Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2014 Work Plan

Date of Report: January 15, 2014

Date of Next Status Update Report: Ocotber 1, 2014

Date of Work Plan Approval:

Project Completion Date: June 30, 2018

Does this submission include an amendment request? No

PROJECT TITLE: Dredged Sediment for Forest Restoration on Unproductive Minelands

Project Manager: Tom Levar

Organization: University of Minnesota – Duluth, Natural Resources Research Institute (UMD - NRRI)

Mailing Address: 5013 Miller Trunk Highway

City/State/Zip Code: Duluth/MN/55811-1442

Telephone Number: (218)720-4333

Email Address: tlevar@d.umn.edu

Web Address: www.**nrri**.umn.edu/

Location:

Saint Louis County Landfill Parcel/Acct 090-0193-00075 82249

Section 10 Township 58.0 Range 17

SW1/4 of NW1/4 LYING ELY OF A LINE BEG

ON W LINE N 1 DEG 21'26"W 174.09 FT FROM

W1/4 COR THENCE S30 DEG 44'17"E 376.05

Total ENRTF Project Budget: $300,000	
ENRTF Appropriation:	**$300,000**
Amount Spent:	**$0**
Balance:	**$300,000**

Legal Citation: M.L. 2014, Chp. 226, Sec. 2, Subd. 06j

Appropriation Language:

$300,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota–Duluth for the Natural Resources Research Institute to restore up to 136 acres of unproductive mine stockpile while improving the treatment of municipal sewage and biosolids near Virginia using clean Erie Pier dredged sediment and managed forestry techniques. This appropriation is available until June 30, 2018, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Dredged Sediment for Forest Restoration on Unproductive Minelands

II. PROJECT STATEMENT:

1. Intent of Project

The intent of this project is to demonstrate improved, sustainable, and best-practices methods of mineland restoration then transfer this methodology elsewhere, to perpetuate dual benefits to the environment and local commerce.

2. Justification and Impacts

Minnesota mining activities result in the removal of plant materials, depletion of soils, exposure of geologic formations and subsequent stockpiling of by-product rock. These disturbances reduce the biological productivity and biodiversity of a mine site, as well as impact the role of this land in the ecosystem. A reclamation permit for minelands required by State statute and enforced by the regulatory agencies addresses the practices designed to remedy these disturbances and fundamentally revegetate the site. This reclamation permit does not require revegetation with purpose grown plant species, for sustained economic benefit. This research takes the next step towards sustained economic benefit of mineland reclamation. The end results of this research are site restoration, effective plant succession, and economic sustainability. This research will therefore enable and demonstrate a higher use of these disturbed lands.

Presently mineland reclamation requirements do not include the higher goals of biodiversity and sustained economic development from resources disturbed by mining activities. Where ownership of such disturbed lands is transferred or conveyed, both biodiversity and sustained economic return are justified. This higher level of site restoration would provide economic return to the owner and stimulate local commerce, including tax revenues from the sale of products. This research site was reclaimed according to existing regulations prior to its conveyance to St. Louis County. In this specific case, the research site is owned by St. Louis County and NRRI was requested to demonstrate a higher use, specifically with purpose grown biomass species. St. Louis County based their request on the expertise and success of NRRI in site restoration at other locations. Based on ownership, no mining company is participating or contributing to this research. St. Louis County is providing land resources, equipment, operators and on-site facilities in support of this research. The goal of this research is to demonstrate a higher level of mineland reclamation with the benefits of biodiversity and sustained economic benefit, currently not required by regulatory agencies. No ENTRF funds are therefore used to meet regulatory requirement in the execution of this research.

This research is not intended for the revision of regulatory requirements. However, the results expected from this research will demonstrate the ecologic and economic benefits above basic revegetation, as required by existing regulations. All acreage included in this research (at the St. Louis County site) has been reclaimed according to existing regulations, but not resulting in economic activity (i.e. optimized biomass productivity).

