

# Offset Project Data Report for the Initial Reporting Period Bluesource – Marmet Improved Forest Management Project

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<b>OPR Staff Use Only</b>	Date Report Received	OPR Tracking Number:	Date Report Reviewed	<b>OPR Staff Use Only</b>

## Part I. Entity Submitting Report

This form being submitted by the Authorized Project Designee (OPO).

Completed By: Kaarsten Turner-Dalby

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Date Form Completed: 3/5/2019

## Part II. Offset Project Information

Project Name: Bluesource- Marmet Improved Forest Management Project

OPR Project ID: ACR280

ARB ID: CAFR5230

City: Logan

State: West Virginia

Zip: 25601

Registry: American Carbon Registry

Compliance Offset Protocol: U.S. Forest Projects

Version: November 14, 2014

Start Date: 10/20/2015

Reporting Period End Date: 4/30/2017

Crediting Period: 10/20/2015 to 10/19/2040

The commencement date is signified by the submittal of the project listing form ACR. Per page 15 of the ARB Forest Protocol, an IFM project's commencement date can be signified by the submittal of the project's listing information.

## Part III. OPO/APD Information

### Offset Project Operator

OPO Name: Heartwood Forest Fund VIII, LP

CITSS ID#: CA1950

Mailing Address: P.O. Box 9162, Chapel Hill, NC 27515

Contact Person: Kaarsten Turner- Dalby

Phone Number: 303-838-2515

Email: kaarsten@forestlandgroup.com

### Third-Party Consultant

Name: Blue Source LLC

CITSS ID#: CA1278

Contact Person: Joshua Strauss

Mailing Address: 1935 E Vine Street, Suite 300, Murray, UT 84121

Phone Number: 949-233-1501

Email: jstrauss@bluesource.com

## Part IV. Land Ownership

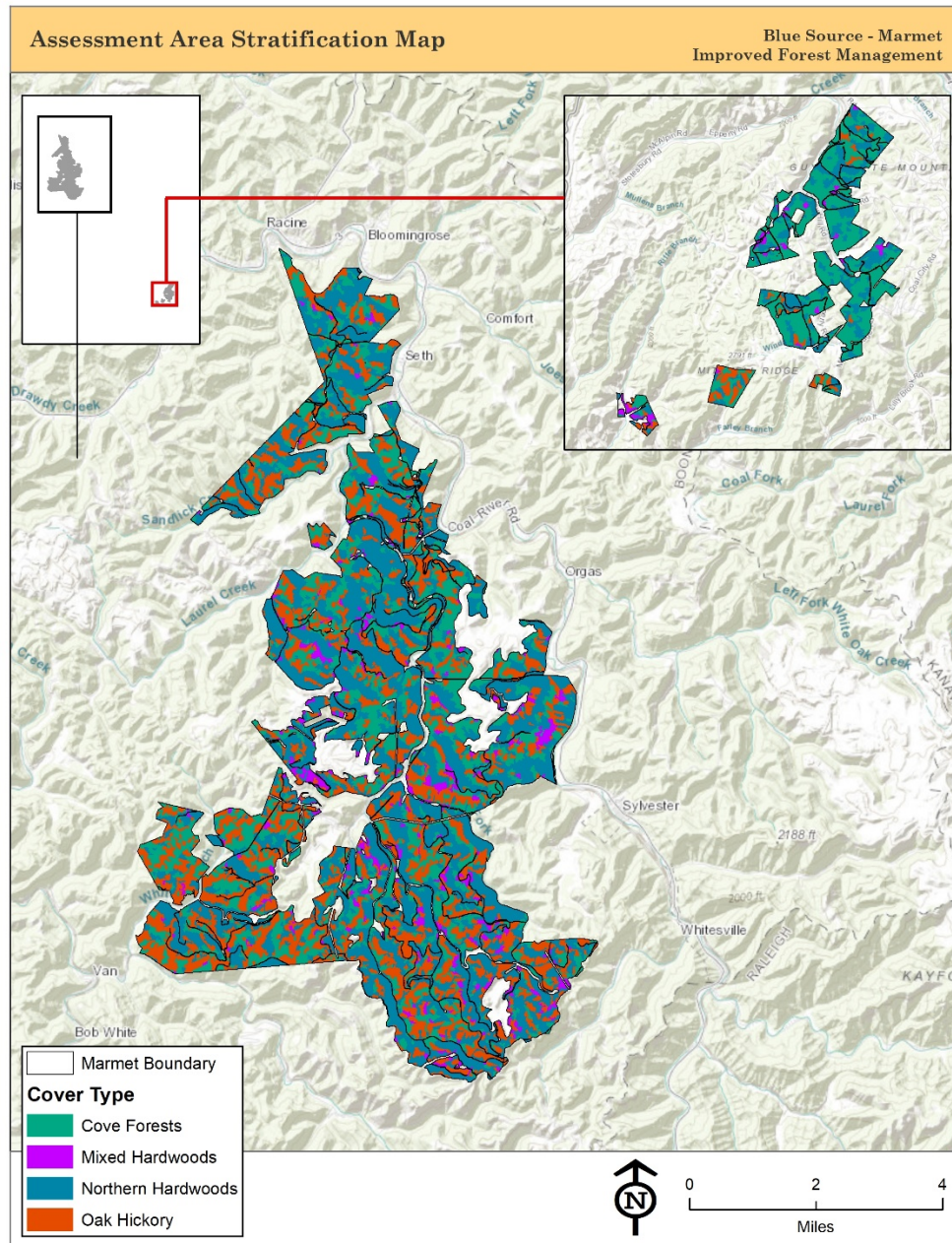
1. **Whether the Offset Project Operator is the owner in fee for the project area.** Yes
  - a. **If yes, provide documentation (e.g. deed of trust, title report) showing the Offset Project Operator's ownership interest in the property and its interest in the trees and standing timber on the property.**  
Please see provided deeds. (Provided separately for verification purposes.)
2. **Forest Owners:**  
Heartwood Forest Fund VIII, LP
3. **Offset project type (reforestation, improved forest management, or avoided conversion).**  
Improved Forest Management
4. **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. **Latitude/longitude coordinates:** 38.02° N/ -81.62° W
2. **Project Area Assessment Areas**

Supersection	Assessment Area	Acres
Allegheny & North Cumberland Mountains	Allegheny & North Cumberland Mountains Cove Forests	6,896
	Allegheny & North Cumberland Mountains Mixed Hardwoods	1,013
	Allegheny & North Cumberland Mountains Northern Hardwoods	10,194
	Allegheny & North Cumberland Mountains Oak-Hickory	6,533
	<b>TOTAL</b>	24,636

Note: sums may not total to 100% due to rounding



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

Governing Jurisdictions: Boone and Raleigh Counties fall within the 25<sup>th</sup> and 10<sup>th</sup> Judicial Circuit courts of West Virginia, respectively.

### 4. Describe how the Project Area was determined.

The project area was determined using GIS to include 24,636 forested acres owned by Heartwood Forest Fund VIII, LP (also referred to as Marmet throughout the OPDR).

Marmet owns in total 39,512 acres. The Nicholas Tract (9,377 acre located wholly within Nicholas County) was excluded from the project area per the landowner's request. Non-forested acres were removed from the



project, including mines, roads, and streams. All excluded areas were removed within a minimum mapping unit of 2.5 acres. After these areas of non-forest were excluded, the total project area included 24,636 acres. To ensure no neighboring properties encroached into the Project Area, ownership extent has been confirmed by property managers and will be further verified in the field.

A supporting georeferenced shapefile has been provided separately for verification purposes.

## **5. Existing land cover and land use**

Land Cover: The Project Area's land cover is mainly hardwood forests.

Land Use: The current land use is commercial forestry.

## **6. Forest vegetation types**

The main forest type across the property is mature Oak-Hickory forests, dominated by yellow poplar, chestnut oak, white oak, and hard maple.

## **7. Site classes**

100% of the property is considered low site class as the annual forest productivity (cubic feet/ acre) is less than 120 cubic feet/ acre. Site class was determined using NRCS soil data and the associated NRCS Forestland Productivity reports. The site index and site productivity analysis is provided separately for verification purposes.

## **8. Land pressures and climate zone/classification**

Though the neighboring properties are almost all commercial forestlands, there has been noted some land development on adjoining properties as noted in an appraisal conducted on the property on December of 2014. Certain portions of the property could be developed for rural residences or hunting residences at this time. Water and sewer services are not currently available to most of the property, so the cost of large-scale developing would be significantly higher than in other less rural areas. Although the property is reasonable close to Charleston and Beckley, West Virginia, there does not appear to be sufficient demand for large-scale development in the area. Industrial or commercial development is not economically feasible for the property as a whole.

Climactic zone: The project area falls within climactic zones 6a and 6b on the USDA plant hardiness zone map.<sup>1</sup> Average annual extreme minimum temperatures for these zones range from -10 to -5 and -5 to 0 degrees Fahrenheit, respectively. In West Virginia's mountains, the growing season is about 140 days per year with a mean annual precipitation of 40 to 50 inches distributed fairly evenly throughout the year. The normal daily average temperature in the summer is about 75 degrees Fahrenheit and in winter, about 45 degrees Fahrenheit.

## **9. Historical land uses, current zoning, and projected land use within project area and surrounding areas**

The property and the surrounding area has been used for timber production. Located in rural central Appalachia, mineral extraction and timber harvesting are common throughout the region.

The property is not critically zoned and is located in a rural area. The project area falls into unincorporated areas of Boone and Raleigh Counties, West Virginia, which have no zoning classification. There do not appear to be legal restrictions to the land use. The use of the subject area has been as a forestry property with compatible recreational use.

