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

Date of Report: December 4, 2015

Date of Next Status Update Report: January 16, 2017

Date of Work Plan Approval:

Project Completion Date: June 30, 2019

Does this submission include an amendment request? _No_

PROJECT TITLE: **Enhancing understanding of the Minnesota River aquatic ecosystem**

Project Manager: Tony Sindt

Organization: Minnesota Department of Natural Resources

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Location: Big Stone, Blue Earth, Brown, Carver, Chippewa, Dakota, Hennepin, Lac qui Parle, Le Sueur, Nicollet, Redwood, Renville, Scott, Sibley, Swift, and Yellow Medicine counties

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Total ENRTF Project Budget:		**ENRTF Appropriation:**	**$500,000**
		Amount Spent:	**$0**
		Balance:	**$500,000**

Legal Citation: M.L. 2016, Chp. xx, Sec. xx, Subd. xx

Appropriation Language:

I. PROJECT TITLE: Enhancing understanding of the Minnesota River aquatic ecosystem

II. PROJECT STATEMENT:
The ecological health of the Minnesota River is being continually threatened by land conversion, population growth, climate change, and the establishment of aquatic invasive species. These factors likely have consequential impacts on lower trophic organisms (i.e., phytoplankton, zooplankton), physical habitat (e.g., channel dimensions, floodplain connectivity), backwater ecosystems, and sensitive fish species (e.g., Shovelnose Sturgeon, Paddlefish) among many other elements of the Minnesota River system. Additionally, conservation efforts within the Minnesota River watershed may have positive impacts on these elements and overall ecosystem health. Due to limited resources, current data on these elements are insufficient and diminishes the ability to measure change, understand important ecosystem functions, and monitor the ecological health of the Minnesota River. This project will accelerate collection of robust baseline data across all 320 miles of the Minnesota River to A) enhance fundamental understanding of the Minnesota River ecosystem; B) measure future impacts of land conversion, climate change, aquatic invasive species, and conservation efforts; C) inform monitoring of Minnesota River ecological health; and D) guide future management, restoration, and protection efforts. The Minnesota Department of Natural Resources (DNR) will use project funds to hire personnel, purchase supplies, and contract services necessary for accomplishing four specific project activities on the Minnesota River: 1) accelerating collection of baseline lower trophic data, 2) quantifying physical habitat characteristics, 3) inventorying backwater fish communities, and 4) evaluating population dynamics, movement, and habitat use of sensitive fish species. The DNR and other agencies will continue to build on the information gathered as part of this project and will utilize project outcomes to quantify future ecosystem changes and inform future management strategies that will ultimately benefit the ecological health of the Minnesota River.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of January 16, 2017:

Project Status as of July 16, 2017:

Project Status as of January 16, 2018:

Project Status as of July 16, 2018:

Project Status as of January 16, 2019:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Accelerate collection of baseline Minnesota River lower trophic data
Description:
Lower trophic organisms (i.e., phytoplankton, zooplankton) are an important component of aquatic ecosystems. As primary producers, phytoplankton are the base of the aquatic food chain and are an important food source for zooplankton and other aquatic organisms. In turn, zooplankton are an important food source for many larger aquatic organisms including nearly all fish species. Abundance, composition, and timing of phytoplankton and zooplankton communities can have major impacts on aquatic ecosystems and can greatly influence survival, growth, and recruitment of fishes. Both phytoplankton and zooplankton communities are extremely sensitive to environmental change and are influenced by a variety of physical and biological factors including temperature, hydrology, turbidity, nutrients, competition, and predation. Thus, climate change, eutrophication, altered hydrology, and invasive species can have major impacts on lower trophic ecology, and consequently aquatic ecosystems.

