

II. Projects Funded Preceding Biennium

“a description of each project receiving money from the trust fund during the preceding biennium;”

- The following documents are short abstracts for projects funded in FY2014 (beginning July 1, 2013) and in FY2015 (beginning July 1, 2014).
- Research projects have been marked as such in the description.
- Full work plans are available at the LCCMR, Room 65, State Office Building. The abstracts are current as of 12/31/2014.
- 119 Projects were funded for a total of \$68,790,000.
- Legal Citations
 1. FY2014 - M.L. 2013, Chapter 52, Sec. 2 (47 projects for a total of \$38,360,000)
 2. FY2015 - M.L. 2014, Chapter 226, Sec. 2 and M.L. 2014, Chapter 312, Section 8 (72 projects for a total of \$30,430,000)

- 1. FY2014 - MN Laws 2013, Chapter 52, Section 2**

M.L. 2013 ENVIRONMENT AND NATURAL RESOURCES TRUST FUND APPROPRIATIONS BY SUBDIVISION - M.L. 2013, Chapter 52, Section 2

Process for M.L. 2013 Appropriations

For the next biennium (July 1, 2013 - June 30, 2014), approximately \$33.8 million is available each fiscal year (Total = \$67,620,000) for funding from the Environment and Natural Resources Trust Fund. In response to the 2013 Request for Proposal, 169 proposals requesting a total of approximately \$155 million were received. Through a competitive, multi-step process 66 of these proposals, requesting a total of \$73 million, were chosen to present to the LCCMR and 46 of those proposals, totaling \$38.2 million (all FY 2014 funds and part of the FY 2015 funds), were chosen to receive a recommendation for funding to the 2013 MN Legislature. The Legislature adopted all 46 of these project recommendations and added one additional project. All 47 appropriations were signed into law by the Governor on 05/09/13. \$29.6 million remains available for LCCMR funding recommendations to the ML 2014 Legislature.

December 7, 2011	2013 Funding Priorities Determined and RFP Adopted
December 12, 2011	2013 RFP Issued
April 6, 2012	2013 RFP Proposal Deadline (Received 169 Proposals totaling \$154,628,351)
June 5, 2012	Discussion of 2013 Proposals Received and Selection of Proposals for Presentations
June 19, 20, 27, 28, 2012	2013 Proposal Presentations (4 days) (66 proposals totaling \$73,610,973 selected to present)
July 11, 2012	2013 Allocations Recommendations
August-November 2012	Research Projects Recommended Underwent Peer Review
November 28, 2012	M.L. 2013 Appropriation Language Review & Adoption
May 1 & 6, 2013	Appropriations adopted by MN House and Senate
May 9, 2013	Appropriations signed into law by Governor
June 11 & 25, 2013	Project work plans approved by LCCMR
July 1, 2013	Projects can begin.

Summary of Appropriations by Subdivision

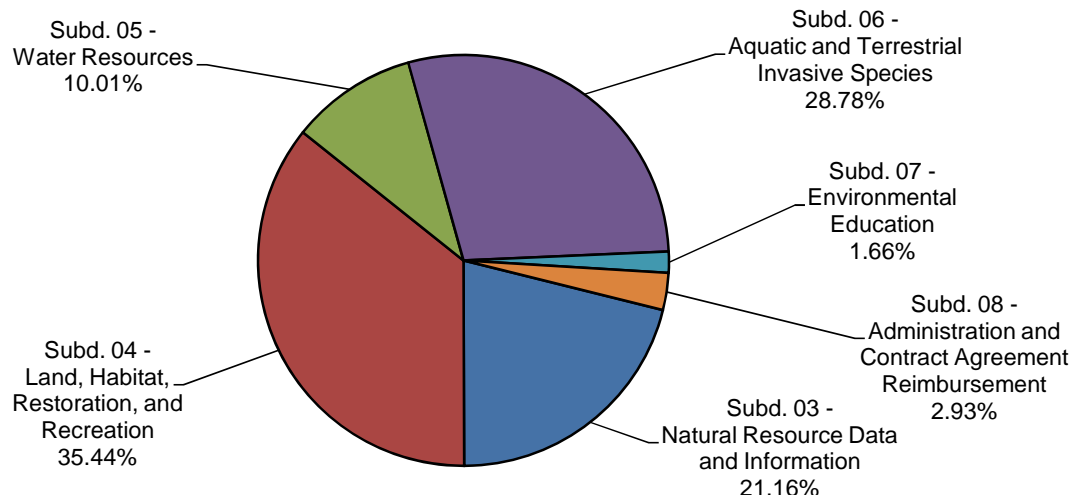
Subdivision	\$ Appropriated	# Appropriations*
Subd. 03 - Natural Resource Data and Information	\$8,076,000	10
Subd. 04 - Land, Habitat, Restoration, and Recreation	\$13,722,000 **	12
Subd. 05 - Water Resources	\$3,819,000	8
Subd. 06 - Aquatic and Terrestrial Invasive Species	\$10,982,000	7
Subd. 07 - Environmental Education	\$636,000	2
Subd. 08 - Administration & Contract Agreement Reimbursement	\$1,125,000	2
TOTAL	\$38,360,000	41

Notes:

*One appropriation includes multiple projects with multiple partners of different affiliations receiving funds. The total number of individual projects within the 41 appropriations is 47.

**One appropriation of \$200,000 is not a new appropriation but a re-appropriation of funds originally appropriated in M.L. 2009.

% of Total \$ Appropriated

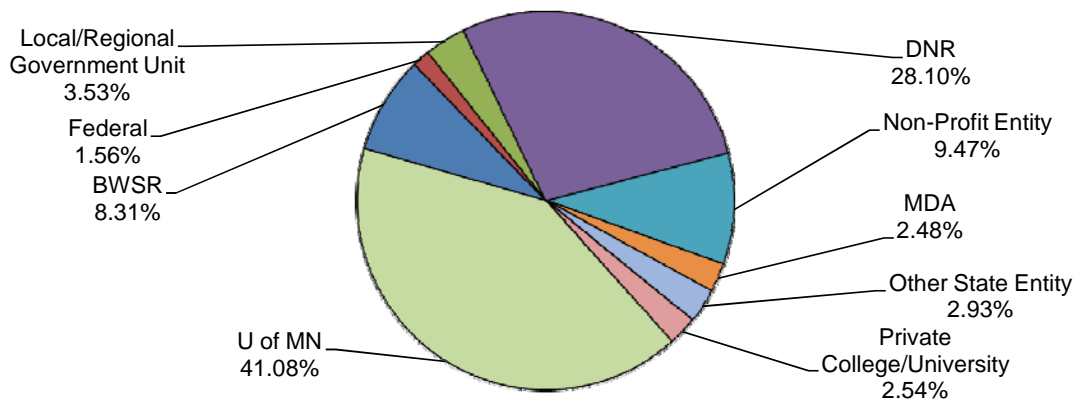


**M.L. 2013 ENVIRONMENT AND NATURAL RESOURCES TRUST FUND APPROPRIATIONS
BY SUBDIVISION - M.L. 2013, Chapter 52, Section 2**

Summary of Appropriations by Affiliation*		
Affiliation Type	\$ Appropriated	# Appropriations
MN Board of Water and Soil Resources (BWSR)	\$3,186,000	2
Federal	\$600,000	1
Local/Regional Government Unit	\$1,353,000	4
MN Department of Natural Resources (DNR)	\$10,780,000	11
Non-Profit Entity	\$3,634,000	9
MN Department of Agriculture (MDA)	\$950,000	2
Other State Entity	\$1,125,000	2
Private College/University	\$975,000	2
U of MN	\$15,757,000	14
TOTAL	\$38,360,000	47

*Some projects have multiple partners with different affiliations receiving funds. The distribution of funds between affiliation types above is based on the designated legal recipient of the appropriation.

% of Total \$ Appropriated by Affiliation

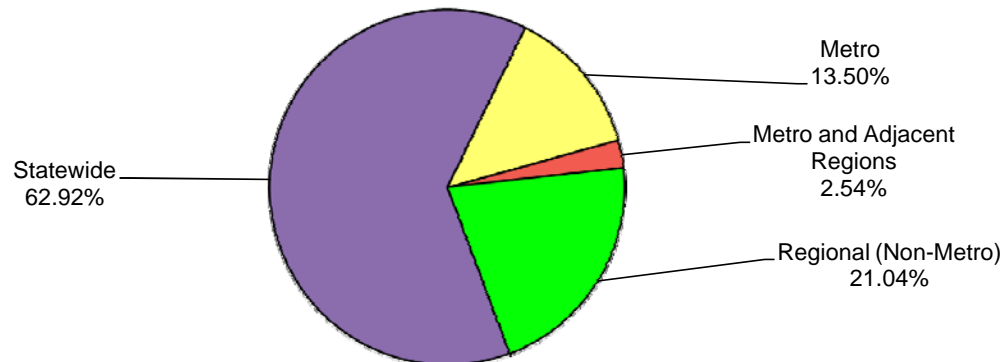


Summary of Appropriations by Area of Impact		
Area of Impact	\$ Appropriated	# Projects
Metro*	\$5,180,000	7
Metro and Adjacent Regions	\$973,000	4
Regional (Non-Metro)**	\$8,070,000	13
Statewide	\$24,137,000	23
TOTAL	\$38,360,000	47

* "Metro" region includes the 11 counties of Anoka, Carver, Chisago, Dakota, Hennepin, Isanti, Ramsey, Scott, Sherburne, Washington, and Wright.

** "Regional" means area of impact is less than "Statewide" but includes one or more regions of the state ("Northwest", "Northeast", "Central", "Southwest", or "Southeast") other than the 11-county "Metro" region.

% of Total \$ Appropriated by Area of Impact



M.L. 2013 ENVIRONMENT AND NATURAL RESOURCES TRUST FUND APPROPRIATIONS - M.L. 2013, Chapter 52, Section 2

SUMMARY OF ML 2013 APPROPRIATIONS BY SUBDIVISION (\$38,360,000)

- SUBD. 3. Natural Resource Data and Information: \$8,076,000 – 10 Appropriations**
- Collection, interpretation, mapping, and dissemination of foundational data and information pertaining to groundwater, wetlands, and distributions of plant and animal species and ecological systems.
 - Planning, inventory, monitoring, and data management pertaining to existing state-held conservation easements.
 - Research and analysis pertaining to Dutch elm disease resistance and to the application of unique microorganisms for bioremediation, bioenergy, and biocontrol uses.
 - Evaluation of alternative methods for improved and expedited forest inventory, more sustainable timber payment methods, and management of woodland grazing.
- SUBD. 4. Land, Habitat, Restoration, and Recreation: \$13,722,000 – 12 Appropriations [18 projects] (*Includes 1 appropriation that is \$200,000 transfer from ML 2009 appropriation)**
- Protection, restoration, and enhancement of priority, high quality, and unique lands and habitat through fee title acquisition, conservation easements, restoration/enhancement, and related efforts.
 - Expansion of outdoor recreational opportunities through expanded state parks and state trails, an expanded metropolitan landscape arboretum, and the addition of a new city park in Saint Paul.
 - Planning and monitoring to conserve rare and unique habitats with high biodiversity significance.
 - Development and assessment of best practices for restoring moose habitat, enhancing bee pollinator habitat, and utilizing conservation grazing to improve wildlife habitat.
 - Technical assistance and training for landowners on conservation program opportunities, habitat restoration, and land stewardship.
 - Outreach to engage and educate citizens about ecology, outdoor recreation, and land use and protection.
- SUBD. 5. Water Resources: \$3,819,000 – 8 Appropriations**
- Development and implementation of modeling, monitoring, and reporting protocols to track and understand changes in Minnesota lakes and improve water and fisheries management.
 - Assessment of copper-nickel bedrock in northeastern Minnesota and its related impacts to water quality as a result of both natural processes and potential future mining operations.
 - Research and analysis pertaining to understanding significant thermal and biological changes occurring in Lake Superior and related implications; evaluating the impacts of habitat restoration on flood-reduction and water quality to inform future restoration practices; and assessing the presence, sources, and threats posed by antibiotics in the Mississippi River.
 - Develop, test, and optimize a technology designed to utilize wastewater to generate clean water and energy.
 - Installation and monitoring of shoreland and agricultural best management practices to improve water quality of lakes in two regions of southern Minnesota.
- SUBD. 6. Aquatic and Terrestrial Invasive Species: \$10,982,000 – 8 Appropriations**
- Establish, develop, and support a new, first-of-its-kind research center at the University of Minnesota specifically dedicated to developing and implementing new techniques for controlling aquatic invasive species.
 - Development, testing, monitoring, and implementation pertaining to control methods for a variety of established invasive species including garlic mustard, emerald ash borer, and zebra mussels and several emerging invasive species including oriental bittersweet and Grecian foxglove.
 - Establishment of a detection and monitoring program targeting Asian carp species.
- SUBD. 7. Environmental Education: \$636,000 – 2 Appropriations**
- Training of future conservation professionals through mentoring opportunities.
 - Delivery of environmental education and training to youth through focused outdoors experiences along the Mississippi River from Grand Rapids to the Twin Cities and down to Red Wing and through internships in environmental fields.
- SUBD. 8. Administration and Contract Agreement Reimbursement: \$1,125,000 – 2 Appropriations**
- LCCMR administration and project contract agreement reimbursement.

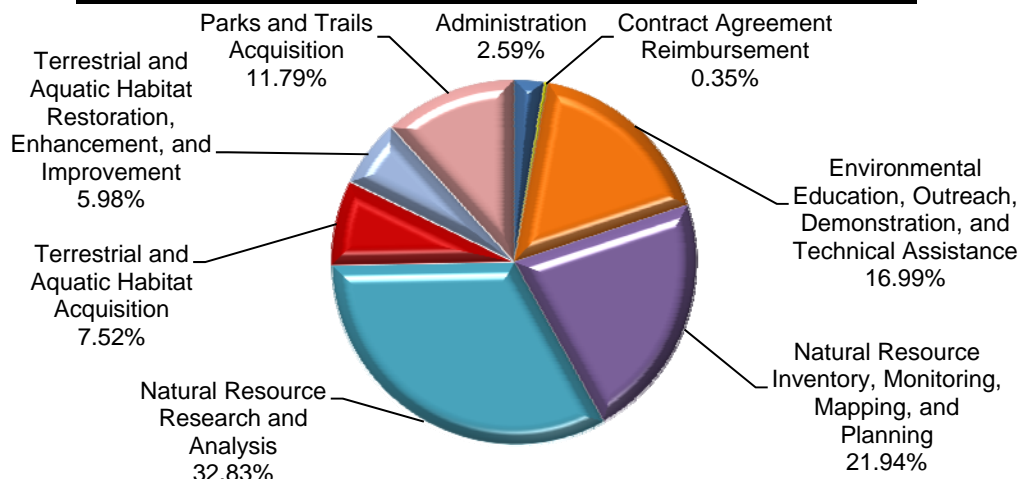
*Includes approximately \$33.8 million for FY 2014, \$4.4 million for FY 2015, and appropriation transfer from ML 2009, Ch. 143, Sec. 2, Subd. 8(b) to ML 2013, Ch. 52, Sec. 2, Subd. 4(l)