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<sup>1</sup> <http://planthardiness.ars.usda.gov/PHZMWeb/>

The property has been historically managed for commercial timber operations. After the acquisition of the project area by the OPO, the land has been under sustainable forest management with Forest Stewardship Council certification.

**10. 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 (refer to Section 3.8.1).**

- ☐ 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” (refer to Section 3.8.2), including:
- a. Composition of native species;

Species	BA/acre*	%
American Beech	7.62	6.55%
American Elm	0.19	0.16%
Aspen	0.63	0.54%
Basswood	3.90	3.36%
Bitternut Hickory	0.21	0.18%
Black Birch	3.52	3.03%
Black Cherry	0.41	0.35%
Black Gum	1.75	1.50%
Black Locust	0.53	0.45%
Black Oak	4.66	4.01%
Box Elder	0.07	0.06%
Buckeye	0.25	0.22%
Butternut	0.12	0.10%
Chestnut Oak	13.36	11.49%
Chinkapin Oak	0.11	0.10%
Cucumber	2.49	2.14%
Dog Wood	0.35	0.30%
Hard Maple	6.74	5.80%
Hemlock	4.64	3.99%
Ironwood	0.23	0.20%
Magnolia	1.16	1.00%
Mockernut Hickory	1.71	1.47%
Muscle Wood	0.05	0.04%
Mixed Hardwood	0.07	0.06%
Paulownia	0.14	0.12%

Paw Paw	0.12	0.10%
Pignut Hickory	4.55	3.92%
Pin Cherry	0.02	0.02%
Pitch Pine	0.88	0.76%
Red Bud	0.31	0.26%
Red Mulberry	0.01	0.01%
Red Oak	5.61	4.83%
Sassafras	0.84	0.72%
Scarlet Oak	4.38	3.77%
Serviceberry	0.09	0.08%
Shagbark Hickory	0.41	0.35%
Short Leaf Pine	0.17	0.14%
Silver Maple	0.10	0.09%
Slippery Elm	0.19	0.16%
Soft Maple	12.61	10.85%
Sourwood	2.66	2.29%
Striped Maple	0.09	0.08%
Sycamore	0.91	0.78%
Tree Of Heaven	0.63	0.54%
Virginia Pine	0.09	0.07%
White Ash	0.28	0.24%
White Oak	8.51	7.32%
Yellow Birch	1.05	0.90%
Yellow Poplar	16.81	14.46%

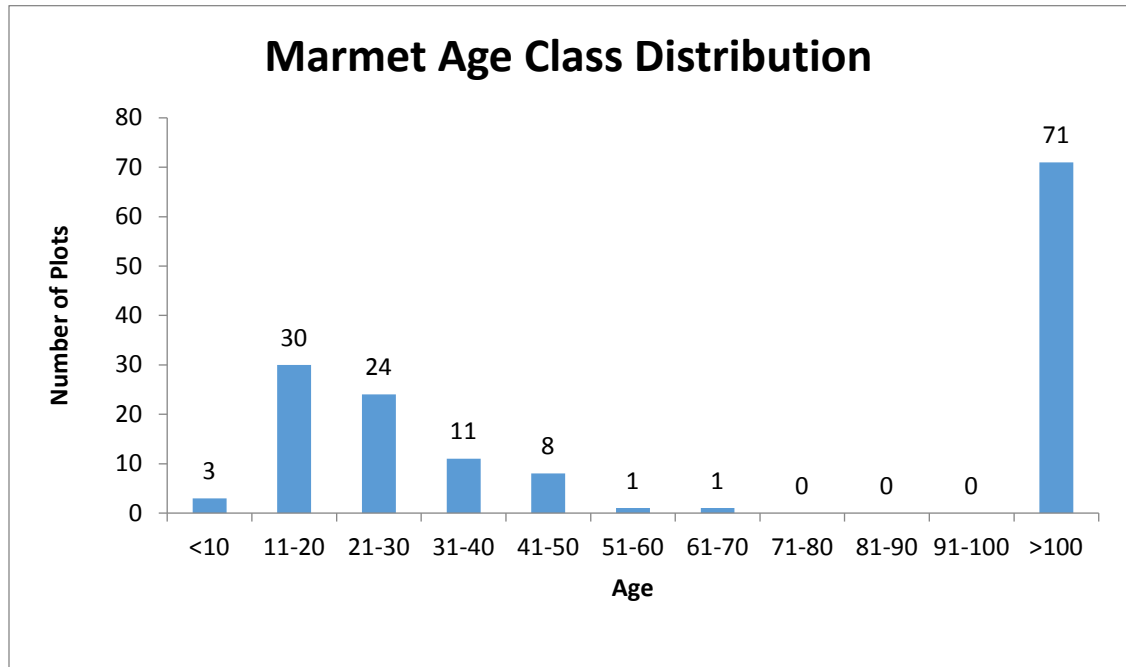
\*Totals may not sum to 100% due to rounding.

The project area naturally consists 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. Specifically, as noted in section V8a, the species with the highest frequency (%) throughout the project area is Yellow Poplar with 14.46% of the total live basal area, well below the 65% threshold found within the Allegheny & North Cumberland Mountains Oak-Hickory assessment area. The species diversity threshold for the remaining supersections is 70%.

- i. **Explain how the project will demonstrate a trend toward achieving the Species Diversity Index of native species and meet this requirement within 25 years.** NA
- ii. **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.** NA

**b. Distribution of age classes / sustainable management;**

Across the project area, 22% of the project’s forestlands are maintained in age classes less than 20 years old. For further explanation see “Marmet Modeling Supplement” provided separately for verification.



**c. Structural elements (standing dead wood);**

Live C (tonnes C/acre)	Dead C (tonnes C/acre)	% Standing Dead
40.3	0.56	1.4%

At the end of the first reporting period, standing deadwood accounted for 0.56 mt C/acre or 1.4% of the total carbon in standing live trees throughout the property. There are no portions of the property that are currently subject to salvage harvesting operations. As of the start date, the project did not meet the 1 mt C/acre structural elements criteria of the COP for U.S. Forest Projects, 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. In the Marmet Management Plan, snags will be retained and recruited, continuing progress towards meeting the structural elements criteria.

- 8. 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.

- a. Explain how the project demonstrates continuous progress toward meeting this requirement within the next 25 years.** NA

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

Across the project area, the forested acres will be managed such that in any given year, annual growth will exceed harvesting, building carbon stocks over time. Because the baseline harvest activities will meet or exceed annual growth, the management practices utilized in the project scenario will increase and maintain carbon stocks above the baseline over time.

The main silvicultural prescriptions used in the typical forest management of the property include single tree and group selection to maintain or create uneven-aged stands. Overall, the management objectives of the property aim to meet or exceed the requirements of the BMPs and harvest less than 100% of annual growth, which would lead to increased stocking levels over time.

The baseline harvesting scenarios must consider West Virginia BMPs as noted in Attachment I. Outside of SMZ zones, there are no regulations on harvesting. Clear cut and single-tree selection harvests would be the predominant silvicultural techniques applied in the baseline, converting the uneven-aged stands to even-aged. This would cause rotation ages to decrease, decreasing the age class structure on the property and significantly reducing the carbon stocks as management trends away from natural forest management.

Thus, the management practices utilized in the project scenario will increase and maintain carbon stocks above the baseline over time.

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

Yes. See Attachment F for supporting documentation.

**11. 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, November 14,2014:**

- a. Does the project consist of at least 95% native species based on the estimated sum of carbon in the standing live carbon pool? Improved Forest Management Projects are assessed using estimates of basal area per acre. Yes

## 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, November 14, 2014.**

### Inventory Methodology

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

Project Boundary: The offset Project Area was determined using the most recent geospatial file of the property which was provided by the landowner and is updated continuously through survey and boundary work. All roads, right-of-ways, major water bodies, and other non-forested areas were removed from the Project Area. Some forested areas were removed due to management considerations.

Stratification: The Project was stratified into four distinct strata. Stratification was conducted post-inventory using remote sensing techniques described in the "Marmet Inventory Stratification Methods\_01\_18\_18," provided separately for verification. The resulting strata acres and spatial distribution are shown below. The minimum mapping unit for the project area was 2.5 acre (or approximately 1 hectare) (Knight and Kunetta 2003).



### Strata Acreage

Strata	Acres
1	3,093
2	6,421
3	11,680
4	3,441
Total	24,636

Note: sums may not total to 100% due to rounding.

**Plot Number and Locations:** A gridded network of permanent inventory plots were installed across the project area, between March through the end of April 2017. Using the Fishnet tool in ArcGIS, a grid of 149 plots were sampled across the entire project area, placed at least 74.4 feet apart, ensuring no overlapping plot boundaries. For each strata, a plot grid was established in GIS using the fishnet grid tool and the strata boundary as a spatial constraint for the grid. Grid centers were used as the plot locations, selecting for all plots in the grid that fell within the specific strata in the project boundary. Iterations of the fishnet grid with the spatial parameter of various size grid unit squares were created until a grid that would have the number of desired plots for each strata. This process was repeated separately for each stratum. Sampling bias was minimized because the plots per strata were predetermined and systematically placed in a grid based on the geographical constraints of each strata. The final 149 plots sampled were the number needed to reach <5.1% sampling error.

**Monumentation:** Permanent inventory plot centers were monumented with a rebar pole pounded into the ground and topped with a small rebar cap flush with the ground.

