Final Abstract

Final Report Approved on October 23, 2026

M.L. 2023 Project Abstract

For the Period Ending June 30, 2026

Project Title: Biochar Implementation in Habitat Restoration: A Pilot

Project Manager: Todd Rexine

Affiliation: Great River Greening

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Website: https://www.greatrivergreening.org/

Funding Source:

Fiscal Year:

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 07b

Appropriation Amount: $185,000

Amount Spent: $162,655

Amount Remaining: $22,345

Sound bite of Project Outcomes and Results

Implementation of on-site biochar is a viable alternative to brush pile burns and chipping for wood waste removal on natural resource restoration projects. On site biochar processing produces less impacts to the site with no sterilization of the soil, mass reduction of wood waste, and reduced carbon emissions.

Summary of Project and Outcomes

Tree and shrub encroachment, both native and invasive, produce large quantities of wood waste while implementing habitat restoration projects. Burning brush piles is an inexpensive method of disposal but has negative environmental impacts related to air quality, carbon balance and soil burn scars. The chip markets are saturated due to EAB etc., making these preferred disposal methods even more costly. The use of flame-capped kilns to convert wood waste into biochar offers an alternative method to process the material on site with reduced environmental impacts and mass reduction.

During the project, Greening tracked the implementation of flame-capped kilns compared to standard operating procedures from other regions. Preparation of wood needs 60-90 days in drying conditions for kilns to operate properly.

It was found that an average of 8 cubic yards of biochar is available per acre in medium to high-density buckthorn stands. Using a 5 cubic yard kiln two trained individuals can process 25 cubic yards of wood into 5 cubic yards of biochar per day. Upper Midwest kiln operation and specifications are available on Greening's website.

Over the course of the project, Greening engaged 974 land managers, local government units, agricultural professionals, natural resource practitioners, volunteers, and private citizens through demonstrations, trainings, presentations and guest speaking engagements. Ten entities utilized the kilns to evaluate them. Over the course of the project, 1,620 cu yds of wood waste were converted to 324 cu yds biochar, with 148.69 tonnes of carbon sequestered and 164.35 tons of CO_2 emissions avoided. This project demonstrated a scalable, low-emission framework for Minnesota land managers to manage wood waste. Flame-capped kilns can reduce localized air pollution from restoration, protect native soils from sterilization, and permanently store carbon—directly supporting state goals for climate resilience and healthier forest ecosystems.

Project Results Use and Dissemination

Beyond the 22 demonstrations, dissemination was through various avenues. Presentations were given at the United States Biochar Initiative's 2025 annual conference, MN Biochar Initiative Char Talk series, Great Lakes Biochar Network, Washington County Watershed Consortium, and MN Forest Resources Council. A video of the project was created by the Science Museum of MN for their MN's Greatest Environmental Investment exhibit. Specifications and best practices documents were created and are hosted for download on Greening's website: www.greatrivergreening.org/biochar. With the knowledge gained, Greening was asked to participate in MPCA's Wood Waste Group and BWSR's Biochar Collaboration.

Environment and Natural Resources Trust Fund

M.L. 2023 Approved Final Report

General Information

Date: October 28, 2026

ID Number: 2023-043

Staff Lead: Tom Dietrich

Project Title: Biochar Implementation in Habitat Restoration: A Pilot

Project Budget: $185,000

Project Manager Information

Name: Todd Rexine

Organization: Great River Greening

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Project Reporting

Final Report Approved: October 23, 2026

Reporting Status: Project Completed

Date of Last Action: October 23, 2026

Project Completion: June 30, 2026

Legal Information

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 07b

Appropriation Language: $185,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with Great River Greening to pilot the use of portable biochar kilns as an alternative to open-pile burning of trees and shrubs to reduce smoke and carbon emissions and produce beneficial by-products from invasive species removal and land restoration efforts.

Appropriation End Date: June 30, 2026

Narrative

Project Summary: Pilot the implementation of portable biochar kilns in natural resource management and restoration as a reduced carbon-emitting, biologically beneficial alternative to open pile burning when managing invasive trees and shrubs.

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Woody encroachment and woody invasive species control on habitat projects can produce large quantities of waste wood. On-site pile burning is the cheapest method of disposal, while the chip and log markets are saturated due to EAB etc., making these preferred disposal methods even more costly. Pile burning leaves room for improvement in terms of carbon balance and soil fire scars.

Biochar is the process of burning biomass at high temperatures under low-oxygen conditions that converts it into a product that can be used as a soil additive for carbon sequestration, drought resistance, and microbial support in natural systems, farm fields, and gardens. Biochar production releases less smoke and greenhouse gas than pile burning. While it requires specific equipment and knowledge, it is an accessible technology and process. By reducing barriers to its use for land managers, local government units, and service providers, its use can multiply quickly with this modest investment for a pilot demonstration program.

