Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2016 Work Plan

Date of Report: May 29, 2016

Date of Next Status Update Report: January 31, 2017

Date of Work Plan Approval: June 7, 2016

Project Completion Date: September 30, 2017

Does this submission include an amendment request? _No_

PROJECT TITLE: Roseau Lake Watershed Targeted Water Quality Improvement

Project Manager: Henry Van Offelen

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Location: Roseau Lake Watershed, Roseau County.

Total ENRTF Project Budget:		
	ENRTF Appropriation:	**$65,000**
	Amount Spent:	**$0**
	Balance:	**$65,000**

Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 04w

Appropriation Language:

$65,000 the second year is from the trust fund to the commissioner of natural resources to develop targeted water quality improvements for the Roseau Lake watershed by coordinating with partner agencies to identify the top priority field scale best management and conservation practices to implement in the region.

I. PROJECT TITLE: Roseau Lake Watershed: Targeted Water Quality Improvement

II. PROJECT STATEMENT:
The MN Department of Natural Resources (DNR) and International Water Institute (IWI) will partner with other state agencies, the Roseau River Watershed District, and local partners to identify the top 100 field-scale best management practices in the Roseau Lake watershed based on their suitability, pollutant load reduction efficiency, and cost/unit load reduction. The project will directly complement the efforts of the MN Department of Natural Resources and the Roseau River Watershed District to implement the Roseau Lake Rehabilitation Project which will reduce flood damages and improve wildlife habitat. This project will result in a roadmap for implementing projects in the watershed to improve water quality and ensure long-term sustainability of the Roseau Lake rehabilitation.

The Roseau Lake Watershed: Targeted Water Quality Improvement project will build on existing technologies developed with Clean Water Legacy Funds to apply the Prioritize, Targeting and Measuring Application (PTMApp) http://www.rrbdin.org/prioritize-target-measure-applicationptmapp. The PTMApp will be used to identify and evaluate the suitability and effectiveness of best management and conservation practices in the watershed, provide estimates of sediment, nitrogen and phosphorous delivered (and subsequently treated after project implementation) to the lake and prepare a list of implementation projects that includes treatment train (BMP and CP) load reduction amounts to the Roseau Lake. Final project outcomes will include the 100 most effective projects to improve Roseau Lake water quality which local government partners and landowners will use to implement conservation practices.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of January 31, 2017:

Project Status as of July 1, 2017:

Project Status as of September 30, 2017:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Run the PTMApp, assemble model outputs for implementation planning, and derived drained wetland inventory with associated water quality related attributes.

Description:
The PTMApp is run through an ArcGIS toolbar to estimating loads at the catchment level, to ranking catchments, to evaluating BMP suitability, and finally conducting a benefits analysis. This project activity will include assembling and deriving the data for use by the PTMApp, running the PTMApp, assembling PTMApp outputs into user friendly maps and tables, and completion of the drained wetland basin inventory. Tasks include:

1) Updating the hydrologic conditioning of the Roseau River Digital Elevation Model (DEM). Hydrologic conditioning refers to the modification of topographic data in a raw or "bare earth" DEM through a series of GIS processing steps to more accurately reflect the movement of water across the landscape. The process includes filling spurious sinks or pits, breeching digital dams (roadbeds and bridges which block the modeled flow of water across the DEM), and enforcing drainage connections such as culverts, storm sewers, and known tile drainage.

Hydrologic conditioning is an iterative process. Several iterations are generally needed to achieve the final conditioned DEM. The hydrologic conditioning process can be accomplished to a high level at the computer desktop; however, the practitioner can ensure a higher quality product by incorporating local knowledge of drainage patterns as well as bridge and culvert locations.

This project will use standard methods to integrate a recently created culvert inventory with local knowledge and a conditioned DEM originally used for hydrologic modeling into a new conditioned DEM suitable for use in the PTMApp.

