Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2019 ENRTF Work Plan (Main Document)

Today's Date: June 7, 2019

Date of Next Status Update Report: Sept. 1, 2019

Date of Work Plan Approval: June 17, 2019

Project Completion Date: December 30, 2020

Does this submission include an amendment request? No

PROJECT TITLE: Managed Aquifer Recharge: Banking Groundwater

Project Manager: John Bilotta, Senior Research and Extension Coordinator

Organization: University of Minnesota

College/Department/Division: Water Resources Center

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Location: Statewide

Total Project Budget: $350,000

Amount Spent: $0

Balance: $0

Legal Citation: M.L. 2019, 1st Special Session, Chapter 4, Article 2, subd. 04t

Appropriation Language: $350,000 the first year is to the Board of Regents of the University of Minnesota, Water Resources Center, for a comprehensive study of the economic benefits of managed aquifer recharge and to make recommendations to enhance and replenish Minnesota's groundwater resources. The study must include, but is not limited to:

(1) examining the potential benefits of enhancing groundwater recharge in water-stressed areas;

(2) assessing the relationship to changing seasonality and intensity of precipitation on groundwater recharge rates;

(3) reviewing the approaches to manage recharge in geologically appropriate areas;

(4) identifying policy options, costs, and barriers to recharging groundwater; and

(5) assessing the economic returns of options for groundwater recharge.

In conducting the study, the Water Resources Center must convene a stakeholder group and provide for public participation.

I. PROJECT STATEMENT: An interdisciplinary team led by the Water Resources Center (WRC) will evaluate the engineering, hydrogeologic, economic and policy benefits of and barriers to aquifer recharge. The team will produce recommendations for recharge and how the state might proceed if recharge is needed for future water sustainability. Stakeholders will be engaged throughout the study for contributions and recommendations and results will be presented at the conclusion of the project.

For parts of Minnesota, groundwater recharge may be necessary to meet the competing needs of communities and agriculture that are expected to be exacerbated by changes in recharge that result from drainage and climate. This increases the uncertainty for a community. Options to increase water supply include conservation and reuse of water, but also recharging groundwater.

Passive aquifer recharge involves treating and directing surface water to unconfined aquifers. A more active approach is aquifer storage and recovery (ASR) through injection and recovery wells. Both methods are used around the world and have application to Minnesota.

II. OVERALL PROJECT STATUS UPDATES:

First Update September 1, 2019

Second Update March 1, 2020

Third Update September 1, 2020

Final Report between project end (Dec 30, 2020) and February 15, 2021

III. PROJECT ACTIVITIES AND OUTCOMES:

Activity 1: Identify areas where groundwater will be used more quickly than it is replenished based on compilation of DNR permit and water level data, climate projections, demographic data, and recharge data.

- Assemble background materials to project changes in groundwater dependence and need by assessing: a) how water is currently being used; and b) how this use might change with anticipated demographic shifts.
- Put bounds on the magnitudes of projected groundwater availability from changes to: a) the seasonality and intensity of precipitation; b) evapotranspiration; and c) hydrology.

ENRTF BUDGET: $25,000

Outcomes	Completion Date
1. Collect, compile and interpret demographic and water level data; present and report (this meets appropriation requirement # 1 and 3)	*9/30/2019*
2. Narrow uncertainties: water balance, groundwater recharge and climate; report (this meets appropriation requirement # 2)	*12/30/2019*

Activity 2: Characterize regionally shared aquifers for recharge and identify additional information needs.

- Identify at least 4 regionally shared aquifers that are projected to have decreasing water levels for evaluation.
- Compile existing available information including data from the county geologic atlas and develop list of characteristics for those aquifers; develop a process that describes how to obtain and compile existing data.
- Develop a methodology for estimating injection capacity of Aquifer Storage and Recovery (ASR) wells;
- Apply the developed methodology to estimate injection capacity of wells at the selected aquifers.

ENRTF BUDGET: $125,000

Outcomes	Completion Date
1. Describe regional aquifers, confined and surficial, extent, trends; present and report (this meets appropriation requirement # 1 and 3)	*6/30/2020*
2. Identify hydrogeologic data needs, how to acquire or compile if available; report (this meets appropriation requirement # 2 and 3)	*9/30/2020*
3. Develop understanding of recharge potential of aquifers; present and report (this meets appropriation requirement # 3)	*12/30/2020*

Activity 3: Evaluate the environmental barriers and engineering requirements to treat water to the standard required to recharge groundwater while avoiding unwanted effects in aquifers.
Using local and regional examples of successful recharge, identify best practices for ASR required to minimize risk to groundwater quality, human health and ecosystems.