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Phytoplankton and zooplankton community dynamics have been extensively studied in lakes and oceans, but considerably less is known about lower trophic ecology in riverine systems such as the Minnesota River. Many native Minnesota River fishes including Bigmouth Buffalo *Ictiobus cyprinellus*, Emerald Shiner *Notropis atherinoides*, Gizzard Shad *Dorosoma depedianum*, and Paddlefish *Polydon spathula* rely on zooplankton as a primary food source. Unfortunately, limited knowledge and data restrict the ability to predict or quantify how changes in land use, climate, and hydrology within the Minnesota River basin affect the lower trophic ecology of the Minnesota River. The threat of invasive carps *Hypophthalmichthys spp.* and Zebra Mussel *Dreissena polymorpha* expansion into the Minnesota River is of further concern as they would have predatory impacts on plankton communities and consequently competitive impacts on native organisms such as Paddlefish and freshwater mussel species. For example, research conducted on the Illinois River showed that although zooplankton densities haven't been significantly impacted by the establishment of invasive carps, the zooplankton community has shifted towards smaller species (rotifers) resulting in a significant zooplankton biomass decline.

For this project activity, we will quantify spatial and temporal trends in Minnesota River phytoplankton and zooplankton communities and identify relationships between plankton communities and water chemistry parameters. Specifically, seven sites representing the spatial complexity of the Minnesota River will be selected and monthly phytoplankton, zooplankton, and water samples will be collected July–October 2016, May–October 2017, and May–October 2018. This results in a total of 112 sample collection events. Phytoplankton, zooplankton, and water samples will be collected using standard methodologies. All water samples and phytoplankton samples will be processed and analyzed by contracted laboratories. Zooplankton samples will be processed and analyzed by DNR staff (Jodie Hirsch, Aquatic Biologist) but two additional replicate samples will be performed each month and sent to a contracted laboratory for analyses including biovolume measurements. Phytoplankton and zooplankton samples will be analyzed for taxa composition, density, and biovolume or biomass. Water samples will be analyzed for a suite of parameters including but not limited to total phosphorous, total Kjeldahl nitrogen, nitrite + nitrate, chlorophyll a, total suspended solids, total dissolved solids, ammonia-nitrogen, and soluble reactive phosphorous.

Results of this project activity will establish a baseline understanding of Minnesota River phytoplankton and zooplankton communities. This knowledge will increase understanding of the Minnesota River ecosystem, and provide the ability to predict responses to various physical (e.g., hydrology), chemical (e.g., nutrients), and biological (e.g., invasive species) stressors. Additionally, continued monitoring efforts will be able to quantify changes to Minnesota River phytoplankton and zooplankton communities as they respond to an ever changing environment.

Activity 1 Timeline:
- Prior to July 2016: Seven study sites will be selected and contract bids will be solicited.
- July 2016–October 2018: Monthly phytoplankton, zooplankton, and water samples will be collected from study sites (May–October) and sent to contracted laboratories for analyses.
- October 2018–June 2019: Minnesota River lower trophic data will be summarized and analyzed. A final report for project activity 1 will be completed by July 2019.

Summary Budget Information for Activity 1:   **ENRTF Budget: $ 167,438**
                                                         Amount Spent: $ 0
                                                         Balance: $ 167,438

Outcome	Completion Date
1. Quantify spatial and temporal variability of Minnesota River phytoplankton communities (7 sites, 16 months)	06-30-2019
2. Quantify spatial and temporal variability of Minnesota River zooplankton	06-30-2019

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communities (7 sites, 16 months)	
3. Identify relationships between Minnesota River phytoplankton and zooplankton communities with water chemistry parameters	06-30-2019

Activity Status as of January 16, 2017:

Activity Status as of July 16, 2017:

Activity Status as of January 16, 2018:

Activity Status as of July 16, 2018:

Activity Status as of January 16, 2019:

Final Report Summary:

ACTIVITY 2: Quantify physical habitat characteristics of the Minnesota River
Description:
Physical habitat characteristics of the Minnesota River have a direct influence on aquatic organisms from phytoplankton to fish. For example, most fish species require specific habitat features (e.g., depth, substrate, current velocity, aquatic macrophytes) for successful spawning. Rivers are a dynamic landscape feature strongly influenced by watershed characteristics, climate, and underlying geology. Establishing baseline habitat data is important for understanding how changes in land use and climate impact the physical features of the Minnesota River. Furthermore, since habitat features greatly influence aquatic organisms and communities, monitoring changes in habitat features will inform how and why aquatic ecosystems respond.