**Sampling Method:** Permanent, fixed-radius plots were established across the Marmet property to facilitate precise tracking of individual tree growth and ease of verification. At each plot location, a fixed-radius plot was established to measure all trees greater than or equal to 5.0" in diameter at breast height (DBH); and a sub-plot was taken to capture live 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, inventory crew measured all species  $\geq 1$ " DBH that met this definition. For all trees in the fixed-radius plot, species, status, DBH (to the nearest tenth of an inch), 4" top height (to the nearest foot or  $\pm 5'$  for difficult to measure trees), phantom 4" top height (using nearby live trees of same species and DBH), and decay class (for snags) were measured. In the subplot, species and DBH were recorded for each eligible tree. Defect for live trees was estimate by dividing the tree into thirds based on total original height and weighted according to the protocol (10/25/65, top to bottom). Defect for dead trees used the same method except considered defect in the bole only instead of the whole tree. Measurements for DBH and height of irregular trees used the methods outlined in the Forest Inventory and Analysis National Core Field Guide Version 7.1. Further specification for field measurements are provided in the Marmet Carbon Plot Methodology document.

**Statistical Standard:** Mean volume estimates (e.g. above ground carbon per acre) for the ownership were reported with a minimum statistical precision of  $\pm 5\%$  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.

Data Collection Materials: Data was collected on hand held electronic data recorders. If data recorders were not available, field data was collected on paper tally sheets and manually entered into a computer for data analysis. All data sheets were scanned and sent to Blue Source.

Field personnel used the following equipment for obtaining forest-carbon inventory data: 75' or longer Logger's Tape designed to measure in 10ths of feet and 10ths of inches for diameter, clinometer capable of measuring height in feet and slope angle, laser rangefinder capable of measuring height to the nearest  $\pm 1'$ , as well as distance ( $\pm 1'$ ), electronic data recorder (EDR), compass, GPS handheld unit (capable of 3 meter accuracy) with point locations, Distance Measuring Equipment (DME) or rangefinder, cover type maps and aerial Photographs, pencils and permanent marker, flagging, aluminum tree tags, aluminum nails (cannot contain iron as this may damage the tree), hammer, tube paint or spray paint for marking DBH measurement and tree number, rebar poles and caps for marking plot centers (.5 in diameter, 2 ft. length), species code list, paper tally sheets (in case EDR fails), overview and point location maps.

QA/QC Field Procedures: At least 5% of the plots were checked by a different forester than cruised the plot, specifically by someone senior to the field crew. This involved 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 were resolved by talking with the foresters.

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

Independent Forester Review: The project implementation team (Blue Source) 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, were led by one of these foresters. Prior to finalization, a second forester who did not lead development of that component was tasked with a QA/QC review including random examinations and data checks to identify and fix any errors.

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

Senior Management Review: Once outputs were 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 reviewed 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 Blue Source for a minimum of 15 years.

#### **IFM-1 Standing Live:**

Please see the "Marmet Carbon Plot Methodology" document, provided separately for verification.

**IFM-3 Standing Dead:**

Please see the "Marmet Carbon Plot Methodology " document, provided separately for verification.

**IFM-6 Soil (if applicable):** Excluded.

**IFM-7 Carbon in in-use forest products:** NA

No specific inventory processes apply.

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

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:**

No specific inventory processes apply.

**IFM-17 Biological emissions from decomposition of forest products:**

No specific inventory processes apply.

**Monitoring Plan**

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, harvest, and any significant disturbances.

The Project Area will be re-inventoried at least every 12 years. During re-inventory, a subset of the current 149 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 the desired confidence statistics of  $<5.1\%$ , then randomly selected plots in the applicable strata 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 the desired confidence statistics, plots may be added into the inventory in a systematic design using the fishnet tool in ArcGIS. Otherwise, if the re-inventory results in a sampling error of  $\geq 5.1\%$ , 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 within 12 months following the event.

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 future updates to the inventory methodology will be approved in advance by a third-party verification body and by ARB, and documented in the project inventory change log.

In addition to inventory sampling, management staff will monitor the general health and condition of the 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:

1. New forest inventory data obtained from scheduled sampling during the previous year will be incorporated.
2. Annual harvests will be carefully tracked based on timber sale data.
3. 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 165 acres or more of the property (each plot represents ~165 acres, 24,636 acres/149 plots). If there is removal of  $\geq 50\%$  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 within 12 months of the event.

In the event that 165 acres or more are impacted by a singular event, 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 165 acres). Plots will be placed using an approved systematic selection method in GIS such as the fishnet tool. If plots are impacted by a significant event, they will be remeasured and incorporated into the inventory statistics, and will thus be reflective of the event.

4. 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.
5. Any necessary modification to spatial data based on strata boundary adjustments or other changes will be made.
6. Results will be incorporated in the annual OPDR

### **Potential Pests and Diseases**

Most of the insect and disease damage on the property is minimal. There is the occasional defoliation of trees due to loopers, gypsy moth, eastern tent caterpillars, fall webworm, bagworm, black knot in black cherry, and the anthracnose of sycamores. Historical damage has been minimal. Monitoring for the pests described below will be continuous as field personnel travel in and through the property.

Gypsy Moth, *Lymantria dispar*, is potentially the most destructive forest pest threatening the Marmet Property. Personnel in the Office of Plant and Pest Services predict the frontal wave of the moth to likely arrive to the southern West Virginia region during the next decade. Field personnel will vigilantly monitor the Marmet Property and will help identify outbreaks if they occur. If future defoliation or death occurs the damage will be recorded and reported to Heartwood Forest Fund VIII, LP where an assessment will be made and a strategy designed. Pesticide spraying for gypsy moth may be considered.

The emerald ash borer (EAB) is a potentially serious insect pest to the eastern hardwood forests. Reports indicate EAB has quickly spread throughout the state of West Virginia and evidence of mortality is becoming more frequent. The insect will likely have a direct impact to the ash on this property. During harvest preparation, ash trees will be selected for removal in order to salvage the timber before it is lost. The EAB quarantine is now statewide. In fact, most of the eastern United States is within the federal quarantine limits; so all ash timber can be transported within these boundaries.

Sudden Oak Death (SOD) is also a possible pest on the property even though most of the confirmed cases to date have been located on the west coast and in Canada. Infected plants should be destroyed. While risk for this disease is low, the potential loss is considerable due to the high stocking of oak and alternate

ericaceous hosts of the fungus throughout the property. General monitoring will include observing for bark cankers and foliar wilting.

The hemlock wooly adelgid is not considered a serious problem on the property because of very small amount of hemlock growing on the property. General monitoring will observe for the white wooly masses on the tree branches.

Heartwood Forest Fund VIII, LP will utilize integrated pest management for the control of these and other pests. Local officials and experts will be contacted if serious outbreaks of any of these pests are discovered. Advice and recommendations will be sought in order to control problem pests. The first alternative for controlling pests will be through cultural means, such as harvesting, clearing, and burning or manual removal of the pest or infected plant. Any biological or chemical control methods will be performed as necessary and with the recommendation and assistance of local officials and experts.

If pesticide application is necessary, Heartwood Forest Fund VIII, LP will develop a treatment prescription prior to any chemical use. The plan will include chemical application objectives, rate and method of application, risks and benefits of the chemical used and alternatives considered.

#### **Rare, Threatened, or Endangered Species**

According to the Marmet Management Plan completed in 2016, "Regional Directors (RDs) or their consulting foresters annually update data on rare, threatened or endangered species' locations, typically through the state's Natural Heritage Program. If there is a sighting of a species or habitat on or near the FMU, Heartwood Forest Fund VIII, LP maps the location and takes all necessary precautions, which will vary depending on the situation, during management activity.

If the presence of an RTE species or community type is suspected on the Marmet Property, Heartwood Forest Fund VIII, LP will either conduct a field survey prior to management activities, or manage as if the species is present. When an RTE species or community type is confirmed present, management activities may include but are not limited to the following:

- Modifying timber harvest prescriptions and adding the changes as an addendum to the timber harvest plan.
- Creating conservation zones, or maintaining existing zones, to enhance the viability of populations and their habitats, including their connectivity within the landscape.
- Controlling activities such as hunting, fishing, trapping and collecting to ensure adequate protection of the species or community type."

#### **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:**

Gross and sound cubic foot volume was calculated using equations and coefficients developed by Scott (1981), 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).

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 Users Manual Version 4.0 for Phase 2," and as specifically described in Appendix J, Tables 1 through 4. 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 3.664 to convert the metric tons of carbon into metric tons of CO<sub>2</sub>e.

### **Projected Growth**

Please see the “Modeling Plan” document, provided separately for verification.

### **Site Index**

Please see the “Marmet Modeling Supplement” document, provided separately for verification.

### **Adjustments for Start Date**

To determine CO<sub>2</sub> stocks at the project commencement date, the tree data was grown backwards to 10/20/2015. Detail on how the data was grown can be found in the “Modeling Plan” document, provided separately for verification.

### **Adjustments for Reporting Period Calculations**

To determine CO<sub>2</sub> stocks at the end of the reporting period, the initial inventory was assumed to be reflective of the end of reporting period stocks.

### **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 Forest Inventory and Analysis (FIA) documentation cited in the COP.

### **IFM-3 Standing Dead:**

Standing dead wood carbon CO<sub>2</sub> is calculated by estimating above and below ground biomass in the same manner it was for live trees (using appropriate volume equations and using the component ratio method and Jenkins coefficients), but then adjusting for defect and decay by applying the Domke et al. 2011<sup>2</sup> structural loss factors, and the Harmon et al. 2011<sup>3</sup> density decay coefficients, before finally converting to CO<sub>2</sub>e.

The estimates of standing dead wood are 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.

For the baseline, standing dead is projected to remain constant over the 100-year baseline at 2.00 tonnes CO<sub>2</sub> per acre.

### **IFM-6 Soil (if applicable): NA**

### **IFM-7 Carbon in in-use forest products:**

---

<sup>2</sup> Domke GM, Woodall CW, Smith JE. 2011. Accounting for density reduction and structural loss in standing dead trees: implications for forest biomass and carbon stock estimates in the United States. *Carbon Balance Manage* 6:1–11.