In addition to the carbon sequestration benefits of biochar, indirectly it will help contain the costs of 1) the removal of invasive woody species, and 2) thinning of wooded habitats in a significant percentage of habitat restoration projects.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

Great River Greening is proposing a pilot project to address the scalability of biochar kilns as an effective technique for processing waste wood material from natural resource management activities. As part of the process, several “Oregon” and “Ring of Fire” biochar kilns will be purchased. Using kilns for processing waste wood will decrease the adverse climate effects of alternative burn methods. GRG will work with municipalities, soil and water conservation districts, and other land-owning partners to utilize this technique to reduce greenhouse emissions while reducing waste from land restoration actions.

Funding will support on-site demonstrations, monitoring results, and dissemination of results. In addition, funding will allow outreach on the applications of biochar production for natural resource management on public lands and connecting with individuals on how to implement it on private lands. The message of sustainable land management practices will benefit practitioners in the short term as well as communities in the long term, increasing awareness of climate-related issues and how positive steps like biochar kilns can help.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state’s natural resources?

We propose to:

- Convert the burning of invasive wood species or log piles from the conventional manner to the biochar pyrolysis method.
- Demonstrate biochar production at 9 restoration and enhancement sites throughout 3 regions of Minnesota.
- Engage 75 land managers, local government units, and natural resource practitioners in the process.
- Engage 50 volunteers to promote use on residential-scale
- Allow access to kilns for land managers, local government units, and natural resource practitioners to test out.
- Calculate and assess the cubic yards of biochar that can be processed from invasive wood waste at different scales of density.

Project Location

What is the best scale for describing where your work will take place?

Region(s): Central, Metro, SE,

What is the best scale to describe the area impacted by your work?

Region(s): Central, Metro, SE,

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: 1. Purchase and construct biochar kilns.

Activity Budget: $30,376

Activity Description:
After a thorough review with peers and partners, we will purchase or contract fabrication of up to 10 “Oregon” and “Ring of Fire” kilns to be used across three MN regions: Central, SE, and Metro. One “Oregon” or “Ring of Fire” kiln can process 6-10 cubic yards of brush per day producing 1.5 cubic yards of biochar or .44 tons of sequestered carbon per kiln. A properly trained technician has the ability to supervise 2-3 kilns per day. Staff will work to collect quotes on the purchase and shipping of "Ring of Fire" kilns. For "Oregon" kilns staff will draft plans and bid documents to solicit MN-based metal fabricators for bids. Staff will oversee the fabrication process to make sure specifications for "Oregon" kilns are met. Great River Greening staff will pick up and transport "Oregon" kilns that are fabricated.

Activity Milestones:

Description	Approximate Completion Date
Contract metal fabricators and collect quotes on producing and purchasing kilns	September 30, 2023
Procure supplies and equipment to promote safe and reliable implementation of kilns	November 30, 2023
Oversee purchasing and fabrication of up to10 kilns	February 28, 2024

Activity 2: Biochar Demonstration and Outreach.

Activity Budget: $123,624

Activity Description:
DEMONSTRATION: Great River Greening will use and demonstrate kilns on 9 sites throughout the 3 proposed regions of Minnesota. We will monitor and document the process including:
Testing the quality of biochar produced through sample testing,
Monitoring the timing and process to produce a full kiln of biochar,
Conducting precutting density counts to discern the quantity of biochar produced per acre.
Discussion on the carbon sequestration gained.
OUTREACH: Offer trainings on how to use biochar kilns properly and safely for wood waste disposal. Trainings would be offered to land managers, service providers, and other organizations that would share the benefits of using on-site kilns to manage tree and shrub removal in addition to how to use a kiln. This process will also involve other entities having access to testing the kilns on projects, specifically landowners, practitioners, and other organizations that could benefit from using biochar kilns in habitat restoration activities.

Activity Milestones:

Description	Approximate Completion Date
Contract vendors to cut and prep material for biochar demonstrations and trainings.	September 30, 2023
Define projects with land owning partners – 9 total sites throughout 3 regions of Minnesota.	December 31, 2023
Test the quality of biochar produced from invasive tree and shrub species.	June 30, 2025
Begin demonstrations and trainings	September 30, 2025
Demonstrate the efficacy and scalability of biochar techniques in each region by facilitating kiln use.	December 31, 2025
Engage 75 practitioners and 50 volunteers through 9 trainings and demonstrations	March 31, 2026

Activity 3: Dissemination

Activity Budget: $31,000

Activity Description:
Produce educational materials on biochar applications in natural resource projects, contextualized for land managers and natural resource practitioners.

Notify service providers and land managers that Great River Greening will be integrating the required use of biochar kilns for any future land management over onsite pile burning or brush stacking. By making biochar a requirement for wood waste removal for all vendors on our sites, GRG will greatly expand the positive impacts of biochar and increase the speed of adoption.