For this project, we will establish at least 12 fixed sites where channel dimensions and physical habitat characteristics will be quantified within the Minnesota River. Specifically, at each fixed site, cross sections will be established where depth profiles and channel dimensions will be measured. Additionally, various physical habitat characteristics (e.g., substrate, woody cover, riparian vegetation, bathymetry, etc.) will be quantified within 1km study reaches. Protocols developed as part of this project activity will be used to monitor physical habitat changes in the Minnesota River over time.

Activity 2 Timeline:
- Winter and spring 2016: Fixed habitat study sites will be identified and habitat survey protocols will be developed.
- Summer and fall 2016, 2017, and 2018: Habitat surveys will be completed at ≥12 fixed sites.
- Winter 2018—Spring 2019: Data will be summarized and the final report for project activity 2 will be completed by July 2019.

Summary Budget Information for Activity 2:   **ENRTF Budget: $ 98,437**
                        Amount Spent: $ 0
                         Balance: $ 98,437

Outcome	Completion Date
1. Quantify channel dimensions at ≥12 locations along the Minnesota River	06-30-2019
2. Quantify habitat characteristics for ≥12 1km reaches along the Minnesota River	06-30-2019

Activity Status as of January 16, 2017:

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Activity Status as of July 16, 2017:

Activity Status as of January 16, 2018:

Activity Status as of July 16, 2018:

Activity Status as of January 16, 2019:

Final Report Summary:

ACTIVITY 3: Inventory Minnesota River backwater fish communities
Description:
The floodplain is an important component of the river ecosystem and backwater habitats within the floodplain serve vital ecosystem functions. The Minnesota River floodplain contains hundreds of backwater habitats that provide valuable habitat for fish and other organisms. For fish, these backwaters can serve multiple functions from spawning and nursery habitat, to zooplankton rich foraging areas, and refuge from high-flow conditions. For example, many nest spawning centrarchids (e.g., Bluegill *Lepomis* macrochirus, Black Crappie *Pomoxis nigromaculatus*) utilize the lentic environment of backwaters for spawning habitat. Backwater habitats typically support greater zooplankton densities than main-channel habitats and thus provide important foraging habitat for species such as Bigmouth Buffalo, Gizzard Shad, and Paddlefish. Some Minnesota River fish species such as Bowfin *Amia calva*, Central Mudminnow *Umbra limi*, Largemouth Bass *Micropterus salmoides*, and Weed Shiner *Notropis texanus* are almost exclusively found in backwater habitats.

All backwaters provide some form of habitat for aquatic organisms, but not all backwater habitats are equal. Size, depth, substrate, connectivity, distance from river channel, macrophyte cover, and other physical features influence the species that utilize the habitat. Changes in hydrologic characteristics resulting from climate change and land use practices can greatly influence the functionality of bacakwater habitats. For example, flood timing, frequency, magnitude, and duration regulate connectivity of backwaters to the river channel and consequently access by fish. Furthermore, sediment deposition can fill in backwaters altering or eliminating their ecosystem function.

Invasive carps are also known to extensively utilize backwater habitats for feeding and as a nursery habitat for juveniles. If invasive carps were to establish in the Minnesota River, they could compete with native fishes for space and food resources found in backwater habitats. Documenting fish communities found in Minnesota River backwaters prior to invasive carp establishment will provide the opportunity to understand how invasive carps impact backwater habitat use by native species if they become established in the Minnesota River.

Despite the importance of Minnesota River backwater habitats, very little information exists about their ecosystem functions or fish communities. For this project activity, we will develop survey protocols for sampling fish communities in backwater habitats and perform extensive fish community assessments in at least 12 Minnesota River backwaters that represent the spatial and physical diversity of backwater habitats found in the Minnesota River floodplain. Fish community assessment gears that will be evaluated and used include but are not limited to gill nets, fyke nets, boat electrofishing, and seines. Evaluated backwaters will represent the diversity of Minnesota River backwaters in regards to size, depth, connectivity, and physical attributes.