M.L. 2013 ENVIRONMENT AND NATURAL RESOURCES TRUST FUND APPROPRIATIONS - M.L. 2013, Chapter 52, Section 2

SUMMARY OF EXPECTED OUTCOMES ACROSS SUBDIVISIONS FOR ~\$38.4 MILLION*

- **Natural Resource Inventory, Monitoring, Mapping, and Planning: ~\$8.6 million**
Inventory, monitoring, mapping, and planning efforts to obtain critical information and guide relevant decisions and efforts over time, including acceleration of the MN Biological Survey; MN County Geologic Atlas program; MN Wetlands Inventory; mapping and measurement of springsheds; expanded monitoring and management of state-owned lands; restoration evaluation; surveying, monitoring, and modeling of Minnesota lakes, including Lake Superior; detection and monitoring of invasive species including Asian carp, emerald ash borer, and others.
- **Terrestrial and Aquatic Habitat Acquisition: ~\$2.9 million**
Acquisition of an estimated 912 acres in a combination of fee title (130 acres and .2 miles of shoreline) and conservation easements (782 acres and .7 miles of shoreline), including donated easements. Permanently protected areas will include forests, prairie, blufflands, wetlands, shorelands, grasslands, and other habitat.
- **Terrestrial and Aquatic Habitat Restoration, Enhancement, and Improvement ~\$2.3 million**
Restoration, enhancement, and improvement activities on an estimated 9,289 acres and 6 miles of shoreline. Activities performed will include seed collection, prescribed burns, soil preparation, native vegetation installation, structural improvements, woody encroachment removal, and invasive species control.
- **Parks and Trails Acquisition: ~\$4.5 million**
Acquisition of an estimated 287 acres, including 1.35 miles of shoreline, in state parks, state trails, a metropolitan park, and the University of Minnesota Landscape Arboretum.
- **Natural Resource Research and Analysis: ~\$12.5 million**
Research and analysis projects that will advance our knowledge about and provide strategies and recommendations for addressing issues relating to invasive species control; water quality and conservation; bioremediation and wastewater treatment; renewable energy options; forestry and forest inventory practices; species protection, decline, and recovery; and conservation grazing practices.
- **Environmental Education, Outreach, Demonstration, and Technical Assistance: ~\$6.5 million**
Environmental education, outreach, demonstration, and technical assistance efforts that will engage and educate Minnesotans on topics including ecology, plants and wildlife, land protection, alternative landscape practices, and outdoor recreation; demonstrate options for alternative landscape practices; and provide training and technical assistance on invasive species prevention, detection, and control and natural resource conservation and management tools, practices, and options.
- **Contract Agreement Reimbursement: ~\$0.1 million**
Administering of contract agreement reimbursement for projects of non-state entities.
- **Administration: ~\$1 million**
FY 2014-2015 LCCMR administration

% OF EXPECTED OUTCOMES ACROSS SUBDIVISIONS



*Includes approximately \$33.8 million for FY 2014, \$4.4 million for FY 2015, and appropriation transfer from ML 2009, Ch. 143, Sec. 2, Subd. 8(b) to ML 2013, Ch. 52, Sec. 2, Subd. 4(l)

M.L. 2013 Projects

[MN Laws 2013, Chapter 52, Section 2 \(beginning July 1, 2013\)](#)

For the next biennium (July 1, 2013 - June 30, 2015), approximately \$33.8 million is available each fiscal year (Total = \$67,620,000) for funding from the Environment and Natural Resources Trust Fund. In response to the 2013 Request for Proposal, 169 proposals requesting a total of approximately \$155 million were received. Through a competitive, multi-step process 66 of these proposals, requesting a total of \$73 million, were chosen to present to the LCCMR and 46 of those proposals, totaling \$38.2 million (all FY 2014 funds and part of the FY 2015 funds), were chosen to receive a recommendation for funding to the 2013 MN Legislature. The Legislature adopted all 46 of these project recommendations and added one additional project. All 47 appropriations were signed into law by the Governor on 05/09/13. \$29.6 million remains available for LCCMR funding recommendations to the ML 2014 Legislature.

NOTE: For all projects, [contact us](#) to obtain the most up-to-date work programs for current projects (project updates are required twice each year) or the final reports of completed projects.

When available, we have provided links to web sites related to the project. The sites linked to this page are not created, maintained, or endorsed by the LCCMR office or the Minnesota Legislature.

MN Laws 2013, Chapter 52, Section 2

- [Subd. 03](#) **Natural Resource Data and Information**
- [Subd. 04](#) **Land, Habitat, Restoration, and Recreation**
- [Subd. 05](#) **Water Resources**
- [Subd. 06](#) **Aquatic and Terrestrial Invasive Species**
- [Subd. 07](#) **Environmental Education**
- [Subd. 08](#) **Administration and Contract Management**

Subd. 03 Natural Resource Data and Information

- [03a](#) Minnesota Biological Survey
- [03b](#) County Geologic Atlases - Part A
- [03c](#) County Geologic Atlas - Part B
- [03d](#) Updating the National Wetland Inventory for Minnesota - Phase IV
- [03e](#) Conservation Easement Stewardship Program - Phase III
- [03f](#) Harnessing Soudan Mine Microbes: Bioremediation, Bioenergy and Biocontrol - **RESEARCH**
- [03g](#) Improved Rapid Forest Ecosystem and Habitat Inventory
- [03h](#) Finding Disease Resistant Elm Trees in Minnesota - **RESEARCH**
- [03i](#) Enhancing Timber Sale Program Environmental and Economic Sustainability
- [03j](#) Enhancing Environmental and Economic Benefits of Woodland Grazing - **RESEARCH**

Subd. 04 Land, Habitat, Restoration, and Recreation

- [04a](#) State Parks and State Trails Land Acquisition
- [04b](#) Scientific and Natural Areas Restoration, Enhancement and Citizen Engagement

- [04c](#) Native Prairie Stewardship and Prairie Bank Easement Acquisition
- [04d](#) Metropolitan Conservation Corridors (MeCC) - Phase VII
- [04e](#) Landscape Arboretum Acquisition Lake Tamarack
- [04f](#) Conservation Program Technical Assistance
- [04g](#) Moose Habitat Restoration in Northeastern Minnesota - **RESEARCH**
- [04h](#) Bee Pollinator Habitat Enhancement
- [04i](#) Conservation Grazing to Improve Wildlife Habitat on Wildlife Management Areas
- [04j](#) Preserving the Avon Hills Landscape - Phase II
- [04k](#) Frogtown Farm and Park Acquisition
- [04l](#) Restorations Evaluations

Subd. 05 Water Resources

- [05a](#) Sustaining Lakes in a Changing Environment - Phase II - **RESEARCH**
- [05b](#) Assessment of Natural Copper-Nickel Bedrocks on Water Quality - **RESEARCH**
- [05c](#) Heron Lake Sediment and Phosphorus Reduction Implementation Projects
- [05d](#) Southern Minnesota Lakes Restoration
- [05e](#) Measuring Hydrologic Benefits from Glacial Ridge Habitat Restoration - **RESEARCH**
- [05f](#) Evaluation of Lake Superior Water Quality Health - **RESEARCH**
- [05g](#) Membranes for Wastewater-Generated Hydrogen and Clean Water - **RESEARCH**
- [05h](#) Antibiotics in Minnesota Waters - Phase II - Mississippi River - **RESEARCH**

Subd. 06 Aquatic and Terrestrial Invasive Species

- [06a](#) An Aquatic Invasive Species Research Center - **RESEARCH**
- [06b](#) Detection and Monitoring of Asian Carp Populations
- [06c](#) Improving Emerald Ash Borer Detection Efficacy for Control
- [06d](#) Elimination of Target Invasive Plant Species
- [06e](#) Biological Control of Garlic Mustard - **RESEARCH**
- [06f](#) Zebra Mussel Control Research and Evaluation in Minnesota Waters - **RESEARCH**
- [06g](#) Controlling Terrestrial Invasive Plants with Grazing Animals

Subd. 07 Environmental Education

- [07a](#) Minnesota Conservation Apprentice Academy
- [07b](#) Youth Outdoors: Mississippi River Education and Employment Opportunities

Subd. 08 Administration and Contract Management

- [08a](#) Legislative-Citizen Commission on Minnesota Resources
- [08b](#) Contract Agreement Reimbursement

Funding Source:

Environment and Natural Resources Trust Fund (TF)

MN Laws 2013, Chapter 52, Section 2

Subd. 03 Natural Resource Data and Information

Minnesota Biological Survey

Subd. 03a \$2,650,000 TF

Carmen Converse

MN DNR

500 Lafayette Rd

St Paul, MN 55155

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Email: carmen.converse@state.mn.us

Web: <http://www.dnr.state.mn.us/mbs/index.html>

Appropriation Language

\$2,650,000 the first year is from the trust fund to the commissioner of natural resources for continuation of the Minnesota biological survey to provide a foundation for conserving biological diversity by systematically collecting, interpreting, monitoring, and delivering data on plant and animal distribution and ecology, native plant communities, and functional landscapes.

Project Overview

The Minnesota Biological Survey (MBS) is an ongoing effort begun in 1987 by the Minnesota Department of Natural Resources (DNR) that is systematically surveying, county-by-county, the state's natural habitats. The effort identifies significant natural areas and collects and interprets data on the status, distribution, and ecology of plants, animals, and native plant communities throughout the state. To date, surveys have been completed in 81 of Minnesota's 87 counties and nearly 20,000 records of rare features have been recorded. MBS data is used by all levels of government in natural resource planning and use decisions, including prioritization of protection of park lands and scientific and natural areas. This appropriation will permit continuation of the survey in Lake, St. Louis, Clearwater, Beltrami, Lake of the Woods, and Koochiching counties. Additionally sites containing select native plant communities or select rare plant and animal populations will be monitored, conservation technical assistance will be provided, and interpretive products and publications will be developed to make the information useful to a variety of audiences.

Project due to be completed: 6/30/2015

County Geologic Atlases - Part A

Subd. 03b \$1,200,000 TF

Dale Setterholm

U of MN - Minnesota Geological Survey

2642 University Ave W

St. Paul, MN 55114-1057

Phone: (612) 627-4780 x2

Email: sette001@umn.edu

Web: http://www.mngs.umn.edu/county_atlas/countyatlas.htm

Appropriation Language

\$1,200,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to continue the acceleration of the production of county geologic atlases that define aquifer boundaries and the connection of aquifers to the land surface and surface water resources for the purpose of sustainable management of surface water and groundwater resources. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

The Minnesota County Geologic Atlas program is an ongoing effort begun in 1979 that is being conducted jointly by the University of Minnesota's Minnesota Geological Survey and the Minnesota Department of Natural Resources (DNR). This portion, called Part A and conducted by the Minnesota Geological Survey, collects geologic information to produce maps and databases that define aquifer boundaries and the connection of aquifers to the land surface and surface water resources. The information is used in planning and environmental protection efforts at all levels of government, by businesses, and by homeowners to ensure sound and sustainable planning, management, and protection of water resources used for drinking, agriculture, industry, and more. This appropriation will initiate Part A geologic atlases for three additional counties yet to be determined depending on county participation and other priorities.

Project due to be completed: 6/30/2016

County Geologic Atlases - Part B

Subd. 03c \$1,200,000 TF

Jan Falteisek
MN DNR
500 Lafayette Rd
St Paul, MN 55155

Phone: (651) 259-5665

Email: jan.falteisek@state.mn.us

Web: http://www.dnr.state.mn.us/waters/groundwater_section/mapping/index.html

Appropriation Language

\$1,200,000 the first year is from the trust fund to the commissioner of natural resources to continue the analysis and compilation of groundwater data for the production of county geologic atlases, publication of geospatial groundwater data, and continued mapping of springsheds and karst features for Winona and Houston Counties. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

The Minnesota County Geologic Atlas program is an ongoing effort begun in 1979 that is being conducted jointly by the University of Minnesota's Minnesota Geological Survey and the Minnesota Department of Natural Resources (DNR). This portion, called Part B and conducted by the DNR, analyzes water samples to understand water chemistry and sensitivity to pollution. The information is used in planning and environmental protection efforts at all levels of government, by businesses, and by

homeowners to ensure sound and sustainable planning, management, and protection of water resources used for drinking, agriculture, industry, and more. This appropriation will continue or complete work on Part B geologic atlases for Blue Earth, Chisago, Nicollet, Sibley, Anoka, Wright, Renville, and Clay counties and potentially begin work on Part B atlases for Sherburne and Morrison counties. Additionally springshed mapping will be continued in the karst area of southeastern Minnesota in Winona, Houston, and Fillmore counties.

Project due to be completed: 6/30/2015

Updating the National Wetland Inventory for Minnesota - Phase IV

Subd. 03d \$1,000,000 TF

Steve Kloiber

MN DNR

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St Paul, MN 55155

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Email: steve.kloiber@state.mn.us

Web: http://www.dnr.state.mn.us/eco/wetlands/nwi_proj.html

Appropriation Language

\$1,000,000 the first year is from the trust fund to the commissioner of natural resources to continue the update and enhancement of wetland inventory maps for Minnesota. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Over the past 100 years, about half of Minnesota's original 22 million acres of wetlands have been drained or filled. Some regions of the State have lost more than 90 percent of their original wetlands. The National Wetland Inventory, a program initiated in the 1970s, is an important tool used at all levels of government and by private industry, non-profit organizations, and private landowners for wetland regulation and management, land management and conservation planning, environmental impact assessment, and natural resource inventories. The data behind the National Wetlands Inventory for Minnesota is now considerably out-of-date and a multi-phase, multi-agency collaborative effort coordinated by the Minnesota Department of Natural Resources is underway to update the data for the whole state. This appropriation is being used to conduct the fourth of six phases of this effort, which involves wetlands maps for portions of Lake, Cook, and St. Louis counties in northeastern Minnesota. A completed wetlands inventory will help improve wetland protection and management.

Project due to be completed: 6/30/2016

Conservation Easement Stewardship Program - Phase III

Subd. 03e \$60,000 TF

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MN DNR

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St. Paul, MN 55155

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Web: <http://www.dnr.state.mn.us>

Appropriation Language

\$200,000 the first year is from the trust fund to the commissioner of natural resources for the final phase to bring conservation easements held by the Department of Natural Resources up to minimum conservation standards, through monitoring, baseline data collection, and baseline report preparation.

Project Overview

The purchase of conservation easements - restrictions on land use that protect natural features while keeping land in private ownership - has proven to be an effective means to protect land at a lower initial cost than full state ownership. However, once an easement is purchased there are ongoing stewardship, monitoring, and enforcement responsibilities necessary to ensure the terms of the agreement between the easement holder and the landowner are met. Earlier efforts funded by the Environment and Natural Resources Trust Fund in 2008 and 2011 allowed the Minnesota Department of Natural Resources (DNR) to retroactively bring existing conservation easements up to minimum standards by developing a central inventory and management system of the conservation easements held by the DNR, along with a plan for how they would be administered into the future. This appropriation is the final phase of this effort allowing the DNR to continue and accelerate the implementation of the previously developed plan. Additionally, tools will be developed to enhance monitoring efficiency using remote sensing.

Project due to be completed: 6/30/2015

Harnessing Soudan Mine Microbes: Bioremediation, Bioenergy and Biocontrol

Subd. 03f \$838,000 TF

Christine Salomon

U of MN

MMC 204, 516 Delaware St SE, 7-132 PWB

Minneapolis, MN 55455

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Email: csalomon@umn.edu

Web: <http://www.cdd.umn.edu/Members/Salomon/index.htm>

RESEARCH

Appropriation Language

\$838,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to continue the characterization of unique microbes discovered in the Soudan Underground Mine State Park that have potential applications for metal remediation in water resources, microbial electrofuels, and biocontrol of white-nose bat syndrome. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

The Soudan Iron Mine near Ely, Minnesota is no longer an active mine and is now part of a state park, as well as the home to a state-of-the-art physics laboratory at the bottom of the mine. The mine has also been discovered to contain an extreme environment in the form of an ancient and very salty brine bubbling up from a half-mile below the Earth's surface through holes drilled when the mine was active. Strange microorganisms - part of an ecosystem never before characterized by science - have been found

living in the brine. Scientists from the University of Minnesota will use this appropriation to continue to study this unique ecosystem and its organisms and build upon findings from a previous Environment and Natural Resources Trust Fund supported effort to explore potential applications of using the microorganisms living there for removing metals from mine waters, producing biofuels, and developing a biocontrol for White-Nose Syndrome, which is decimating bat populations around the country.