Dissemination will occur to

- Land Managers,
- Local governmental units,
- Educational institutions,
- Other NGOs
- For-profit service providers
- Individual Landowners

Activity Milestones:

Description	Approximate Completion Date
Develop materials summarizing the efficacy of the use of the kilns in different land management.	February 28, 2026
Disseminate the information to 100 local governmental units, non-governmental organizations, municipalities, and/or service providers.	April 30, 2026

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.
Great River Greening will disseminate information related to Biochar Implementation through onsite 9 demonstrations and trainings in three regions, presentations at natural resource meetings and seminars, email list serve subscribers, and digital brochures, as well as through our website and social media accounts. Information will include how to get started and set up biochar kilns, the benefits of processing bio-matter in this way, and the calculation of the cubic yards of biochar that can be processed from invasive wood waste at different scales of density and the carbon impact. All dissemination will follow the Environment and Natural Resources Trust Fund acknowledgment guidelines.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?
This is a pilot project that will accelerate biochar kiln implementation to become a new standard operating procedure for natural resource management projects in the future. Long-term funding is to be determined as part of the initial partner development. There is some commercial value to biochar which may be a catalyst for larger implementation in Minnesota. Biochar produced from this funding will be utilized by the landowners and Great River Greening as a beneficial soil amendment in related habitat restoration projects and/or given away to volunteers, landowners, and partners, etc; but will not be sold for financial gain.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Upland, Wetland, and Shoreline Restoration in Greater Metropolitan Area	M.L. 2016, Chp. 186, Sec. 2, Subd. 08g	$509,000
Community Stewardship to Restore Urban Natural Resources - Phase Ten	M.L. 2017, Chp. 96, Sec. 2, Subd. 08i	$524,000
Pollinator Central: Habitat Improvement with Citizen Monitoring	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 08a	$750,000
Pollinator Central II: Habitat Improvement With Community Monitoring	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 08c	$631,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount	$ Amount Spent	$ Amount Remaining
Personnel										
Ecologist and Project Manager		Coordination with the land managers and natural resource practitioners for project implementation.			21%	0.54		$50,000	-	-
Grant Manager		Grant management and project implementation.			21%	0.39		$30,000	-	-
Outreach and Communications		Coordination of outreach and demonstration events and dissemination of informational materials.			21%	0.09		$5,000	-	-
Field Crew		Implementation of biochar production and on-site field work.			9%	0.18		$10,000	-	-
Grant Administration		Finance administration and grant fund coordination, status reporting, and amendment communication.			24%	0.09		$5,000	-	-
							Sub Total	**$100,000**	**$92,587**	**$7,413**
Contracts and Services										
Crystal Welding	Service Contract	Activity 1 - Fabrication of biochar kilns				0.02		$4,788	$4,788	-
Control Laboratories	Service Contract	Activity 2 - Testing of biochar samples for biochar composition				0.01		$6,825	$6,825	-
Edge Ecosystems	Service Contract	Activity 2 - Contracted land management service provider to incorporate the use of biochar kilns in the disposal of woody material on projects coordinated with Great River Greening and the land-owning partner				0.1		$16,071	$15,455	$616
Minnesota Native Landscapes	Service Contract	Activity 2 - Cut, treat, stack, stage woody material. Operate kilns. 2 days each.				0.08		$13,910	$6,955	$6,955
Stantec	Service Contract	Activity 2 - Cut, treat, and stack woody material. Operate kiln.				0.08		$13,000	$13,000	-
							Sub Total	**$54,594**	**$47,023**	**$7,571**

Equipment, Tools, and Supplies										
	Tools and Supplies	Supplies and equipment required for kiln use	Purchase of supplies and equipment to facilitate the safe handling of kilns and biochar. Examples: PPE, infrared thermometers, fire suppression equipment					$4,839	$4,839	-
	Equipment	Purchase of biochar kilns and shipping costs	Biochar kilns will be stationed in 3 listed regions of the State for demonstrations and for entities to test after participating in demonstrations.					$9,000	$9,000	-
							Sub Total	**$13,839**	**$13,839**	**-**
Capital Equipment										
							Sub Total	**-**	**-**	**-**
Acquisitions and Stewardship										
							Sub Total	**-**	**-**	**-**
Travel In Minnesota										
	Miles/ Meals/ Lodging	Travel to and from project sites, partner meetings, and outreach events.	Support on-site visits and project implementation.					$7,823	$7,293	$530
							Sub Total	**$7,823**	**$7,293**	**$530**
Travel Outside Minnesota										
							Sub Total	**-**	**-**	**-**
Printing and Publication										
	Printing	Printing of informational material to give to land managers and natural resource practitioners.	Material will be distributed to educate land managers and natural resource					$1,000	$598	$402

			practitioners on the applications of biochar kilns in habitat restoration woody material disposal.							
							Sub Total	**$1,000**	**$598**	**$402**
Other Expenses										
		Event related expenses	Tents, tables, chairs, food, latrine, etc, as required to support project demonstration and educational events in promotion of the LCCMR strategy and objectives.	X				$7,244	$1,058	$6,186
		Permitting Entities	Activity 2 - Permit fees for biochar kiln usage					$500	$257	$243
							Sub Total	**$7,744**	**$1,315**	**$6,429**
							Grand Total	**$185,000**	**$162,655**	**$22,345**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Other Expenses		Event related expenses	Event-related expenses will support participant and volunteer hours needed to accomplish project deliverables and to provide education to participants and volunteers on the ecological benefits of the project and awareness of LCCMR's commitment and funding to this project.