The opportunity for purpose grown vegetation on minelands in Minnesota is significant. "Iron ore and taconite have been mined in Minnesota since the 1890s. Most lands disturbed by mining are on the Mesabi Iron Range in northeastern Minnesota. Currently, 256,000 acres are covered by Permits to Mine, 76,100 acres of which have been altered since 1980 when the Legislature established the DNR's permitting program. Of this acreage, about 33,100 are tailings basins, about 22,150 are mine pits, and about 18,300 are stockpiles (https://webapps8.dnr.state.mn.us/outcomes_reporting/conservation_agenda/detail/542). Lands disturbed by mining activities, requiring reclamation could benefit from this research, where a business could utilize the biomass (i.e. fiber related industry). In the case of the higher level of reclamation represented by this research, the owner of the land would incur the costs and then receive payment for the biomass.

A fundamental practice of harbor maintenance is dredging of sediment. In the Duluth Harbor, sediment is carried by the influx of water and settled into the harbor from the St. Louis River and surrounding landscape. The accumulation of sediment restricts ship traffic and commerce. Dredging ensures adequate depth for ship passage; an integral element of agricultural and industrial vitality in the region. In the case of the Duluth Harbor, the dredged sediment is lifted from the bottom of the channel, then barged to a containment facility owned by the Duluth Port Authority and managed by the US Army Corps of Engineers. The sediment from this facility is clean, classified and permitted for landscape use. This sediment has been successfully used in construction projects, landfill caps, sports turf substrate and a variety of land reclamation projects. The containment facility holds over two million cubic yards of dredging at full capacity, with annual additions of over one hundred thousand cubic yards of sediment.

The project affects the commercial sectors of shipping, forest products and biofuels production with other benefits to carbon sequestration, wildlife habitat, ecosystem beautification, recreational use, aesthetics and biodiversity enhancement. The ecosystem management enabled by the use of sediment on unproductive minelands results in an enhanced, healthy rootzone, improvements to soil organic matter and maximizes biomass productivity.

3. Description of Activities

a. Research Site - The research site is located on lands owned and managed by St. Louis County Environmental Services adjacent to their landfill, leachate fields, recycling and recovery operations near Virginia. Maps of the research site, satellite images and the tax document (ownership) are available upon request.

The research site will include two general areas: staging and biomass production (i.e., research plots therein). Dredged sediment will be truck transported from the Erie Pier Containment Facility (Duluth Seaway Port Authority and US Army Corps of Engineers) in west Duluth to the staging area. NRRI personnel will monitor the shipments of dredged sediment from this facility, supported by ENTRF Funds. No ENTRF funds will be expended for the transport and handling of the dredged sediment; other funding sources will support this activity. The most cost-effective method of transporting the sediment from Duluth will be used and supported by funds other than ENTRF. The staging area is located at the St. Louis County Landfill site near the research plots. The staging area will be used to store dredged sediment intended for the substrate enhancement at the research plots. Since this staging area is not rail accessible, delivery trucks will deposit the sediment here, and samples will be retained for reference and analysis. Each delivery will be carefully monitored and recorded, with full compliance to regulatory permits. From the staging area the dredged sediment will be deployed to the prepared research plots. Site preparation is described in the following paragraph. The staging area and research plots are located within the 140 acre facility managed by St. Louis County Environmental Services (legal description previously provided as Location.)

b. Sequence of Activities – The research site and staging areas are currently covered with brush, saplings and a variety of emergent plants species. The productivity of this site is very low due to the deficient soils. This site was formerly a mine bench, where rock by-product was deposited and graded. The existing vegetation is the result of natural regeneration (i.e. little or no management).

Site preparation consists of floristic survey, baseline biomass productivity and in situ substrate analysis. The purpose of the floristic survey is to describe the present vegetation prior to research activities. Plants from seeds and fragments of this vegetation may regenerate at the sites, and this will require cultural management (mowing, removal and/or herbicide). Also baseline productivity will be quantified. Baseline biomass productivity is a weight measurement of vegetation collected from both staging and research areas before substrate enhancement. Also, the existing substrate will be classified and reported. These measurements and observations are important when compared to the improved conditions following sediment application.