Outcomes of this project activity will increase understanding of the ecological function of Minnesota River backwater habitats and utilization of backwater habitats by Minnesota River fishes. Additionally, outcomes of this project activity will provide the DNR and other agencies with protocols for monitoring backwater fish communities and the ability to measure future changes to Minnesota River backwater fish communities. Lastly, outcomes of this activity will help prioritize floodplain habitats for conservation, restoration, and protection efforts.

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Activity 3 Timeline:
- Winter and spring 2016: Literature will be reviewed to identify the most appropriate methods for sampling backwater fish communities.
- Winter 2016: Geographic information systems (GIS) and other tools will be used to identify candidate backwaters representative of the spatial and physical diversity of Minnesota River backwaters.
- Winter 2016–2017 and spring 2017: Landowner permission will be obtained for access to backwaters on private property, and reconnaissance of selected backwaters will be performed.
- Summer–fall 2017 and spring–fall 2018: Comprehensive fish community assessments will be performed in at least 12 backwater habitats. Additionally, physical habitat features will be described.
- Winter 2018–2019: Data will be summarized and a final report for project activity 3 will be completed by July 2019.

Summary Budget Information for Activity 3:　　　　　　　　ENRTF Budget:　$ 96,437
　　　　　　　　　　　　　　　　　　　　　　　　　　Amount Spent:　$ 0
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Balance:　$ 96,437

Outcome	Completion Date
1. Develop and evaluate fish community survey protocols for Minnesota River backwater habitats	06-30-2019
2. Characterize fish communities in at least 12 Minnesota River backwaters	06-30-2019

Activity Status as of January 16, 2017:

Activity Status as of July 16, 2017:

Activity Status as of January 16, 2018:

Activity Status as of July 16, 2018:

Activity Status as of January 16, 2019:

Final Report Summary:

ACTIVITY 4: Evaluate population dynamics, movement, and habitat use of sensitive fish species (i.e., Shovelnose Sturgeon, Paddlefish) in the Minnesota River
Description:
Shovelnose Sturgeon are considered a sensitive large river fish species that have been negatively impacted across their native range by over harvest, habitat degradation, and habitat fragmentation (e.g., dams). Shovelnose sturgeon are also a long-lived species that typically do not reach sexual maturity until after age five and can live more than thirty years. In recent years, shovelnose sturgeon catches have increased during fish community assessments on the Minnesota River providing evidence of an increasing population. As a result, regulations have been changed to allow a catch-and-release angling season. Although the Shovelnose Sturgeon is an important indicator species, very little is known about the Shovelnose Sturgeon population in the Minnesota River.

For this project activity, intensive sampling will occur at four or more study sites on the Minnesota River to capture Shovelnose Sturgeon with a variety of assessment gears (e.g., trammel nets, electrofishing, benthic trawls, hook and line). Captured Shovelnose Sturgeon will be measured for length and weight, implanted with a uniquely coded passive integrated transponder (PIT), and fin clipped. Additionally, up to five fish from each

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centimeter length group will have a fin ray removed for age estimation. Relative abundance, length frequency, length-at-age, mark-recapture, and age estimation data will be used to estimate growth, recruitment, and mortality of the Minnesota River Shovelnose Sturgeon population in addition to population density or relative abundance.

Acoustic telemetry technology will also be utilized to evaluate seasonal movement patterns and habitat use of Shovelnose Sturgeon in the Minnesota River. Up to ten fish captured from each study site will be surgically implanted with an acoustic transmitter tag (Vemco 69 KHZ acoustic tags). The large-scale movement of these tagged fish will be detected by six acoustic receivers (Vemco VR2W-69KHZ) deployed into the Minnesota River. These acoustic receivers will be an important expansion to an existing array of acoustic receivers deployed throughout the Mississippi River and its major tributaries. The array of acoustic receivers provides the ability to monitor the movement of hundreds of tagged fish throughout the upper Mississippi River basin, representing a diversity of species, including invasive carps. Active tracking equipment (Vemco VR100) will also be used to locate tagged Shovelnose Sturgeon and identify finer-scale seasonal habitat use throughout the duration of this project.