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount	$ Amount Spent	$ Amount Remaining
State						
Cash	Outdoor Heritage Funded projects.	These projects will support the material cutting portion of the biochar production and other project goals.	Secured	$51,748	$51,748	-
Cash	MN Pollution Control Agency - Wood Waste Program	Funding to support additional kiln purchases, demonstrations, and rental travel assistance	Secured	$41,000	$41,000	-
			State Sub Total	**$92,748**	**$92,748**	**-**
Non-State						
In-Kind	Municipal and other land owning partners - SWWD, Ramsey County	Landowner labor and time facilitating the use of biochar kilns.	Secured	$34,000	$34,000	-
Cash	Municipal and other land owning partners - TRPD Hyland Park	A variety of expenses directly related to the individual landowner or partner sites such as contracting, material purchase, or indirect expenses related to the management of projects.	Secured	$8,040	$8,040	-
In-Kind	GRG administrative match	GRG staff indirect administrative expense to do the work for this grant.	Secured	$11,772	$11,772	-
Cash	GRG cash match.	GRG direct expenses required to do the work for this grant.	Secured	$30,000	$30,000	-
Cash	Foundations and grants - CenterPoint Energy, NWTF, Weesner, Hardenbergh	A variety of expenses directly related to project goals such as contracting, material purchase, or indirect expenses related to the management of projects.	Secured	$122,462	$122,462	-
			Non State Sub Total	**$206,274**	**$206,274**	**-**
			Funds Total	**$299,022**	**$299,022**	**-**

Attachments

Required Attachments

Visual Component

File: 1eb79185-849.pdf

Alternate Text for Visual Component

Summary of the Great River Greening biochar grant proposal with illustrations of the biochar production process and outlines of the proposed activities....

Financial Capacity

File: 685652a4-b6b.pdf

Board Resolution or Letter

Title	File
GRG Board Resolution LCCMR ML2023FY2024 Biochar	09f3cf80-886.pdf

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Letter of Support - Dakota County	c24a3494-9f0.pdf
ML 2023 Great River Greening Biochar flyer	65da8fb7-a6a.pdf
LCCMR Background Check Certification Form	4b18fa52-4c5.pdf
Pioneer Press Jan 2025	b05bb1dc-f22.pdf
Rotary Biochar Article	c4fe026b-cc7.pdf
Owatonna Peoples Press	5a77f6d4-69f.pdf
Biochar Kiln Operation Specifications	6568b9a6-422.pdf
Flame Cap Kiln User Manual	673ed0e7-6b9.pdf
Big Box Flame Cap User Manual	d6d7709e-de3.pdf
Biochar information sign	22df0866-ab2.pdf
Biochar Use Signage	bc7b2420-c7c.pdf

Media Links

Title	Link
Char Talk	https://youtu.be/vX_06e76QXE?si=71a-FCAa4m3_b2pU

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Uploaded background check form and Dissemination Efforts

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the Commissioner's Plan applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

No

Does the organization have a fiscal agent for this project?

No

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

Yes, I understand

Work Plan Amendments

Amendment ID	Request Type	Changes made on the following pages	Justification For Amendment Request (word limit 75)	Date Submitted	Approved	Date of LCCMR Action
1	Amendment Request	• Other • Budget - Professional / Technical Contracts	Amendment to Professional / Technical service is an update from TBD to reflect services that were hired out to service providers to perform and lists service providers that completed the task.	August 16, 2024	Yes	August 20, 2024
2	Amendment Request	• Budget - Professional / Technical Contracts • Activities and Milestones • Budget - Capital, Equipment, Tools, and Supplies • Budget - Printing and Publication • Budget - Other • Attachments	This amendment reflects service contracts awarded to prepare sites for biochar kiln demonstrations. $4,776 was shifted from Activity 1 to Activity 2 to cover service provider bids and contracts. Contracted kiln fabrication was less than anticipated and contracted natural resource costs were more than anticipated with new prevailing wage rule guidance. In addition, GRG requests $500 shift from printing to Other to cover required permit fees for demonstrations.	February 13, 2025	Yes	February 18, 2025
3	Amendment Request	• Activities and Milestones • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences	Activity 1 is complete, and contracts (Crystal Welding) came in under the estimated budget. The remaining funds are to shift to Activity 2. Activity 2 needs an additional $500 to support travel for demonstrations. Activity 2 - contract needs additional funds to support lab testing of biochar and to hire an additional contractor to implement kiln trials. The 2024 change in prevailing wage statute language increased the cost of contracted natural resource services.	April 23, 2025	Yes	May 6, 2025
4	Amendment Request	• Activities and Milestones • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences • Budget - Printing and Publication	To meet the growing demand for kiln demonstrations and trainings, Great River Greening requests to shift funds from event related expenses and printing to cover travel costs for event hosting. This	January 28, 2026	Yes	February 16, 2026