The research plots in this project will receive substrate materials following site preparation, graded to a uniform surface and seeded with a temporary legume cover crop. Native seeds and plant species will be used in this project in accordance to BWSR guidelines for restoration. Plant materials from commercial sources, North Central Research and Outreach Center (NCROC, Grand Rapids) and NRRI's Greenhouse will be transported to the research site and deployed. Some plants species will be propagated at these facilities for specific deployment during this research project. Amendments (ex. nutrient, biological, mycorrhizae, bio-stimulants) will be applied to benefit the establishment and growth of the plant species. The sustainable succession of bio-diverse plant species of commercial importance is the goal of these activities.

As the plant species flourish within the research plots, growth and response will be monitored and documented to quantify effectiveness of treatment and measure biomass productivity (both standing and harvested). Research plots will be culturally managed to optimize survival and productivity. All practices will be carefully documented to enable thorough reporting and technology transfer. As biomass is harvested and quantified, stands will be maintained through replanting or coppicing to ensure re-growth.

Please Note: This research project will be conducted over a period of four years. Due to the timing of funding and seasonality of biomass productivity, we have proposed an extended period of monitoring. The results of biomass productivity can be better extrapolated with this extended timeline. The project status updates (below) will reflect this extend timeline.

c. Additional Impacts of Project - Technology transfer is an important goal of this project. Succession of plant species, building of soil organic matter and the perpetuation of purpose grown plant species are essential elements to the success of this project. The successful practices and materials used in this project have restoration potential for transfer to other disturbed and unproductive land resources in the region, while providing high quality biomass to the energy and bio-products industries.

III. PROJECT STATUS UPDATES:

Project Status as of October 1, 2014:

Project Status as of April 1, 2015:

Project Status as of July 1, 2015:

Please Note: This is a FOUR year project.

Project Status as of April 1, 2016:

Project Status as of July 1, 2016:

Project Status as of April 1, 2017:

Project Status as of July 1, 2017:

Project Status as of April 1, 2018:

Project Status as of July 1, 2018:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Site Preparation and Baseline Productivity
Description: These activities prepare the staging and research plot areas for deployment of sediment to enhance the site prior to planting, including:

- Shearing and removal of standing biomass;
- Processing and transfer of biomass to user;
- Weighing of yield (load monitoring);
- Biofuels analysis (ash content and MBtu).

The research plot area is covered with emergent, volunteer plant species (i.e. brush and saplings) of low productivity, since the site is soil deficient. A contractor will be hired to remove (i.e. shear), transport, chip and ship the harvested biomass. Each load will be sampled and weighed to determine yield and baseline productivity. The samples will be split (one to be retained, one to be analyzed as fuel).

These activities also result in the following data/information from the research site:

- List and incidence of plant species, before site preparation;
- Cost to remove and process biofuels;
- Quantity, quality and value of biofuels.

The baseline floristic survey documents the species mix and relative incidence of these species on the site before further activities, including the placement of dredged sediment. Also, the value and quality of the biofuels removed from the site will be documented. This data will serve as a baseline and will be compared to the results of enhancements to the site (i.e. purpose grown species and their productivity when sediment is used).

Summary Budget Information for Activity 1:

ENRTF Budget: $ 50,496
Amount Spent: $ 0
Balance: $ 50,496

Activity Completion Date: Dec 31, 2014

Outcome	Completion Date	Budget
1. Floristic survey	Oct 31, 2014	$ 12,500
2. Initial harvest	Dec 31, 2014	$ 19,000
3. Biofuels analysis	Dec 31, 2014	$ 18,996

Activity Status as of October 1, 2014:

Activity Status as of April 1, 2015:

Final Report Summary:

ACTIVITY 2: Erie Pier CDF Activities and Stockpiling of Sediment
Description: These activities involve the monitoring of the loading of Erie Pier Sediment from the Duluth Containment Facility (CDF), then the monitoring of the shipment of sediment to the prepared staging area on the Landfill Property, including:

- Loading and monitoring of sediment from CDF at Erie Pier (samples and load out data);
- Monitoring of deliveries (load received and quantities at research site);
- Sampling of delivered sediment (representative samples from loads as received at research site);
- Bioassay of sediment samples (potted study to provide purity/weed-free data);
- Management of sediment stockpile (spray and cover as needed, then monitor).

