Today's Date: December 3, 2018

Date of Next Status Update Report: March 1, 2020

Date of Work Plan Approval:

Project Completion Date: June 30, 2022

Does this submission include an amendment request? No

PROJECT TITLE: Promoting and Restoring Oak Savanna Using Silvopasture

Project Manager: Diomy S. Zamora, PhD

Organization: University of Minnesota Extension

College/Department/Division: Extension

Mailing Address: 1530 Cleveland Ave N

City/State/Zip Code: St. Paul, Minnesota 55108

Telephone Number: 612-626-9272

Email Address: zamor015@ume.edu

Web Address:

Location: Zimmerman, MN; Statewide

Total Project Budget: $750,000

Amount Spent: $0

Balance: $750,000

Legal Citation: M.L. 2019, Chp. xx, Sec. xx, Subd. xx

Appropriation Language:

I. PROJECT STATEMENT:

Oak savanna is a rare shifting-mosaic plant community. Once covering nearly 5.5 million acres in Minnesota (Fig. 1) it is now reduced by approximately 99.8%, making it one of the most threatened habitats in Minnesota (Minnesota Historical Society, 1974). Historically, grazing by large herbivores such as bison and elk maintained the health and structure of these ecosystems. Restoring and protecting these natural communities is critical to preserving natural services, including rare wildlife habitat, enhanced water quality, and soil health.

Ecosystem decline, caused by agricultural expansion/conversion as well as forest succession, has altered soil composition, hydrological processes, and vegetation composition and regeneration patterns (Anderson et al. 1999). This has resulted in the encroachment of invasive plant species and diseases, and altered water quality. In 2014, over 640,000 acres (USDA-ERS, 2014) of unmanaged wooded pasture existed in Minnesota, mostly within the historical oak savanna region. Silvopasture, the practice of intentionally combining intensive management of trees, forage, and livestock as one integrated practice has been successfully used to restore environmental and economic functions of oak savannas around the world, including the Dehesa system in Spain, and within the U.S. (e.g., Oklahoma, Tennessee, California). However, its potential has not been assessed in Minnesota.

This project has two major objectives: a) to assess the impacts of silvopasture as an approach to restore oak savanna ecosystems and native species in Minnesota, as well as improve soil health and water quality for Minnesotans; and b) to scale up the use of silvopasture for oak savanna restoration through outreach activities and development of a Silvopasture Learning Network (SLN) to facilitate farmer-to-farmer learning, promotion, and information sharing to expand natural resource conservation.

This study will examine the effects of silvopasture on plant/animal and pollinator diversity and distribution, soil health, and water quality characteristics at Sherburne National Wildlife Refuge in Zimmerman, MN located in the Anoka Sand Plain (Fig. 2). This region of historical oak savanna communities serves as a critical aquifer for east-central Minnesota. We hypothesize that use of silvopasture methodology will demonstrate a significant increase in restored oak savanna acreage. The results will be developed into case studies to form the core of a Minnesota focused Silvopasture Learning Network.

II. OVERALL PROJECT STATUS UPDATES:

First Update March 1, 2020

Second Update September 1, 2021

Third Update March 1, 2021

Fourth Update September 1, 2022

Fifth Update March 1, 2022

Final Report between project end (June 30) and August 15, 2022

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III. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1 Title: Establish and demonstrate oak savanna restoration using Silvopasture methodology at Sherburne National Wildlife Refuge.

Description: Using the grazing plan of the Sherburne National Wildlife Refuge (NWR), we will establish monitoring (demonstration) plots in the NWR to assess and demonstrate the impacts of silvopasture on restoring oak savanna by understanding changes in species diversity (plants, animals, birds, and insect – pollinators), soil health, and water quality. Baseline data will be collected and these parameters will be assessed annually thereafter. In consultation with staff from the NWR, we will establish these demonstration plots in silvopasture areas in the NWR and the imaginary boundaries of each plot will be demarcated using GPS waypoints. We will establish control plots to allow us to determine the impacts of silvopasture from no-management scenarios. The following parameters will be monitored and assessed:

Vegetation Management and Monitoring (Rebecca Montgomery - UMN, Steve Huckett – Great River Greening)
- Vegetation sampling will take place in the Northeast Grazing Unit of Sherburne NWR. Within this Unit of the NWR grazing plan, we will survey the area to identify the general location(s) of prior management activities within the NWR including *Fire* only, *Grazed* only, and *Fire and Grazing*. We will work in site in each of these prior management activities to assess and compare the impacts of silvopasture on oak savanna ecosystem restoration. This information will be projected to a map of the area so that all three prior management activity types are represented. The following methods will be used to assess vegetation impacts:
    - **Mature Trees:** We will use standard forest inventory methods that use fixed radius plots to survey tree abundance, size distribution, basal area and species composition of trees greater than 5 cm DBH. The number of plots surveyed per management unit will depend on unit size.
    - **Shrubs, tree saplings, and herbs:** Within the demonstration plots**,** we will randomly select a beginning point location to establish one - 100 meter belt transect to survey for shrubs, tree saplings (<50 cm tall), and herbaceous vegetation cover. The beginning point of each will be identified by a unique GPS point. Surveys will always begin at this unique GPS point and extend in a northerly direction, with sample being collected at 10 meter intervals along the transect using a Daubenmire frame that measured 50 centimeters by 25 centimeters. We will also sample the species composition and biomass of grasses and forbs along transects using a pin-frame with ten pins spaced evenly along a 1 m frame. The pin-frame will be placed at 0, 50 and 100 m along each transect. At each placement of the pin-frame, and for each pin, we will record the number of hits for each species of any blade of grass touching the pin, and whether that blade is brown or green. The total number of hits for each placement of the pin-frame will be converted to total plant biomass (gm^{-2}). For analysis, we will calculate the total number of hits per species (differentiating green and brown hits of each species) per pin-frame placement, and then determine the mean number of hits for each transect. We will average estimates for each transect for all transects on each property and this mean will be used for subsequent comparisons among properties.

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Wildlife Species Assessment (John Loegering - UMN, Jodie Provost - DNR)

- Characterize annually the wildlife community composition, species diversity and abundance in three groups of vertebrates: birds, bats, and reptiles in the demonstration plots that will be established at the NWR. Our on-site assessment will include one year prior to grazing and 3 years after implementing grazing.
- Use variable circular plots to characterize the savanna bird community composition and density (Ralph and Scott 1980). Each demonstration plots will be surveyed three times during June for a 10-minute survey period. All detections by sight and sound within the plot will be recorded as well as the distance to the observer.
- Use passive acoustic sampling to identify bat species using the silvopasture demonstration plots. We will use passive acoustic bat detectors to record echolocation calls as it is one of the most efficient and least intrusive methods of characterizing the bat community (Coleman et al. 2014). We will place bat detectors (e.g., Anabat SD2 or Wildlife Acoustics SM4BAT recorders) in the center of each plot for 5 days each per month during the months of June, July, and August.
- Use cover boards (Schemnitz et al. 2012) to document reptile species using the silvopasture plots. We will place five cover boards at randomly-determined locations in each plot. We will apply the cover boards every other week during June, July and August. All reptiles and amphibians observed or captured from beneath the boards will be recorded and released unharmed.

Pollinators Assessment (Anna Hess – DNR, Jessica Petersen -DNR)

