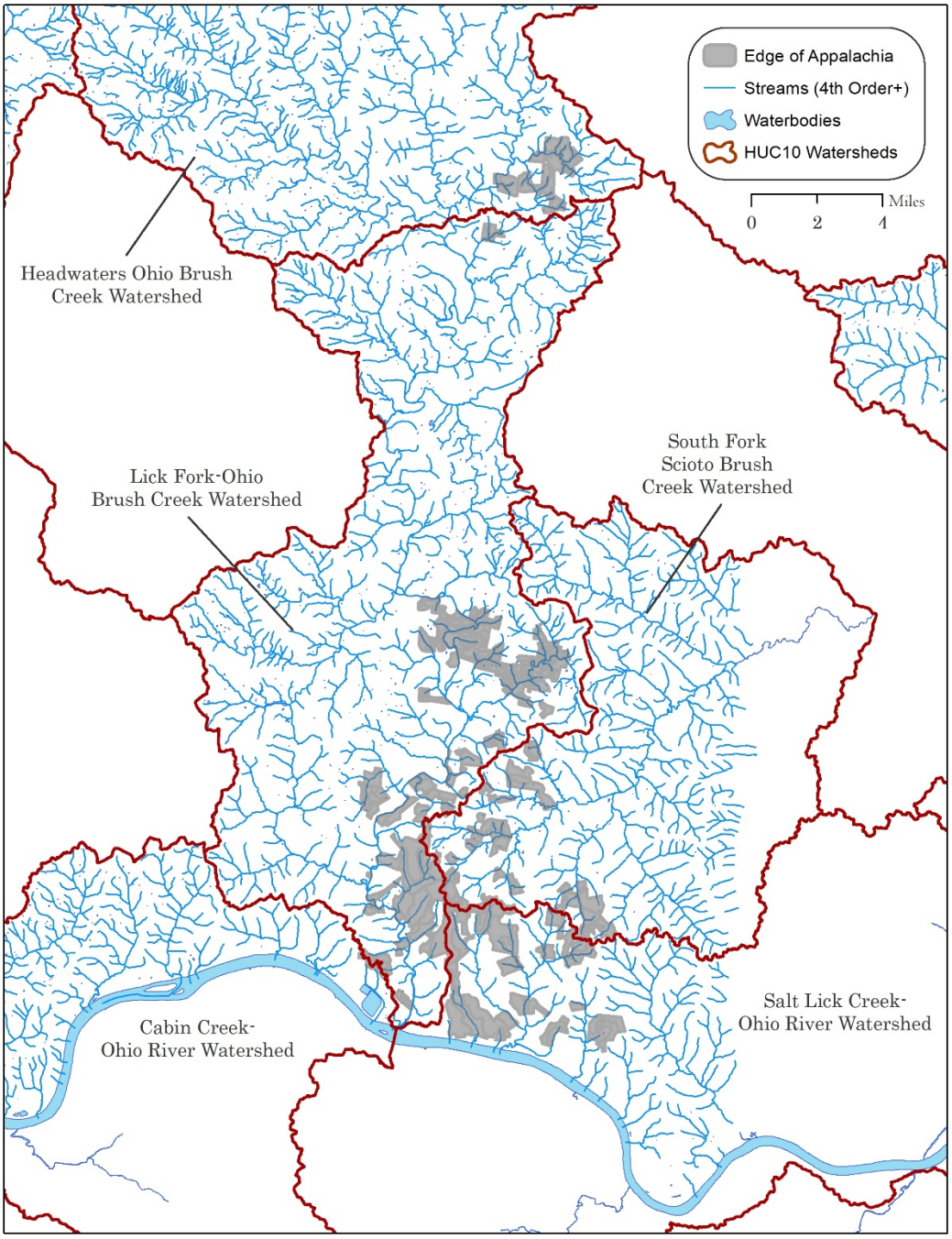
2. Public and private roads (map)