ENRTF funds will be expended only in the sampling and monitoring of activities at the Containment Facility, jointly operated by the Duluth Seaway Port Authority and US Army Corps of Engineers (i.e. not for transport costs). Loading and transport of the sediment will be supported by other funds. A composite sample of each load will be taken and each load will be monitored. Load tickets will be retained. As loads are delivered to the staging area near the research plots, the sediment will be bulldozed and the stockpile will be sloped and tended. A contractor will be hired when St. Louis County personnel and equipment are not available. NRRI has established a bioassay protocol for determining the presence of viable seed and plant fragments in sediment samples. Retained sediment samples will be used for these bioassays. Before sediment is deployed from this staging area, emergent weeds will be controlled by spray and/or cover, as needed. This will ensure weed control prior to deployment of sediment onto the research plots. Special emphasis will be placed on the control of invasive weed species, such as Purple Loosestrife.

Please Note: ENRTF monies will not be used for the transport of the sediment from the Erie Pier CDF to the staging area.

Summary Budget Information for Activity 2:

ENRTF Budget: $ 48,546
Amount Spent: $ 0
Balance: $ 48,546

Activity Completion Date: Dec 31, 2014

Outcome	Completion Date	Budget
1. CDF activities	Dec 31, 2014	$ 10,500
2. Receipt of deliveries	Dec 31, 2014	$ 10,500
3. Sampling and bioassay	June 30, 2015	$ 14,500
4. Stockpile management	Dec 31, 2014	$ 13,046

Activity Status as of April 1, 2015:

Activity Status as of July 1, 2015:

Final Report Summary:

ACTIVITY 3: Sediment Deployment and Substrate Management
Description: These activities involve the initial placement and management of the substrate from the stockpile to the research plots, including:

- Deployment, grading and surface preparation (prepare research plots for purpose grown plants);
- Weed control (monitor and eliminate unwanted vegetation);
- Nutrient and stimulant application (fertilizer and biological products for the benefit of plant growth);
- Seeding with cover crop (green manure and organic matter building);
- Monitoring of vegetation (data on success or per cent of cover);
- Research plot layout (map of purpose grown species).

These activities describe the preparation of the research plots, the transport of sediment from the staging area located at the research site, the placement of the sediment onto the research plot areas and the initial management of the substrate (i.e. blanket of sediment in place). Based on the initial sample analysis of the sediment, the fertility and biology of the sediment will be amended in place. Products will be applied to the surface of the sediment and incorporated. Seeds of native species approved as cover crops by BWSR and MN DNR will be applied to the research plots. The success of the establishment of this cover will be monitored and reported. The position and placement of purpose grown shrubs and trees will be marked. A detailed map of these plots will be made available for review.

Summary Budget Information for Activity 3:

ENRTF Budget: $ 47,250
Amount Spent: $ 0
Balance: $ 47,250

Activity Completion Date: Oct 31, 2015

Outcome	Completion Date	Budget
1. Deployment of sediment	June 30, 2015	$ 10,500
2. Sampling and analyses	June 30, 2015	$ 12,500
3. Cultural applications of products and seed	June 30, 2015	$ 9,000
4. Monitoring of vegetation	Sept 30, 2015	$ 8,500
5. Plot layout	Oct 31, 2015	$ 6,750

Activity Status as of July 1, 2015:

Activity Status as of April 1, 2016:

Final Report Summary:

ACTIVITY 4: Propagation and Sourcing of Plant Materials
Description: These activities involve the purchase, storage and propagation of the plant materials, such as greenhouse and nursery operations. (Please Note: These activities are redundant until all research plots are fully stocked; final projected planting including restocking by June 30, 2016), resulting in:

- Sufficient planting stock (dormant and/or live containerized) for research plots;
- Purchased planting stock;
- Fully stocked (populated) research plots;
- Managed nursery plots for successive plantings and re-plantings;
- Additional (propagated in greenhouse) planting stock.