- The project sites will be visited 3 times per summer, in June, July and August when weather permits. We will employ a minimum of 3 weeks between surveys. Preferably conduct surveys on first week of each month. Surveys will be conducted during these weather conditions: 1) Sunny or partly cloudy; 2) $> 65°F$ and $< 90°F$; 3) < 10mph of wind speed, 4) No rain or drizzle.
- Establish permanent transects at each of the demonstration plots. Transects will be laid out perpendicular to the long axis of the site. These transects will have a random starting point, and be spaced contiguously 30 meters apart. Transect end points will be marked with bamboo stakes with high-visual flagging or paint.
- Observers and recorders will walk each transect during appropriate weather conditions. Record time spent surveying (record both start and stop times).
- Identify butterflies and moths seen along the transect route. GPS units will be used to capture location of each specimen. The use of Distance sampling technique will be used to measure the distance from the center point of the transect to identify the butterfly or moth initial or resting location. For each Lepidopteran, record initial position where observer spotted the insect.
- Confirm identification at site, or take photo or written description and identify at lab. Identify preferably to genus and species, but family if necessary.
- Conduct statistical analyses. The Distance sampling results will be used to calculate encounter rates and absolute population estimates of individual or pooled species. Species diversity will also be calculated based on observations per site, and species distribution will be calculated based on GPS locations.
- Comparisons of total Lepidopterans counted, absolute population estimates, and encounter rates among silvopasture control sites and silvopasture grazing, fire, and grazing/fire sites will be calculated using appropriate method (nonparametric Kruskal-Wallis).
- Additional analyses will include intersecting GPS points with the Daubenmire frames used for vegetation analyses. Overlap areas will be used to analyze relationships between Lepidopteran species and vegetation cover. This will be assessed using logistical (presence/absence) and stepwise (abundance) regressions.

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- Results will be used to determine impacts of silvopasture grazing on Lepidopteran populations. These results will be incorporated into case studies to form the core of Minnesota focused Silvopasture Learning Network.

Soil and Water Assessment (Joe Magner – UMN, Jessica Gutknecht – UMN, Craig Sheaffer – UMN)

Soil Health/Ecology:
- At each demonstration plot, randomly selected positions will be identified for performing soil characterization and determination of soil health. Soil samples will be collected to determine physical attributes, chemical attributes, and biological indication of the abundance and activity of soil organisms important for soil health outcomes and soil functioning.
    - Physical Characteristics: At a single representative location in each demonstration plot, we will do a full soil profile description as a baseline for understanding subsequent changes in soil characteristics. At each soil profile location we will also take soil samples at 0-15 and 15-30 cm depth to perform soil moisture flux, water infiltration analysis, and wet aggregate stability analysis. Subsamples from this representative location will also be analyzed for the chemical and biological analyses described below.
    - Chemical Characteristics: Using the same transect locations and approach described above for tree, sampling, and herb samplings, we will randomly choose 5 of the plant sampling locations along the transect to take 0-15 and 15-30cm soil samples. Samples will be air-dried, ground, and analyzed for total organic carbon, total nitrogen, readily available carbon (POX-C), pH, and micronutrient analysis.
    - Biological Characteristics: Using a frozen portion of the soil samples taken as described for chemical analysis, we will perform lipid analysis to determine the abundance of bacteria and fungi at each demonstration plot. We will also determine the microbial decomposition activity through performing extracellular enzyme assays.
- Data sets from the physical, chemical, and biological characteristics of soil quality will be combined for a broad perspective of how the soil resource is altered by Silvopastoral management approaches. Sampling will also be coordinated with the water quality and plant sampling campaigns so that soil, water, and plant community data can be interpreted and combined together for an ecosystem-wide perspective on demonstration plot strategies.

Water Quality:
Water quality will be measured at the site scale using water table access tubes (with data loggers) and at the small watershed scale with measurement of precipitation (at NWR office), hydraulic head, and flow (if possible). Water chemistry will be measured using hand-held sonde instruments and field specific probes/sensors. Lab measurements of stable isotopes will be used to infer watershed scale influences upon region water quality from defined management practices.

ACTIVITY 1 ENRTF BUDGET: $359,106

Outcome	Completion Date
1. Silvopasture demonstration plots established at Sherburne National Wildlife Refuge; baseline data established and collected	October 2019
2. Vegetation management, assessment, and monitoring	Annually
3. Wildlife community, assessment and monitoring of three groups of vertebrates (i.e., birds, bats, and reptiles)	Annually
4. Pollinator diversity assessment and monitoring	Annually
5. Water quality monitoring and assessment	Annually

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6. Soil Health Assessment	October 2019, October 2021
7. Research findings reported.	Annually

First Update March 1, 2020

Second Update September 1, 2021

Third Update March 1, 2021

Fourth Update September 1, 2021

Fifth Update March 1, 2022

Final Report between project end (June 30) and August 15, 2022

ACTIVITY 2 Title: Establish Silvopasture Learning Network and initiate a Silvopasture Volunteerism program (UMN Extension, Sustainable Farming Association, Great River Greening)**.**

Description: We will establish an active Silvopasture Learning Network (SLN) to support the promotion and adoption of silvopasture as an approach to oak savanna restoration. The Silvopature Learning network will use an integrated outreach, education, and research approach to foster active learning with current silvopasture practitioners, interested operators, researchers, extension agents, natural resource professionals, non-government and other institutional partners across the state. The SLN will facilitate farmer-to-farmer learning, and information sharing about silvopasture.