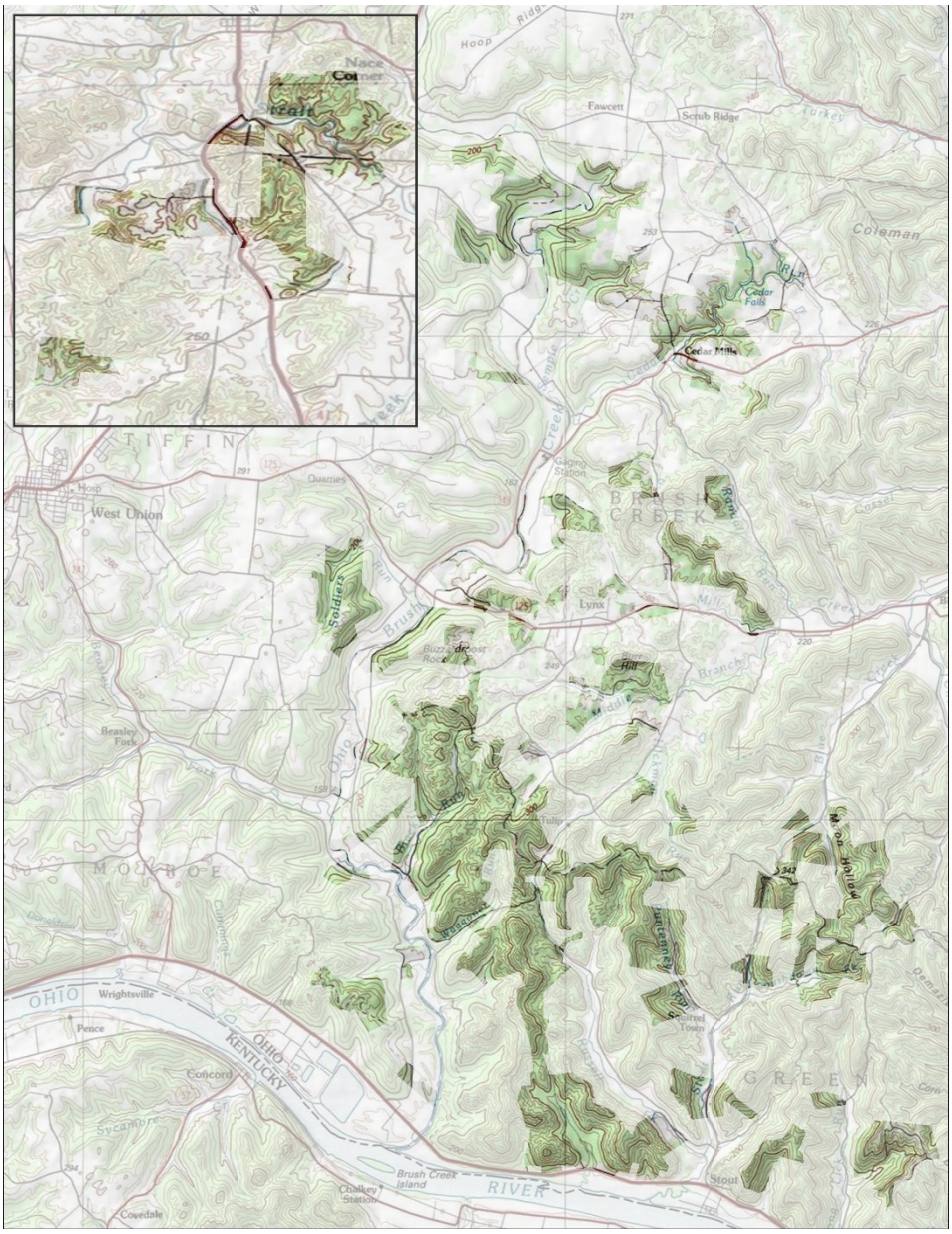
3. Towns (map)

See map 1 for towns and urban areas.