Project due to be completed: 6/30/2016

Improved Rapid Forest Ecosystem and Habitat Inventory

Subd. 03g \$262,000 TF

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St Paul, MN 55108

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Web: <http://www.forestry.umn.edu/People/Ek/index.htm>

Appropriation Language

\$262,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to evaluate a new approach to forest inventory, based on statewide forest inventory and analysis (FIA) data.

Project Overview

Minnesota has 15.9 million acres of forest land managed by a variety of county, state and federal agencies, and private landowners for timber production, wildlife habitat, and ecological considerations. Forest managers rely on inventory data to make effective planning and management decisions. Because forests are continually changing through natural and human processes, forest inventory data is periodically updated. However, doing so is an expensive and time-consuming endeavor and, as a result, much of Minnesota's forest inventory data is currently out of date. This appropriation is being used by scientists at the University of Minnesota to evaluate an innovative approach to forest inventory using existing statewide Forest Inventory and Analysis (FIA) data that could help reduce costs, expedite future updates, and improve overall usability.

Project due to be completed: 6/30/2015

Finding Disease Resistant Elm Trees in Minnesota

Subd. 03h \$200,000 TF

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Web: <http://forestpathology.cfans.umn.edu/default.htm>

RESEARCH

Appropriation Language

\$200,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to evaluate and identify native Minnesota elms resistant to Dutch elm disease to assist with limiting the susceptibility of the state's elms to Dutch elm disease. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Elms were once a very widespread tree in Minnesota and amongst the most common and popular in urban landscapes due to their size, shading capability, and tolerance of pollution and other stresses. Over the past five decades, though, Dutch elm disease, an exotic and invasive pathogen, has killed millions of elms throughout the state. However, scientists at the University of Minnesota have observed that some elms have survived the disease and appear to have special characteristics that make them resistant to Dutch elm disease. This appropriation is being used to identify, propagate, and evaluate native Minnesota elms resistant to Dutch elm disease to assist with limiting the susceptibility of the state's remaining elms to Dutch elm disease and possibly lay the foundation for re-introductions of the tree in the future.

Project due to be completed: 6/30/2016

Enhancing Timber Sale Program Environmental and Economic Sustainability

Subd. 03i \$336,000 TF

Charles Blinn

U of MN
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St Paul, MN 55108

Phone: (612) 624-3788

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Web: <http://www.forestry.umn.edu/People/Blinn/>

Appropriation Language

\$336,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to evaluate the impacts of timber payment methods on postharvest forest ecological conditions and net revenue generated from public timber sale programs. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Minnesota has 9.5 million acres of public forest lands that play an important role in sustaining Minnesota's environment and economy. The policies and programs used by public timber sale programs can impact post-harvest ecological conditions and have pronounced effects on the composition, structure, and productivity of the forest in the future. Additionally, timber harvesting revenues play an important role in economic activity, employment, and tax revenue. Currently, timber on public lands is sold in of two ways: pay based on volume harvested and pay based on appraised volume available for harvest, regardless of the actual harvest. Scientists at the University of Minnesota are using this appropriation to evaluate how timber payment methods impact post-harvest forest ecological conditions, net revenue generated from public timber sale programs, and barriers perceived by forest

managers and loggers. This information will help gauge economic and ecological tradeoffs between the two methods in order to maximize future forest productivity, wildlife habitat, and biodiversity.

Project due to be completed: 6/30/2016

Enhancing Environmental and Economic Benefits of Woodland Grazing

Subd. 03j \$190,000 TF

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RESEARCH

Appropriation Language

\$190,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to evaluate management options for woodlands used for grazing to improve ecological and economic benefits. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Over 527,000 acres of unmanaged woodlands are being used for livestock grazing throughout Minnesota. Managing these grazed woodlands based on the use of best management practices can provide environmental and economic opportunities, including improved water quality, maximized forage production, and higher-quality timber. The best management practices involved are commonly used in other parts of the country with other types of ecosystems, but have not been widely adopted in Minnesota due to a lack of knowledge and experience with implementing them within the ecosystems of Minnesota. This appropriation is being used by scientists at the University of Minnesota to evaluate and demonstrate how to effectively adapt and implement these best management practices for improved woodland grazing for use in Minnesota.

Project due to be completed: 6/30/2017

Subd. 04 Land, Habitat, Restoration and Recreation

State Parks and State Trails Land Acquisition

Subd. 04a \$1,000,000 TF

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Appropriation Language

\$1,000,000 the first year is from the trust fund to the commissioner of natural resources to acquire authorized state trails and critical parcels within the statutory boundaries of state parks. State park land acquired with this appropriation must be sufficiently improved to meet at least minimum management standards, as determined by the commissioner of natural resources. A list of proposed acquisitions must be provided as part of the required work plan. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Minnesota's extensive state park and trail system, the second oldest in the country, is currently comprised of a total of 76 state parks and recreation areas and 13 state trails scattered throughout the state. Some of Minnesota's state parks and trails have privately owned lands within the designated park boundaries or trail corridors. Purchase of these lands from willing landowners for addition to the state park and trail system makes them permanently available for public recreation and enjoyment and facilitates more efficient management. Additional benefits include preserving contiguous wildlife corridors, facilitating preservation and restoration of native plant communities and cultural resources, reducing impacts of future development, and providing riparian buffers along wetlands, creeks, and lakes. The Minnesota Department of Natural Resources is using this appropriation to fund the acquisition of approximately 245 acres to add to the state park and trail system, which includes:

- 50 acres for Great River Bluffs State Park in Winona County
- 115 acres for Cuyuna Country State Recreation Area in Crow County
- 80 acres for the Mill Towns State Trail in Rice County

Project due to be completed: 6/30/2015

Scientific and Natural Areas Restoration, Enhancement and Citizen Engagement

Subd. 04b \$1,500,000 TF

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Appropriation Language

\$1,500,000 the first year is from the trust fund to the commissioner of natural resources to conserve sites of biodiversity significance by restoring and enhancing lands established as scientific and natural areas as provided in Minnesota Statutes, section 86A.05, subdivision 5, and providing volunteer engagement and outreach. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Minnesota's Scientific and Natural Areas (SNA) Program is an effort to preserve and perpetuate the state's ecological diversity and ensure that no single rare feature is lost from any region of the state. This

includes landforms, fossil remains, plant and animal communities, rare and endangered species, and other unique biotic or geological features. These sites play an important role in scientific study, public education, and outdoor recreation. The Minnesota Department of Natural Resources is using this appropriation to conduct restoration and enhancement activities on approximately 1,600 acres in existing SNAs and to increase citizen and student knowledge and skills pertaining to ecological restoration and biodiversity conservation through engagement with SNAs.

Project due to be completed: 6/30/2015

Native Prairie Stewardship and Prairie Bank Easement Acquisition

Subd. 04c \$750,000 TF

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Appropriation Language

\$750,000 the first year is from the trust fund to the commissioner of natural resources to acquire native prairie bank easements, prepare baseline property assessments, restore and enhance native prairie sites, and provide technical assistance to landowners. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Prior to European settlement more than 18 million acres of prairie covered Minnesota. Today less than 1% of that native prairie remains, and about half of those remaining acres are in private landownership without any formal protection currently in place. Through this appropriation the Minnesota Department of Natural Resources will work with private landowners of high quality native prairie sites to protect remaining native prairie using a variety of tools. Approximately 200 acres are expected to be permanently protected through Native Prairie Bank conservation easements. A variety of restoration and enhancement activities will be implemented on a total of about 690 acres. Additionally, education and technical assistance will be provided to interested landowners to help them improve the management and stewardship of native prairie sites they own.

Project due to be completed: 6/30/2015

Metropolitan Conservation Corridors (MeCC) - Phase VII

Subd. 04d \$2,000,000 TF

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Appropriation Language

\$2,000,000 the first year is from the trust fund for the acceleration of agency programs and cooperative agreements. Of this appropriation, \$10,000 is to the commissioner of natural resources for agency programs and \$1,990,000 is to the commissioner of natural resources for agreements as follows: \$304,000 with Friends of the Mississippi River; \$368,000 with Dakota County; \$208,000 with Great River Greening; \$310,000 with Minnesota Land Trust; \$400,000 with Minnesota Valley National Wildlife Refuge Trust, Inc.; and \$400,000 with the Trust for Public Land for planning, restoring, and protecting priority natural areas in the metropolitan area, as defined under Minnesota Statutes, section 473.121, subdivision 2, and portions of the surrounding counties, through contracted services, technical assistance, conservation easements, and fee title acquisition. Land acquired with this appropriation must be sufficiently improved to meet at least minimum management standards, as determined by the commissioner of natural resources. Expenditures are limited to the identified project corridor areas as defined in the work plan. This appropriation may not be used for the purchase of habitable residential structures, unless expressly approved in the work plan. All conservation easements must be perpetual and have a natural resource management plan. Any land acquired in fee title by the commissioner of natural resources with money from this appropriation must be designated as an outdoor recreation unit under Minnesota Statutes, section 86A.07. The commissioner may similarly designate any lands acquired in less than fee title. A list of proposed restorations and fee title and easement acquisitions must be provided as part of the required work plan. Lands that would require payments in lieu of taxes under Minnesota Statutes, section 97A.061 or 477A.12, shall not be acquired with money from this appropriation. Up to \$54,000 is for use by Minnesota Land Trust in a monitoring and enforcement fund as approved in the work plan and subject to subdivision 16. An entity that acquires a conservation easement with appropriations from the trust fund must have a long-term stewardship plan for the easement and a fund established for monitoring and enforcing the agreement. Money appropriated from the trust fund for easement acquisition may be used to establish a monitoring, management, and enforcement fund as approved in the work plan. An annual financial report is required for any monitoring, management, and enforcement fund established, including expenditures from the fund. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

OVERALL PROJECT OVERVIEW

Though many parts of the Twin Cities metropolitan area are urbanized, there are also has large areas of natural lands that continue to serve as important habitat for fish, wildlife, and plant communities. However, pressure on these remaining lands continues to intensify as population and development pressures increase. This appropriation represents the seventh phase of an ongoing effort by a partnership of state and non-profit organizations, called the Metro Conservation Corridors (MeCC) partnership, to conduct strategic and coordinated land protection, restoration, and enhancement activities that build connections between remaining high quality natural areas in the greater Twin Cities metropolitan area and ensures their benefits are available for future generations. Efforts will strengthen and protect biodiversity; improve water quality in lakes, rivers, and streams; and improve connectivity and access to outdoor recreation. This phase involves six partners and is expected to result in the permanent protection of more than 260 acres and the restoration and enhancement of more than 260 acres. Organizations involved in this phase include Dakota County, Friends of the Mississippi River, Great River Greening, Minnesota Land Trust, MN Valley National Wildlife Refuge Trust, and Trust for Public Land.

Individual Partner Project Overviews

- *1.1/1.2: Coordination and Mapping - [Minnesota Land Trust](#) (\$20,000)*
The Minnesota Land Trust provides coordination, mapping, and data management for the Metropolitan Conservation Corridors partnership. Funds are being used to coordinate the partnership, guide strategic outreach and implementation efforts, manage project data, and provide reporting and mapping of accomplishments.
- *2.1 & 3.4: Protect, Restore and Enhance Significant Watershed Habitat - [Friends of the Mississippi River](#) (\$304,000)*
Friends of the Mississippi is using this appropriation to permanently protect six acres through fee title acquisition for addition to Fish Creek Natural Area near Maplewood, MN, and to restore and enhance approximately 134 acres of permanently protected prairie, savanna, wetland, and forest habitat in Dakota, Washington, Ramsey, and Hennepin counties. Specific restoration and enhancement activities will include updating management plans, soil preparation, prescribed burning, native vegetation installation, woody encroachment removal, and invasive species control.
- *2.3: Restoring Our Lands and Waters - [Great River Greening](#) (\$208,000)*
These funds will enable Great River Greening to restore approximately 90 acres of permanently protected forests, savanna, prairie, and wetland habitat and 0.18 miles of shoreland habitat while engaging hundreds of volunteers in the stewardship of the Metropolitan area's remaining natural areas. Specific activities include invasive species control, seeding/planting, prescribed burning, and other associated activities.
- *2.6 & 3.7: Dakota County Lakeshore and Riparian Protection - [Dakota County](#) (\$368,000)*
Through this appropriation Dakota County plans to permanently protect approximately 27 acres of shoreland and contiguous upland in the Marcott Lakes area of Inver Grove Heights by securing a conservation easement from willing landowner. For all acres protected, natural resource management plans will be prepared to ensure their long term stewardship. Additionally, restoration and enhancement activities are expected to occur on approximately 40 acres.
- *3.1: 2013 TPLs Critical Land Protection Program - [Trust for Public Land](#) (\$400,000)*
The Trust for Public Land is using this appropriation to purchase approximately 24 acres of land and 0.2 miles of shoreline with high ecological value and then convey the land to state or local governments for long-term stewardship and protection. Lands being considered for permanent protection in this round of funding include an areas around the Rum River in Anoka County, Lindstrom Natural Area in Chisago County, and Carnelian Creek and Keystone Woods area in Washington County.
- *3.2: Protect Significant Habitat by Acquiring Conservation Easements - [Minnesota Land Trust](#) (\$300,000)*
With this appropriation, the Minnesota Land Trust plans to protect 100 acres of high quality forest, prairie, wetland, or shoreline habitat by securing permanent conservation easements and dedicating funds for their perpetual monitoring, management, and enforcement. Lands being considered for permanent protection in this round of funding are located in Chisago, Goodhue, Hennepin, Isanti, and Washington counties.
- *3.3: Priority Expansion of Minnesota Valley National Wildlife Refuge - [Minnesota Valley National Wildlife Refuge Trust Inc.](#) (\$400,000)*
The Minnesota Valley National Wildlife Refuge Trust is using this appropriation to purchase a total of approximately 100 acres of land and donated to the U.S. Fish and Wildlife Service to

expand the Minnesota Valley National Wildlife Refuge. Many benefits are anticipated from this project, including improved habitat connectivity, protection of native species, improved water quality in the Minnesota River, and increased public access to natural lands for activities such as hiking, hunting, and fishing. Restoration and management plans will be completed for all acquired lands.

Project due to be completed: 6/30/2015

[Overall MeCC Work Plan](#) (PDF)

Individual Partner Work Plans:

- [1.1/1.2](#) - MeCC VII - Coordination and Mapping - MLT (\$20,000)
- [2.1/3.4](#) - MeCC VII - Protect, Restore and Enhance Significant Watershed Habitat - Friends of the Mississippi River (\$304,000)
- [2.3](#) - MeCC VII - Restoring Our Lands and Waters - Great River Greening (\$208,000)
- [2.6/3.7](#) - MeCC VII - Dakota County Lakeshore and Riparian Protection - Dakota County (\$368,000)
- [3.1](#) - MeCC VII - 2013 TPLs Critical Land Protection Program - The Trust for Public Land (\$400,000)
- [3.2](#) - MeCC VII - Protect Significant Habitat by Acquiring Conservation Easements - Minnesota Land Trust (\$300,000)
- [3.3](#) - MeCC VII - Priority Expansion of Minnesota Valley National Wildlife Refuge - Minnesota Valley National Wildlife Refuge Trust Inc. (\$400,000)

Landscape Arboretum Acquisition Lake Tamarack

Subd. 04e \$2,000,000 TF

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Appropriation Language

\$2,000,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to acquire land surrounding Lake Tamarack in Carver County as part of the acquisition of approximately 80 acres. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

The University of Minnesota's Landscape Arboretum is the largest and most diverse horticultural site in Minnesota. It features gardens and natural areas representative of Minnesota and the upper-Midwest that can be explored using several miles of trails. Additionally it conducts fruit and plant breeding research to develop cultivars that have particular desired characteristics, such as cold hardiness or disease resistance. The arboretum has a long-term goal of protecting the entire watershed of which it is a part. This appropriation is being used by the arboretum to acquire approximately 80 acres of land

surrounding Lake Tamarack in Carver County, which will protect a variety of habitat types and 1,300 feet of shoreline in an area threatened by development. This new portion of the arboretum will have free public access and provide additional land for future research that may pertain to restoration ecology, crop production, bio-energy, or wildlife habitat.