The planting stock for this project will be containerized, rooted material based on our previous forestry research. Both dormant and actively growing stock will be used, depending on the specie and timing. The goal is to have a live, measurable plant at each position for shrub and tree species (i.e. fully stocked plots). When planting stock cannot be propagated, it will be purchased from local source. In the case of herbaceous cover, seeds will be used. The North Central Research and Outreach Center in Grand Rapids is used to hold planting and propagation stock for this research. NRRI's greenhouse facility is also used in the indoor propagation of materials. The NRRI staff have over twenty years of experience in the propagation of plant materials for site restoration. Please note: native and approved species will be used in this activity, in accordance to State guidelines.

Summary Budget Information for Activity 4:

ENRTF Budget: $ 49,453
Amount Spent: $ 0
Balance: $ 49,453

Activity Completion Date: Oct 31, 2015

Outcome	Completion Date	Budget
1. Propagation of plant materials	June 30, 2016	$ 12,500
2. Purchase of planting stock	June 30, 2016	$ 12,000
3. Direct Plantings	June 30, 2016	$ 9,000
4. Nursery Management	June 30, 2016	$ 7,453
5. Additional propagation	June 30, 2016	$ 8,500

Activity Status as of July 1, 2016:

Activity Status as of April 1, 2017:

Final Report Summary:

ACTIVITY 5: Research Plot Management and Monitoring of Biomass Productivity
Description: These activities involve cultural practices, monitoring of growth and measurement of productivity within research plots, including sampling to project harvest yields, resulting in:

- Recommended methods of measuring stand productivity;
- Data (destructive and non-destructive evaluation) of productivity of purpose grown plants;
- Data (proof) from test methods (non-destructive);
- Yield projections and verification.

Biomass yield estimates are based on measurement data (i.e. caliber, height and weight). This data will be collected within the research plots and equations will be developed for standing biomass. Yield projections will be verified, again by harvesting. Where destructive data is gathered, research plots will be replanted. Yield projection equations from this project are specific to the specie mix and age class of the stock within plots. The methodology and equations can be used for similar plantations for yield estimates and as a management tool to maximize productivity.

Summary Budget Information for Activity 5:

ENRTF Budget: $ 50,774
Amount Spent: $ 0
Balance: $ 50,774

Activity Completion Date: June 30, 2017

Outcome	Completion Date	Budget
1. Cultural management of plots	June 30, 2017	$ 12,500
2. Sampling of biomass	June 30, 2017	$ 22,500
3. Yield projections	June 30, 2017	$ 15,774

Activity Status as of July 1, 2017:

Activity Status as of April 1, 2018:

Final Report Summary:

ACTIVITY 6: Final Analysis and Site Visits
Description: These activities involve the final sampling, analysis and site visits to enable the promotion, education and transfer of these practices to other sites, including the following results:

- Comparative changes in substrate properties (organic matter and nutrient changes);
- Growth curves projected yields;
- Tutorials, video and literature enabling technology transfer.

Summary Budget Information for Activity 6:

ENRTF Budget: $ 53,481
Amount Spent: $ 0
Balance: $ 53,481

Activity Completion Date: June 30, 2017

Outcome	Completion Date	Budget
1. Final sampling	June 30, 2018	$ 22,000
2. Final measurements	June 30, 2018	$ 19,500
3. Final site visits	June 30, 2018	$ 11,981

Activity Status as of June 30, 2018

Final Report Summary June 30, 2018

V. DISSEMINATION:

Please Note: This is a FOUR year project.