Learning networks involve people voluntarily learning from each other (peer to peer learning), and sharing their experience with others (learners become teachers). This SLN will be moderated by U of MN Extension. One model for fostering learning that the University of Minnesota has found successful is the Master Woodland Owner Program. A blended on-line and faced to face learning environment that fosters peer to peer learning. Through SLN, we expect to reach at least 400 landowers, and these landowners will seek out and participate in the network, the network will continue beyond the end of this grant. Multiple educational models may be used to create the SLN.

To achieve a functional Silvopasture Learning Network, the University of Minnesota Extension will work with collaborators including the Sustainable Farming Association of Minnesota (SFA) and the Great River Greening. SFA is a farmer to farmer network comprised of family farmers, small business people, agricultural professionals, educators, and food advocates who are dedicated to protecting farming resources by advancing sustainable farming practices. The University of Minnesota Extension and collaborators will identify farmers, landowners, natural resource professionals and other stakeholders with an interest in and potential for adoption of silvopastoral methods and techniques. The University of Minnesota Extension will foster the nascent learning network fostering outreach and supporting farmers and landowners. The U of MN Extension will also develop e-learning tools, for producers, farmers, and natural resource professionals to share their experiences and foster peer to peer learning about silvopasture and the restoration of oak savanna. The e-learning tool will contain resources, blogs, discussion forums, and links to training sessions on silvopasture. All these activities for form part of the SLN.

To further accelerate the promotion and adoption of silvopasture for oak savanna restoration, we will initiate a Silvopasture Volunteerism Program. The purpose of the Silvopasture Volunteerism program is to foster peer to peer learning for farmers, livestock producers, woodland owners, about the "hands on" application of silvopasture as a practice to restore oak savannas.

We will establish two silvopasture demonstration sites (one each in Central and SE Minnesota) that were historically oak savanna. Participants in the volunteerism program will be asked to volunteer and help in the establishing these demonstration sites. During volunteerism events, expert speakers will be invited to share knowledge and train participants about how silvopasture can be used to restore oak savanna.

ACTIVITY 2 ENRTF BUDGET: $214,452

Outcome	Completion Date
1. Silvopasture Learning Network launched with initial gathering of participants and practitioners; then annual ongoing SLN recruitment	Annually beginning January, 2020
2. Silvopasture Learning Network field days (2) and workshops (2) each year, held in Central and Southern Minnesota initially and other regions as SLN grows	September, 2020, September, 2021 June, 2022
3. Silvopasture Learning Network e-tools and online portal development	January, 2020
4. SLN online portal and e-tools update and maintenance, quarterly and as needed to include research results and materials generated from Activity 1	Beginning January, 2020, updates as needed
5. Silvopasture Oak-Savanna Volunteerism program established and its associated activities started.	Annually beginning year 2
6. Two silvopasture demonstration sites established as a component of SLN and the Oak Savanna Volunteerism program.	Summer 2020
7. SLN and Oak Savanna Volunteers workshop at demonstration sites, 1 per site annually	Summer 2020, Summer/Fall 2021

First Update March 1, 2020

Second Update September 1, 2021

Third Update March 1, 2021

Fourth Update September 1, 2021

Fifth Update March 1, 2022

Final Report between project end (June 30) and August 15, 2022

ACTIVITY 3: Scale up the use of Silvopasture across Minnesota through development of networking tool, conducting outreach/extension activities and development of educational materials. (UMN Extension, Sustainable Farming Association)

Description: In addition to using the Silvopasture Learning Network and initiating a Silvopasture Volunteerism Program, we will employ several outreach and extension activities to scale up the use of