		• Budget - Other • Budget - Non-ENRTF Funds Contributed	shift results in $11K moving from the Activity 3 budget to the Activty 2 Budget. Deliverables remain on track for this project.			
5	Amendment Request	• Budget - Professional / Technical Contracts • Budget - Travel and Conferences • Budget - Printing and Publication • Budget - Other • Budget - Non-ENRTF Funds Contributed • Attachments	Contracts section: updated the amount for Control Labs for testing of final samples, eliminated TBD to consolidate unused land management service provider funds on one line (Edge Ecosystems). The Non-ENRTF amounts were updated to reflect the final sources and amounts secured for this project, including foundations, grants, landowner contributions, etc. - Line items covered by additional non-ENRTF funds: Personnel, Travel, Equipment, Tools and Supplies, Event-related expenses, Permitting fees.	August 18, 2026	Yes	September 11, 2026

Status Update Reporting

Final Status Update August 14, 2026

Date Submitted: July 29, 2026

Date Approved: September 11, 2026

Overall Update
Great River Greening exceeded project expectations through increased financial and in-kind support, allowing the organization to expand project activities while completing the work $22,345 under budget.

Project outcomes:
Converted invasive wood waste management from conventional burning to biochar pyrolysis by demonstrating flame cap kiln technology, increasing awareness of its environmental and practical benefits across Minnesota.

Demonstrated biochar production at 22 restoration and enhancement sites, exceeding the goal of nine demonstrations and expanding project's reach across state.

Engaged 974 land managers, local government units, agricultural professionals, natural resource practitioners, volunteers, and private citizens, far surpassing outreach goals:
500 participants through demonstrations and trainings
295 participants through presentations and guest speaking engagements
179 volunteers and community members promoting residential-scale biochar production

Provided access to flame cap kilns for organizations and practitioners to evaluate them, including Ramsey County, Olmsted County, the City of Minneapolis, Anoka Conservation District, Prairie Island Indian Community, and five natural resource contractors.

Calculated and assessed biochar production from invasive wood waste:
324 cubic yards biochar produced
Approximately 5:1 hardwood-to-biochar production ratio
Approximately 8 cubic yards biochar available per acre in medium- to high-density buckthorn stands
164.35 tons CO_2 emissions avoided
148.69 tonnes of carbon sequestered

Activity 1
This activity was previously marked complete.
(This activity marked as complete as of this status update)

Activity 2
We were able to hold 4 final demonstrations at Wild River State Park, Kaplan's Woods (Owatonna), Arden Hills Army Training Site, Spring Hill County Park (Melrose), Rotary Riverside Park (Brainerd).

Great River Greening worked with two natural resource service providers training staff on site use of kilns, assisting with setup, operations and how to deploy. Service providers then implemented kilns for a couple of days on their own. We also held two hands on training workshops for staff with Olmstead County and Fond du Lac Band Foresty department on proper implementation and operation of flame cap kilns.

Final samples were sent in for analysis. The biochar produced by Great River Greening at demonstrations has stayed consistent. Biochar produced by service providers using kilns for the first time is a lower carbon content and higher H:C ratio. This is consistent with results that Great River Greening experienced when using kilns for the first time. Feedback was given to service providers on how to adjust practices to get a better yield quality.
(This activity marked as complete as of this status update)

Activity 3
Presented to Great Lakes Biochar Network on the program funded by ENRTF. Sharing with others lessons learned and how to set up a demonstration/training program and information that is key to share with attendees. Due to the elevated knowledge gained through this program and becoming subject matter experts, Great River Greening has been asked to participate on two state stakeholder groups. Great River Greening was invited to participate in BWSR's Biochar Collaboration group. The purpose is to get state agencies up to speed and coordination on biochar implementation and look at state level best practices/recommendations for biochar application depending on the use. Great River Greening has also been participating in the MPCA's wood waste stake holder group to discuss options around biochar as one possible solution to the state's wood waste issue.
Technical information and specifications finished and posted on Great River Greening website. Upgraded dissemination brochures for events include sandwich board signs to cover commonly asked questions. Credit on all signage included acknowledgement of Environment and Natural Resources Trust Fund. Final specifications and best practices were shared with event participants as well as links to the documents were shared in end of program follow up to participants.
(This activity marked as complete as of this status update)

Dissemination
Rotary Riverside Park on-site training (January 15, 2026) 4 natural resource practitioners
Wild River State Park (February 14, 2026) 30 participants (general public)
Fond du Lac Band Forestry (March 5, 2026) 12 participants (forestry and fire staff)
Olmstead County training (March 12, 2026) 15 participants (Government entities)
Kaplan Woods (March 18, 2026) 26 participants (20 practitioners/government entities and 6 pvt landowners)
Arden Hills Army Training Site (March 20, 2026) 37 participants (32 practitioners/government entities and 5 private landowners)
Spring Hill County Park (June 10, 2026) 21 participants (17 practitioners/government entities and 4 private landowners)
Rotary Riverside Park (June 12, 2026) 24 participants (16 practitioners/government entities and 8private landowners)
All dissemination followed the Environment and Natural Resources Trust Fund acknowledgment guidelines.
Media articles added in attachment section.