The dissemination of data and reports will be accomplished through the NRRI website, in cooperation with the Laurentian Vision Partnership Meetings (quarterly), through progress reports to Commission Members and regulatory agencies (specifically MN DNR Hibbing Mineland Reclamation contacts) as status is reported. This will coincide with the above Item III. Project Status Updates, as follows:

Status as of October 1, 2014:

Status as of April 1, 2015:

Status as of July 1, 2015:

Status as of April 1, 2016:

Status as of July 1, 2016:

Status as of April 1, 2017:

Status as of July 1, 2017:

Status as of April 1, 2018:

Status as of June 30, 2018:

Description: In addition to the above reporting, site visits will be made available as requested featuring the activities at the NRRI facilities and St. Louis County research site. Annual fall tours will be scheduled and promoted. Participants will be invited from mining companies, land managers and regulatory agencies. Annual fall tours will be publicized through the NRRI website, local media and Laurentian Vision Partnership. A final tour of the research site will be scheduled in June 2018 and reported in the final report.

Each tour will begin at NRRI or be otherwise coordinated. Each tour will be preceded with a promotional mailing to highlight and describe the features of the activity or otherwise publicized through local media, the NRRI website or Laurentian Vision Partnership. The tours will be videotaped for future use and made available on request. In addition, the progress of this research will be photo-archived for reporting and dissemination.

Since this project is supported by County, State and Federal monies, all reported information will be made available to the funding sources, corresponding to the reporting schedule. Presentations will be made available to cooperators, especially the forum represented by Laurentian Vision Partnership.

All reported information will be archived and referenced in the NRRI Library and promoted as NRRI documents, with attribution to the funding sources.

VI. PROJECT BUDGET SUMMARY:

Please Note: Itemized details of this budget are included in a separate document.

A. ENRTF Budget Overview:

Budget Category	$ Amount	Explanation
Personnel (all for four years): Tom Levar (PI) $64,646 for 20% FTE Larry Zanko (Co-PI) $ 39,512 for 10% FTE Bernie McMahon $ 20,721 for 5% FTE Craig Maly $ 55,816 for 20% FTE Sara Post $ 38,304 for 20% FTE	$ 218,999	All UMD-NRRI Staff: These persons execute all activities of project, with the exception of contracted services and operations provided by cooperators.
Professional/Technical/Service Contracts:	$ 22,000	Botanist and Equipment Operators Dr. Gerould Wilhelm will conduct annual floristic surveys. Equipment operators will shear existing shrubs and trees, and process this material as biofuel.
Equipment/Tools/Supplies:	$ 11,654	Field supplies, greenhouse supplies, plants These supplies include fertilizers, potting soils, containers, seeds, cuttings and horticultural products. Also included are miscellaneous field supplies, sample containers and expendables (as designated by funding source).
Travel Expenses in MN:	$ 38,707	Day trips from NRRI to research site No overnight or out of state trips are needed or covered by these funds. Trips to the Erie Pier Facility and to the research site near Virginia are included. Travel funds will also be expended on tours and presentations.
Other:	$ 8,640	UM analytical costs (UM Research Analytical Laboratory, St. Paul Campus i.e. not a private vendor, not selected through competitive bid) These costs are related to sediment, water and plant tissue analysis; approximately 180 samples per year at a rate of $12 per sample. Analysis to be performed by the UM Research Analytical Lab with data analyzed by the NRRI staff.
TOTAL ENRTF BUDGET:	**$ 300,000**	

Explanation of Use of Classified Staff: University employees are not classified.

Explanation of Capital Expenditures Greater Than $5,000: No capital expenditures greater than $5,000 for this project.