ENRTF BUDGET: $50,000

Outcome	Completion Date
1. Compile relevant case studies; present and report (this meets appropriation requirement # 3 and 4)	*12/30/2019*
2. In selected aquifers, review geochemistry, water sources (this meets appropriation requirement # 3)	*9/30/2020*
3. Evaluate engineering and pre-treatment options required to minimize risk; report (this meets appropriation requirement # 3 and 4)	*12/30/2020*

Activity 4: Evaluate the economic and policy barriers to recharge.
Assess the economics for aquifer recharge and evaluate the existing policy barriers for aquifer recharge.

ENRTF BUDGET: $ 75,000

Outcomes	Completion Date
1. Determine economic conditions where recharge is feasible; present and report (this meets appropriation requirement # 5)	*6/30/2020*
2. Assess existing rule and statute changes to implement recharge; present and report (this meets appropriation requirement # 4)	*12/30/2020*

Activity 5: Project management, stakeholder engagement, meeting facilitation, report and dissemination

ENRTF BUDGET: $ 75,000

Outcomes	Completion Date
1. Schedule and prepare for working meetings in which subgroups report out to full group (this meets appropriation requirement #1-5)	*9/30/2020*
2. Engage broad stakeholder group with relevant experience and public (this meets appropriation requirement #1, 4, 5)	*9/30/2020*
3. Publish and disseminate report to LCCMR and legislative committees, and stakeholders (this meets appropriation requirement # 1-5)	*12/30/2020*

First Update September 1, 2019

Second Update March 1, 2020

Third Update September 1, 2020

Final Report between project end (Dec 30, 2020) and February 15, 2021

IV. DISSEMINATION:

Description: Results of this work will be disseminated to stakeholders assembled for the project and to the legislature, public and interested professional community through various publications and local and regional presentations.

Publications may include: journal submissions derived from the contributions of the principle investigators; white paper distillation of results by Freshwater and intended for a legislative and stakeholder audience; Minnesota Geological Survey Report of Investigations with accompanying map.

Presentation venues may include: Water Resources Conference, St. Paul; interested Minnesota legislative committees, councils or commissions (e.g. Clean Water Council, Legislative Water Commission, LCCMR); local professional groups (e.g., Association of Professional Geologists, Minnesota Groundwater Association); Interagency Groundwater Team (members from all executive branch agencies with water authority); gatherings in affected communities or regions including regional agency (MPCA, DNR, MDA, MDH) and SWCD staff.

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 September 1, 2019

Second Update March 1, 2020

Third Update September 1, 2020

Final Report between project end (Dec 30, 2020) and February 15, 2021

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:

Enter Total Estimated Personnel Hours for entire duration of project: 4,576	Divide total personnel hours by 2,080 hours in 1 yr = TOTAL FTE: 2.2

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

Enter Total Estimated Contract Personnel Hours for entire duration of project: 1,087	Divide total contract hours by 2,080 hours in 1 yr = TOTAL FTE:.52

VI. PROJECT PARTNERS:

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

- Tony Runkel and a Hydrologist, Minn. Geological Survey: *Aquifer and aquitard characterization*
- Bill Arnold, Faculty, CEGE, U of M: *Engineering analysis*
- Brian Bohman, Research Fellow, Freshwater Society and WRC: *Research*
- Lucia Levers, Research Associate, WRC: *Economic analysis*
- Carrie Jennings, Research and Policy Director, Freshwater Society: *Research, stakeholder engagement, facilitation*
- Peter Kang, Faculty, Earth Sciences: *Aquifer storage and recovery through wells*

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

- Peter Boulay or Kenny Blumenfeld, State Climatologist, DNR: *Climate projections*
- Jeff Paddock or employee under Sandeep Burman, Hydrologist, MDH: *Health oversight*
- Greg Kruse or Joy Loughry, Groundwater Monitoring, DNR: *Groundwater monitoring and projections*
- Jared Troost, or Stephen M. Westenbroek, Hydrogeologists, USGS: *Water Balance projections*
- Tracy Twine, Faculty, Soil Water and Climate: *Climate projections*
- Ali El Hassan, Water Supply Planning, Metropolitan Council and Environmental Services: *Water supply projections*
- Chuck Regan, Modeler, MPCA: *Recharge partitioning (HSPF) models*