OVERALL PROJECT OUTCOME AND RESULTS

The University of Minnesota Landscape Arboretum purchased the property at 400 Arboretum Boulevard, Victoria, (previously known as the Kerber Farm or Lano Bureau Property), effective Friday, November 1, 2013. The property consists of 78.13 acres in Carver County. This is the final property purchase identified in the Arboretum's 1995 Boundaries Plan. Over 300 acres have been added to the Arboretum during the last 18 years.

The property is north of State Highway 5 and directly adjacent to the Horticultural Research Center. The property contains native forest, wetlands, tillable land, and 1,300 feet of lakeshore on Lake Tamarack. Current structures on the property will be evaluated for condition and safety and some will likely be retained for unheated storage while others may be demolished.

The property will be used in the future for research; protection of wildlife, wetlands and water quality; protection of big woods, oak savanna and upland meadow; and educational and public low impact recreational purposes. Research uses have not been determined and roads, fencing, and irrigation will be installed in the 10 acre area designated for research. Some of the current soybean fields could also be used for alternative crop, forage crop, or restoration research projects, and the Arboretum is considering partners from across the University of Minnesota or other conservation and natural resources groups.

Funding for this purchase was provided by the Environment and Natural Resources Trust Fund (ENRTF) - recommended by the Legislative Citizens Commission for Minnesota Resources (LCCMR), the Lessard Sams Outdoor Heritage Council (LSOHC) and the Minnesota Landscape Arboretum Foundation. Because we received LCCMR and LSOHC funding to purchase the property, the Arboretum will provide FREE public access. The University of Minnesota is charging the City of Victoria \$1 for the 50 year Use License Agreement for the Trail that crosses the Lake Tamarack Property and \$1 for the Use License Agreement for Temporary Construction Access for this trail. There are no fees beyond the \$2 for the entire trail including the sections that do not cross the Lake Tamarack Property. Finally, the Arboretum will work over the next several months to develop public access policies and install signage.

PROJECT RESULTS USE AND DISSEMINATION

The acquisition was successfully publicized by the Arboretum with a press release issued on November 11, 2013 and was also covered in the Arboretum E-News with 10,000 subscribers. It was then covered in the local media:

- U to expand arboretum with 78-acre purchase, Minnesota Daily, January 28, 2013
- U Arboretum expands base in Chanhassen by 78 acres, Star Tribune, November 12, 2013
- Minnesota Landscape Arboretum grows by 78 acres, Finance & Commerce, November 13, 2013
- Minnesota Landscape Arboretum Grows By 78 Acres, WCCO-CBS News Online, November 13, 2013

Project completed: 6/30/2014

Conservation Program Technical Assistance

Subd. 04f \$3,000,000 TF

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Appropriation Language

\$3,000,000 the first year is from the trust fund to the Board of Water and Soil Resources to continue providing grants to soil and water conservation districts and other units of local and state government for the employment of staff to reenroll expiring lands into programs for conservation purposes. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Enrollment of private lands in conservation programs can provide important natural resource and other public benefits by taking the lands out of production so that they can provide various wildlife, water quality, and ecological benefits. This appropriation is enabling the Minnesota Board of Soil and Water Resources to continue to provide grants to local soil and water conservation districts for employment of technical staff to assist private landowners in implementing conservation programs. This effort is expected to assist with the enrollment, retention, and management of 170,000 private acres of grasslands, wetlands, and forests in federal and state conservation programs, particularly in areas expected to lose enrollments in the Conservation Reserve Program (CRP).

Project due to be completed: 6/30/2016

Moose Habitat Restoration in Northeastern Minnesota

Subd. 04g \$200,000 TF

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RESEARCH**Appropriation Language**

\$200,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota for the Natural Resources Research Institute to develop best practices guidelines for creating moose foraging habitat efficiently and cost-effectively. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Moose, one of Minnesota's most iconic wildlife species, are dying at increasingly higher rates in Minnesota and there is uncertainty as to why. Estimates suggest the population declined 35 percent just between 2012 to 2013, and projections suggest moose could be nearly gone from the state by 2020 if this trend is not halted and, ideally, reversed. Scientists at the University of Minnesota are using this appropriation to identify appropriate management and habitat needs and the sorts of actions that can be implemented to help slow or prevent continued population declines amongst Minnesota's moose populations. The project is a continuation and expansion of work completed and underway by two other past Environment and Natural Resources Trust Fund supported projects on determining the cause for the increasing mortality.

Project due to be completed: 6/30/2016

Bee Pollinator Habitat Enhancement

Subd. 04h \$200,000 TF

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Appropriation Language

\$200,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to assess the potential to supplement traditional turf grass by providing critical floral plant resources to enhance bee pollinator habitat. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Bees play a key role in ecosystem function and in agriculture, including more than one hundred U.S. crops that either need or benefit from pollinators. However, bee pollinators are in dramatic decline in Minnesota and throughout the country. One of the potential causes appears to be a scarcity of bee-friendly flowers, particularly in urban areas, which is leading to nutritional deficiencies, chronic exposure to pesticides, and debilitating diseases and parasites. Scientists at the University of Minnesota are using this appropriation to assess options that can be broadly implemented in urban areas to enhance bee pollinator habitat and counteract declining populations and bee health. The effort will examine ways to supplement traditional turfgrass landscapes, particularly in areas that primarily serve an aesthetic purpose, with flowering plants that can provide increased nutrition and less potential exposure to pesticides.

Project due to be completed: 6/30/2016

Conservation Grazing to Improve Wildlife Habitat on Wildlife Management Areas

Subd. 04i \$600,000 TF

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Appropriation Language

\$600,000 the first year is from the trust fund to the commissioner of natural resources to develop grazing plans and provide infrastructure to support conservation grazing on approximately 10,000 acres of targeted wildlife management areas in partnership with local livestock producers. Any revenue generated as a result of this appropriation must be reinvested in producing plans, conducting maintenance, or building infrastructure for new or existing conservation grazing efforts. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Overall Project Overview

Grassland ecosystems evolved to depend on periodic disturbances, such as fire and grazing, to maintain their health and stability. Periodic disturbances help control invasive species, add nutrients back into the soil, germinate plant seeds, enhance wildlife habitat, and more. In Minnesota habitat managers have used fire as a disturbance tool for decades but the use of grazing has been much rarer, mostly because of a lack of necessary infrastructure such as fencing. This appropriation is being used by the Minnesota Department of Natural Resources to provide the infrastructure needed to support conservation grazing on 10,000 acres of targeted wildlife management areas to demonstrate that grazing can be effectively and cost-efficiently implemented to improve grassland habitat quality and ecological integrity in Minnesota.

Project due to be completed: 6/30/2016

Preserving the Avon Hills Landscape - Phase II

Subd. 04j \$772,000 TF

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Appropriation Language

\$772,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with Saint John's University in cooperation with the Minnesota Land Trust to secure permanent conservation easements on high quality habitat in Stearns County, prepare conservation management plans, and provide public outreach. A list of proposed easement acquisitions must be provided as part of the required work plan. Up to \$80,000 is for use by Minnesota Land Trust in a monitoring and enforcement fund as approved in the work plan and subject to subdivision 16. An entity that acquires a conservation easement with appropriations from the trust fund must have a long-term stewardship plan for the easement and a fund established for monitoring and enforcing the agreement. Money appropriated from the trust fund for easement acquisition may be used to establish a monitoring,

management, and enforcement fund as approved in the work plan. An annual financial report is required for any monitoring, management, and enforcement fund established, including expenditures from the fund. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

The Avon Hills area is a unique 65,000-acre glacial moraine landscape located in Stearns County just west of St. Cloud. It has been identified as having statewide ecological significance and includes the highest concentration of native plant communities in the county - including oak and maple-basswood forests, tamarack and mixed-hardwood swamps, and wet meadows - and several rare plants and animal species, including American ginseng, cerulean warbler, red-shouldered hawk, and Blanding's turtle. This appropriation is being used by the St. John's Arboretum at St. John's University to secure permanent protection, via conservation easements, for an additional 350-550 acres of high quality habitat in the Avon Hills area, prepare conservation management plans for the easement lands, and provide public outreach on the significance of the Avon Hills landscape and options for its protection. St. John's Arboretum previously used a 2008 Environment and Natural Resources Trust Fund appropriation to permanently protect more than 1,000 acres in the area.

Project due to be completed: 6/30/2016

Frogtown Farm and Park Acquisition

Subd. 04k \$1,500,000 TF

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Appropriation Language

\$1,500,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with the Trust for Public Land to acquire a portion of 12 acres for Frogtown Farm and Park to be established as a St. Paul city park.

Project Overview

The Frogtown area of St. Paul is a culturally diverse, low-income neighborhood having less green space per child than any other neighborhood in the city and was recently identified as an area in need of a new park. This appropriation is being used by The Trust for Public Land, in partnership with the City of St. Paul, to acquire a portion of twelve acres of a currently vacant space in the area to establish the multi-purpose Frogtown Farm and Park. The vision for the space is to provide a safe space for neighborhood children to experience nature and families to recreate while simultaneously acting as a demonstration urban farm for community members to learn about growing food locally as a vehicle for advancing self-sufficiency, environmental stewardship, healthy living, and community collaboration.

Project due to be completed: 6/30/2015

Restoration Evaluations

Subd. 04I \$200,000 Transfer from M.L. 2009, Chp. 143, Sec. 2 ,Subd. 8b as amended by M.L. 2011, First Special Session, Chp. 2, Art. 3, Sec. 2, Subd. 18, Para. A, Clause 8

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Appropriation Language

\$200,000 from Laws 2009, chapter 143, section 2, subdivision 8, paragraph (b), Legislative-Citizen Commission on Minnesota Resources, as amended by Laws 2011, First Special Session, chapter 2, article 3, section 2, subdivision 18, paragraph (a), clause (8), is transferred to the Board of Regents of the University of Minnesota for evaluation of lands restored using money from the trust fund. The lands to be evaluated shall be identified and prioritized in consultation with the Legislative-Citizen Commission on Minnesota Resources.

Project Overview

Ecological restorations aim to aid the recovery of native ecosystems that have been degraded or lost. However, very seldom are restorations evaluated past the initial implementation phase to determine whether the efforts achieved their goals and the funds spent were a strategic conservation investment. Monitoring and evaluation of restorations can teach what works and what does not in order to advance restoration practices and increase the likelihood of success for future projects. The Environment and Natural Resources Trust Fund has funded restoration activities on hundreds of thousands of acres since its inception. The University of Minnesota is using this appropriation to evaluate the outcomes and effectiveness of some of those restoration efforts in order to inform and improve future land restoration techniques and best practices and future state investments in restoration activities.

Project due to be completed: 6/30/2015

Subd. 05 Water Resources

Sustaining Lakes in a Changing Environment - Phase II

Subd. 05a \$1,200,000 TF

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RESEARCH

Appropriation Language

\$1,200,000 the first year is from the trust fund to the commissioner of natural resources in cooperation with the United States Geological Survey, the University of Minnesota, and the University of St. Thomas to continue development and implementation of monitoring, modeling, and reporting protocols for Minnesota lakes to be used in water and fisheries management. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Minnesota's environment is changing in response to a variety of stressors - including population growth, residential development, industry, agriculture, invasive species, and climate change - and the state's iconic lakes, and the goods and services they provide (e.g., fishing and water recreation), are an important part of what's being impacted. To manage effectively for these changes it is important to understand how the state's many lakes respond to these stressors. This includes knowing baseline habitat conditions, observing long-term changes to the baseline, and developing models that can forecast the risks posed and expected impacts of various stressors. In 2009 the Minnesota Department of Natural Resources (DNR) began an ambitious long-term monitoring effort of 24 "sentinel" lakes throughout the state specifically identified to represent the breath of basic conditions (e.g., water chemistry, habitat conditions, fishery types, surrounding ecosystem types) present in Minnesota's most common aquatic environments. The DNR is using this appropriation to continue and expand on that effort to develop and implement improved monitoring, modeling, and reporting protocols that will provide timely information on lake trends, reduce uncertainty about potential causes, and guide conservation approaches for improving water quality, reversing problematic trends, and preventing further degradation into the future.

Project due to be completed: 6/30/2016

Assessment of Natural Copper-Nickel Bedrocks on Water Quality

Subd. 05b \$585,000 TF

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Email: shauck@nrri.umn.edu

Web: <http://www.nrri.umn.edu/cartd/min/default.htm>

RESEARCH**Appropriation Language**

\$585,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota in cooperation with the United States Geological Survey to assess impacts of existing mineralization and potential mining on northeastern Minnesota regional water quality, including impacts from copper, nickel, and other metal concentrations in rocks, streambed sediments, and soils in areas of potential base-metal mining. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Large deposits of copper, nickel, cobalt, and other minerals in northeastern Minnesota could provide huge economic and employment benefits to the state while becoming an important source of important metals for the country. However, the mining required to extract them could have significant water quality impacts in a region that includes the Boundary Water Canoe Area Wilderness and other environmentally sensitive watersheds. Up-to-date and accurate geochemical data is needed in order to assess and predict water quality impacts of potential mining and inform decision-making to protect water quality and sensitive ecosystems. Scientists at the University of Minnesota are using this appropriation to gather baseline data for assessing how existing concentrations of these metals in rocks, streambeds, and soils currently influence regional water quality. This information is a critical component for examining the risks posed by any potential future mining.

Project due to be completed: 6/30/2016

Heron Lake Sediment and Phosphorus Reduction Implementation Projects

Subd. 05c \$122,000 TF

Jan Voit

Heron Lake Watershed District
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Heron Lake, MN 56137

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Web: <http://www.hlwdonline.org/hlwd/>

Appropriation Language

\$122,000 the first year is from the trust fund to the Board of Water and Soil Resources for an agreement with the Heron Lake Watershed District for public outreach and installation and monitoring of water quality improvement projects. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Once known for its clean water, fertile soil, and healthy habitat, in more recent times the Heron Lake Watershed in southwestern Minnesota has been heavily impacted by pollution from intensive agriculture, feedlots, non-compliant septic systems, and urban stormwater runoff. The Heron Lake Watershed District is using this appropriation for public outreach and installation and monitoring of water quality improvement projects aimed at reducing sediment and nutrient loading for the benefit of public health, recreation, and wildlife habitat.

Project due to be completed: 6/30/2016

Southern Minnesota Lakes Restoration

Subd. 05d \$463,000 TF

Lauren Klement

Le Sueur County
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Le Center, MN 56057

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Web: <http://www.co.le-sueur.mn.us/>

Appropriation Language

\$463,000 the first year is from the trust fund to the Board of Water and Soil Resources for an agreement with Le Sueur County to install shoreland and agricultural best management practices to improve water quality for up to 14 lakes in a tri-county area in southern Minnesota. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Lakes and streams located in Blue Earth, Le Sueur, and Waseca Counties provide important public benefits such as hydrologic storage, economic and recreational opportunities, and regional water quality improvement. However, several of the lakes and streams have been listed as impaired because of excess nutrients and sediment from runoff. Le Sueur County is using this appropriation to install shoreland and agricultural best management practices such as wetland enhancements, infiltration basins, stream restoration, and native plantings to improve the water quality of up to 11 lakes in the region.