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 3.0 FTE total for UMD NRRI Staff for the four year project

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: 0.3 FTE total for contractors for the four year project

B. Other Funds: Please Note – PROJECTED FUNDS (not verified as January 2014)

Source of Funds	$ Amount Proposed	$ Amount Spent	Use of Other Funds
Non-state			
	$ 352,500	$ 352,500	US ACOE and US EDA MMC TOTAL allocated and spent on research projects related to the transport and use of Erie Pier Sediment for site restoration (through 2014)
	$ 250,000		Federal monies through US ACOE (pending request for transport monies) Please Note: Not ENRTF. Covering all forms of transport to the research site
State			
	$ 125,000		IRRRB LVP (pending request for transport monies) Please Note: Not ENRTF. Covering all forms of transport to the research site.
TOTAL OTHER FUNDS:	**$ 727,500**	**$ 352,500**	

VII. PROJECT STRATEGY:

The long term vision for this project is:

- To substantiate the most cost effective system for the transport of sediment from Duluth to minelands within the Mesabi Range (i.e. establish parameters of cost effectiveness);
- To provide protocols for quality control and quality assurance for the sediment relative to site restoration;
- To prove best management practices in the use of the sediment for mineland site restoration;
- To demonstrate long term economic benefits of site restoration, with emphasis on biomass productivity;
- To establish transferrable, technical practices for the use of sediment for other sites, such as brownfields, landfills and spill sites.

A. Project Partners: All of these Project Partners are funded without ENRTF monies - US ACOE, Duluth Port Authority, St. Louis County Environmental Services, IRRRB (Laurentian Vision Partnership – LVP), UMD-NRRI (indirect and PUTF). All are partnering without ENRTF funds.

B. Project Impact and Long-term Strategy: Transfer proven technology and methods to other sites, including public lands, industrial properties, brownfield and disturbed sites for the purpose of restoration and sustained, benefitical use.

C. Spending History:

Please Note: No ENRTF funds have supported this research to date.

Please Note: No specific Minnesota Legislative appropriations have been expended on research related to Erie Pier Sediment by UMD- NRRI. Internal NRRI monies, Federal funds and PUTF monies have been expended in support of related research (US ACOE and EDA MMC) since 2010. Previous research sites are lcoated at tailings basins, superfund sites, one local golf course, landfill and borrow pit. For reports on these activities please contact the NRRI research team.

Funding Source	M.L. 2008 or FY09	M.L. 2009 or FY10	M.L. 2010 or FY11	M.L. 2011 or FY12-13	M.L. 2013 or FY14

VIII. ACQUISITION/RESTORATION LIST: None

IX. VISUAL ELEMENT or MAP(S):

A map of the research site, as originally submitted to LCCMR is attached and included in XI. Research Addendum

X. ACQUISITION/RESTORATION REQUIREMENTS WORKSHEET: None

XI. RESEARCH ADDENUM/EXHIBIT:

Purpose: If more information is required to explain the geography and logistics of the overall project and Research Site specifically, please contact the NRRI research team.

Title (format)	Description/Purpose
Landfill Area Gray (jpg)	gray scale visual of landfill, submitted with initial proposal, research plot within

XII. REPORTING REQUIREMENTS:

Project Status as of October 1, 2014:

Project Status as of April 1, 2015:

Project Status as of July 1, 2015:

Project Status as of April 1, 2016:

Project Status as of July 1, 2016:

Project Status as of April 1, 2017:

Project Status as of July 1, 2017:

Project Status as of April 1, 2018:

Project Status as of July 1, 2018:

Environment and Natural Resources Trust Fund

M.L. 2014 Project Budget

Project Title: Dredged Sediment for Forest Restoration on Unproductive Minelands

Legal Citation: M.L. 2014, Chp. 226, Sec. 2, Subd. 06j

Project Manager: Tom Levar

Organization: University of Minnesota - Duluth, Natural Resources Research Institute (UMD-NRRI)