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Silvopasture for oak savanna restoration throughout historically oak savanna region in Minnesota (from southeast Minnesota to northwest Minnesota) using the following approaches/activities:

- Adapt a GIS-based Farmmaps program/app to include silvopasture case studies (Task 1). The Center for Integrated Natural Resources and Agricultural Management (CINRAM) together with the Southwest Regional Sustainable Development Partnerships at the University of Minnesota and the Minnesota Sustainable Farming Association have developed a tool used for farmer and natural resource professional networking and education. The Farmmaps program/app is a tool designed to promote the adoption of sustainable farming agricultural practices by connecting farmers who are interested in trying to implement practices with experienced farmer practitioners who have successfully adopted those practices. Changing farming practices can be a risk, and farmers need a platform for exchanging their experiences. We will utilize the Sustainable Agriculture Case Study Database that provides a forum for sharing the methods, challenges and results of Minnesota farmers who have adopted specific conservation practices. Farmers using the database can search for examples in close geographic proximity. Participants willing to talk to other farmers are invited to share their contact information. If someone is interested in adopting silvopasture, they can talk with someone who has done it, and learn from a farmer's perspective what the challenges and benefits are. The Farmmaps tool will promote "farmer to farmer" learning, and also provides a source of information for natural resource professionals and extension to use to plan field days related to silvopasture systems. It also provides farmer vetted information to other farmers interested in adopting silvopasture systems/practices. Sub activities for this activity include:
    - o <u>Meet with project partners and farmers interested in silvopasture to define a minimum data set for each case to be included in the database</u>. The minimum data set will include information that potential adopters need to make a decision and monitoring data that will allow us to track progress over time.
    - o <u>Data base development</u>. Programmer will develop a database structure and user interface for entering case study information into the database.
    - o <u>Program preparation</u>. Programmer will prepare a program suitable for online use and also apps for smartphone use to present information from database in a format most useful to the potential farmer and natural resource professional users.
    - o <u>Field testing and implementation</u>. Once the initial database and program are ready they will be tested by farmer cooperators and natural resource professionals to ensure it meets their needs. Program use will be monitored, and adjustments will be made as necessary over the life of the task.

- Work with farmers practicing silvopasture to develop case studies that can be accessed by other farmers and natural resource professionals interested in learning more about silvopasture and how to apply it in practice. A total of 5 cases will be prepared with project funding. This activity will allow the project to prepare the cases that will be presented in the database and tool explained above. Sub activities for this activity include:
    - o <u>Meet with project partners and farmers interested in silvopasture to define a minimum data set for each case to be included in the database</u>. The minimum data set will include information that potential adopters need to make a decision and monitoring data that will allow us to track progress over time.
    - o <u>Identify cases to be presented</u>. Working closely with project partners, we will identify cases to be included in the database and presented using the program developed in Task 1. Criteria for selection may include but are not limited to: i) successful implementation of silvopasture practices; ii) willingness to be part of database and provide advice to other farmers; iii) established silvopasture practice 3+ years.

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- o <u>Gather data for cases</u>. Formats and user interface programs will be prepared for gathering data in the field and entering the data in the database. This will require visits to the participating farms to interview owner/operators.
  - o <u>Enter data and test the database and output program</u>. This will be coordinated with "field testing and implementation" as described above.
- Train farmers, livestock producers, and natural resource professionals on the use of principles, science, and establishments of silvopasture. In partnership with the Sustainable Farming Association, we will provide farm consults, and on-site assistance and support to farmers and landowners who are adopting silvopasture techniques. This "boots on the ground" approach is a key technique to provide farmers the information, support and consultation necessary to adopt new, innovative practices and monitor and measure inputs and outcomes.
- Organize and lead the training sessions on silvopasture with farmers and stakeholders in Silvopasture Learning Network so they are prepared to lead silvopasture gatherings in their communities.
- Offer one silvopasture forum with state agencies and stakeholders to advance silvopasture adoption for oak savanna restoration.
- Develop an array of knowledge products and training materials for use in silvopasture educational programming to reach more farmers, and natural resource professionals on silvopasture. These extension publication materials will be made available to the public via a number of outlets.