Similar to Shovelnose Sturgeon, very little is known about the Paddlefish population in the Minnesota River as Paddlefish are rarely caught by anglers or fisheries biologists. However, commercial fishermen typically encounter several Paddlefish each year while conducting seining operations in Minnesota River backwaters. During this project, DNR employees will coordinate with commercial fishermen and if Paddlefish are captured they will be surgically implanted with an acoustic transmitter tag. Telemetry data will be used to better understand migration patterns of Minnesota River Paddlefish and determine their tendency to move between the Minnesota River and Mississippi River.

This project will accelerate efforts to better understand rare and sensitive fish species of the Minnesota River. Data collected during this project will provide the foundation for future monitoring of these fish species populations and allow us to track population responses to climate change, land use alteration, and establishment of aquatic invasive species. The array of acoustic receivers deployed during this project will allow tracking of tagged fish well beyond the scope of this project, and can be utilized for future projects to better understand fish movement within the Minnesota River as well as immigration and emigration. Future captures of PIT tagged Shovelnose Sturgeon will also provide continued information about Shovelnose Sturgeon growth and movement within the Minnesota River.

Activity 4 Timeline:
- <u>Winter 2016</u>: Identify intensive study sites and finalize sampling plan for evaluation of Shovelnose Sturgeon population dynamics in the Minnesota River.
- <u>Fall 2016</u>: Deploy 6 acoustic receivers onto Minnesota River bridge pilings to track movement of acoustic tagged fish.
- <u>Spring–Fall of 2016, 2017, 2018</u>: Conduct Shovelnose Sturgeon sampling and tagging
- <u>Continuously</u>:
  - Maintain and upload data from acoustic receivers
  - Coordinate with commercial fishermen for opportunities to tag Paddlefish with acoustic transmitters
  - Actively track acoustic tagged fish to identify seasonal habitat use
- <u>Winter 2018–Spring 2019</u>: Summarized and analyzed data will be compiled for project activity 4 and the final report will be completed by July 2019.

Summary Budget Information for Activity 1:   **ENRTF Budget: $ 137,688**
                                                                                        Amount Spent: $ 0
                                                                                                   Balance: $ 137,688

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Outcome	Completion Date
1. Estimate population dynamics (abundance, growth, mortality, recruitment) of Shovelnose Sturgeon in the Minnesota River	06-30-2019
2. Quantify movement patterns and habitat use of tagged Shovelnose Sturgeon in the Minnesota River	06-30-2019
3. If Paddlefish are encountered during this project, quantify movement patterns and habitat use of tagged Minnesota River Paddlefish	06-30-2019

Activity Status as of January 16, 2017:

Activity Status as of July 16, 2017:

Activity Status as of January 16, 2018:

Activity Status as of July 16, 2018:

Activity Status as of January 16, 2019:

Final Report Summary:

V. DISSEMINATION:
Description:
Project leaders will take advantage of all opportunities to share data and results of this project with other agencies, interested stakeholders, and the general public. At a minimum, one oral presentation will be given each year to provide project updates and preliminary results to relevant scientific audiences at state or regional conferences. Additionally, annual project updates and preliminary results will be disseminated electronically to a diverse audience. After the completion of this project, a final report for each project activity will be published as a DNR report made publicly available and one or more peer-reviewed manuscripts will be published in appropriate scientific journals. All data collected during this project will be freely shared.

Status as of January 16, 2017:

Status as of July 16, 2017:

Status as of January 16, 2018:

Status as of July 16, 2018:

Status as of January 16, 2019:

Final Report Summary:

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

Budget Category	$ Amount	Overview Explanation
Personnel:	$321,500	NR Fisheries Specialist 100% FTE for 36 months ($175,000; 70% salary, 30% fringe), NR Fisheries Technician 100% FTE for 30 months ($132,000, 70% salary, 30% fringe), and Summer Intern 100% FTE for 8 months ($14,500; 100% salary)