Status Update Reporting

Status Update February 1, 2026

Date Submitted: January 28, 2026

Date Approved: February 16, 2026

Overall Update
Great River Greening loaned kilns to Minneapolis Park and Recreation and 2 agriculture producers. Staff assisted with initial setup and kiln operations.

To date in 2025, GRG has engaged 443 land managers, local government units, agricultural professionals, natural resource practitioners, and private citizens in the process of flame cap kiln operations. GRG hosted 4 demonstrations and trainings in northern MN, and Twin Cities region, and presented at the North American Biochar Conference hosted in Minneapolis. Through demonstrations and trainings, 87 cubic yards of biochar have been produced from approximately 435 cy of wood waste related to natural resource restoration activities, sequestering 39.9 tonnes of carbon and 44.14 tons of air emissions avoided.

Activity 1
This activity was previously marked complete.
(This activity marked as complete as of this status update)

Activity 2
Stem density counts were conducted at contractor sites. We are awaiting the final contractor to complete processing material with flame cap kilns in early winter 2026.

Demonstrations were held at Westwood Hills Nature Center (St Louis Park, MN), Hartley Nature Center (Duluth, MN) for land managers and practitioners. A third two-day demonstration was conducted at Highland Park Reserve to showcase the benefit of processing brush piles from 4 acres of land to biochar instead of pile burning. On-site training of natural resource service provider in Arden Hills on the use of kilns for waste from buckthorn removal. Due to the increasing interest, we have several demonstrations and trainings set for Feb/March 2026 in the final 6 months of the grant.

Collected samples were sent in for analysis. Average carbon percent is coming back around 81% with a hydrogen to carbon ratio averaging around .33. The biochar being produced at demonstrations using flame cap kilns is coming back with a fairly high carbon percent and is in a highly stable form (H:C ratio below .4).

Activity 3
Great River Greening was invited to present and host a demonstration at the North American Biochar Conference hosted in Minneapolis in September 2025. The presentation was on the Biochar Pilot Program funded by ENTRF and the lessons we learned along the way. Significant discussions took place from organizations outside of MN on how MN's ENRTF funding works in support of this project, as well as what the project plan looks like. GRG hosted a demonstration on flame cap operations for conference attendees in partnership with Dakota Prairie Composting in Shakopee, MN.

Work advanced on writing up technical information on specifications for the use of flame cap kilns on natural resource management sites, a user manual based on Great River Greening's findings for flame cap kiln operation in the upper Midwest. Both are in final draft form and will be hosted for download on Great River Greening's biochar website page in early 2026.

Upcoming: Invitation to talk to the Great Lakes Biochar Network in Feb 2026 on flame cap kiln use in the upper Midwest and the project ENRTF funded in MN.

Dissemination

USBI Biochar Conference Presentation (September 15, 2025) 70 participants
USBI Biochar Conference Demonstration (September 15, 2025) 80 participants
Westwood Hills Nature Center (Oct 30, 2025) 50 participants (50 practitioners/government entities)
Hartley Nature Center (November 7, 2025) 30 participants (22 practitioners/government entities and 8 private landowners)
Highland Park Reserve demo & training (November 19-20, 2025) 15 practitioners from government entities
Floral Park on-site training (November 24, 2025) 6 natural resource practitioners
All dissemination followed the Environment and Natural Resources Trust Fund acknowledgment guidelines.

Status Update Reporting

Status Update August 1, 2025

Date Submitted: July 22, 2025

Date Approved: July 29, 2025

Overall Update
GRG loaned kilns to Ramsey County and assisted staff with field testing flame capped kilns to see what size might be right for the county and walk them through the operation. Staff also assisted the city of Eden Prairie in setting up and the operation of a Ring of Fire that the city purchased.

To date in 2025, GRG has engaged 200 land managers, local government units, agricultural professionals, and natural resource practitioners in the process of flame-capped kiln operations. GRG hosted 5 training demonstrations in central MN, southwest MN, and Twin Cities region and presented to two working groups on biochar processing from wood waste. Through demonstrations and trainings, 47 cubic yards of biochar have been produced from approximately 234 cy of wood waste from natural resource restoration activities sequestering 20 tons of carbon.

Activity 1
This activity was previously marked complete.
(This activity marked as complete as of this status update)

Activity 2
Three contractors hired to conduct controlled site prep processing completed site prep and are awaiting final contractor to complete processing material with flame capped kiln. Contractors documented the hours required for each part of the process. GRG staff forester will be conducting a final inspection of the site and stem density count.

Demonstrations were held at Seha WMA (Elysian, MN), Ritter Farm (Lakeville, MN), Bend in the River (Rice, MN) for land managers and practitioners. Additional demonstrations were held at Linden Grange Farm (Mora, MN) for agricultural practitioners and at Kanabec SWCD Buckthorn management field day for forest landowners.