4. Major watercourses (4th order or greater), water bodies, and watershed description (map)

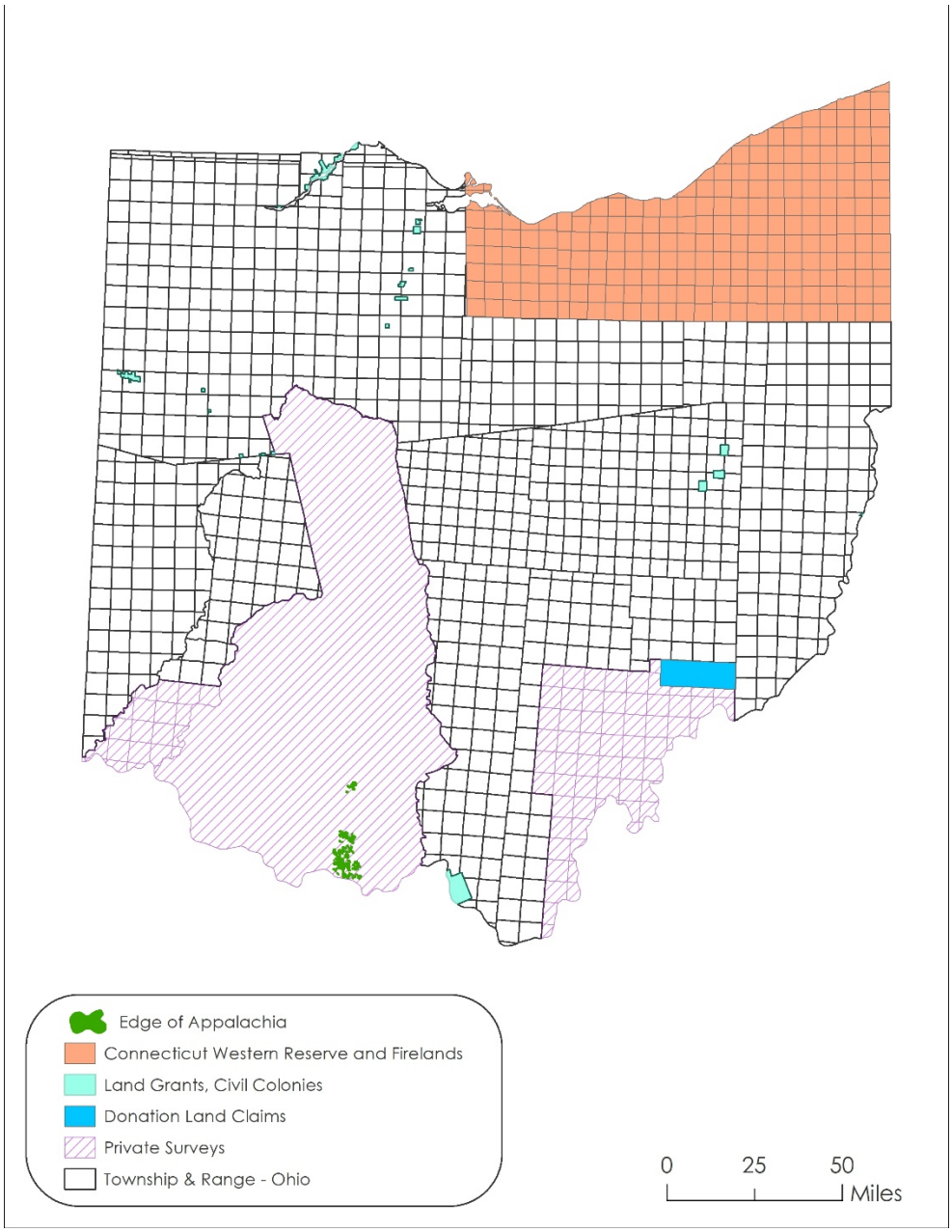


5. Topography (map)



6. Townships, ranges, and sections (map)

The State of Ohio is part of the USGS Public Land Survey System, however a large portion of the state does not have PLSS information and land parcels were determined by private survey. Location information is provided in map.