ACTIVITY3. ENRTF BUDGET: $176,442

Outcome	Completion Date
1. A GIS-based Farmmaps program/app adapted to include silvopasture case studies.	June 2021, June 2022
2. 5 case studies of silvopasture with some video documentations developed, which will also form part of the SLN.	Summer 2021
3. Two training/workshop session/camps/field days on Silvopasture offered each year targeting farmers, and natural resource professionals in historically oak savanna region in Minnesota.	Annually
4. One silvopasture forum offered with government agencies, and stakeholders to advance silvopasture adoption for oak savanna restoration	March 2021
5. One webinar per year, beginning in year 2, to reach stakeholders.	Mar 2021; Mar 2022
6. One volunteerism event each year offered to train volunteers on silvopasture	May 2021, July 2021
7. Three local, informal gatherings modelled after "café chats" in year 2 and 3 offered to bring trained farmers together with their peers, to introduce people to silvopasture techniques and learn from each other.	Jan. – Mar. 2021 and 2022.
8 An array of knowledge products and training materials produced to be used at "café chats", plus workshops and field days in Activity 2	Jan. 2021, updated Jan. 2022
9. Final Project Report written	June 2022

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IV. DISSEMINATION:

Description: We will offer a number of approaches to disseminate our project results. As presented above, the Silvopasture Learning Network will be used to reach farmers and natural resource professionals throughout Minnesota while the Silvopasture Volunteerism program will be used to train core individuals on silvopasture with the expectations that these core individuals will accelerate promotion of the use of silvopasture throughout the state through peer-to-peer discussion. Furthermore, the networking tool we will employ will allow also farmers to share their experience on silvopasture with each other. Two camps/field days will also be offered to reach farmers, producers, and natural resource professionals on silvopasture. We will also organize three local, informal gatherings modelled after "café chats" in years 2 and 3 to bring trained farmers together with their peers, to introduce people to silvopasture techniques and learn from each other. We will use existing educational events such as the Minnesota Cattlemen's Association summer tour, winter and summer gathering of the Crow Wing River Forage Council, and soil health field days and workshops of the Sustainable Farming Association to reach our key audience. At least 400 farmers, producers and natural resource professionals are reached out during these events.

Results will also be presented during workshops and conferences of professional organizations in Minnesota. Educational materials such as factsheet series, you tube videos, and case study videos will be developed and will be posted at the Silvopasture Learning Network sites. These materials will be linked with partners' websites.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgement Guidelines

First Update March 1, 2020

Second Update September 1, 2021

Third Update March 1, 2021

Fourth Update September 1, 2021

Fifth Update March 1, 2022

Final Report between project end (June 30) and August 15, 2022

V.   ADDITIONAL BUDGET INFORMATION:
A. Personnel and Capital Expenditures

Explanation of Capital Expenditures Greater Than $5,000:

Explanation of Use of Classified Staff:

Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:

17,140	8.24

Total Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:

4,223	2.04

VI. PROJECT PARTNERS:

A. Partners outside of project manager's organization receiving ENRTF funding

Sustainable Farming Association = $80,675
Great River Greening = $31,500

B. Partners outside of project manager's organization NOT receiving ENRTF funding

Minnesota Department of Natural Resources

VII. LONG-TERM- IMPLEMENTATION AND FUNDING:

University of Minnesota Extension will include results in its outreach and education efforts to create increased impacts of the program. It is expected that a functional SLN will yield interest and resources to expand this work throughout the state.

VIII. REPORTING REQUIREMENTS:
- Project status update reports will be submitted March 1 and September 1 each year of the project
- A final report and associated products will be submitted between June 30 and August 15, 2022

IX. SEE ADDITIONAL WORK PLAN COMPONENTS:
    A. Budget Spreadsheet
    B. Visual Component or Map
    C. Parcel List Spreadsheet
    D. Acquisition, Easements, and Restoration Requirements
    E. Research Addendum