2) Assemble and create base library data for the Roseau Lake watershed. In order to successfully run the PTMApp, a suite of data products must be assembled and derived (Table 1) from the conditioned DEM. The input products are used by the PTMApp to prioritize various catchments based on their BMP suitability and to estimate load contribution and reduction from one or more BMPs, and cost per unit load reduction.

Table 1. List of inputs required to run PTMApp (for more information, see PTMApp Users Manual: http://gis.rrbdin.org/Lidar_data/RRBDIN_data/PTMApp/PTMApp_User_Guide.pdf.

	Data	PTMApp Name	Description	Format
1	Plan Boundary			
		bound_1w1p	Boundary for 1W1P planning area	polygon
2	Priority Locations			
		p_res_pts	Point locations of priority resources and/or plan regions, with WQ goals in attributes	points
3	DNR Travel Time*			
		tt_grid	Cell to cell travel time in seconds	raster
4	Curve Number*			
		curve_num	Curve number raster	raster
5	Elevation Products			
		raw_dem	Non-conditioned digital elevation model	raster
		fdr_total	Flow direction raster from fill all	raster
		fac_total	Flow accumulation from fill all	raster
		hyd_dem	Hydrologically conditioned digital elevation model	raster
		us_tt	Upstream travel time in hours	raster
		ds_tt	Downstream travel time in hours	raster
6	SSURGO*			
		ssurgo_cpi	SSURGO - Crop Productivity Index	raster
		ssurgo_hs	SSURGO – hydraulic rating	raster
		ssurgo_dtgw	SSURGO - Depth to groundwater	raster
7	RUSLE Inputs			
		rusle_kw	RUSLE - Soil erodibility factor	raster
		rusle_r	RUSLE - rainfall-runoff erosivity factor	raster
		rusle_c	RUSLE - Cover management factor	raster
		rusle_p	RUSLE - Support practice factor	raster
		rusle_m	RUSLE - m-weight factor	raster

3) Run PTMApp and compile output data for public use. Once the application is run for the Roseau Lake watershed, a series of GIS processing will be completed to create a comprehensive set of user-friendly tables and map products for use in workshops with local conservation professionals. The maps will present basic PTMApp output loading grids, identify catchments which are most suitable for different categories of BMPs, the relative effectiveness of one or more land treatments, and their cost effectiveness.
4) Develop drained wetland basin inventory. The PTMApp will identify priority catchments for using water storage as a BMP that will improve water quality. Wetland restoration is one type of water storage BMP; however, no data is currently available in the Roseau Lake watershed to identify drained wetland basins. Previous efforts to map drained wetland basins were limited geographically to areas of the Prairie Pothole Region within Minnesota (i.e. Ducks Unlimited drained wetland inventory) and did not include this area of Minnesota. In addition, methods have recently been developed to use LiDAR data to identify the location of wetland basins which existed prior to drainage and to quantify their attributes (e.g., depth, volume, drainage area). A drained basin analysis will be conducted in the Roseau Lake watershed to identify drained basins. This data will be combined with outputs from the PTMApp to identify the most suitable locations for wetland restorations to improve water quality.

Summary Budget Information for Activity 1:

ENRTF Budget: $ 45,000
Amount Spent: $ 0
Balance: $ 45,000

Outcome	Completion Date
1. Hydrologically Conditioned Digital Elevation Model with metadata	January, 2017
2. PTMApp base data library for the Roseau Lake watershed	February, 2017
3. PTMApp derived maps and tables of potential sediment, total nitrogen, and total phosphorus load reductions to Roseau Lake for categories of Best Management Practices (BMPs)	May, 2017
4. Drained basin inventory with quantitative attributes associated with water quality.	June, 2017

ACTIVITY 2: Conduct workshops to engage local resource professionals, share PTMApp results, and get input to develop a list of top 100 projects to improve water quality in the Roseau Lake watershed.