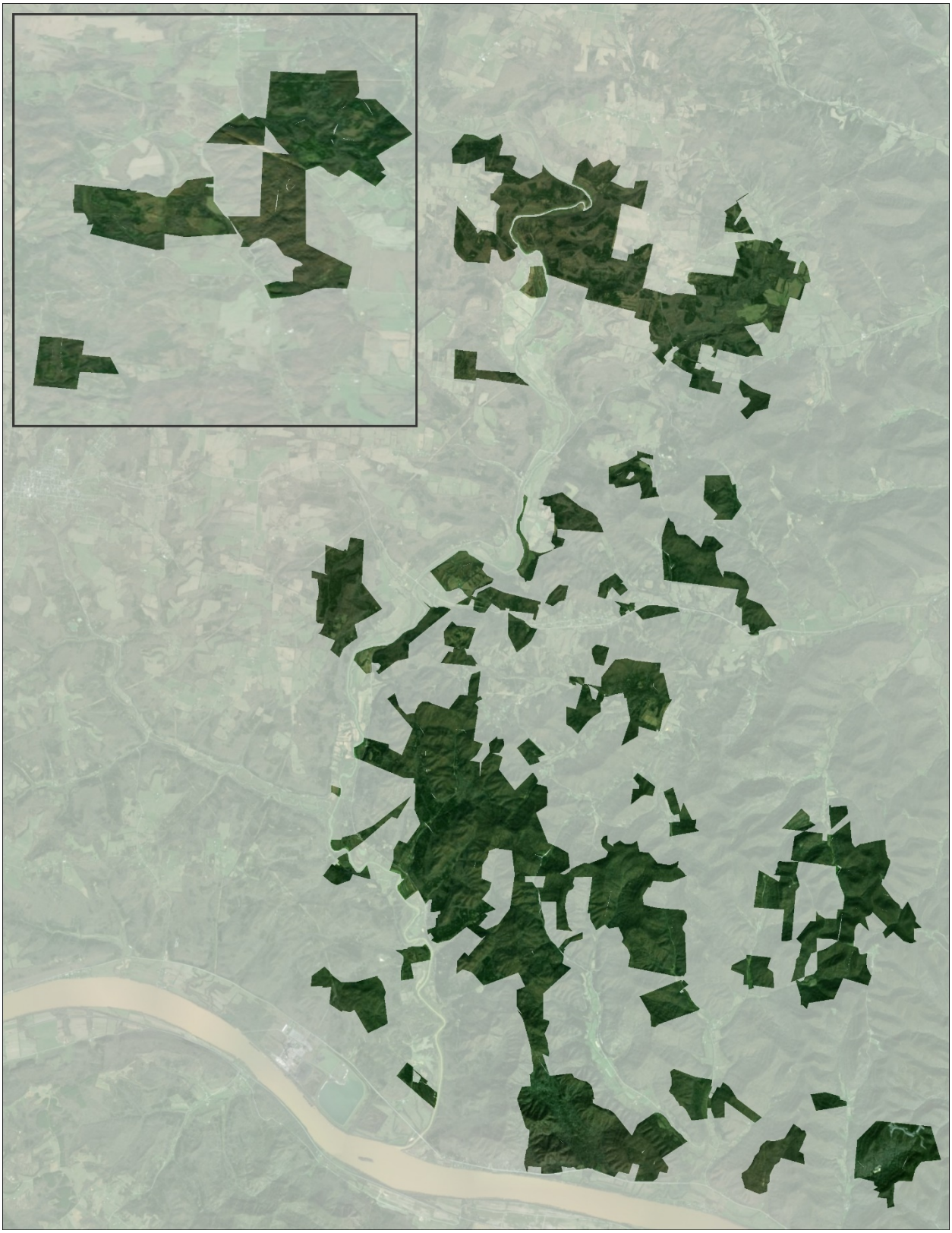


7. Georeferenced shape file

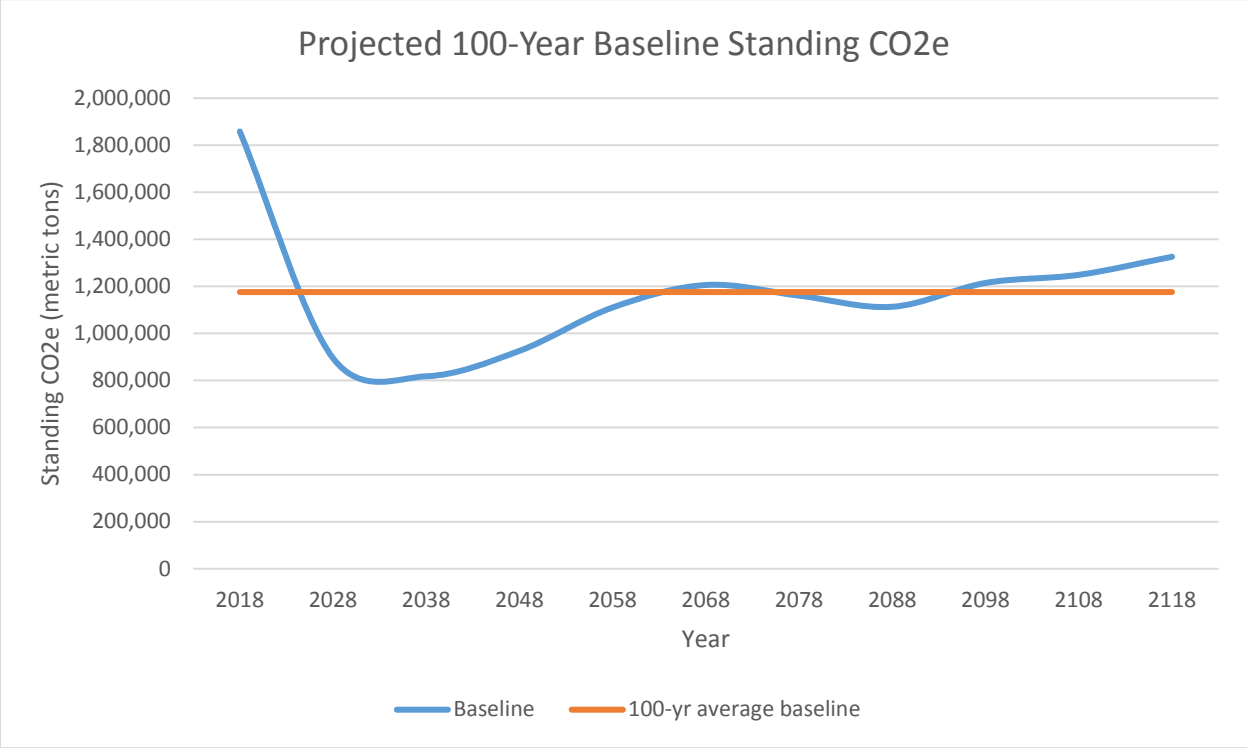
Please see provided georeferenced shapefile.