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Professional/Technical/Service Contracts:	$57,000	1 contract for water chemistry analyses TBD through competitive bid ($20,000), 1 contract for phytoplankton analyses TBD through competitive bid ($28,000), and 1 contract for zooplankton analyses TBD through competitive bid ($9,000)
Equipment/Tools/Supplies:	$45,251	Plankton and water sampling supplies ($10,000), habitat survey supplies ($3,000), fish tags and telemetry equipment ($29,000), fish sampling equipment ($2,000), personal protective gear ($1,251)
Capital Expenditures over $5,000:	$6,500	VEMCO VR100 Manual Acoustic Receiver
Travel Expenses in MN:	$34,500	$31,500 for fleet expenses (mileage) and $3,000 for in-state travel expenses (meals and lodging)
Other:	$35,249	Direct and necessary expenses: Human Resources Support ($8,963), IT Support ($15,367), Safety Support ($2,113), Financial Support ($6,507), Communications Support ($1,236), Planning Support ($829), and Procurement Support ($235) necessary to accomplishing funded programs/projects.
TOTAL ENRTF BUDGET:	**$500,000**	

Explanation of Use of Classified Staff: One classified staff will be funded by this project. Two of the positions funded by this project (NR Specialist and Summer Intern) will be unclassified staff funded specifically for and only for this project. According to AFSCME union rules, the NR Technician position must be a classified position. However, this temporary project-based position is being specifically created for this project and will not be funded beyond this project. Other classified staff, such as the project manager, will provide in-kind contributions to the project (≈$67,000).

Explanation of Capital Expenditures Greater Than $5,000:
The only capital expenditure greater than $5,000, will be for the purchase of a Vemco VR100 manual acoustic receiver (approximately $6,500). The VR100 receiver will be used for project activity 4 to manually track and identify the location of Shovelnose Sturgeon and Paddlefish implanted with acoustic transmitter tags. This equipment will continue to be used by the DNR to track tagged fish beyond the completion of this project.

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 6.16FTEs

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: 0 FTEs

B. Other Funds:

Source of Funds	$ Amount Proposed	$ Amount Spent	Use of Other Funds
State			
DNR facilities & services (In-kind Support)	$9,000	$0	Office space, office overhead, technical & field support
Existing DNR equipment (In-Kind Support)	$14,000	$14,000	Boats, sampling equipment (fyke nets, gill nets, trawls, seines), microscopes, lab supplies, etc. This equipment is already owned and maintained by the DNR, and

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			will continue to be used by the DNR for various other fisheries projects.
DNR staff salary (In-Kind Support)	$67,500	$0	Tony Sindt (Project Manager) - 25% FTE for 36 months, Brian Schultz (Project Supervisor) – 5% FTE for 36 months, and Jodie Hirsch (Zooplankton Analyses) – 4% FTE for 36 months
TOTAL OTHER FUNDS:	**$90,500**	**$14,000**	

VII. PROJECT STRATEGY:

A. Project Partners: N/A

B. Project Impact and Long-term Strategy:

Outcomes of this project will be directly or indirectly used to A) enhance fundamental understanding of the Minnesota River ecosystem; B) measure future impacts of land conversion, climate change, aquatic invasive species, and conservation efforts; C) inform monitoring of Minnesota River ecological health; and D) guide future management, restoration, and protection efforts. Although this project is largely focused on gathering foundational data, outcomes from this project may have direct uses for improving the health of the Minnesota River. For instance, quantifying plankton communities in the Minnesota River will provide information necessary for predicting and quantifying impacts of invasive carps if they become established in the Minnesota River; baseline habitat data can be used to measure the success of future conservation efforts aimed at increasing channel stability and reducing sedimentation; building an understanding of backwater habitat functionality and fish communities can help guide conservation and restoration efforts for maximized floodplain habitat value; and telemetry data may be used to identify important Shovelnose Sturgeon spawning habitats that warrants special protection.