Project due to be completed: 6/30/2016

Measuring Hydrologic Benefits from Glacial Ridge Habitat Restoration

Subd. 05e \$400,000 TF

Tim Cowdery

Red Lake Watershed District
2208 Woodale Dr
Mounds View, MN 55112

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Web: <https://sites.google.com/site/largescaleresto/>

RESEARCH

Appropriation Language

\$400,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with the Red Lake Watershed District in cooperation with the United States Geological Survey to compare the hydrology of habitats before and after restorations to evaluate and quantify the impacts on flood reduction and water quality in order to inform improvements to restoration techniques. The United States Geologic Survey is not subject to the requirements in Minnesota Statutes, section 116P.10. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Since 2000, a diverse group of partners has been collectively working in northwestern Minnesota on one of the largest prairie-wetland restorations in the world. Spanning 22,000 acres and adjacent to an additional 16,000 acres of public and private conservation land, the goal of the Glacial Ridge Project has been to demonstrate whether large-scale habitat restoration is a viable way to reduce flooding and improve water quality. Prior to beginning restoration efforts on the project, a comprehensive baseline hydrologic study of the area was completed by the U.S. Geological Survey (USGS). The Red Lake Watershed District and USGS are using this appropriation to conduct a post restoration study that will

quantify and evaluate the amount of flood reduction, water-quality improvement, and ecosystem-function change that has resulted from the wetland and prairie restoration efforts at Glacial Ridge. This information will be used to guide future restoration efforts throughout the state and beyond.

Project due to be completed: 6/30/2016

Evaluation of Lake Superior Water Quality Health

Subd. 05f \$600,000 TF

Erik Brown

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Web: <http://www.d.umn.edu/llo>

RESEARCH

Appropriation Language

\$600,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to evaluate impacts to Lake Superior from a changing thermal structure and invasive species in order to implement lake water quality management strategies. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Lake Superior, the world's largest freshwater lake by surface area, is amongst Minnesota's greatest natural resources providing drinking water, shipping, recreation, and tourism. Recently the lake has been undergoing significant changes including increasing water temperatures, decreasing ice cover, increasing nutrient loads, decreasing biological productivity, increasing invasive species, and changes in species abundance and distribution. The reasons behind these changes and the interactions amongst them are not well understood. Scientists at the Large Lakes Observatory at the University of Minnesota - Duluth are using this appropriation to gather critical baseline data on Lake Superior to evaluate the impacts these changes are having on the lake and how natural resource managers and scientific and regulatory entities can best respond to the changes. No prior large lake study has ever included the breadth of measurements, geographic range, and span of seasons to be examined by this study.

Project due to be completed: 6/30/2016

Membranes for Wastewater-Generated Hydrogen and Clean Water

Subd. 05g \$246,000 TF

Paige Novak

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Web: <http://personal.ce.umn.edu/~novak/>

RESEARCH

Appropriation Language

\$246,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to develop, optimize, and test membranes made of thin film polymers embedded with selected bacteria to generate clean water and energy in the form of hydrogen from wastewater. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Waste streams often contain unutilized resources that if properly extracted or otherwise utilized could be used to provide additional sources of renewable energy or other benefits. Wastewater is one of the primary candidate waste streams because of its nutrient content and researchers have been developing technologies such as microbial fuel cells and algal-based biofuel production in order make use of these nutrients. Researchers at the University of Minnesota are using this appropriation to develop, test, and optimize another new technology that can be used to extract energy from wastewater, specifically a polymer membrane embedded with select bacteria that could be used to simultaneously improve wastewater treatment while generating renewable energy in the form of hydrogen. If effective the technology is likely to be scalable with broad application potential for use with any biodegradable liquid waste stream.

Project due to be completed: 6/30/2016

Antibiotics in Minnesota Waters - Phase II - Mississippi River

Subd. 05h \$203,000 TF

Kristine Wammer

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St. Paul, MN 55105

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Web: <http://www.stthomas.edu/chemistry/faculty/wammer.htm>

RESEARCH

Appropriation Language

\$203,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with the University of St. Thomas to measure antibiotic concentrations and antibiotic resistance levels and assess the contributions of farm runoff and wastewater treatment in a portion of the Mississippi River. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

The occurrences of contaminants including antibiotics, other pharmaceuticals, and personal care products in the environment have gained increasing attention in recent years because of their potential health and ecological impacts. However, serious gaps remain in our understanding of these contaminants and the significance of the threats they may pose, such as to drinking water. Through this

appropriation scientists at the University of St. Thomas, Gustavus Adolphus College, and the University of Minnesota will continue work focused on the threats posed by antibiotics to understand which antibiotics are of the most concern - for example, because of their potential to increase antibiotic resistance - and to delineate their urban and rural sources. The first phase focused on antibiotics in the Minnesota River and this phase will focus on the Mississippi River. Findings will help develop strategies to manage threats and minimize future impacts posed by antibiotics to human and ecological health.

Project due to be completed: 6/30/2015

Subd. 06 Aquatic and Terrestrial Invasive Species

An Aquatic Invasive Species Research Center

Subd. 06a \$8,700,000 TF

Susan M. Galatowitsch

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2003 Upper Buford Circle
Saint Paul, Minnesota 55108

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Web: <http://fwcb.cfans.umn.edu/Faculty/Galatowitsch/index.htm>

RESEARCH

Appropriation Language

\$4,350,000 the first year and \$4,350,000 the second year are from the trust fund to the Board of Regents of the University of Minnesota to develop and support an aquatic invasive species (AIS) research center at the University of Minnesota that will develop new techniques to control aquatic invasive species including Asian carp, zebra mussels, and plant species. This appropriation is available until June 30, 2019, by which time the project must be completed and final products delivered.

Project Overview

Aquatic invasive species pose critical ecological and economic challenges for the entire state and beyond. They can cause irreparable harm to fisheries and aquatic habitat as well as damage to infrastructure. The problems posed by aquatic invasive species continue to grow as existing infestations expand and new exotic species arrive, most of which are poorly understood. New ideas and approaches are needed to develop real solutions. In 2012 the Minnesota Legislature provided the University of Minnesota with \$3,800,000 (\$2,000,000 from the Environment and Natural Resources Trust Fund; \$1,800,000 from the Clean Water Fund) to launch a new, first-of-its-kind research center specifically focused on developing and implementing solutions to control aquatic invasive species. This appropriation provides this new center with additional initial operating funds for conducting research aimed at slowing the spread, reducing, controlling, and/or eradicating aquatic invasive species including Asian carp, zebra mussels, Eurasian watermilfoil, and more. Proven tools and techniques developed at the center are intended to be implemented statewide.

Project due to be completed: 6/30/2019

Detection and Monitoring of Asian Carp Populations

Subd. 06b \$540,000 TF

Bradford Parsons

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Appropriation Language

\$540,000 the first year is from the trust fund to the commissioner of natural resources to accelerate a search and monitoring program directly targeting Asian carp to be used in the development of potential control strategies.

Project Overview

Asian carp pose a real and serious threat to Minnesota's aquatic ecosystems. While there are a few instances of individual carp being found in Minnesota waters, including the Mississippi and St. Croix Rivers, it is not presently believed that there are significant established populations in the state. In order to quickly and effectively respond to threats posed by Asian carp in the future, though, detailed information about the fish themselves is needed. The DNR is using this appropriation to establish an aggressive search and monitoring program directly targeting Asian carp to determine existing distribution and abundance, measure current reproductive success, and evaluate impacts on native fish populations. The information will inform rapid response efforts aimed at control and removal of Asian carp as they emerge.

Project due to be completed: 6/30/2015

Improving Emerald Ash Borer Detection Efficacy for Control

Subd. 06c \$600,000 TF

PART A (\$240,000)

Mark Abrahamson

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PART B (\$360,000)

Brian Aukema

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Appropriation Language

\$600,000 the first year is from the trust fund to evaluate and implement options for effective detection of the presence of emerald ash borer. Of this appropriation, \$240,000 is to the commissioner of agriculture and \$360,000 is to the Board of Regents of the University of Minnesota. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

The Emerald Ash Borer (EAB) is an invasive insect that has been decimating ash trees throughout the Great Lakes states. It was first discovered in Minnesota in 2009 and is now found in four counties (Hennepin, Houston, Ramsey, and Winona). EAB poses a particularly serious threat to Minnesota because it is home to nearly 1 billion ash trees that occur throughout the state - the second most of any state. Loss of these trees would devastate ecosystems throughout Minnesota and have major economic impacts for the forest products industry as well as through the costs associated with treatment, removal, and replacement of lost trees. Much work has already been done to stem the spread of EAB in Minnesota, including education, quarantine, detection surveys, and biological control efforts. Effective detection remains a key obstacle, though, as current detection tools have not been calibrated to estimate population densities. The Minnesota Department of Agriculture and the University of Minnesota are using this appropriation to attempt to fill this critical information gap necessary for best determining how and where to implement control measures. The effort will evaluate a range of detection tools and measure their ability to detect EAB at different population densities in order to improve and implement better detection practices.

Project due to be completed: 6/30/2016

Elimination of Target Invasive Plant Species

Subd. 06d \$350,000 TF

Monika Chandler

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Web: <http://www.mda.state.mn.us/plants/badplants/noxiouslist.aspx>

Appropriation Language

\$350,000 the first year is from the trust fund to the commissioner of agriculture to train volunteers and professionals to find, control, and monitor targeted newly emergent invasive species. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

New invasive plant species continue to emerge in Minnesota and will pose ongoing threats to Minnesota's economy, ecology, and environment if able to spread across the state. It is cheapest, easiest, and least harmful to find and control small populations of invasive plants before they become widespread. The Minnesota Department of Agriculture is using this appropriation to increase the state's

flexibility and rapid response to newly emergent terrestrial invasive plant species by training professionals and volunteers to find, control, and monitor certain invasive plants that presently exist only as small, isolated populations in the state. Targeted species include Dalmatian toadflax (NW MN), cutleaf teasel (various isolated areas of state), Japanese hops (SW MN), Oriental bittersweet (Areas along St. Croix and Mississippi Rivers), and Grecian foxglove (Washington County).

Project due to be completed: 6/30/2016

Biological Control of Garlic Mustard

Subd. 06e \$140,000 TF

Laura Van Riper

MN DNR

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St. Paul, MN 55155

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Web: <http://www.mndnr.gov/invasives>

RESEARCH

Appropriation Language

\$140,000 the first year is from the trust fund to the commissioner of natural resources in cooperation with the University of Minnesota to continue the implementation of biological control for invasive garlic mustard plants. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Garlic mustard is a non-native, invasive plant species that is severely threatening native plant communities and degrading wildlife habitat in forest and riparian zones throughout the state. The plant is considered the highest priority species for development of long-term management solutions such as biological control, which involves using natural enemies of a non-native species from its native region to control or reduce the impact of the species in the areas where they are invasive. Introducing one non-native species to control another, though, is something that must be done with care so that the introduction does not have unintended consequences. This appropriation is enabling the Minnesota Department of Natural Resources and the University of Minnesota to continue ongoing research and evaluation of biological control options for garlic mustard. With this phase the aim is to be able to release multiple biological control inserts and monitor their effectiveness.

Project due to be completed: 6/30/2016

Zebra Mussel Control Research and Evaluation in Minnesota Waters

Subd. 06f \$600,000 TF

Mark Gaikowski

US Geological Survey, Upper Midwest Environmental Sciences Center

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LaCrosse, WI 54603

Phone: (608) 783-6451
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Web: <http://www.umesc.usgs.gov/>

RESEARCH

Appropriation Language

\$600,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with the United States Geological Survey, Upper Midwest Environmental Sciences Center, to assess the ecological impacts of a commercially available molluscicide formulation on the reproduction and development of native fish, as well as impacts on larval aquatic insect survival, and to evaluate the effectiveness of these treatment options for detection and control of zebra mussels. The United States Geologic Survey is not subject to the requirements in Minnesota Statutes, section 116P.10. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Zebra mussels are an aquatic species that are invasive in Minnesota and severely threaten native fish and other aquatic species by disrupting food webs and damaging spawning habitat. Their range continues to expand within Minnesota lakes and rivers, where they are spread through the transporting of water, vegetation, or equipment from an infested water body. Once established zebra mussels are very difficult to control and there is an immediate need for safe and effective control measures to reduce their impacts in the state. Scientists at the United States Geological Survey are using this appropriation to assess the ecological impacts of a commercially available molluscicide formulation (Zequanox) showing some promise for the control of zebra mussels. Findings will be used to determine the extent to which this product can and should be used in Minnesota waters and, if so, to optimize treatment protocols and techniques to maximize zebra mussel control while minimizing undesirable impacts.

Project due to be completed: 6/30/2015

Controlling Terrestrial Invasive Plants with Grazing Animals

Subd. 06g \$52,000 TF

John Beckwith

Hiawatha Valley Resource Conservation and Development, Inc.
6584 134th Ct
Apple Valley, MN 55124

Phone: (612) 599-5864
Email: john.e.beckwith@gmail.com

Appropriation Language

\$52,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with Hiawatha Valley Resource Conservation and Development, Inc. to develop cost effective best management practices to control invasive terrestrial species through planned grazing. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

Terrestrial invasive plants such as buckthorn, wild parsnip, garlic mustard, and others are becoming widespread threats throughout many sites in Minnesota. Present chemical and mechanical control methods tend to be costly, effective only in the short-term, or have other negative environmental impacts. However, an alternative practice of using grazing animals for invasive species management is used successfully in many parts of the western United States. Grazing animals can help put target plant species at a competitive disadvantage if plants are grazed at times when they are most vulnerable in order to prevent flower and seed production. The Hiawatha Valley Resource Conservation & Development Council is using this appropriation to develop and demonstrate cost effective and environmentally friendly best management practices for using grazing as a component of invasive species management in Minnesota.

Project due to be completed: 6/30/2017 [Extended in M.L. 2014, Chapter 226]

Subd. 07 Environmental Education

Minnesota Conservation Apprentice Academy

Subd. 07a \$186,000 TF

Jenny Gieseke

Board of Water and Soil Resources
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St. Paul, MN 55155

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Web: <http://www.bwsr.state.mn.us>

Appropriation Language

\$186,000 the first year is from the trust fund to the Board of Water and Soil Resources in cooperation with the Conservation Corps Minnesota to continue a program to train and mentor future conservation professionals by providing apprenticeship service opportunities with soil and water conservation districts.

Project Overview

Many of the most experienced conservation practitioners at local soil and water conservation districts throughout the state are nearing retirement, and with their departure will go much of their practical, on-the-ground knowledge, experience, and skills. Meanwhile, college students seeking to be the next generation of conservation practitioners have knowledge of emerging technologies and other innovations that can improve and contribute to current conservation efforts. Through this appropriation the Minnesota Board of Soil and Water Resources will work with the Minnesota Conservation Corps to continue a program that places students in apprenticeship positions with county soil and water conservation district offices throughout the state. This unique program provides an opportunity for interns to gain valuable in-the-field experience from current practitioners while sharing their knowledge with those practitioners about the newest ideas and solutions for meeting today's natural resource challenges.

Project due to be completed: 6/30/2015

Youth Outdoors: Mississippi River Education and Employment Opportunities

Subd. 07b \$450,000 TF

Chad Dayton

Wilderness Inquiry
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Minneapolis, MN 55414

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Email: chad@wildernessinquiry.org

Web: <http://www.wildernessinquiry.org>

Appropriation Language

\$450,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with Wilderness Inquiry to provide outdoor education, recreation, and youth employment on the Mississippi River from Grand Rapids to St. Cloud, the Twin Cities, Hastings, and Red Wing. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Project Overview

There has been a sharp decline in participation in outdoor recreation and education amongst youth, particularly in urban areas. Some argue that youth who have meaningful outdoor education experiences are more likely to become engaged in environmental stewardship and invested in outdoor resources as adults. Wilderness Inquiry - in partnership with state and federal agencies, non-profits, and local school districts - is using this appropriation to expand an environmental education and recreation program that provides youth with hands-on educational and recreational experiences of the Mississippi River. Funds enable the program to offer canoe experiences to an additional 6,000 youth and to expand the types of experiences provided to include overnight camping, aquatic sampling and monitoring, and conservation-related internships. The program is also expanding geographically to serve additional communities in the Twin Cities and outstate, including Grand Rapids, St. Cloud, Hastings, and Red Wing.