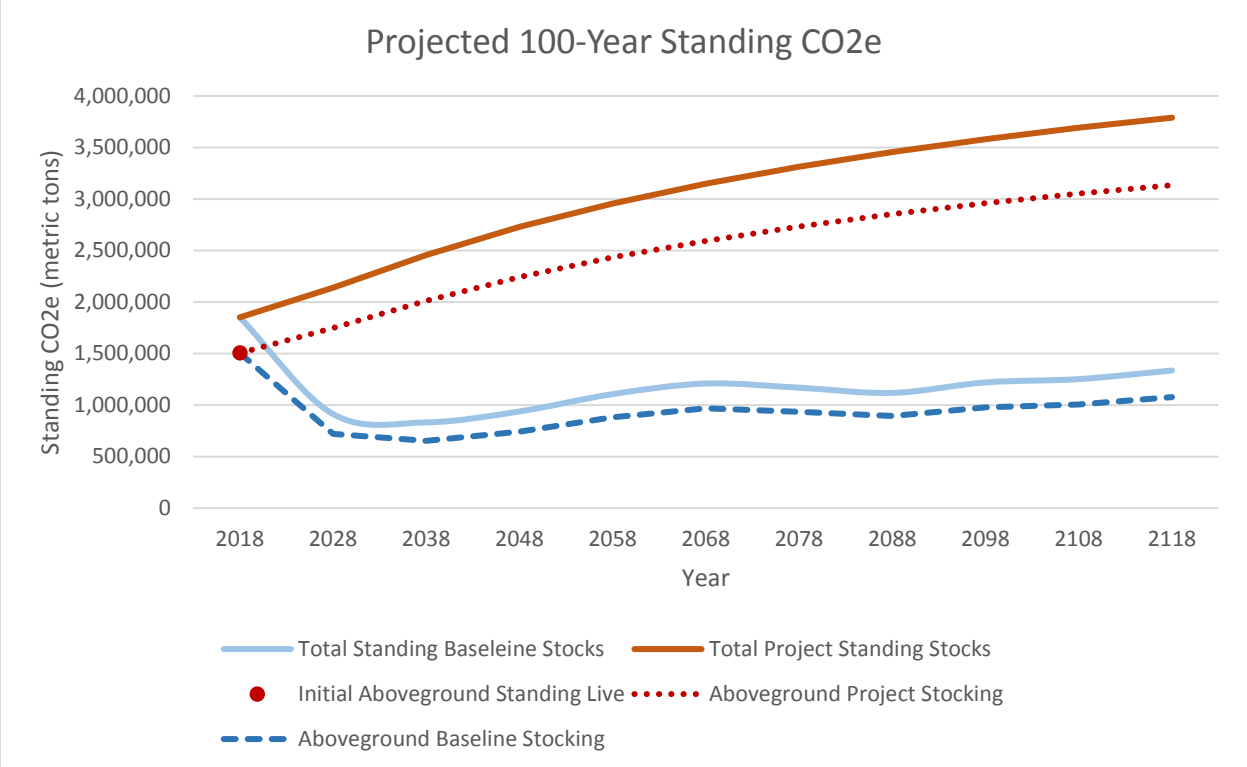
Attachment F: Canopy Cover

As evidence by recent aerial imagery, the Project Area contains greater than 10% canopy cover.