The Minnesota River is an important geological, biological, and recreational resource for all Minnesotan's. Accordingly, the DNR Section of Fisheries has recently dedicated one full-time fisheries specialist to managing Minnesota River fisheries and monitoring long-term biological health. The value and effectiveness of this DNR position will be exponentially increased by the accelerated development of sampling protocols and establishment of baseline ecological datasets resulting from this project. As a result, future DNR sampling efforts can build upon the outcomes of this project, and focus on measuring change and monitoring ecosystem health rather than collecting initial baseline data. Additionally, external funds will be continually sought to increase the DNR's capacity to build upon the outcomes of this project and share data with other entities.

C. Funding History:

Funding Source and Use of Funds	Funding Timeframe	$ Amount
The type and extent of data collection proposed for this project has never been done by the DNR Section of Fisheries. However, DNR Section of Fisheries has conducted fisheries assessments and other surveys on the Minnesota River which helped inform and develop this project. Past efforts on the Minnesota River include fish population assessments (1959, 1966, 1971, 1985, 1992, 1998, 2004), annual fish index of biotic integrity surveys (2003–2015), creel surveys (1998), and Flathead Catfish assessments (1989–2000, 2008–2009, 2013–present).	1959–Present	Est. $700,000–$1,000,000 from Game and Fish funds
Minnesota River Specialist: Starting in 2014, the DNR Section of Fisheries dedicated one full-time fisheries specialist for inventorying and managing Minnesota River fisheries and with limited monitoring aspects to address long-term biological health. The Minnesota River Specialist is the designated project manager that contributed to the development of this project and will dedicate at least 25% of his time	2014–Present	Est. $180,000 from Game and Fish funds

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to coordinating and managing this project (in-kind support).		
Many past surveys and reports by various agencies and organizations (e.g., Minnesota Pollution Control Agency, Minnesota State University- Mankato, DNR Division of Ecological & Water Resources, University of Minnesota, United State Geological Survey) have contributed to the existing knowledge about the Minnesota River ecosystem and helped inform the development of this project. However, these LGUs have not been able to fund or collect the targeted information listed in this project.	1965–Present	Unknown

VIII. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS:

A. Parcel List: N/A

B. Acquisition/Restoration Information: N/A

IX. VISUAL COMPONENT or MAP(S): See attached visual.

X. RESEARCH ADDENDUM: N/A

XI. REPORTING REQUIREMENTS:
Periodic work plan status update reports will be submitted no later than January 16, 2017; July 16, 2017; January 16, 2018; July 16, 2018; and January 16, 2019. A final report and associated products will be submitted between June 30 and August 15, 2019.