Samples from demonstrations were collected and are ready to be sent in for analysis.

Discussions are in place for final demonstrations for fall 2025 winter 2026 in southern MN and Twin Cities metro area.

Activity 3
Presentations were given to the MN Forest Resource Council (25 participants) and Washington County Water Consortium (50 participants).

GRG project manager was invited to present on the uniqueness of this project, its implementation and funding at US Biochar Initiative's Annual Conference being held in Minneapolis in September.

Specifications are being shared with other partners and being incorporated into RFP's for natural resource management. Drafting of best management practices language is completed and awaiting final pictures from remaining demos to complete. One pagers for Ag and forestry professionals are in process. The goal is all written documents will be hosted on GRG's biochar webpage for viewing and download.

Dissemination
Ritter Farm (Feb 26,2025) - 60 participants (60 practitioners/government entities)

Linden Grange Farm (March 1, 2025) - 20 participants (3 practitioners/government entities and 17 agriculture practitioners)

Seha WMA (March 5, 2025) - 10 participants (10 practitioners/government entities)

Bend in the River (March 12,205) - 7 participants (7 practitioners/government entities)

MN Forest Resource Council (March 27, 2025) - 50 participants (50 practitioners/government entities)

Washington County Water Consortium (May 7, 2025) 50 SWCD professionals

Kanabec SWCD Forest Mgmt Day (June 21,2025) 12 participants (4 practitioners/8 private landowners)

All dissemination followed the Environment and Natural Resources Trust Fund acknowledgment guidelines.

Status Update Reporting

Status Update February 1, 2025

Date Submitted: February 13, 2025

Date Approved: February 18, 2025

Overall Update
Great River Greening is adapting to the interest and demand we are experiencing in the state of MN around biochar. At the end of 2024 we engaged 118 land managers, local government units, and natural resource practitioners in the process and 42 volunteers/general public to promote use on residential-scale. Hosted 5 trainings /demonstrations in central MN and the Twin City region. Produced 34 cu yds of biochar through various trainings which is the equivalent of 168 cu yds of waste wood, sequestering approximately 13 tons of carbon.

Activity 1
Equipment and protective gear were finalized for safe kiln operation. Great River Greening, through private foundation grants, worked with a fabricator to complete the manufacturing of a big box kiln as well as procure equipment specific to support the operation of a larger kiln. This is a 9 cy kiln that was not in the original scope or budget of the project. There has been interest from municipalities (counties and park districts) on a larger system to deal with the wood waste they are contending with. Activity 1 fabrication is complete. Funds have not been reallocated at this time as we are planning out the best need. We have been talking about getting 1-2 more Ring of Fire kilns as that is a size that larger land management units are interested in or moving it to contracting to hire vendors to gain more experience on using the kilns.
(This activity marked as complete as of this status update)

Activity 2
Dec 15th 2024 – 50 participants (38 practitioners/12 general public) Klin demonstration at Lake Elmo Park Reserve. Participants saw demonstrations and operations of a big box kiln and smaller Oregon kilns as well as equipment required to implement kilns in cold weather conditions. Pioneer Press was on site and authored an article posted on Jan 5, 2025.

Three contractors were hired to complete prep cutting at three separate sites across the state in preparation for early 2025 demonstrations and trainings. Contractors are tracking the labor time required to cut and prep the site for kiln use. This data along with stem density counts will be used to calculate and assess the cubic yards of biochar that can be processed from invasive wood waste at different scales of density.

Inquiries for potential quarter 1 & 2 2025 demonstrations are in progress and should be planned by end of January 2025.

Tested biochar to date has averaged 80% carbon content. Biochar is classified as having 60% carbon content or higher.

Activity 3
Oct 29th 2024 - (60 participants from local government units) Presentation at BWSR Academy Training educating on biochar and walking through the process of biochar kiln operation planning, permitting to implementation and lessons learned so far.
Great River Greening staff researched and drafted a specification document on how to prepare a site for biochar kiln use and specification to implement kiln use.

Dissemination
BWSR Academy (Oct 29, 2024) - 60 participants (50 Soil and Water Conservation Districts and 10 practitioners)

Lake Elmo Park Reserve (Dec 5, 2024) - 50 participants (38 practitioners/government entities and 12 general public)
All dissemination followed the Environment and Natural Resources Trust Fund acknowledgment guidelines.

Status Update Reporting

Status Update August 1, 2024

Date Submitted: August 13, 2024

Date Approved: August 20, 2024

Overall Update
The proposed timelines are out of alignment with the interest that has been generated by the possibilities of biochar. Demonstration, outreach and dissemination activities gained traction over some of the planning and purchasing milestones this past quarter. Kiln procurement was finalized. We refocused in June and are on a path to get earlier milestones back in alignment while we continue with the momentum gained on others. Activity 1 milestone on "Procure supplies and equipment to promote the safe and reliable implementation of kilns" is behind. This will be back on track by the next reporting period. Staff wanted to make sure the proper research on the correct equipment was done before purchasing anything this required reaching out to others in the field to see what has worked and what has not. All activities are on track to be completed within the timeline of the grant. Other timelines on Activity 2 & 3 are moving ahead as projected.