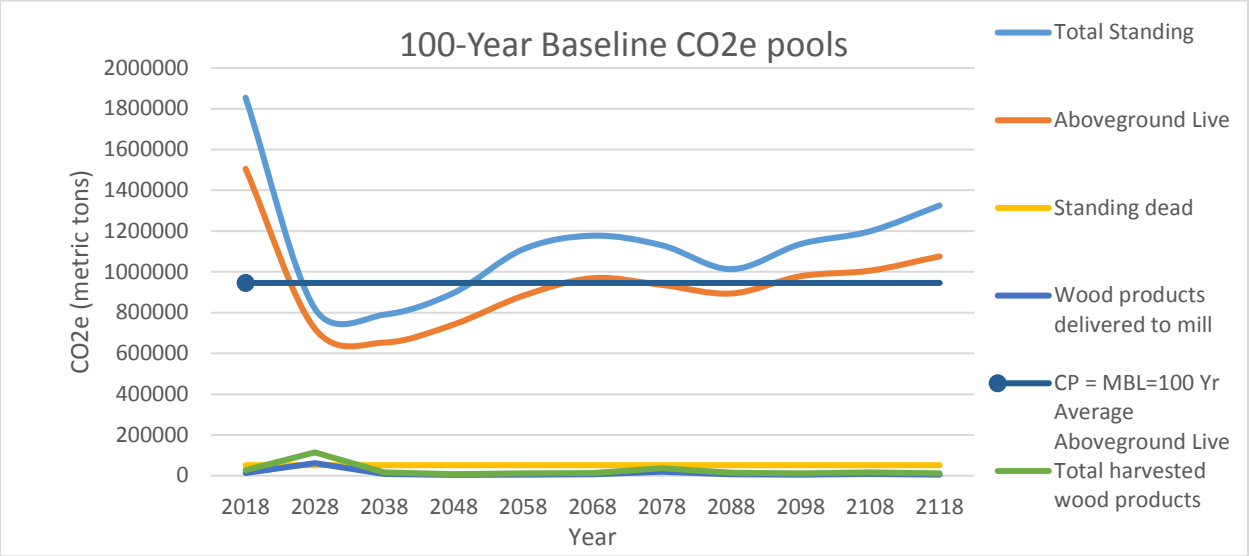
Attachment G: 100-year Baseline





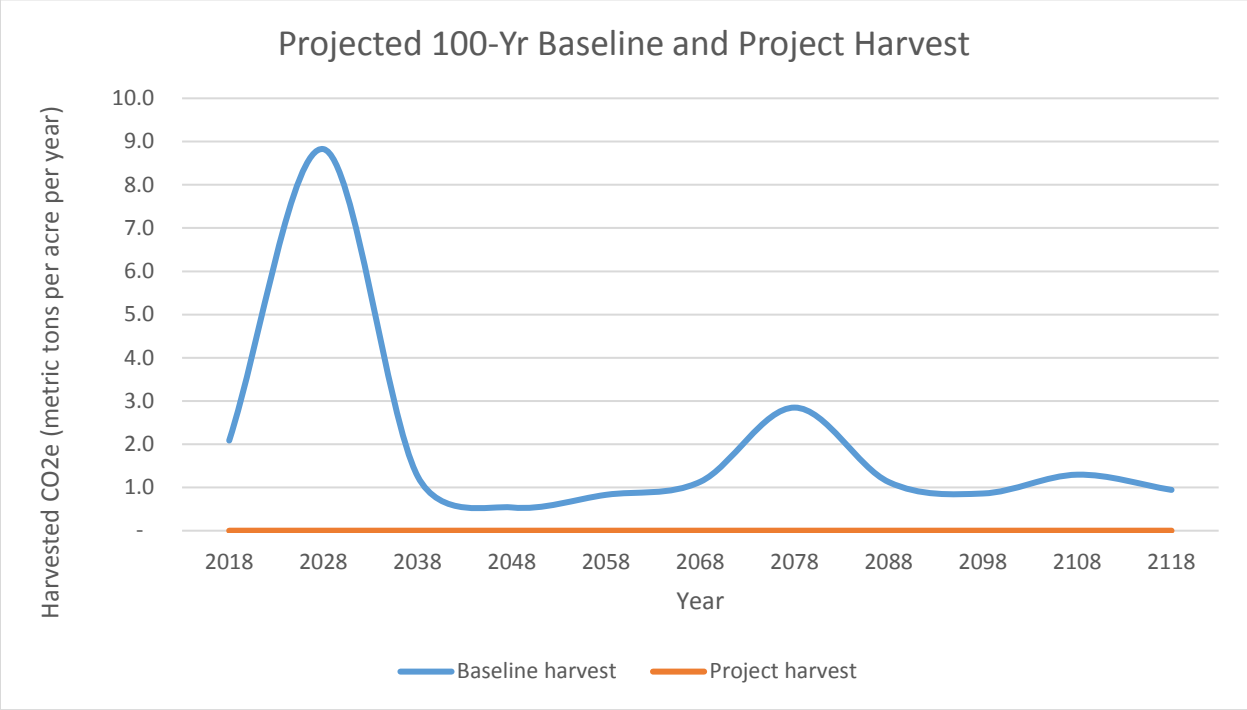
Projects stocks are projected to continuing growing over time as there is no harvesting. A description of the baseline over time may be found in Attachment H.