M.L. 2014 ENRTF Appropriation: $ 300,000

Project Length and Completion Date: 4 Years, June 30, 2018

Date of Report: January 15, 2014

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	Activity 3 Budget	Amount Spent	Activity 3 Balance	Activity 4 Budget	Amount Spent	Activity 4 Balance	Activity 5 Budget	Amount Spent	Activity 5 Balance	Activity 6 Budget	Amount Spent	Actvity 6 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	**Site Preparation & Baseline Productivity**			**Transport & Stockpiling of Sediment**			**Sediment Deployment & Substrate**			**Propagation & Sourcing of Plant Materials**			**Research Plot Management & Monitoring**			**Final Analysis, Reporting & Site Visits**				
Personnel (including Wages and Benefits)	**$33,046**		**$33,046**	**$33,046**		**$33,046**	**$33,046**		**$33,046**	**$39,953**		**$39,953**	**$39,954**		**$39,954**	**$39,954**		**$39,954**	**$218,999**	**$218,999**
All UMD-NRRI Staff: Tom Levar - salary and benefits, 20% time per year for four years ($64,646) Larry Zanko - salary and benefits, 10% time per year for four years ($39,512) Bernie McMahon - salary and benefits, 5% time per year for four years ($20,721) Craig Maly - salary and benefits, 20% time per year for four years ($55,816) Sara Post - salary and benefits, 20% time per year for four years ($38,304)																				
Professional/Technical/Service Contracts Contract #1: Floristic Survey (Dr. Gerould Wilhelm at Conservation Forum) Annual Events (four) each at $3,000 Project Total $ 12,000	**$3,000**		**$3,000**				**$3,000**		**$3,000**	**$3,000**		**$3,000**				**$3,000**		**$3,000**	**$12,000**	**$12,000**
Professional/Technical/Service Contracts Contract #2: Site Preparation and Equipment Operations Annual for Two Years $ 5,000 Project Total $ 10,000	**$5,000**		**$5,000**	**$5,000**		**$5,000**													**$10,000**	**$10,000**
Equipment/Tools/Supplies $ 11,654 Project Total Tractor and implement rental (seasonal) Trailer rental (seasonal) Planting supplies (seasonal, field) Soil and substrate materials sampling supplies Water sampling supplies Hydrologic monitoring supplies Plant tissue sampling supplies Seed sampling supplies Plant propagation, greenhouse and nursery supplies Planting stock (field and propagation) Agrichemicals and fertilizers (seasonal, field and greenhouse)	**$2,950**		**$2,950**	**$4,000**		**$4,000**	**$4,704**		**$4,704**										**$11,654**	**$11,654**
Travel expenses in Minnesota Round trips, one leased vehicle, 120 mile each trip seasonal at twice per week (3,840 miles per four months per year or 15,360 seasonal plus 1,920 miles per year off season (two round trips per month for eight months) = 17,280 per year or 69,120 total miles for four year project X $0.56 per mile = $38,707; travel is needed for site establishment, site maintenance, monitoring, sample collection, coordination of activities and technical outreach	**$6,500**		**$6,500**	**$6,500**		**$6,500**	**$6,500**		**$6,500**	**$6,500**		**$6,500**	**$6,500**		**$6,500**	**$6,207**		**$6,207**	**$38,707**	**$38,707**
Other U MN Analytical Services: Fees for chemical analysis of substrate, water and plant tissue (180 samples per year X four years = 720 samples total X $12.00 analytic cost per sample = $ 8,640 total analytical cost for four years													$4,320		**$4,320**	$4,320		**$4,320**	**$8,640**	**$8,640**
COLUMN TOTAL	**$50,496**	**$0**	**$50,496**	**$48,546**	**$0**	**$48,546**	**$47,250**	**$0**	**$47,250**	**$49,453**	**$0**	**$49,453**	**$50,774**	**$0**	**$50,774**	**$53,481**	**$0**	**$53,481**	**$300,000**	**$300,000**

Lake Christina - Gahlon Conservation Easement

Lund Twp., Douglas County, MN T130N, R40W, S06
MN-309-1

DUCKS UNLIMITED | LIVING LAKES

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

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