Description:
Two workshops (one face-to-face and a final recorded Webinar) will be held to engage watershed district, soil and water conservation district and other resource professionals (e.g. NRCS) responsible for delivering conservation to landowners so that they can understand and use PTMApp outputs and provide input into the development of the list of top 100 water quality improvement projects.

Participants will review maps and data generated from PTMApp depicting the top 100 field scale best management practices and gain understanding of underlying theory and methods used to rank the watershed catchments. Participants will also learn how to generate their own PTMApp maps and information using PTMApp Desktop application developed as part of the MN BWSR Clean Water fund project (scheduled for completion January 2016).

Incorporate PTMApp final products and workshop outcomes into a final report in collaboration with local implementers. Local partners will implement the marketing plan.

Summary Budget Information for Activity 2:

ENRTF Budget: $20,000
Amount Spent: $ 0
Balance: $20,000

Outcome	Completion Date
1. Workshops for information exchange and strategy development	August, 2017
2. List of the top 100 strategies for local agencies to implement to achieve water quality improvement in the watershed.	September, 2017
3. Final Report	September, 2017

Activity Status as of January 31, 2017:

Activity Status as of July 1, 2017:

Activity Status as of September 30, 2017:

Final Report Summary:

V. DISSEMINATION:
Description:
Water quality related maps, associated data, and the list of top 100 water quality improvement projects developed by this project will be disseminated locally to conservation and water resource professionals and made available for download on the Red River Basin Decision Information Network (www.rrbdin.org) The information produced will empower local conservation professionals to meet with landowners in order to implement priority conservation practices. Additional outreach for this effort will include presentations at county and watershed board meetings and professional conferences. Conference presentations are likely to include the Minnesota Association of Soil and Water Conservation Districts, Minnesota Association of Watershed Districts, the Red River Basin Commission, Board of Water and Soil Resources Academy, and the Red River Basin Flood Damage Reduction Work Group.

Activity Status as of January 31, 2017:

Activity Status as of July 1, 2017:

Activity Status as of September 30, 2017:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:
A. ENRTF Budget Overview:

Budget Category	$ Amount	Overview Explanation
Personnel:	$ 0	DNR lead staff will manage this project and be engaged in every activity as part of in-kind work.

Professional/Technical/Service Contracts:	$ 65,000	1 contract with the International Water Institute to complete all activities in this project.
TOTAL ENRTF BUDGET:	**$65,000**	

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 0

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: 0.5

B. Other Funds:

Source of Funds	$ Amount Proposed	$ Amount Spent	Use of Other Funds
Non-state			
In-kind match from the Roseau River Watershed District and Roseau County Soil and Water Conservation District	$15,000	$0	Assistance in completion of activities 1 and 5.
State			
Anticipated Clean Water Fund Grant from the Board of Water and Soil Resources	$60,000	$0	Funding to supplement LCCCMR funding for completion of Activities 1, 3, 4, 5, and 6.
TOTAL OTHER FUNDS:	$75,000	**$0**	

VII. PROJECT STRATEGY:

A. Project Partners:

Project Partners Not Receiving Funds:
Roseau County Soil and Water Conservation District
Roseau River Watershed District
Minnesota Board of Water and Soil Resources

Project Partners Receiving Funds:
International Water Institute: $65,000 to complete project activities.

B. **Project Impact and Long-term Strategy:**

This project will help ensure the long term sustainability of the investments that the state and local governments make into the rehabilitation of Roseau Lake. The list of water quality projects focussed on improving the water quality in the Roseau Lake watershed will provide a template for project implementation. Upon completion, the project will serve as example with statewide application of how to engage multiple partners in development and implementaion of a watershed-based approach to improve habitat, reduce flood damages, and improve water quality.

C. Funding History:

Funding Source and Use of Funds	Funding Timeframe	$ Amount
Board of Water and Soil Resources, Accelerated Implementation Grant	March, 2016 – December, 2018	$111,800

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted no later than January 31, 2017 and July 1, 2017. A final report and associated products will be submitted by September 30, 2017.