<sup>3</sup> Harmon, M.E., C.W. Woodall, B. Fasth, J. Sexton, and M. Yatkov. 2011. Differences between standing and downed dead tree wood density reduction factors: A comparison across decay classes and tree species. Research Paper NRS-15. Newtown Square, PA: U.S. Department of Agriculture, Forest Service.



Carbon in in-use forest products was calculated using actual harvest volumes, following the steps in Appendix C.3 of the COP. Calculations have been provided separately for verification purposes.

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

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

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

**IFM- 9 Biological emissions from site preparation: NA**

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

Calculated using a default 20% “leakage” factor applied to the difference in harvest volume relative to baseline.

**IFM-17 Biological emissions from decomposition of forest products:**

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

**C. 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:**

	<b>Average tCO<sub>2</sub>e/acre</b>	<b>Total tCO<sub>2</sub>e</b>
Start Date	141.8	3,492,617
End of Reporting Period	147.8	3,641,894

**IFM-3 Standing Dead:**

	<b>Average tCO<sub>2</sub>e/acre</b>	<b>Total tCO<sub>2</sub>e</b>
Start Date	2.07	50,917
End of Reporting Period	2.07	50,917

**IFM-6 Soil (if applicable): NA**

**IFM-7 Carbon in in-use forest products:**

End of Reporting Period Long-term storage in in-use wood products (tCO <sub>2</sub> e)						
<b>Units</b>	<b>Lumber</b>	<b>Plywood</b>	<b>Oriented Strandboard</b>	<b>Non Structural Panels</b>	<b>Miscellaneous Products</b>	<b>Paper</b>
<b>Hardwood</b>	224	-	108	23	9	7
<b>Softwood</b>	-	-	-	-	-	-

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

End of Reporting Period Long-term storage in wood products in landfills (tCO <sub>2</sub> e)					
Units	Lumber	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper
Hardwood	370	43	21	23	20
Softwood	-	-	-	-	-

**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:** NA

Actual Harvested Wood Products Summary	Total (tCO <sub>2</sub> e)	tCO <sub>2</sub> e / acre
Total Harvested Wood Products	1,304	0.05
Actual Carbon in Harvested Wood Delivered to Mill	2,093	0.08
Actual Carbon in Trees Harvested for Wood Products	4,332	0.18
Actual Carbon Stored Long-term in Wood Products - Excluding Landfill	370	0.02
Actual Carbon Stored Long-term in Wood Products - Landfill	477	0.02
Actual Carbon Stored Long-term in Wood Products - Including Landfill	847	0.03

**D. Inventory Confidence Statistics**

Total	n	Stratified Standard Error	Bound	Sampling Error
3,692,811	149	95,448	157,012	4.16%

The end of reporting period inventory sampling error is calculated as follows:

- 1)  $95,448 \times 1.645 = 157,012$
- 2)  $(157,012 / 3,692,811) \times 100 = 4.25\%$

The calculated end of reporting period sampling error of 4.25% is below 5.1%, so no confidence deduction should be applied to the inventory results.

**E. Reversal Risk Rating**

Reversal Risk Rating was calculated using the following formula:

Reversal Risk =  $100\% - (1 - \text{Financial Failure}) \times (1 - \text{Illegal Forest Biomass Removal}) \times (1 - \text{Conversion}) \times (1 - \text{Over Harvesting}) \times (1 - \text{Social Risk}) \times (1 - \text{Wildfire}) \times (1 - \text{Disease/Insect Outbreak}) \times (1 - \text{Other Catastrophic Events})$

$$= 1 - ((1 - 0.05) \times (1 - 0.0) \times (1 - 0.02) \times (1 - 0.02) \times (1 - 0.02) \times (1 - 0.04) \times (1 - 0.03) \times (1 - 0.03))$$

$$= 19.2\%$$

Buffer Pool Contribution:  $1,019,350 \text{ net ARBOCs} \times 0.192 = 196,085 \text{ ARBOCs}$  contributed to the Forest Buffer Account.

## Part VIII. Offset Project Baseline

1. The aboveground Common Practice (CP) value is 88.3 mtCO<sub>2</sub>e/acre with a live value of 105.7 mtCO<sub>2</sub>e/acre. The project's aboveground ICS live carbon stocks of 118.6 mtCO<sub>2</sub>e/acre is above the CP value, and as such the CP is equal to the Minimum Baseline Level (MBL)

Supersection	Assessment Area	Site Class	CP	Acres
Allegheny & North Cumberland Mountains	Allegheny & North Cumberland Mountains Cove Forests	Low	91	6,896
	Allegheny & North Cumberland Mountains Mixed Hardwoods	Low	52	1,013
	Allegheny & North Cumberland Mountains Northern Hardwoods	Low	87	10,194
	Allegheny & North Cumberland Mountains Oak-Hickory	Low	93	6,533
Weighted Average/ Total			88.1	24,636

### 2. Baseline Carbon Stocks

Aboveground (mtCO <sub>2</sub> e/acre)	Belowground (mtCO <sub>2</sub> e/acre)	Live (mtCO <sub>2</sub> e/acre)	Dead (mtCO <sub>2</sub> e/acre)	Standing (mtCO <sub>2</sub> e/acre)
88.1	17.2	105.3	2.07	107.3

3. 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 is non-applicable.

### 4. Baseline Modeling

Please see document, "Modeling Plan", provided separately for verification.

### 5. Harvest Planning

- a. Is harvesting planned in the Project Area? Yes
  - b. Optional: Does the project use a harvest schedule model? No.
6. Provide an estimate of carbon that was stored long-term in harvested wood products in the baseline.

End of Reporting Period Long-term storage in wood products in in-use wood products (tCO <sub>2</sub> e)						
Units	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper
Hardwood	2,048	0	5,305	208	445	322
Softwood	75	0	132	78	11	8

End of Reporting Period Long-term storage in wood products in landfills (tCO <sub>2</sub> e)						
Units	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper
Hardwood	3,391	0	2,124	188	1,147	989
Softwood	48	0	53	71	29	25

Baseline Wood Products Estimate	Total (tCO2e)	tCO2e / acre
<b>Total Harvested Wood Products</b>	26,732	1.09
<b>Baseline Carbon in Harvested Wood Delivered to Mill</b>	42,171	1.71
<b>Baseline Carbon in Trees Harvested for Wood Products</b>	87,294	3.54
<b>Baseline Carbon Stored Long-term in Wood Products - Excluding Landfill</b>	8,632	0.35
<b>Baseline Carbon Stored Long-term storage in wood products in landfills</b>	8,065	0.33
<b>Baseline Carbon Stored Long-term in Wood Products - Including Landfill</b>	16,697	0.68

## 7. Secondary Effects Estimate

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 Effect (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 CO<sub>2</sub>-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 CO<sub>2</sub>-equivalent tons, as determined in Step 1 of Section 6.2.3.

Y = The current year or reporting period.

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

$$= (4,332 - 87,294) \times 0.2$$

$$= -16,592$$

Secondary Effects Inputs	Tonnes CO2e
<b>Actual Carbon in Trees Harvested for Wood Products</b>	4,332
<b>Baseline Carbon in Trees Harvested for Wood Products</b>	87,294
<b>Difference Between Actual and Baseline Carbon in Trees Harvested for Wood Products</b>	-82,962
<b>Secondary Effects Emissions</b>	-16,592

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

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

Summary	Tonnes CO2e
<b>ARBOCs Issued</b>	1,019,350
<b>Buffer Pool Contributions</b>	196,085
<b>Annual ARBOCs Issued to Account Holder</b>	823,265

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

Please see Attachment K.

**9. Baseline Modeling**

Please see provided proprietary document, "Modeling Plan."

**10. 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.**

Please see Attachment I: Legal Constraints below.

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

Please see provided document, "Modeling Plan."

**12. The OPO will demonstrate financial feasibility of the growth and harvesting regime assumed for the baseline by 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.**

Please see attachment J: Financial Feasibility.