Project due to be completed: 6/30/2016

Subd. 08 Administration and Contract Management

Legislative-Citizen Commission on Minnesota Resources

Subd. 08a \$990,000 TF

Susan Thornton

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Web: <http://www.lccmr.leg.mn>

Appropriation Language

\$990,000 the first year is from the trust fund to the LCCMR for administration in fiscal years 2014 and 2015 as provided in Minnesota Statutes, section 116P.09, subdivision 5.

Project Overview

Per M.S. 116P.09, up to 4% of the amount available for appropriation from the Environment and Natural Resources Trust Fund (ENRTF) for a biennium is available for expenses related to LCCMR administration. These expenses include the LCCMR's project selection and approval process and its ongoing oversight of projects funded by the ENRTF, including both new projects funded during the biennium and existing projects funded in previous bienniums. Historically, LCCMR has always used less than 3% of available funds for administration. This appropriation, which represents 1.46% of the amount available for the biennium, funds LCCMR administration expenses for FY 2014-15.

Project due to be completed: 6/30/2015

Contract Management

Subd. 08b \$135,000 TF

Amanda Graeber

Organization: MN DNR

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Web: <http://www.dnr.state.mn.us>

Appropriation Language

\$135,000 the first year is from the trust fund to the commissioner of natural resources at the direction of the Legislative-Citizen Commission on Minnesota Resources for expenses incurred for contract agreement reimbursement for the agreements specified in this section. The commissioner shall provide documentation to the Legislative-Citizen Commission on Minnesota Resources on the expenditure of these funds.

Project Overview

Appropriations to non-state entities must be made through a formal contract with a state entity that manages all of the funds for the project on a reimbursement basis. This appropriation to Minnesota's Department of Natural Resources (DNR) funds the expenses incurred by the DNR in contracting, contract management, and expense re-imbursement for most of the Environment and Natural Resources Trust Fund appropriations made to non-state entities, including both new projects funded during the biennium and existing projects funded in previous bienniums.

Project due to be completed: 6/30/2015

[Work Plan](#) (PDF)

- 2. FY2015 - MN Laws 2014, Chapter 226, Section 2
and
MN Laws 2014, Chapter 312, Section 8**

2014 ENVIRONMENT AND NATURAL RESOURCES TRUST FUND APPROPRIATIONS

M.L. 2014: Chapter 226, Section 2 & Chapter 312, Section 8

Process for M.L. 2014 Appropriations

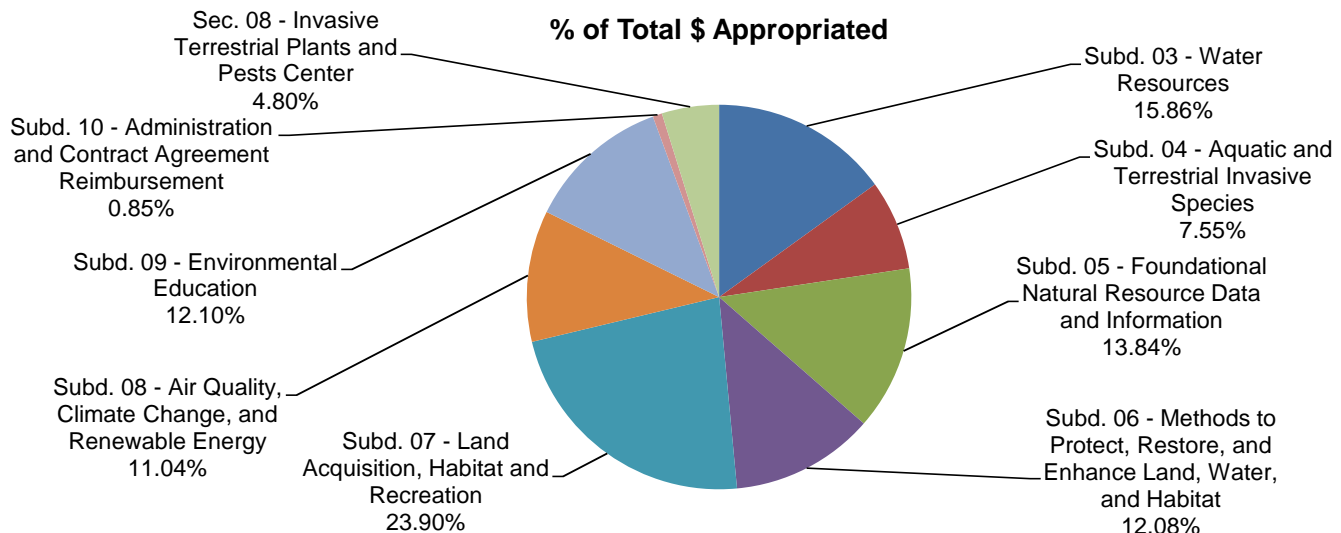
For the FY 2014 and FY 2015 biennium (July 1, 2013 - June 30, 2015), approximately \$33.8 million is available each year (Total = \$67,620,000) for funding from the Environment and Natural Resources Trust Fund. The FY 2014 funds and a portion of the FY 2015 funds were appropriated during M.L. 2013 and approximately \$29.6 million remained available for FY 2015. In response to the 2014 Request for Proposal (RFP) - for the FY 2015 funds beginning July 1, 2014 - 192 proposals requesting a total of approximately \$111 million were received. Through a competitive, multi-step process, 94 of these proposals, requesting a total of approximately \$59 million, were chosen to present to the LCCMR and 71 of those proposals were selected to receive a recommendation for funding to the 2014 MN Legislature. The Legislature adopted all 71 of these project recommendations and they were signed into law by the Governor on 05/09/14. The Legislature added one additional appropriation and it was signed into law by the Governor on 05/20/14.

February 18 & 25, 2013	2014 Funding Priorities Determined and RFP Adopted
March 3, 2013	2014 RFP Issued
June 7, 2013	2014 RFP Proposal Deadline (192 Proposals totaling \$111,455,013 received)
September 18, 2013	2014 Selection of Proposals for Presentations (94 proposals totaling \$58,751,605 selected)
October 1, 2, 3, 15, 16, & 17, 2013	2014 Proposal Presentations (6 Days)
October 22-23, 2013	2014 Allocations Recommendations (2 days)
November 2013 - February 2014	Research Projects Recommended Undergo Peer Review
December 10, 2013	M.L. 2014 Appropriation Language Review & Adoption
May 7 & 16, 2014	Appropriations adopted by MN Legislature
May 9 & 20, 2014	Appropriations signed into law by Governor
June 4, 2014	Project work plans approved by LCCMR
July 1, 2014	Projects can begin.

Summary of Appropriations by Subdivision/Section

Subdivision/Section	\$ Appropriated	# Appropriations
Chapter 226		
Subd. 03 - Water Resources	\$4,579,000	13
Subd. 04 - Aquatic and Terrestrial Invasive Species	\$2,298,000	6
Subd. 05 - Foundational Natural Resource Data and Information	\$4,210,000	14
Subd. 06 - Methods to Protect, Restore, and Enhance Land, Water, and Habitat	\$3,675,000	11
Subd. 07 - Land Acquisition, Habitat and Recreation	\$6,923,000	6
Subd. 08 - Air Quality, Climate Change, and Renewable Energy	\$3,360,000	9
Subd. 09 - Environmental Education	\$3,681,000	9
Subd. 10 - Administration and Contract Agreement Reimbursement	\$244,000	3
Chapter 312		
Sec. 08 - Invasive Terrestrial Plants and Pests Center	\$1,460,000 *	1
TOTAL	\$30,430,000	72

*NOTE: Sec. 08 includes \$970,000 from an unused balance of a project appropriation made in ML 2011.



2014 ENVIRONMENT AND NATURAL RESOURCES TRUST FUND APPROPRIATIONS

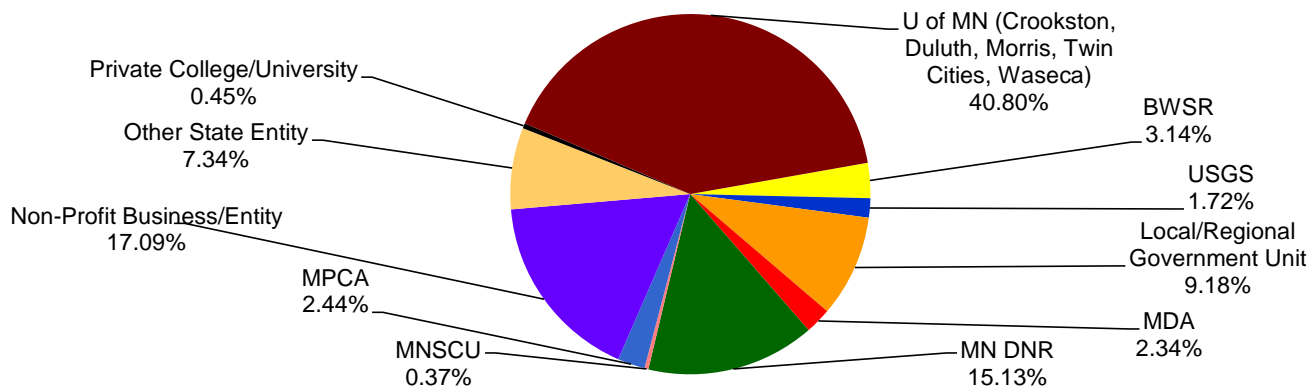
M.L. 2014: Chapter 226, Section 2 & Chapter 312, Section 8

Summary of Appropriations by Proposer Affiliation*

Affiliation Type	\$ Appropriated	# Appropriations
MN Board of Water and Soil Resources (BWSR)	\$957,000	3
U.S. Geological Survey (USGS)	\$523,000	2
Local/Regional Government Unit	\$2,792,000	5
MN Department of Agriculture (MDA)	\$713,000	2
MN Department of Natural Resources (MN DNR)	\$4,605,000	7
MN State Colleges and Universities (MNSCU)	\$112,000	1
MN Pollution Control Agency (MPCA)	\$743,000	1
Non-Profit Business/Entity	\$5,201,000	16
Other State Entity	\$2,234,000	4
Private College/University	\$136,000	1
University of MN [Crookston, Duluth, Morris, Twin Cities, Waseca]	\$12,414,000	30
TOTAL	\$30,430,000	72

*Dollar amounts based on project manager affiliation listed in the proposal; some proposals have multiple partners with multiple affiliations and dollars requested distributed between them.

% of Total \$ Appropriated by Proposer Affiliation



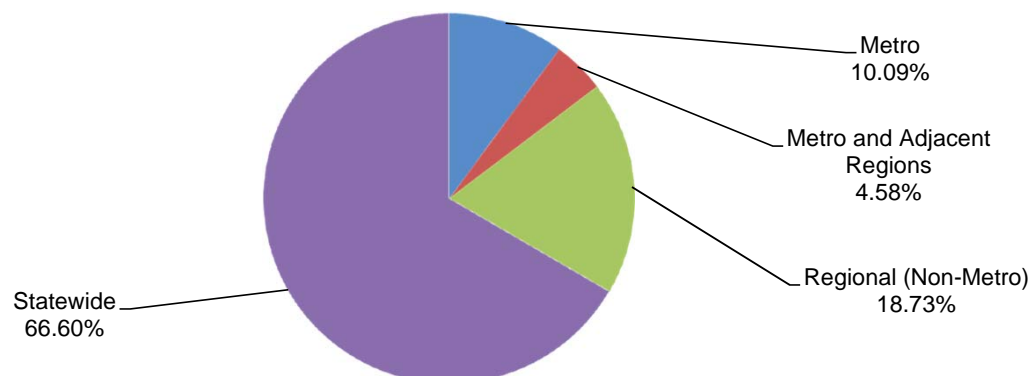
Summary of Appropriations by Area of Impact

Area of Impact	\$ Appropriated	# Appropriations
Metro*	\$3,070,000	4
Metro and Adjacent Regions	\$1,393,000	2
Regional (Non-Metro)**	\$5,701,000	18
Statewide	\$20,266,000	48
TOTAL	\$30,430,000	72

* "Metro" region includes the 11 counties of Anoka, Carver, Chisago, Dakota, Hennepin, Isanti, Ramsey, Scott, Sherburne, Washington, and Wright.

** "Regional" means area of impact is less than "Statewide" but includes one or more regions of the state ("Northwest", "Northeast", "Central", "Southwest", or "Southeast") other than the 11-county "Metro" region.

% of Total \$ Appropriated by Area of Impact





ENVIRONMENT AND NATURAL RESOURCES TRUST FUND
M.L. 2014 Appropriations: Chapter 226, Section 2 & Chapter 312, Section 8
SUMMARY OF M.L. 2014 APPROPRIATIONS BY SUBDIVISION (\$30,430,000)

CHAPTER 226, SECTION 2

SUBD. 3. Water Resources: \$4,579,000 – 13 Appropriations

- Research and analysis initiatives pertaining to wastewater treatment systems and water contaminants – including pesticides, pharmaceuticals, estrogenic compounds, nutrients, and antibiotics – in order to optimize treatment methods for improved protection of water quality and human and aquatic ecosystem health.
- Evaluation of existing land and water management practices to determine their long-term effectiveness in reducing sediment and nutrient loads, managing water flow, and protecting aquatic wildlife.
- Development and testing of methods to improve and enhance groundwater management practices.
- Assessment of the undetermined causes of exceptionally high mercury levels in certain watersheds within the state to guide further mercury reduction efforts.
- Design, installation, and monitoring of a pilot system for reusing rainwater to economically produce chilled water and help identify other potential applications for rainwater reuse systems.
- Training and technical assistance to develop and implement local water quality improvement projects.

SUBD. 4. Aquatic and Terrestrial Invasive Species: \$2,298,000 – 6 Appropriations

- Development and assessment of techniques and technologies for detecting, impeding, and managing invasive carp species, including optimizing existing dam infrastructure to act as barriers and creating systems that exploit carp physiology and behavior to control them.
- Development and implementation of a pilot locally-based, regional-scale aquatic invasive species prevention program intended to provide a model for other regions of the state.
- Surveying, monitoring, and biological control evaluation and implementation for established invasive species including emerald ash borer and brown marmorated stink bug.
- Surveying and analysis pertaining to mountain pine beetle, an invasive species not yet established in Minnesota, to understand the risks it poses to the state's forests and inform actions that can be taken should it become established in the future.

SUBD. 5. Foundational Natural Resources Data and Information: \$4,210,000 – 14 Appropriations

- Collection, analysis, mapping, and dissemination of foundational data and information pertaining to statewide land cover and population distributions of species including pollinators, birds, and native freshwater mussels.
- Development and testing of processes and systems for inventorying spring resources statewide and modernizing and making accessible public drainage records.
- Compilation and analysis of existing historical datasets on Minnesota species, ecosystems, and forest resources for comparison with recent data to identify changes, improve understanding of trends and ecological vulnerabilities, and inform future natural resource management strategies.
- Research and analysis pertaining to declining Minnesota moose populations, native butterfly species, native freshwater mussel species, and loon and pelican populations impacted by the Deepwater Horizon oil spill.
- Surveying and profiling of Minnesota plant species for a public oriented plant identification reference website.