Attachment H: Baseline Onsite Carbon Stocks



Overall, the management objective in the baseline is focused on early reductions in carbon stocks to maximize net present timber revenue, with secondary harvests during the second rotation. Over a 100-year period, this will cause the project area to reach the average common practice baseline in the region.

Attachment I: 100-Year Baseline and Actual Harvest Volumes



Actual harvest volumes not applicable since there are no ongoing or planned commercial harvestsAttachment K Legal Constraints

The Project baseline must consider Ohio Best Management Practices:

- Streamside Management Zone- variable width buffer, slope dependent
- There are no endangered species on the property, so no ESA restrictions were modeled in the baseline

All BMPs and FPA requirements have been modeled into the baseline.

Table 4. Baseline Constraints Table

Constraint	Reference	Geographic Location	Acreage	Associated Agency	Silvicultural Method
SMZ Acres	Ohio Best Management Practices	Variable width buffers, slope dependent	477.8 acres	Ohio Dept of Forestry	Let Grow

Attachment L: Financial Feasibility

A financial analysis (Forest Protocol section 5.2.1(e)(2)(A))) of the baseline growth and harvest regime reveals that the activities represented in baseline scenario are clearly feasible.

Commercially viable species in the project area include oak, maple, yellow-poplar, walnut, cherry, ash, hickory, and other hardwood and softwood species.

Species	Saw timber stumpage ($/Mbf)*	Pulp price ($/ton)

black walnut	$875	$0
white oak	$525	$0
red oak	$422	$0
sugar maple	$367	$0
black cherry	$340	$0
ash	$306	$0
red maple	$280	$0
hickory	$243	$0
basswood	$225	$0
yellow-poplar	$225	$0
Mixed hardwood	$75	$0
Mixed softwood	$75	$0

*Average of mean Spring 2018 (March/April/May 2018) and Fall 2018(Sept/Oct/Nov) prices for Southeast Ohio

Source: Comparison of Prices Paid for Ohio Sawlogs by Region (Doyle Scale) – Jan 31 2019, "January 2019 Report" website link

Because stumpages were estimated above, variable costs are assumed to be $0. Variable costs would include harvest management costs such as equipment mobilization, logging, hauling, camping, roadwork (layout/ construction/ maintenance), travel to and from the job site, boundary delineation (property/sale/unit), and timber marking/paint. In addition, it was assumed that there are additional administrative costs on the property: $10 per acre.

There were no readily available sources for pulp prices, but discussion with a local forester, and local economic studies show that there is a significant pulp market in the area. Pulp prices were conservatively assumed to be $0/ton.

Ultimately, even with the conservative estimate for pulp prices, the financial analysis estimates the baseline harvest activities to be financially viable over a 100-year term using the pricing estimates cited above.

Baseline Modeling

Site Index

Site Index was calculated from tree cores taken in the field and processed by Rocky Mountain Tree Ring Research. The available outputs following processing tree cores included tree species, DBH, Height, Pith Date (calendar year), DBH Age (years). From these outputs, Site Index was calculated using species-specific site index curves[1]. See "EdgeofAppalachia_SiteIndex_Calcs.xlsx" for more detailed calculations.