## 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

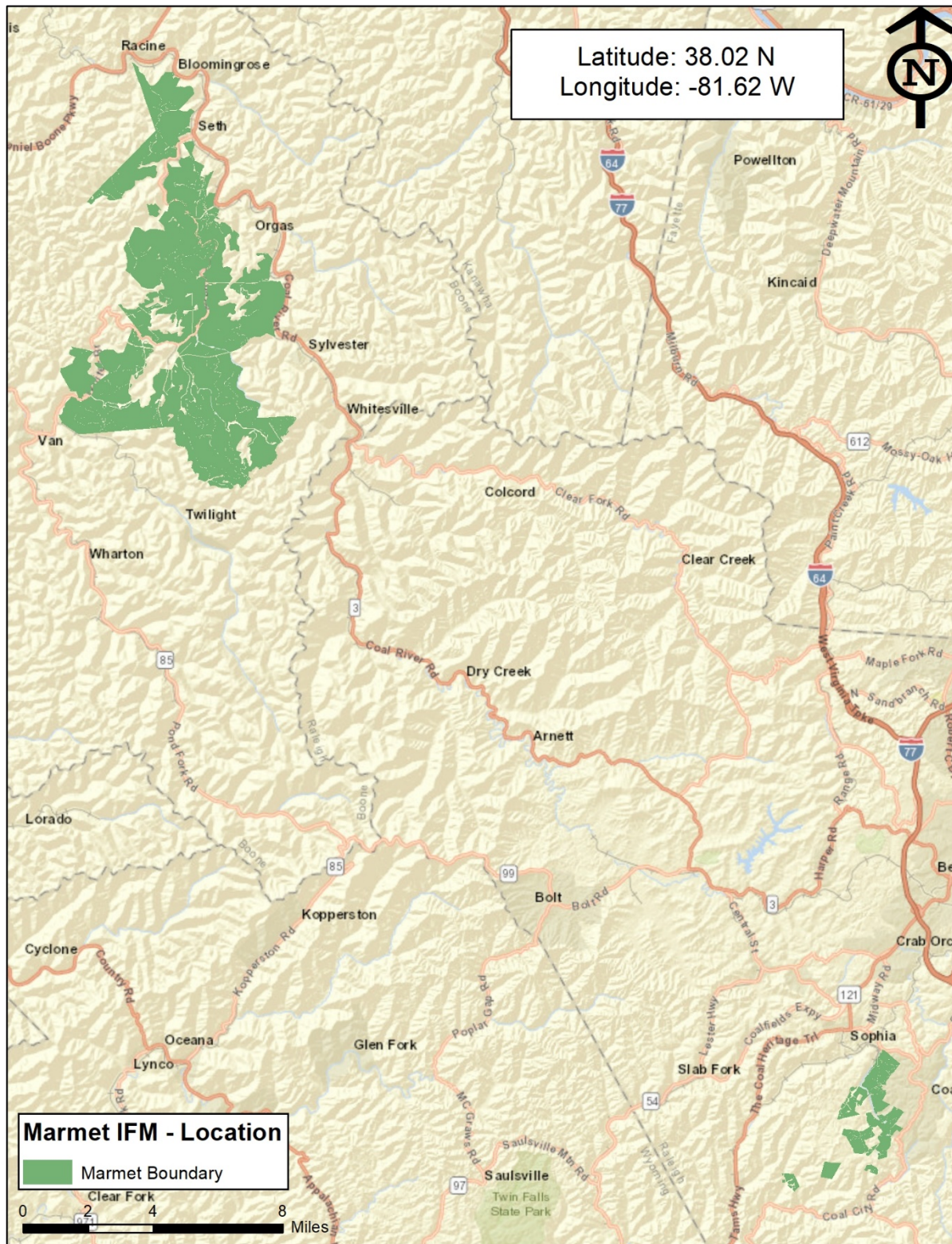
### Attachment D: Tribal Projects

N/A



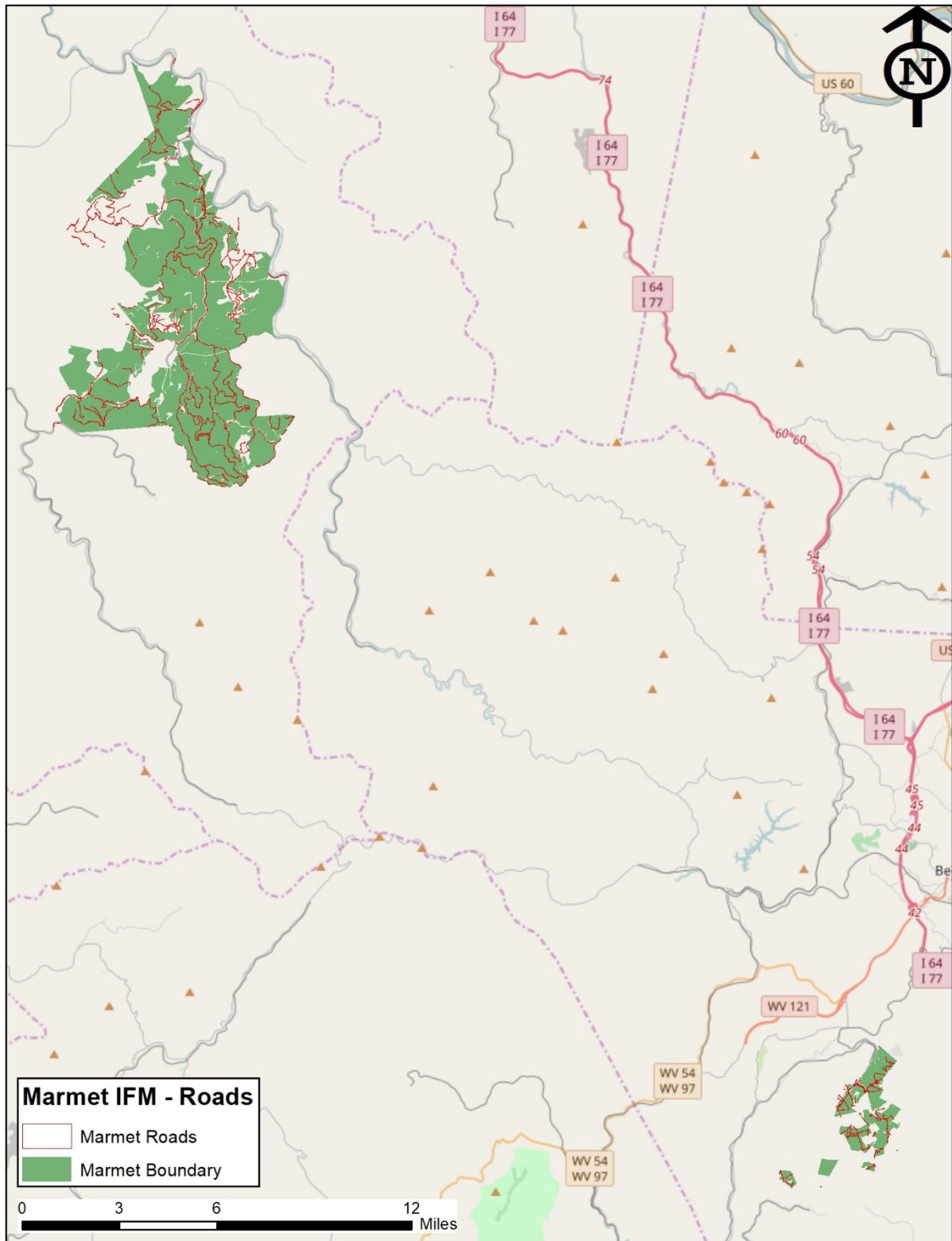
Attachment E: Project Maps

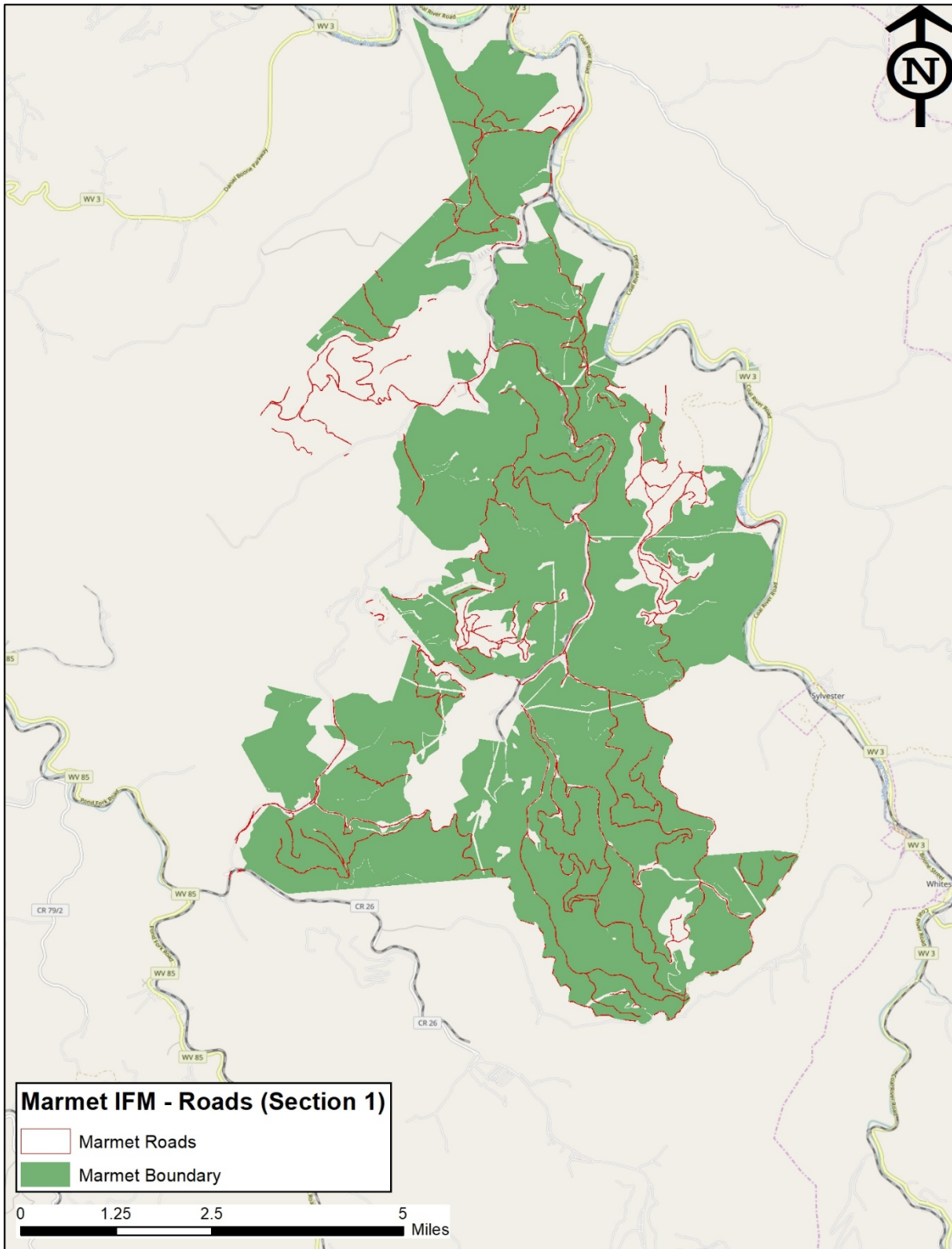
1. Latitude/longitude

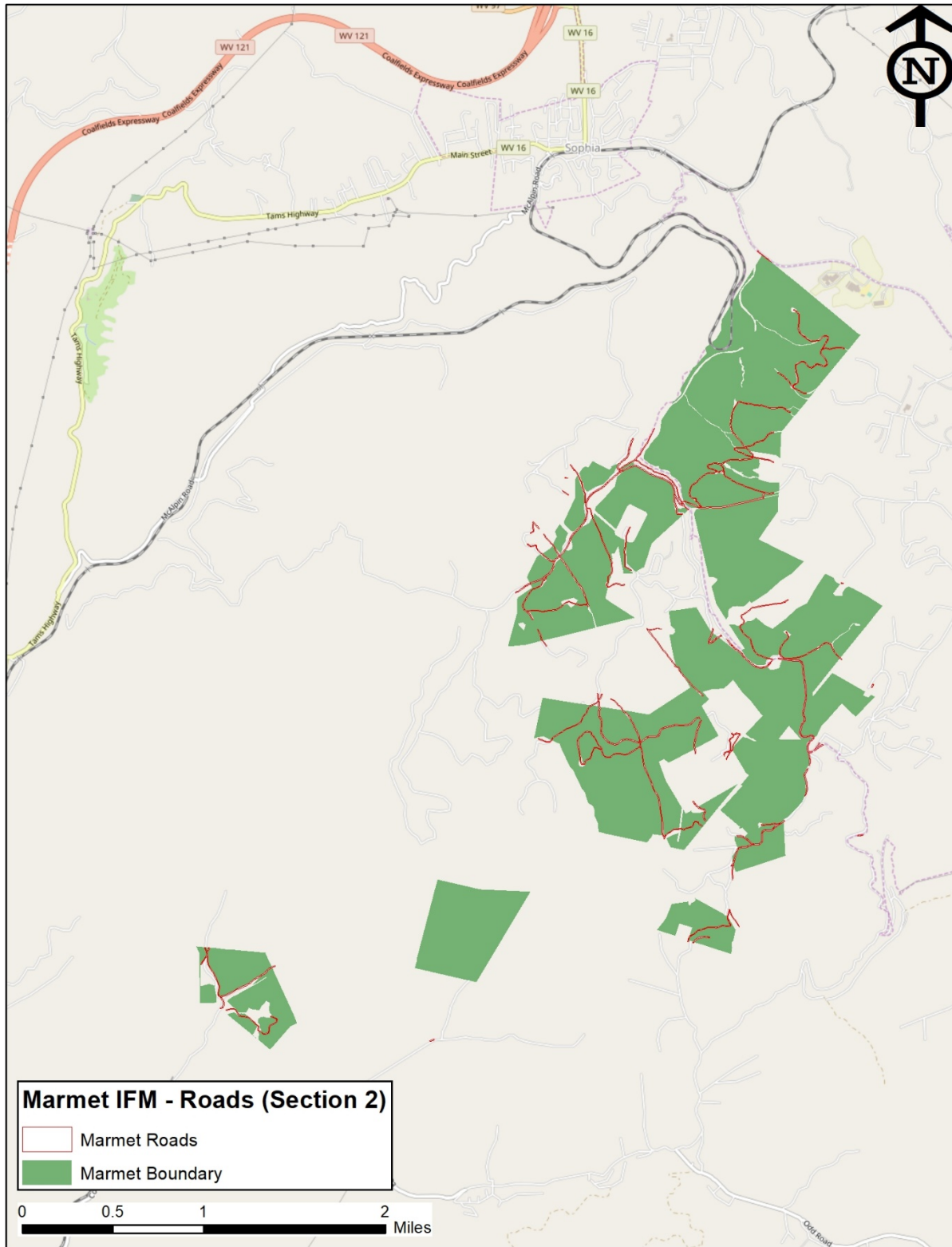




2. Public and private roads (map)

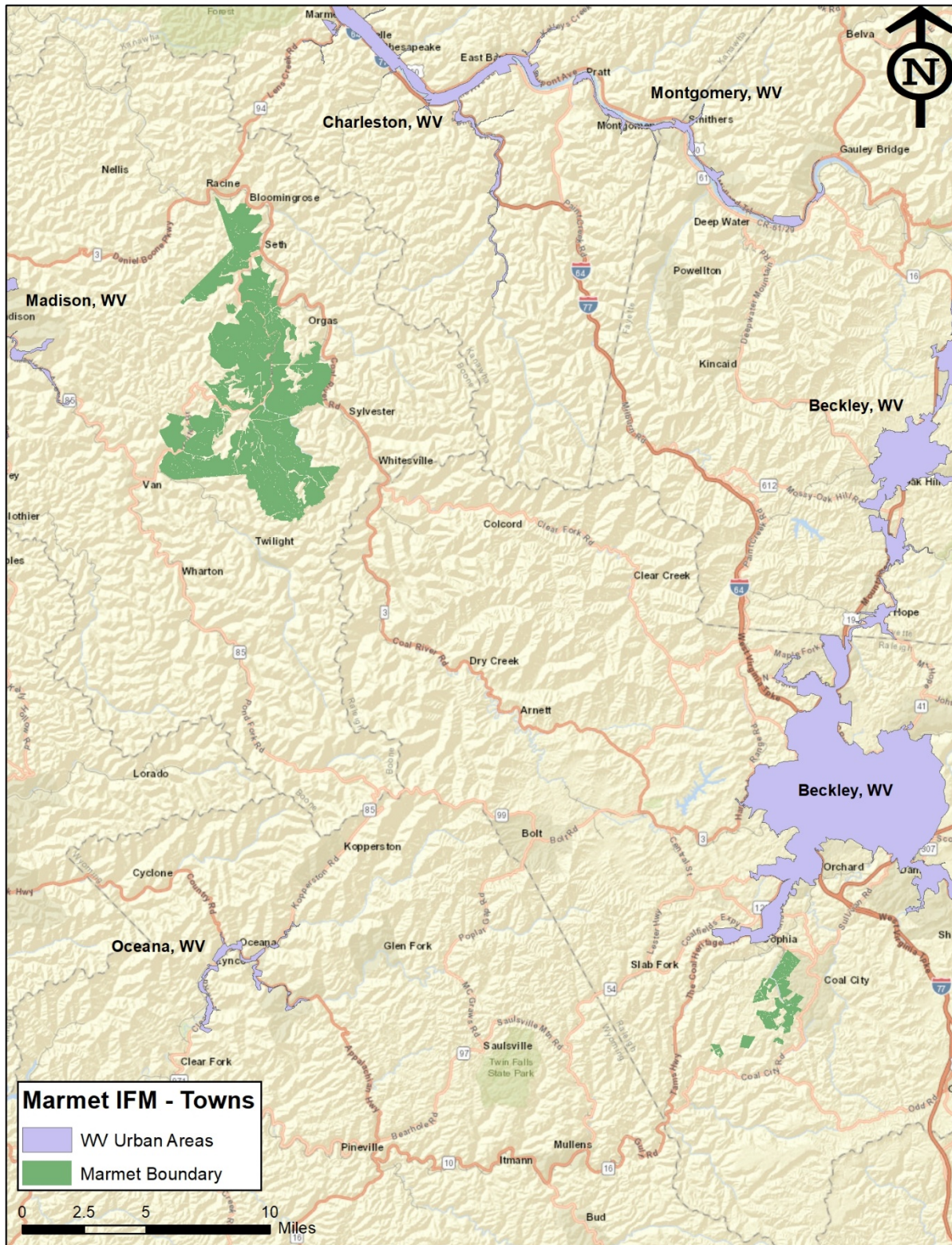






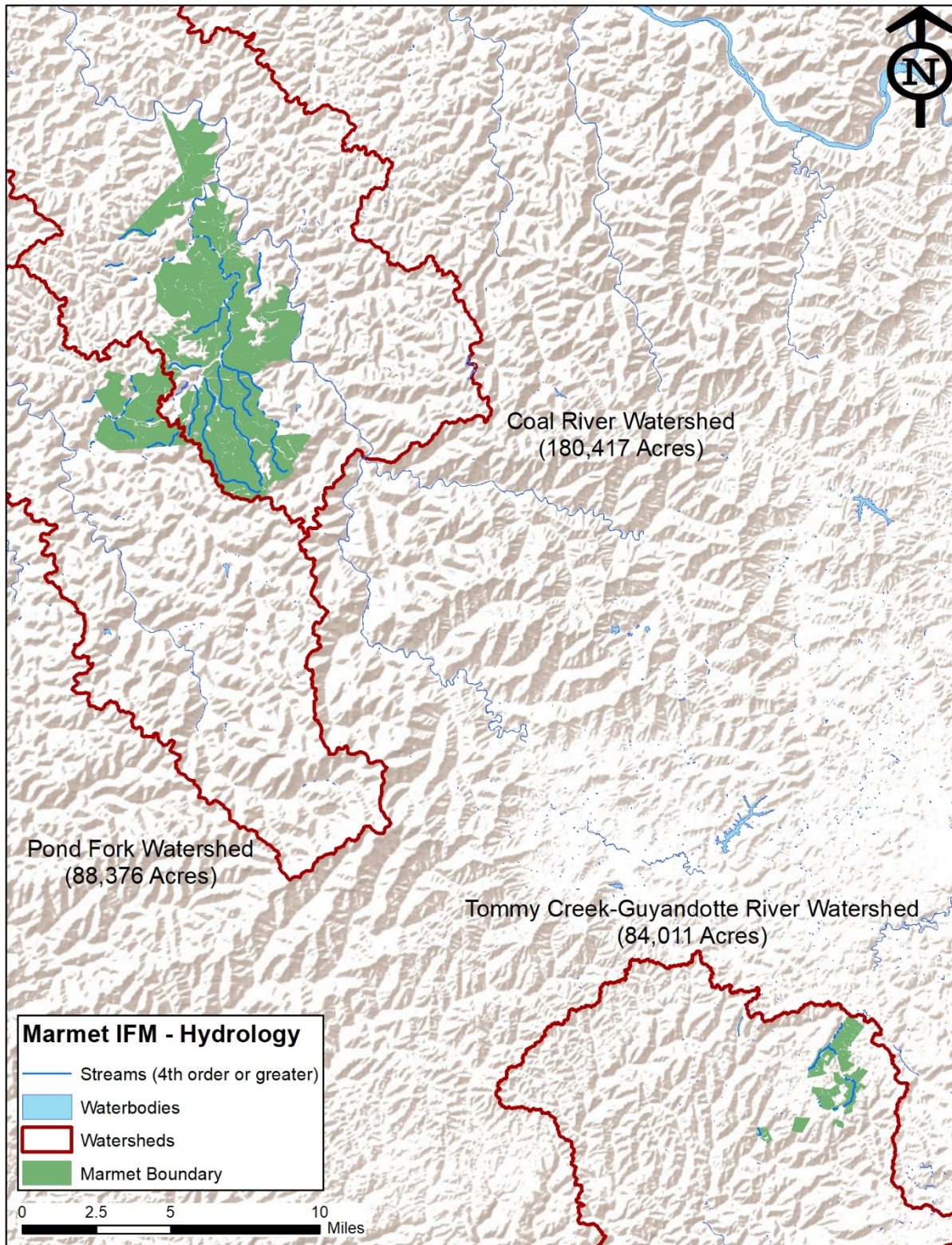


### 3. Towns (map)



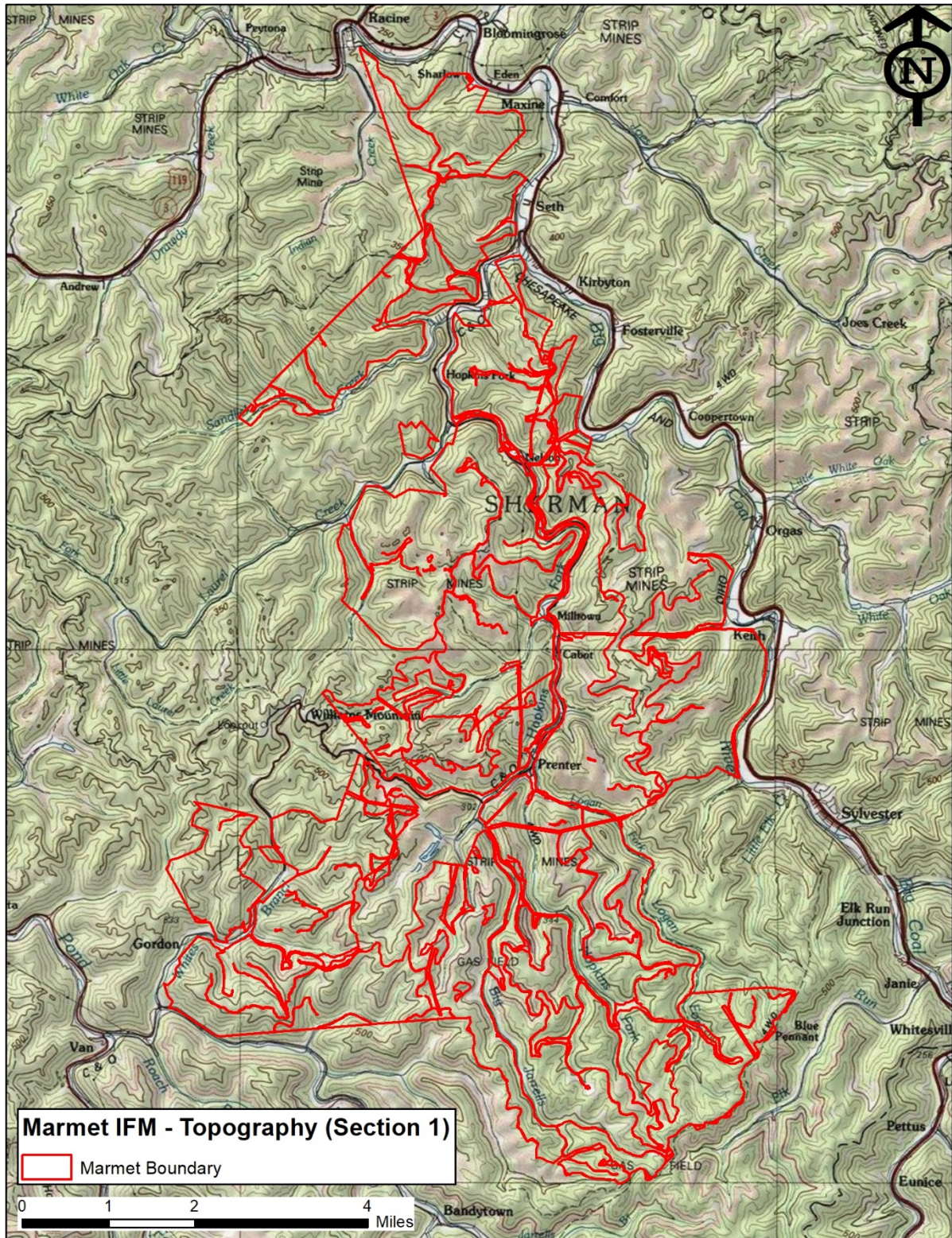


4. Major watercourses (4th order or greater), water bodies, and watershed description (map)

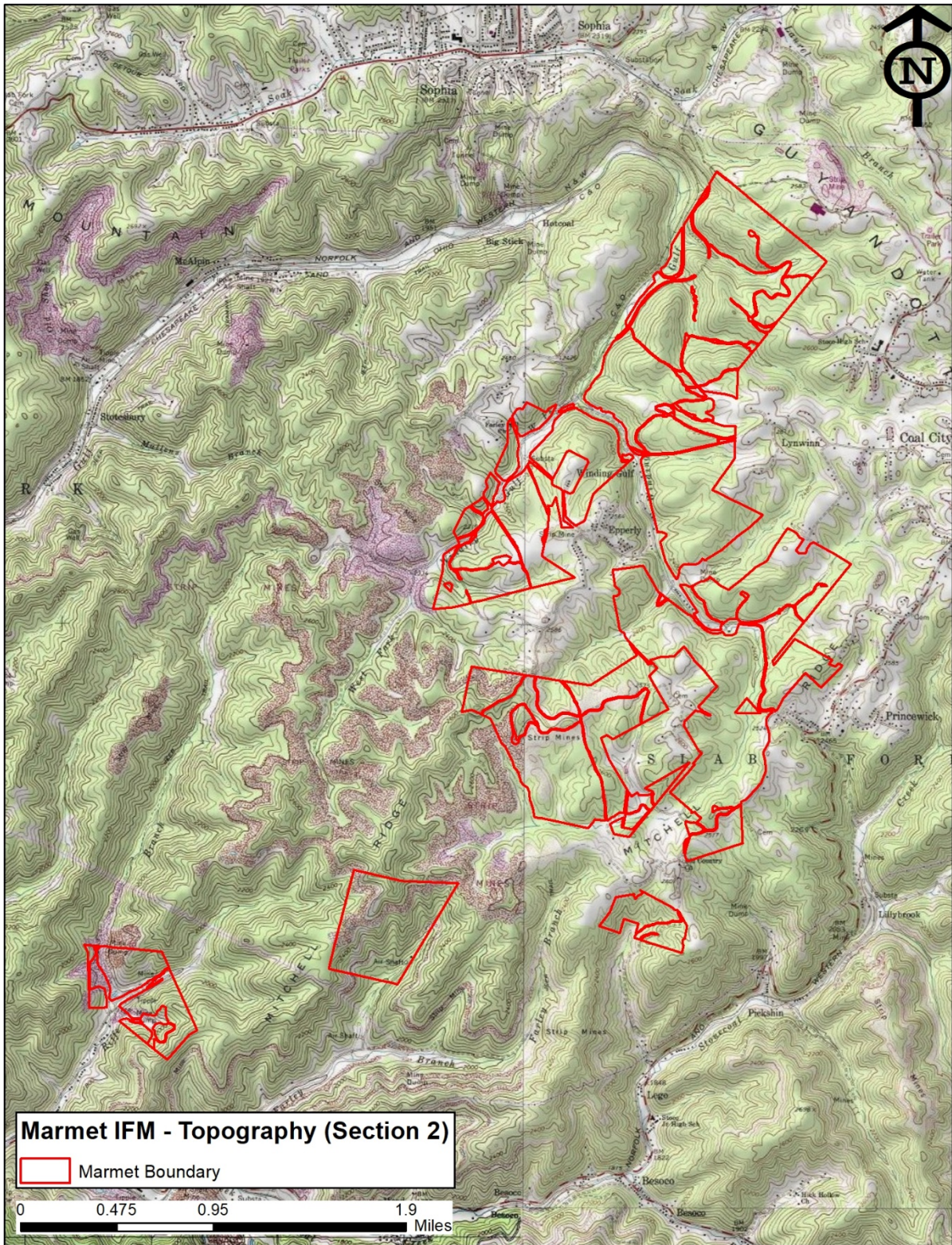




5. Topography (map)





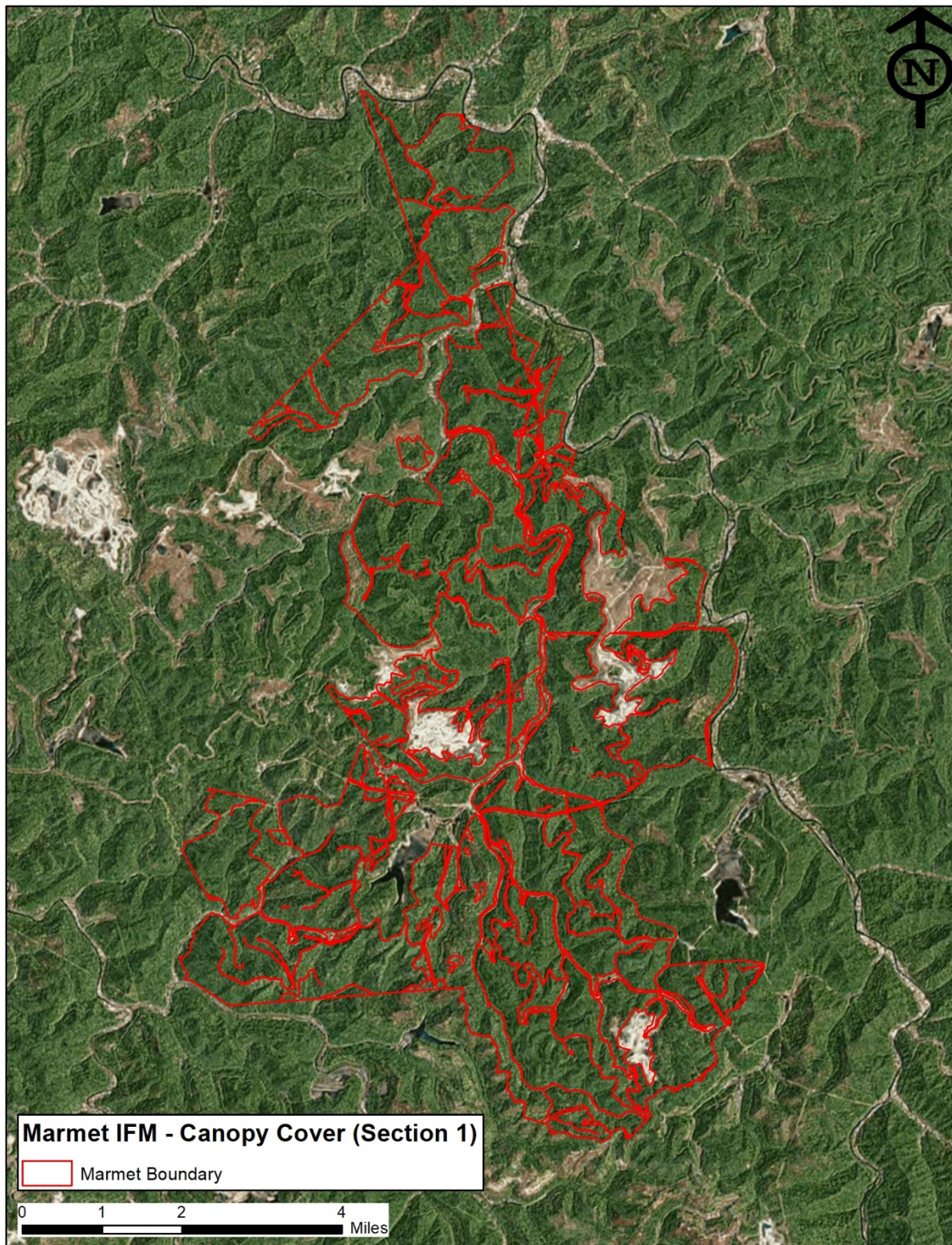


6. **Townships, ranges, and sections or latitude and longitude (map)**  
See map 1.
7. **Georeferenced shape file**  
Please see provided georeferenced shapefile.

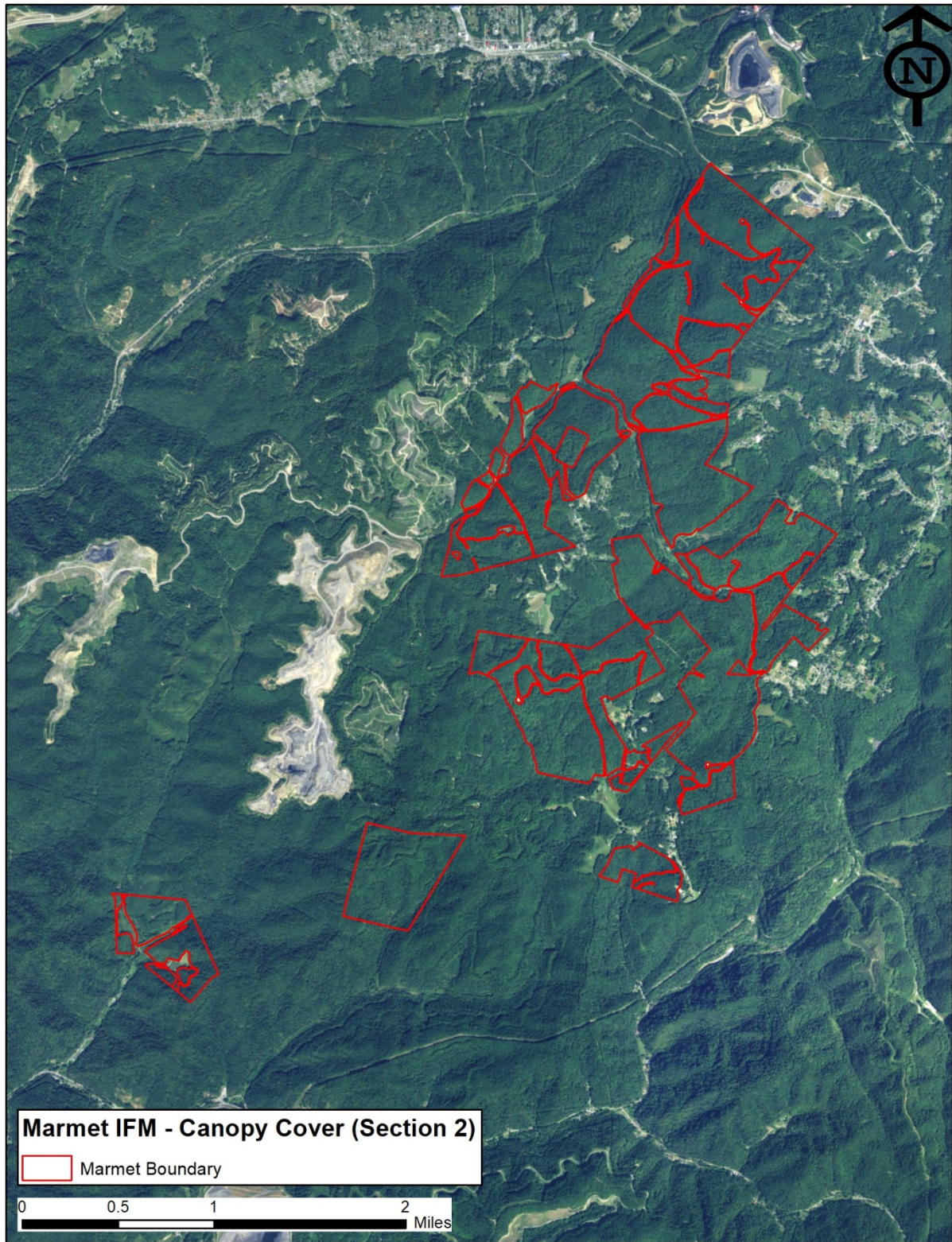