SUBD. 6. Methods to Protect/Restore/Enhance Land, Water & Habitat: \$3,675,000 – 11 Appropriations

- Surveying, research, and analysis pertaining to pollinators and pollinator decline, including establishment of a long-term pollinator research program initiative, identification of strategies for increasing and promoting pollinator habitat, and assessment of the role of systemic pesticides in pollinator decline.
- Collection, research, and analysis efforts to promote long-term prairie sustainability.
- Development of a watershed protection plan for southeast Minnesota.
- Restoration and enhancement efforts including habitat restoration in the greater metropolitan area and demonstration and training of restoration techniques in northeastern Minnesota.
- Evaluation of a variety of novel approaches to addressing various natural resource related challenges with aims including excess nutrient capture from waterways, biofuel feedstock generation, wetland habitat management, and mineland restoration using waste reutilization.
- Expansion and enhancement of an innovative demonstration aquaponics facility.

SUBD. 7. Land Acquisition, Habitat and Recreation: \$6,923,000 – 6 Appropriations

- Protection and restoration of priority, high quality, and unique lands within Minnesota's Scientific and Natural Area system through acquisition, restoration, and related conservation efforts involving citizen engagement.
- Expansion of outdoor recreational opportunities through acquisition of lands for parks in the Metropolitan Regional Parks System and a St. Croix river park, development of lands for a park and a trail in southwestern Minnesota, and development of segments of the Mesabi Trail in northern Minnesota.

SUBD. 8. Air Quality, Climate Change, and Renewable Energy: \$3,360,000 – 9 Appropriations

- Research, analysis, planning, and demonstration pertaining to renewable energy production technologies involving solar, geothermal, waste product reutilization, and biofuels.
- Analysis of agricultural systems and technologies to develop strategies for reducing fossil fuel usage and increasing local energy production, particularly in rural areas.

SUBD. 9. Environmental Education: \$3,681,000 – 9 Appropriations

- Delivery of environmental education, technical assistance, and training to students, particularly youth that are under-represented in natural resource professions and outdoor participation, through a variety of mentoring, internships, action projects, and focused, place-based outdoors experiences.
- Development and delivery of environmental education to communities and schools pertaining to pollinators, wolves, raptors, and climate change.

SUBD. 10. Administration and Contract Agreement Reimbursement: \$244,000 – 3 Appropriations

- ENRTF project records system upgrade and project contract agreement reimbursement by DNR.

CHAPTER 312, SECTION 8

SEC. 8. Invasive Terrestrial Plants and Pests Center: \$1,460,000 – 1 Appropriation

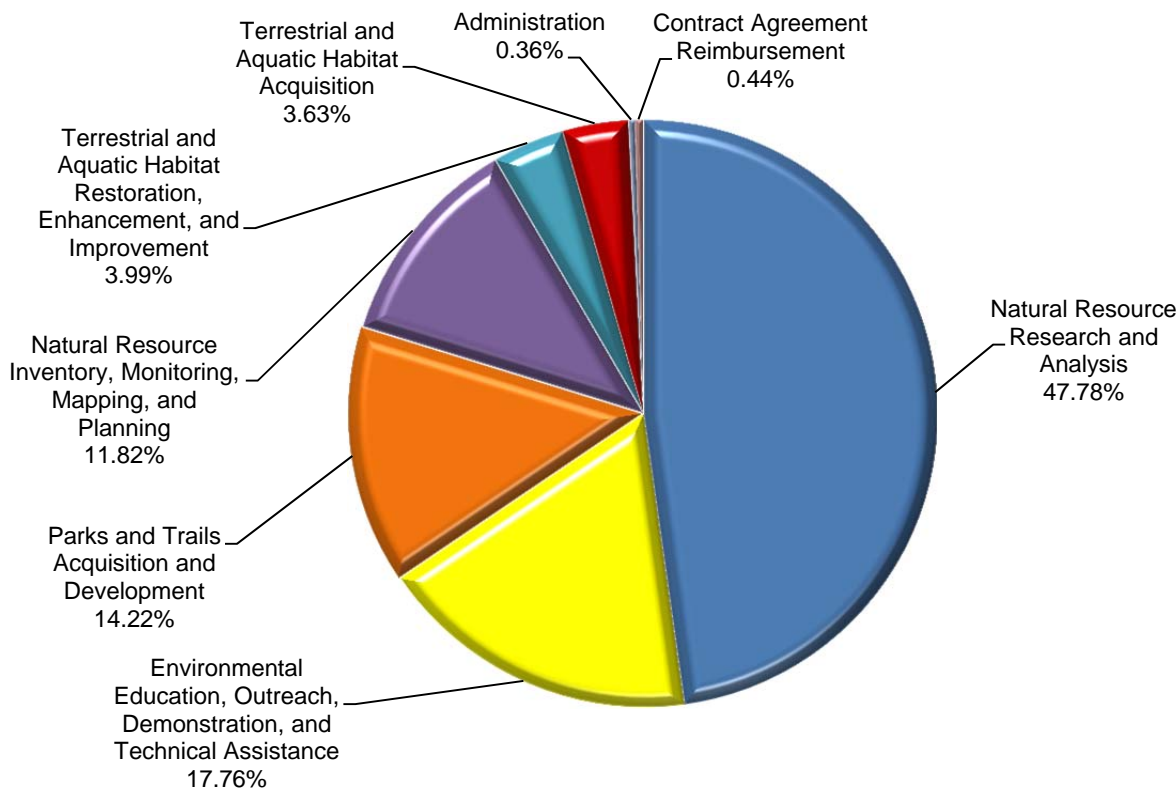
- Establish and support a new research center at the University of Minnesota dedicated to developing and implementing techniques for preventing and minimizing threats posed by terrestrial invasive species.



SUMMARY OF EXPECTED OUTCOMES ACROSS SUBDIVISIONS FOR ~\$30.4 MILLION

- Natural Resource Research and Analysis: ~\$14.6 million**
Research and analysis projects that will advance our knowledge about and provide strategies and recommendations for addressing issues relating to aquatic and terrestrial invasive species control; water quality and conservation; land management; wastewater treatment; species management, protection, decline, and recovery; alternative agricultural practices; waste product utilization; and renewable energy production.
- Environmental Education, Outreach, Demonstration, and Technical Assistance: ~\$5.4 million**
Environmental education, outreach, demonstration, and technical assistance efforts that will engage and educate Minnesotans on topics including aquatic invasive species, climate change, ecology, plant and wildlife species, pollinators, and habitat conservation; outreach to engage under-represented and under-served students and communities in outdoor education and natural resource professions; pilot and demonstrate options for renewable energy production and rainwater reuse; and provide training and technical assistance on water quality improvement, renewable energy and energy conservation, and natural resource conservation and management tools, practices, and options.
- Parks and Trails Acquisition and Development: ~\$4.3 million**
Acquisition of an estimated 255 acres to expand parks in the Metropolitan Regional Park System and a St. Croix river park in the metropolitan area, expand and develop a local park and a local trail in southwestern Minnesota, and design and construct segments of a regional trail in northern Minnesota.
- Natural Resource Inventory, Monitoring, Mapping, and Planning: ~\$3.6 million**
Inventory, monitoring, mapping, and planning efforts to obtain critical information and guide relevant decisions and efforts over time, including updating the statewide land cover map; completing the MN Breeding Bird Atlas; surveying for population distributions of pollinators and imperiled species; planning and development of data management systems for inventorying state spring resources and public drainage system records; collection and assembly of historic datasets of statewide forest inventories and phenology records; monitoring and evaluation of habitat restoration methods; collection and long-term storage of prairie plant seeds; planning and monitoring for the state's Scientific and Natural Areas program; local planning efforts pertaining to renewable energy, recreation, watershed protection, and invasive species management; detection and monitoring of invasive species including emerald ash borer, mountain pine beetle, and brown marmorated stink bugs.
- Terrestrial and Aquatic Habitat Restoration, Enhancement, and Improvement ~\$1.2 million**
Restoration, enhancement, and improvement activities on an estimated 1,440 acres. Activities performed will include prescribed burning, soil preparation, seeding, native vegetation installation, woody encroachment removal, invasive species control, and monitoring and evaluation.
- Terrestrial and Aquatic Habitat Acquisition: ~\$1.1 million**
Acquisition of an estimated 240 acres in fee title. Permanently protected areas will include forests, prairie, blufflands, wetlands, shorelands, and other habitat.
- Contract Agreement Reimbursement: ~\$100 thousand**
Administering of contract agreement reimbursement for projects of non-state entities.
- Administration: ~\$100 thousand**
Upgrade and modernization of ENRTF project records management system containing over 50 years of data on more than 1,800 appropriations representing nearly \$800 million in total appropriations and used to manage an annual average of over 250 open appropriations totaling over \$100 million in appropriations.

% OF EXPECTED OUTCOMES ACROSS SUBDIVISIONS



M.L. 2014 Projects

[MN Laws 2014, Chapter 226](#), Section 2 (beginning July 1, 2014)

[MN Laws 2014, Chapter 312](#), Article 12, Section 8 (beginning July 1, 2014)

For the Minnesota's FY 2014-15 biennium (July 1, 2013 - June 30, 2015), approximately \$33.8 million was available each fiscal year (Total = \$67,620,000) for funding from the Environment and Natural Resources Trust Fund. In response to the 2014 Request for Proposal, 192 proposals requesting a total of approximately \$111 million were received. Through a competitive, multi-step process 94 of these proposals, requesting a total of \$58.7 million, were chosen to present to the LCCMR and 71 of those proposals, totaling \$29 million, were chosen to receive a recommendation for funding to the 2013 MN Legislature. The Legislature adopted all 71 of these project recommendations and they were signed into law by the Governor on 05/09/14. The Legislature added one additional project and it was signed into law by the Governor on 05/20/14. For 2014 a total of 72 appropriations will be receiving \$30,430,000.

NOTE: For all projects, [contact us](#) to obtain the most up-to-date work programs for current projects (project updates are required twice each year) or the final reports of completed projects.

When available, we have provided links to web sites related to the project. The sites linked to this page are not created, maintained, or endorsed by the LCCMR office or the Minnesota Legislature.

M.L. 2014, Chapter 226, [Section 2 Appropriations](#)

M.L. 2014, Chapter 312, [Section 8 Appropriations](#)

MN Laws 2014, Chapter 226, Section 2

[Subd. 03](#) Water Resources

- [03a](#) Solar Driven Destruction of Pesticides, Pharmaceuticals, Contaminants in Water - **RESEARCH**
- [03b](#) Methods to Protect Beneficial Bacteria from Contaminants to Preserve Water Quality - **RESEARCH**
- [03c](#) Triclosan Impacts on Wastewater Treatment - **RESEARCH**
- [03d](#) Evaluation of Wastewater Nitrogen and Estrogen Treatment Options - **RESEARCH**
- [03e](#) Antibiotics and Antibiotic Resistance Genes in Minnesota Lakes - **RESEARCH**
- [03f](#) Impacts of Estrogen Exposure on Minnesota's Shallow Lake Wildlife - **RESEARCH**
- [03g](#) Watershed-Scale Monitoring of Long-Term Best Management Practice Effectiveness - **RESEARCH**
- [03h](#) Protection of State's Confined Drinking Water Aquifers - **RESEARCH**
- [03i](#) Watershed Water Budgets for Managing Minnesota's Groundwater - **RESEARCH**
- [03j](#) Identifying Causes of Exceptionally High Mercury in Fish - **RESEARCH**
- [03k](#) Reducing Lake Quality Impairments through Citizen Action
- [03l](#) Rainwater Reuse and Valuation Investigation
- [03m](#) Measuring Hydrologic Benefits from Glacial Ridge habitat Restoration - **RESEARCH**

[Subd. 04](#) Aquatic and Terrestrial Invasive Species

- [04a](#) Blocking Bighead, Silver, and Other Invasive Carp by Optimizing Lock and Dams - **RESEARCH**
- [04b](#) Bioacoustics to Detect, Deter and Eliminate Silver Carp - **RESEARCH**

- [04c](#) Northwest Minnesota Regional Aquatic Invasive Species Prevention Pilot
- [04d](#) Biosurveillance and Biocontrol of Emerald Ash Borer - Phase 2
- [04e1](#) Mountain Pine Beetle Invasive Threat to Minnesota's Pines
- [04e2](#) Mountain Pine Beetle Invasive Threat to Minnesota's Pines
- [04f1](#) Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation
- [04f2](#) Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation
- [Sec. 08](#) Invasive Terrestrial Plants and Pests Center - **RESEARCH**

Subd. 05 Foundational Natural Resource Data and Information

- [05a](#) Update Statewide Land Cover Use Map
- [05b](#) State Spring Inventory for Resource Management and Protection
- [05c](#) Drainage Records Modernization and Statewide Geographic Information System Database
- [05d](#) Restoring Forest Inventory Data
- [05e](#) Assessing Species Vulnerability to Climate Change Using Phenology
- [05f](#) Minnesota Breeding Bird Atlas - Final Phase
- [05g](#) Assessing Contaminants in Minnesota's Loons and Pelicans - Phase 2
- [05h](#) Sandhill Crane Populations and Management in Minnesota - **RESEARCH**
- [05i](#) Wild Bee Pollinator Surveys in Prairie-Grassland Habitats
- [05j1](#) Imperiled Prairie Butterfly Conservation, Research and Breeding Program - **RESEARCH**
- [05j2](#) Imperiled Prairie Butterfly Conservation, Research and Breeding Program
- [05k](#) Conserving Minnesota's Native Freshwater Mussels - **RESEARCH**
- [05l](#) Impacts of Forest Quality on Declining Minnesota Moose - **RESEARCH**
- [05m](#) Moose Decline and Air Temperatures in Northeastern Minnesota - **RESEARCH**
- [05n](#) Expansion of Minnesota Wildflowers Online Botanical Reference

Subd. 06 Methods to Protect, Restore, and Enhance Land, Water, and Habitat

- [06a](#) Enhancing Pollinator Landscapes
- [06b](#) Understanding Systemic Insecticides as Protection Strategy for Bees - **RESEARCH**
- [06c](#) Prairie Sustainability through Seed Storage, Beneficial Microbes, and Adaptation - **RESEARCH**
- [06d](#) Northeast Minnesota White Cedar Restoration - Phase 2
- [06e](#) Southeast Minnesota Watershed Protection Plan
- [06f](#) Upland and Shoreline Restoration in Greater Metropolitan Area
- [06g](#) Prairie, Forest, and Savanna Restoration in Greater Metropolitan Area
- [06h](#) Nutrient Capture Through Water Management and Biomass Harvesting
- [06i](#) Cattail Management for Wetland Wildlife and Bioenergy Potential
- [06j](#) Dredged Sediment for Forest Restoration on Unproductive Minelands
- [06k](#) Expansion of Greenhouse Production

Subd. 07 Land Acquisition, Habitat, and Recreation

- [07a](#) Scientific and Natural Area Acquisition, Restoration, Improvement and Citizen Engagement

- [07b](#) Metropolitan Regional Park System Acquisition
- [07c](#) Mesabi Trail Development - Soudan to Ely Segment
- [07d](#) Shoreland Acquisition on St. Croix River
- [07e](#) Martin County Park and Natural Area Acquisition
- [07f](#) Minnesota River Water Trailhead and Landing in Morton

[Subd. 08](#) Air Quality, Climate Change, and Renewable Energy

- [08a](#) Solar Cell Materials from Sulfur and Common Metals - **RESEARCH**
- [08b](#) Innovative Groundwater-Enhanced Geothermal Heat Pump Study
- [08c](#) Demonstrating Innovative Technologies to Fully Utilize Wastewater Resources - **RESEARCH**
- [08d](#) Transitioning Minnesota Farms to Local Energy
- [08e](#) Life Cycle Energy of Renewably Produced Nitrogen Fertilizers
- [08f](#) Clean Water and Renewable Energy from Beet Processing Wastewater and Manure - **RESEARCH**
- [08g](#) Next Generation Large-Scale Septic Tank Systems - **RESEARCH**
- [08h](#) Solar Photovoltaic Installation at Residential Environmental Learning Centers
- [08i](#) Itasca Community College Woody Biomass Utilization Project Design