Activity 1
6 Oregon kilns were fabricated and turned around to be tried out in the field. Settled on equipment to monitor temperature readings through recommendations. We are looking into others and talking with vendors. Due to the high temps produced one probe began to malfunction. Safety PPE was tested out and we will be looking into the procurement of some of the items.

Activity 2
Projects are defined and were able to move forward on one site this quarter with internal field staff.

Located a vendor that had openings in their schedule to use a kiln for processing dried piled buckthorn at Blaine Wetland Sanctuary. The vendor kept a log of time, data and provided feedback to assist in drafting specification language.

Great River Greening ran a training for Washington County Work Crews and City staff (15 people) that were working under the direction of South Washington Watershed District (SWWD) to cut and remove wood biomass from a restoration. SWWD, through multiple conversations, decided to try kiln processing instead of pile burning. Work Crews after the initial training used one of the ENRTF purchased Ring of Fires weekly over a 3 month period processing the cut piles into biochar.

Engaged 20 individuals during a biochar demonstration at the Arden Hills Army Training site. Attendees included AHATs natural resource staff, community members and local municipal staff.

Engaged DNR forestry through an opportunity to process oak wilt debris at Carlos Avery WMA. DNR staff came out over the 2 days to learn about the process and see how kiln fires are managed differently than pile burns.

Activity 3
Gave a joint presentation with Dakota County through MN Biochar Initiative's Char Talk. The presentation focused on the need and importance to look at other methods for disposing of wood waste from natural resource restoration efforts and Dakota County and Great River Greening's joint effort in promoting, exploring and demonstrating biochar as one possibility to this issue.

Received two invites to participate in the promotion and dissemination of biochar practices in natural resource restoration.

1) BWSR Academy Training Session – Oct 30 –31, 2024 Unconventional Invasive Woody Management Strategies. Joint training session with FMR and GRG. GRG's focus will be on the biochar process from planning, permitting to implementation and share lessons learned so far.

2) USBI Biochar Conference – Sept 2025 Minneapolis Convention Center. Participating on the MN Biochar Initiative planning committee and in discussion to host a field day to share the process of managing MN's natural resources using biochar with various sizes and styles of flame-capped kilns, including Oregon and Ring of Fire kilns.

Dissemination

CharTalk (Jan. 18, 2024) – 75 online viewers during presentation, included local, national and international viewers. Link to talk is on GRG's YouTube channel and has received 144 views. Link added to attachment Tab 7.

Hasenback Park (Jan. 29, 2024) 15 attendees (city staff, USDA-NRCS staff, SWWD staff, county work crew)

Carlos Avery WMA (Feb 21-22, 2024) - DNR Foresters

Arden Hills Army Training Site (March 7, 2024) 20 attendees (Public, AHATs staff, local metro municipal staff)

Status Update Reporting

Status Update February 1, 2024

Date Submitted: February 13, 2024

Date Approved: February 16, 2024

Overall Update
Great River Greening staff has been actively talking with industry professionals, locally and nationally, on best practices for implementation. At the same time, we have been talking with partners and gaining interest from landowning partner sites for training and demonstration events. Kilns and necessary support materials are being procured or have been procured. One demonstration has been held and several other opportunities are in the works for 2024.

Activity 1
Great River Greening collected quotes and ordered the fabrication of 6 Oregon kilns in late November 2023. Kilns are scheduled to be completed in early 2024. Three Ring of Fire kilns were ordered and received Staff trained on how to assemble and set up the kilns. Communications with other industry professionals across the nation on equipment recommendations is ongoing. Will be procuring in early 2024.

Activity 2
In discussions with landowning partners on 9 potential sites, 5 site opportunities have been identified. One demonstration event was coordinated in the Brainerd/Baxter region and engaged 15 volunteers. We have secured two site opportunities for January 2024 and two for February 2024. Samples have been collected and will be sent to labs for testing in 2024. Identifying all 9 sites is going slower than expected as it is requiring more education of local governments and fire departments than anticipated.

Milestone 6 Contract vendors to cut and prep material for biochar demonstrations and trainings - 9/30/2023 - This is an oversight on the timeline planning and should be 9/30/2024.

Activity 3
No direct activity happened during reporting period. Request from MN Biochar Initiative to give a CharTalk on January 18th. The audience will be municipal agencies and various practitioners. Most of this activity will happen in the last half of the grant period.

Dissemination
Nothing to report during reporting period.

Status Update Reporting

Status Update August 1, 2023

Date Submitted: July 17, 2023

Date Approved: August 8, 2023

Overall Update
LCCMR waived reporting for this period per email on July 6, 2023.

Activity 1
LCCMR waived reporting for this period per email on July 6, 2023.

Activity 2
LCCMR waived reporting for this period per email on July 6, 2023.

Activity 3
LCCMR waived reporting for this period per email on July 6, 2023.

Dissemination
LCCMR waived reporting for this period per email on July 6, 2023.