ACCELERATING COLLECTION OF BASELINE ECOSYSTEM DATA WILL ALLOW US TO UNDERSTAND HOW THESE FACTORS

LAND MANAGEMENT — CLIMATE CHANGE — INVASIVE SPECIES — CONSERVATION EFFORTS

IMPACT THESE VITAL ELEMENTS

PLANKTON — HABITAT — BACKWATER ECOSYSTEMS — FISH

OF THE MINNESOTA RIVER ECOSYSTEM

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

Project Title: Enhancing understanding of the Minnesota River aquatic ecosystem
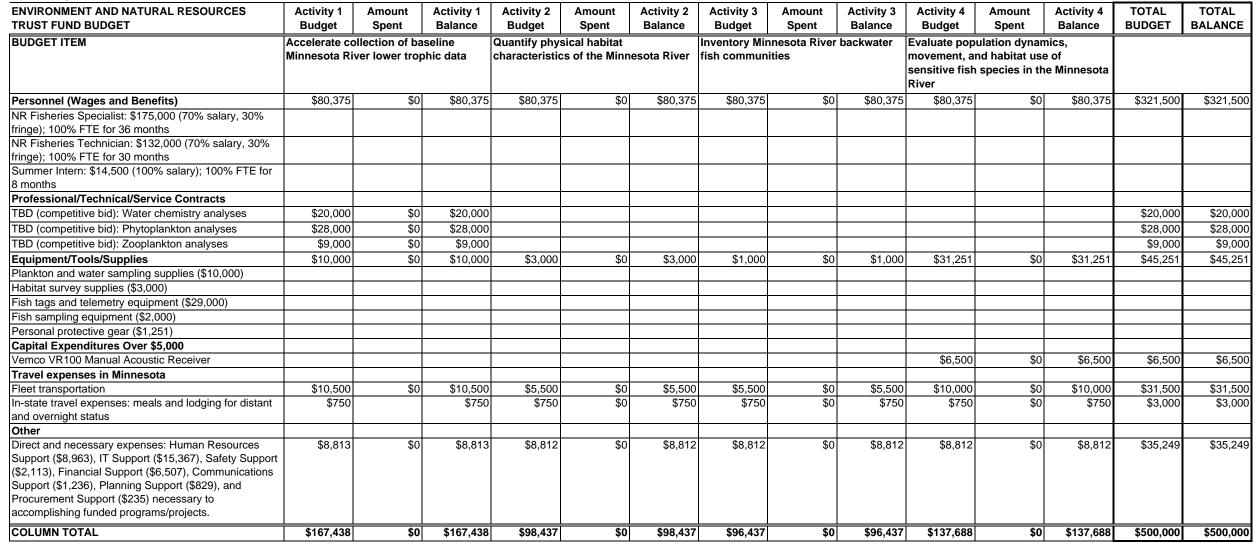**Legal Citation:**
Project Manager: Tony Sindt
Organization: Minnesota Department of Natural Resources
M.L. 2016 ENRTF Appropriation: $500,000
Project Length and Completion Date: 3 Years, June 30, 2019
Date of Report: 12/04/2015

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	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Accelerate collection of baseline Minnesota River lower trophic data			Quantify physical habitat characteristics of the Minnesota River			Inventory Minnesota River backwater fish communities			Evaluate population dynamics, movement, and habitat use of sensitive fish species in the Minnesota River				
Personnel (Wages and Benefits)	$80,375	$0	$80,375	$80,375	$0	$80,375	$80,375	$0	$80,375	$80,375	$0	$80,375	$321,500	$321,500
NR Fisheries Specialist: $175,000 (70% salary, 30% fringe); 100% FTE for 36 months														
NR Fisheries Technician: $132,000 (70% salary, 30% fringe); 100% FTE for 30 months														
Summer Intern: $14,500 (100% salary); 100% FTE for 8 months														
Professional/Technical/Service Contracts														
TBD (competitive bid): Water chemistry analyses	$20,000	$0	$20,000										$20,000	$20,000
TBD (competitive bid): Phytoplankton analyses	$28,000	$0	$28,000										$28,000	$28,000
TBD (competitive bid): Zooplankton analyses	$9,000	$0	$9,000										$9,000	$9,000
Equipment/Tools/Supplies	$10,000	$0	$10,000	$3,000	$0	$3,000	$1,000	$0	$1,000	$31,251	$0	$31,251	$45,251	$45,251
Plankton and water sampling supplies ($10,000)														
Habitat survey supplies ($3,000)														
Fish tags and telemetry equipment ($29,000)														
Fish sampling equipment ($2,000)														
Personal protective gear ($1,251)														
Capital Expenditures Over $5,000														
Vemco VR100 Manual Acoustic Receiver										$6,500	$0	$6,500	$6,500	$6,500
Travel expenses in Minnesota														
Fleet transportation	$10,500	$0	$10,500	$5,500	$0	$5,500	$5,500	$0	$5,500	$10,000	$0	$10,000	$31,500	$31,500
In-state travel expenses: meals and lodging for distant and overnight status	$750		$750	$750	$0	$750	$750	$0	$750	$750	$0	$750	$3,000	$3,000
Other														
Direct and necessary expenses: Human Resources Support ($8,963), IT Support ($15,367), Safety Support ($2,113), Financial Support ($6,507), Communications Support ($1,236), Planning Support ($829), and Procurement Support ($235) necessary to accomplishing funded programs/projects.	$8,813	$0	$8,813	$8,812	$0	$8,812	$8,812	$0	$8,812	$8,812	$0	$8,812	$35,249	$35,249
COLUMN TOTAL	**$167,438**	**$0**	**$167,438**	**$98,437**	**$0**	**$98,437**	**$96,437**	**$0**	**$96,437**	**$137,688**	**$0**	**$137,688**	**$500,000**	**$500,000**