[1] Carmean, W. H., Hahn, J. T., & Jacobs, R. D. (1989). Site index curves for forest tree species in the eastern United States. *General Technical Report NC-128. St. Paul, MN: US Dept. of Agriculture, Forest Service, North Central Forest Experiment Station*, *128*.

Silvicultural Prescriptions

A no harvest, or "let grow," prescription was modeled for the stands. This prescription modeled what would happen in the absence of harvesting. Single-tree selection prescriptions were modeled for all strata. 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 5.0" and maximum DBH of 40.0". These prescriptions were applied to all riparian buffers.

Clearcut prescriptions were implemented in FVS by harvesting all the trees. There are 10 clearcut prescriptions that were designed to implement the harvests, with the first clearcut harvest occurring in one of the first 10 time periods. A possible second clearcut harvest was implemented for each of the clearcut prescriptions based on two triggers: (1) a 2nd clearcut can only be implemented at least 50 years after the 1st clearcut, and (2) the stand basal area must have grown to at least 100 ft^2/acre. This allowed for the harvesting across to property to remain staggered over time. The second cut usually occurred at least approximately 60 years after the first harvest.

The shelterwood prescriptions were implemented using a two-stage shelterwood approach. The stocking trigger for the shelterwood cut was 80 ft^2 of basal area and was done with a thin from below to 50 ft^2 of residual basal area with a minimum tree size of 5". This cut was meant to remove intermediate or suppressed saplings and poles because the smaller understory trees suppress development of vigorous seedlings of the preferred species. For all strata, if a plot had >80 ft^2 of basal area as of the project Start Date, the shelterwood cut was scheduled for the first cycle (first 5 years). The natural regeneration was induced in the stand after the shelterwood cut to simulate natural reproduction under the protection of the older stand. Five years after the shelterwood cut, an overstory removal was simulated using a thin from above while leaving all trees < 5" DBH. After the first overstory removal, the next shelterwood cut was implemented when the stand had grown to at least 80 ft^2 of basal area with a minimum time of 40 years in between cuts.

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 enough plots to express the variability of the stands. 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 the harvest frequency for each prescription, as well as the acreage allocated to each harvest prescription is also provided.

Table 5. Silvicultural Prescriptions Acreage Allocations

ID	Prescription Description	Baseline Rx Acres	Project Rx Acres
CC_2019	Clearcuts starting in 1st time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	491.7	-
CC_2024	Clearcuts starting in 2nd time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	4,413.1	-
CC_2029	Clearcuts starting in 3rd time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	975.8	-
CC_2034	Clearcuts starting in 4th time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	685.6	-

CC_2039	Clearcuts starting in 5th time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	445.2	-
CC_2044	Clearcuts starting in 6th time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	214.4	-
CC_2049	Clearcuts starting in 7th time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre	152.8	-
CC_2054	Clearcuts starting in 8th time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	162.5	-
CC_2059	Clearcuts starting in 9th time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	47.2	-
CC_2064	Clearcuts starting in 10th time period. A 2nd clearcut is possible, but two conditions must be met: (1) the 2nd clearcut must be at least 50 years after the 1st clearcut, and (2) the stand basal area must be at least 100 ft2/acre.	-	-
GROW	Let grow with no harvesting.	2,117.5	13,092.71
SHW	Shelterwood harvest to 50 ft^2 basal area, overstory removal 5 years later, 80 ft^2 basal area stocking trigger.	2,818.4	-
STS50	Single-Tree Selection (starting in the first time period) thinning to 50 ft^2 basal area.	94.4	-
STS75	Single-Tree Selection (starting in the first time period), thinning to 75 ft^2 basal area.	50.2	-
VT_20BA	Thin to 20 ft^2 basal area in first time period. For subsequent time periods, thin from above to 20 ft^2/acre if the basal area exceeds 100 ft^2/acre.	424.1	-

Optimization

To determine a combination of baseline harvest scenarios that would result in a 100-year average CO2 equal to the common practice aboveground CO2/acre, all the possible 100-year baseline scenarios for every plot were copied into a spreadsheet in a format that could be read by optimization (linear programming) software. The optimization software (Frontline Analytic Solver) was used to allocate acreage to different prescriptions for each plot so that the average aboveground CO2 over 100 years equaled the common practice baseline, while meeting all the constraints.