VII. LONG-TERM- IMPLEMENTATION AND FUNDING:

A critical component for the long-term implementation of this project is gaining input from a broad range of stakeholders to enhance the legitimacy of decisions, increase local buy-in, and build the capacity of those involved to understand issues and move to solutions. By providing for meaningful engagement, we can surface and work through differences and highlight the shared goals and strategies. This will lead to summary reports of stakeholder input that apply directly to the development of goals, objectives, and strategies for managing groundwater. Both the Water Resources Center and Freshwater have a long-term history in developing and providing solutions to water-resources challenges in the state. Their base funding will allow them to disseminate results and build the community capacity for implementation.

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 December 30, 2020 and February 15, 2021.

IX. SEE ADDITIONAL WORK PLAN COMPONENTS:

A. Budget Spreadsheet
B. Visual Component or Map
C. Parcel List Spreadsheet--NA
D. Acquisition, Easements, and Restoration Requirements--NA
E. Research Addendum

Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation: M.L. 2019, 1st Special Session, Chapter 4, Article 2, subd. 04t
Project Manager: John Bilotta
Project Title: Managed Aquifer Recharge
Organization: University of Minnesota
Project Budget: $350,000
Project Length and Completion Date: 18 months, December 30, 2020
Today's Date: 6/14/2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET		Budget	Amount Spent	Balance
BUDGET ITEM				
Personnel (Wages and Benefits)		**$ 277,159**	$ -	$ 277,159
Tony Runkel/hydrogeologist (70.50% salary, 29.5% benefits),9.533% FTE for 18 mo. 12943.63 + 3818.37	$ 16,762			
John Bilotta/project manager (64% salary,36 %benefits),8.154 %FTE for 1.5 years $25K for project management 11029.41 + 3970.59	$ 15,000			
John Bilotta/policy analysis (64% salary, 36 %benefits),6.650 %FTE for 1.5 years ($35K for policy analysis*) $8994.85 salary + 3238.15 fringe	$ 12,233			
Lucia Levers/economic analysis (64% salary, 36% benefits), 13.036%FTE for 1.5 years - $12,696.32 salary+ $4,570.68 fringe	$ 17,267			
Jeff Peterson/economic analysis (64% salary, 36% benefits), 1.382% FTE each year for 1.5 years = 3676.47+1323.53	$ 5,000			
Bob Tipping/hydrogeologist (70.50%salary, 29.5%benefits), 9.533%FTE for 18 mo. = 11889.58+3507.43	$ 15,397			
WRC Grad Student $50,500 = $22,838.40 salary + 3,676.98 fringe + Tuition $23,985 Hourly $19.52 hour fringe 16.1% (Fall 2020, Spring and Fall 2021) Total 1170 hours	$ 50,500			
Bill Arnold/engineering analysis (74%salary 36%benefits), 1.731%FTE Supervise U of MN CEGE research assistant, assist with data analysis and report writing for Year 1. 4264.71+1535.30	$ 5,800			
CEGE Graduate Student Research Assistant, (56% salary, 44% benefits) 50% FTE for year 1 Perform review to determine water quality guidelines for recharge, potential engineering issues, and analysis of water quality effects on aquifers. Tuition = $20.50 hour @780 = $15,990.00 Salary 24298.02+Fringe 3911.98	$ 44,200			
Peter Kang/aquifer recharge capacity (75%salary 25%benefits), 7%FTE 3850.74+1386.26	$ 5,237			
Earth Sciences post doc salary (81% salary, 19% benefits), 95% FTE 72214.80 + 17548.20	$ 89,763			
Professional/Technical/Service Contracts				
Freshwater Society contracted services for project management, stakeholder engagement, facilitation, and research tasks as identified in proposal and work plan. Single-source, pre selected as project partner.		**$ 72,500**		$ 72,500
Travel expenses in Minnesota				
Parking expenses for non-University stakeholders, work group and subcommittee members at the University of Minnesota. Parking subject to all University policies.		**$ 341**	$ -	$ 341
Other				
		$ -	$ -	$ -
COLUMN TOTAL		**$ 350,000**	$ -	$ 350,000

SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State: Unrecovered 54% F/A minus tuition cost		**$ 167,414**	$ -	$ 167,414
State:		$ -	$ -	$ -
In kind:		$ -	$ -	$ -

Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	Amount legally obligated but not yet spent	Budget	Spent	Balance
		$ -	$ -	$ -