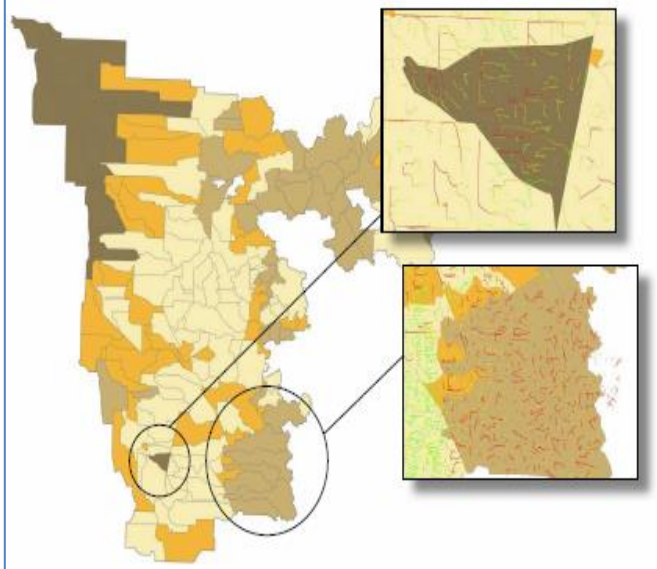
Environment and Natural Resources Trust Fund
M.L. 2016 Project Budget

Project Title: Roseau Lake Watershed Targeted Water Quality Improvement
Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 04w
Project Manager: Henry Van Offelen
Organization: Minnesota Department of Natural Resources
M.L. 2016 ENRTF Appropriation: $ 65,000
Project Length and Completion Date: September, 2017
Date of Report: May 29, 2016

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Run the PTMApp, assemble model outputs for implementation planning, and derived drained wetland inventory with associated water quality related attributes.			Conduct workshops to engage local resource professionals, share PTMApp results, and get input to develop a list of top 100 projects to improve water quality in the Roseau Lake watershed.				
Personnel (Wages and Benefits)								
N/A - DNR lead staff will manage this project and be engaged in every activity as part of in-kind work.								
Professional/Technical/Service Contracts								
1 contract with the International Water Institute to complete activities associated with this project.	$45,000			$20,000			$65,000	
COLUMN TOTAL	**$45,000**			**$20,000**			**$65,000**	

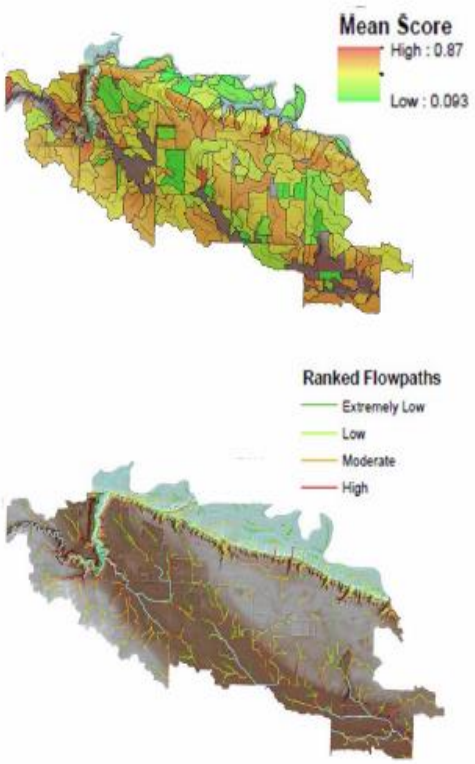
Prioritization, Targeting, and Measuring Water Quality Improvement Application (PTMA)

Prioritize



Subwatersheds for Implementation

Target



Project Locations Within Watershed at Fields Scale

Measure

Progress in Water Quality Improvement