Attachment F: Canopy Cover

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







#### **Attachment G: 100-year Baseline**

Please see provided document, “Modeling Plan” for graphs and description of baseline modelling and harvest volumes for the project and baseline.

#### **Attachment H: Baseline Onsite Carbon Stocks**

Please see provided document, “Modeling Plan” for graphs and description of baseline onsite carbon stocks.

#### **Attachment I: Legal Constraints**

As stated in West Virginia Silvicultural Best Management Practices for Controlling Soil Erosion and Sedimentation from Logging Operations (2009), “The federal Clean Water Act of 1972, amended in 1977, specified under section 208 that states must reduce silvicultural non-point source (NPS) pollution. This law led West Virginia to enact the Logging Sediment Control Act (LSCA), West Virginia Code 19-1B in 1992. The LSCA mandates the use of Best Management Practices (BMPs) to limit and control erosion and soil movement into streams.

Stream BMPs: “The minimum SMZ width or distance between exposed or disturbed soil and a perennial or intermittent stream should be no less than 100 feet slope distance on either side of the stream from the top or edge of the channel. On ephemeral streams it should be no less than 25 feet slope distance on each side from the edge of the channel or visible scour.”

To model these constraints, the SMZ will be determined by placing a 100ft buffer will be placed around all intermittent and perennial streams, and a 25ft buffer will be placed around ephemeral streams. Within these constraints, usual practice is the selection of an occasional mature stem within the buffer zone and maintaining at minimum 50% of the live basal area within these zones. For more information, see “Marmet Modeling Supplement”, provided separately for verification.

#### **Attachment J: Financial Feasibility**

A financial analysis (Forest Protocol section 6.2.1.3, option 1) of the baseline growth and harvest regime reveals that the activities represented in baseline scenario are clearly feasible.

## Part XI. 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 Blue Source- Marmet Improved Forest Management Project from 10/20/2015 to 10/19/2040 will be measured in accordance with the Compliance Offset Protocol U.S. Forest Projects, November 14, 2014, and all information required to be submitted to ARB is true, accurate, and complete.

Initial:

KTD

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:

KTD

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:

KTD

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:

Kaarsten Turner-Dalby

Printed Name: Kaarsten Turner-Dalby

Title: Senior Vice President

Date: 3/5/2019