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Attachment A:
Environment and Natural Resources Trust Fund
M.L. 2019 Budget Spreadsheet
Legal Citation:
Project Manager: Diomy Zamora
Project Title: Promoting and Restoring Oak Savanna using Silvopasture
Organization: Regents of the University of Minnesota
Project Budget: $750,000
Project Length and Completion Date: 3 Years, June 30, 2022
Today's Date: December 3, 2018

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)	$ 483,834	$ -	$ 483,834
Principal Investigator, $28,506 (74.5% salary 25.5% benefits), 10% each year for 3 years			
Extension Professor, $12,441 (68% salary 32% benefits), 4% each year for 3 years			
Extension Professor, $3,699 (70% salary 30% benefits), 1% each year for 3 years			
Economist, $30,089 (74.5% salary 25.5% benefits), 8% each year for 3 years			
Hydrologist, $14,868 (74.5% salary 25.5% benefits), 3% each year for 3 years			
Wildlife Biologist, $9,279 (74.5% salary 25.5% benefits), 2% each year for 3 years			
Ecologist, $5,170 (74.5% salary 25.5% benefits), 1% each year for 3 years			
Program Manager, $192,934 (81% salary 19% benefits), 100% each year for 3 years			
Program Coordinator, $118,473 (80% salary 20% benefits), 75% each year for 3 years			
Undergraduate Students, $68,375 (100% salary 0% benefits), 10% each year for 3 years			
Professional/Technical/Service Contracts			
TBN - Forester to conduct inventory	$ 1,000		$ 1,000
TBN - Logger to cut down and remove trees	$ 5,000		$ 5,000
TBN - Contractor to prep site	$ 5,000		$ 5,000
TBN - Farmer cooperator for movement of cattle in the paddocks	$ 7,500		$ 7,500
TBN - Pollinator crew to access bee and other pollinators	$ 9,000		$ 9,000
TBN - Contractor to produce videos	$ 10,000		$ 10,000
Great River Greening (Subaward and will be paid for actual costs incurred) - to help with research and outreach	$ 31,500		$ 31,500
Sustainable Farming Association (Subaward and will be paid for actual costs incurred) - to help with outreach	$ 80,675		$ 80,675
TBN - Programmer to add silvopasture systems to database	$ 5,000		$ 5,000
Equipment/Tools/Supplies	$ 13,100		$ 13,100
Dual-Wall Permeameter ($3,500)			
Water quality materials and supplies ($2,100)			
Wildlife assessment field supplies for data collection ($1,500)			
Computer for Program Coordinator (new position in Extension) to conduct project work ($1,500)			
Office supplies for use in outreach activities ($2,250)			
Field supplies for use in outreach activities			
Travel expenses in Minnesota	$ 57,471		$ 57,471
Mileage for project personnel to implement all components of the project - 413 trips with approximately 85,000 miles ($46,325) Rates are based on University of Minnesota policy.			
Lodging for project personnel to implement all components of the project - 51 trips with 1 night stay ($5,610) Rates are based on University of Minnesota policy.			
Meals for project personnel to implement all components of the project - 51 trips with 2 days of meals ($3,904) Rates are based on University of Minnesota policy.			
Travel expenses to present results - MN Assoc of Soil & Water Conservation Districts and MN Society of American Foresters ($1,632) Rates are based on University of Minnesota policy.			
Other			
Soil sample analysis for soil health parameters	$ 25,920		$ 25,920
Stakeholders forum to advance restoration - food $1,500, facility rental $1,000, printing $2,000 (food is for all day events for invited participants as to preserve the continuity of the meeting)	$ 4,500		$ 4,500
Bus rental for field days	$ 3,000		$ 3,000
Workshops - facility rental $1,000, printing of promotional materials $2,000	$ 3,000		$ 3,000
Advertising to recruit volunteers to start volunteerism program	$ 4,500		$ 4,500
COLUMN TOTAL	$ 750,000	$ -	$ 750,000

OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State:		$ -	$ -	$ -
State:		$ -	$ -	$ -
In kind:		$ -	$ -	$ -

PAST AND CURRENT ENRTF APPROPRIATIONS	Amount legally obligated but not yet spent	Budget	Spent	Balance
Current appropriation:		$ -	$ -	$ -
Past appropriations:		$ -	$ -	$ -