[Subd. 09](#) Environmental Education

- [09a](#) Minnesota Conservation Apprenticeship Academy
- [09b](#) Youth-led Sustainability Initiatives in 40 Greater Minnesota Communities
- [09c](#) Urban Environmental Education Engaging Students in Local Resources
- [09d](#) Diversifying Involvement in the Natural Resources Community
- [09e](#) Educating Minnesotans about Potential Impacts of Changing Climate
- [09f](#) Pollinator Education Center at the Minnesota Landscape Arboretum
- [09g](#) Minnesota Pollinator Partnership
- [09h](#) Raptor Lab Integrating Online and Outdoor Learning Environments
- [09i](#) Wolf Management Education

[Subd. 10](#) Administration and Contract Agreement Reimbursement

- [10a](#) Contract Agreement Reimbursement
- [10b](#) Legislative Coordinating Commission Legacy Web Site
- [10c](#) Environment and Natural Resources Trust Fund (ENRTF) Project Records System Upgrade

MN Laws 2014, Chapter 312, Section 8

[Sec. 08](#) Invasive Terrestrial Plants and Pests Center - **RESEARCH**

[Funding Source:](#)

Environment and Natural Resources Trust Fund (TF)

MN Laws 2014, Chapter 226, Section 2

Subd. 03 Water Resources

Solar Driven Destruction of Pesticides, Pharmaceuticals, Contaminants in Water

Subd. 03a \$291,000 TF

William Arnold

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RESEARCH

Appropriation Language

\$291,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to quantify the solar-driven destruction of contaminants reacting with dissolved organic matter to optimize water treatment methods and guide reuse. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Pesticides, pharmaceuticals, and agricultural nutrients serve important functions in crop production and the treatment of disease. However, these chemicals become pollutants when discharged into surface waters through wastewater, storm water, and agricultural runoff. There are natural processes, though, that help break down and remove these pollutants from water. One such process is the role that sunlight interacting with dissolved organic matter naturally present in surface water from decaying plant materials and algae has in transforming these contaminants. Researchers at the University of Minnesota are using this appropriation to better understand the role this interaction between sunlight and dissolved organic matter has in affecting the fate of water pollutants in order to optimize water treatment methods and guide effective water reuse.

Project due to be completed: 6/30/2017

Methods to Protect Beneficial Bacteria from Contaminants to Preserve Water Quality

Subd. 03b \$279,000 TF

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RESEARCH

Appropriation Language

\$279,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to research how and why bacteria that provide ecological functions humans depend on for water quality are affected by exposure to certain man-made perfluorinated chemicals entering the wastewater treatment system in order to identify methods that can be implemented to protect those bacterial functions from being degraded. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Many types of bacteria perform critical ecological functions, such as cycling carbon and other nutrients, which enable life to exist. In fact, humans harness these types of bacteria in certain engineered systems, such as wastewater treatment plants and landfills, to provide various benefits such as protecting surface waters from excess nitrogen, decomposing solid waste, and treating wastewater. Unfortunately, the environments within these systems where the beneficial bacteria live are also environments that receive a complex array of synthetic chemicals that can negatively affect bacterial function, particularly when present in mixtures. One such class of chemicals that find their way into these systems is perfluorinated chemicals, which research has suggested can cause other co-contaminants to be more toxic to bacteria. Researchers at the University of Minnesota are using this appropriation to research how and why these beneficial bacteria are affected by exposure to perfluorinated chemicals entering the wastewater treatment system in order to help develop and engineer methods to better protect and enhance the important ecological functions these bacteria provide.

Project due to be completed: 6/30/2017

Triclosan Impacts on Wastewater Treatment

Subd. 03c \$380,000 TF

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RESEARCH

Appropriation Language

\$380,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to assess the role of the commercially used antibacterial agent triclosan in creating antibiotic resistant bacteria during the municipal wastewater treatment process. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

As people use antibiotics and products containing antibacterial substances the bacteria that are resistant to the effects of these products survive and reproduce, thus creating a selection for antibiotic resistant bacteria. Many of these bacteria and the antibacterial substances ultimately make their way into the waste stream and are mixed together and concentrated at wastewater treatment plants, where they interact and can create further selection for organisms with antibiotic resistance to multiple antibacterial substances resulting in what are commonly known as "super bugs". If these antibiotic

resistant organisms are not entirely removed during the wastewater treatment process, these organisms then are released into the environment where they can eventually affect humans and other species. One antimicrobial substance of particular concern is triclosan, which is present in numerous personal care products, because it has been shown to help select for organisms that show antibiotic resistance not just to triclosan but also to a multitude of other antibiotics. Researchers at the University of Minnesota are using this appropriation to improve understanding of the role of triclosan in selecting for antibiotic resistant bacteria during the municipal wastewater treatment process.

Project due to be completed: 6/30/2017

Evaluation of Wasterwater Nitrogen and Estrogen Treatment Options

Subd. 03d \$500,000 TF

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RESEARCH

Appropriation Language

\$500,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to examine the performance of new wastewater contaminant treatment options under Minnesota weather conditions in order to understand how to improve wastewater treatment of nitrogen and estrogenic compounds, decrease costs and energy use, and safeguard aquatic species. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Wastewater treatment plants discharge effluent that contains contaminants of emerging concern, such as estrogens. Estrogens have been shown to cause ecological effects such as fish feminization and fish population collapses. Presently the treatment and discharge of estrogens into the environment via wastewater treatment is not regulated. However, it has been found that the extent of estrogen discharge from wastewater treatment correlates with how and how well nitrogen, which currently is regulated and will likely be more so in the future, is removed during the treatment process. Thus more effective nitrogen removal processes have the potential to also ensure more effective removal of estrogens. Researchers at the University of Minnesota are using this appropriation to determine how different nitrogen removal processes perform under a variety of weather conditions with respect to how well they remove both nitrogen and estrogenic compounds in order to help improve wastewater treatment of nitrogen and estrogenic compounds.

Project due to be completed: 6/30/2017

Antibiotics and Antibiotic Resistance Genes in Minnesota Lakes

Subd. 03e \$300,000 TF

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RESEARCH

Appropriation Language

\$300,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to quantify the relationship between antibiotics and antibiotic-resistant bacteria in Minnesota lakes to determine if improved wastewater treatment is necessary to protect human and aquatic health. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Through various means, human produced chemicals can make their way into surface waters where they can have adverse effects on the function of ecological communities. Of particular concern are antibiotics and other antimicrobial substances because they have the potential to create increased antibiotic resistance. While there is a background level of naturally occurring antibiotic resistance in the natural world, elevated or persistent levels caused by human activities have the potential to harm human, animal, and overall ecosystem health. Researchers at the University of Minnesota are using this appropriation to quantify and compare the levels within lakes of naturally occurring antibiotic compounds versus those resulting from human actions to delineate the role of each in creating antibiotic resistant bacteria and determine the extent to which improved wastewater treatment could contribute to controlling the amount of antibiotics and antibiotic resistant genes within the environment.

Project due to be completed: 6/30/2017

Impacts of Estrogen Exposure on Minnesota's Shallow Lake Wildlife

Subd. 03f \$136,000 TF

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RESEARCH

Appropriation Language

\$136,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the University of St. Thomas to use biological samples already gathered from shallow

lakes across Minnesota to determine the environmental estrogen exposure impacts on aquatic wildlife in shallow lakes for enhanced land and lake management. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Endocrine-disrupting contaminants such as environmental estrogens have been found and studied in large lakes and streams and shown to exist at concentrations that have adverse effects on wildlife. However, very little is known about the sources and effects of environmental estrogens in small, shallow lakes. Preliminary data suggests that these compounds are present in shallow lakes and have an effect on the survival and reproduction of wildlife. Researchers at the University of St. Thomas are using this appropriation to determine the extent to which aquatic wildlife in shallow lakes are being exposed to environmental estrogens, the land-use practices that correlate with exposure, and the amount of detrimental impact that exposure creates in order to enhance land and water management practices.

Project due to be completed: 6/30/2017

Watershed-Scale Monitoring of Long-Term Best Management Practice Effectiveness

Subd. 03g \$900,000 TF

Daniel Engstrom

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RESEARCH

Appropriation Language

\$900,000 the second year is from the trust fund to the Science Museum of Minnesota for the St. Croix Watershed Research Station to evaluate the effectiveness of best management practices in reducing sediment and nutrient loads at watershed scales over long time periods. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Minnesota has widespread water quality impairments due to nonpoint-source pollution generated by agricultural, urban, and other human-altered lands. Mitigation of these impairments requires implementing best management practices (BMPs) that are designed to limit soil erosion and nutrient transport from lands to receiving waters. Long-term data sets of water quality and land-use history are needed to tease apart the many factors that affect water quality. In particular, data sets that span periods before and after BMP implementation are needed to determine BMP effectiveness. However, such data sets are lacking because water quality monitoring of our lakes and rivers did not begin until well after humans altered the landscape. To fill this data gap, Researchers at the Science Museum of Minnesota's St. Croix Watershed Research Station are using this appropriation to construct long-term historical water quality records through analysis of lake sediments in order to enable better determination of the effectiveness of BMPs on improving water quality.

Project due to be completed: 6/30/2017

Protection of State's Confined Drinking Water Aquifers

Subd. 03h \$394,000 TF

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RESEARCH

Appropriation Language

\$394,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the United States Geological Survey to test methods of defining properties of confined drinking water aquifers in order to improve water management. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

The groundwater contained in confined glacial aquifers provides clean drinking water to many Minnesota residents. An important factor affecting the long-term sustainability of these aquifers is how water infiltrates through clayey deposits of overlying glacial till, which act as barriers to contaminants but also limit water flow and aquifer recharge. Very little is actually known about the properties and infiltration of water through till, which hinders the ability to accurately define the sustainability of these aquifers. The United States Geological Survey is using this appropriation to test methods for assessing and defining the hydrologic properties of glacial till in order to understand the role it plays in the long-term sustainability of groundwater.

Project due to be completed: 6/30/2017

Watershed Water Budgets for Managing Minnesota's Groundwater

Subd. 03i \$129,000 TF

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RESEARCH

Appropriation Language

\$129,000 the second year is from the trust fund to the commissioner of natural resources for an

agreement with the United States Geological Survey to create a pilot study to calculate complete watershed water budgets for two counties in Minnesota for enhanced groundwater management. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Effective groundwater management requires accurate knowledge about the water budget, which is the amount of water stored within the system in aquifers and the amount of water flowing through the overall hydrologic system including water flowing at the surface, water flowing from above ground down into aquifers, and water flowing between aquifers below the surface. While groundwater storage can be generally well understood and there is good knowledge about surface water flow, there is not usually a strong understanding about the water flowing down from the surface to aquifers and below the surface between different aquifers. The United States Geological Survey is using this appropriation to pilot a method intended to better calculate the groundwater flow component of the hydrologic system in order to provide information that will improve knowledge about water sustainability and the interaction between surface and ground water. The method will be piloted in watersheds in St. Louis and Goodhue counties.

Project due to be completed: 6/30/2017

Identifying Causes of Exceptionally High Mercury in Fish

Subd. 03j \$743,000 TF

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RESEARCH

Appropriation Language

\$743,000 the second year is from the trust fund to the commissioner of the Pollution Control Agency to quantify the probable causes of high mercury levels in fish within the Roseau River and two tributaries of the Red River of the North by comparing mercury movements within watersheds to understand the drivers of mercury biomagnifications in the food web of rivers with similarly high mercury levels and to guide further mercury reduction initiatives. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Most mercury in Minnesota waters is deposited from the atmosphere as a byproduct of burning coal and other compounds. Once in the environment, mercury can convert to a form called methylmercury where it bioaccumulates up the food chain from microscopic plants and animals to fish and then to humans and wildlife that consume the fish. The first step in solving the problem of mercury in fish is reducing the sources of mercury entering waters. Significant efforts are underway to reduce the amount of mercury released from human sources such as smokestacks and wastewater discharge, which will address the majority of the mercury entering the environment. However, there are a percentage of

watersheds where mercury appears to have enhanced concentrations due to factors that are particular to the ecology of a watershed and not mainly driven by the amount of mercury entering the watershed. The Minnesota Pollution Control Agency is using this appropriation to better understand the probable causes of high mercury levels in fish in watersheds where atmospheric deposition alone does not account for the high mercury levels in order to determine what additional measures beyond source reduction can be taken to reduce mercury levels in those watersheds.

Project due to be completed: 6/30/2017

Reducing Lake Quality Impairments through Citizen Action

Subd. 03k \$59,000 TF

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Appropriation Language

\$59,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the Freshwater Society to train lake associations and other stakeholder groups to develop lake management plans and to implement science-based, citizen-led water quality improvement projects on impaired lakes in west central Minnesota. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Many lakes in Minnesota are classified as "impaired" for aquatic recreation and aquatic life as the result of nonpoint source pollution. These impairments can be addressed by the citizens that live by and have a vested interest in these water bodies, but there is often a lack of knowledge and resources to take effective action. The Freshwater Society is using this appropriation to train citizen groups in lake ecology and management in order to guide them in implementing water quality improvement projects for their local water bodies.

Project due to be completed: 6/30/2017

Rainwater Reuse and Valuation Investigation

Subd. 03l \$300,000 TF

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Appropriation Language

\$300,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to design, install, and monitor a rainwater reuse system for use in evaporative chiller systems and identify other potential applications for rainwater reuse systems.

Project Overview

Rainfall runoff in urban areas contributes to localized flooding and washes contaminants and excess nutrients downstream affecting water quality. Systems to mitigate these problems can be challenging to implement in urban areas due to existing infrastructure and competing demands for land use. However, one option is to find alternative applications for the excess rainwater and use it replace the potable water that is currently being used for certain purposes. Researchers at the University of Minnesota are using this appropriation to evaluate alternative uses for captured rainwater. In particular the project will design and install a rainwater reuse system for integration into evaporative chiller systems, which are common in large buildings and currently account for a significant portion of summer water usage at these sites, and examine other potential reuses for rainwater, such as for toilet flushing and industrial processes.

Project due to be completed: 6/30/2016

Measuring Hydrologic Benefits from Glacial Ridge habitat Restoration

Subd. 03m \$168,000 TF

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RESEARCH**Appropriation Language**

\$168,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the Red Lake Watershed District and the United States Geological Survey for completion of the analysis of flooding and water-quality benefits resulting from wetland and prairie restorations at Glacial Ridge National Wildlife Refuge.

Project Overview

Since 2000, a diverse group of partners has been collectively working in northwestern Minnesota on one

of the largest prairie-wetland restorations in the world. Spanning 22,000 acres and adjacent to an additional 16,000 acres of public and private conservation land, the goal of the Glacial Ridge Project has been to demonstrate whether large-scale habitat restoration is a viable way to reduce flooding and improve water quality. Prior to beginning restoration efforts on the project, a comprehensive baseline hydrologic study of the area was completed by the U.S. Geological Survey (USGS). The Red Lake Watershed District and USGS are using this appropriation to complete a post restoration study that will quantify and evaluate the amount of flood reduction, water-quality improvement, and ecosystem-function change that has resulted from the wetland and prairie restoration efforts at Glacial Ridge. This information will be used to guide future restoration efforts throughout the state and beyond.

Project due to be completed: 6/30/2016

Subd. 04 Aquatic and Terrestrial Invasive Species

Blocking Bighead, Silver, and Other Invasive Carp by Optimizing Lock and Dams

Subd. 04a \$854,000 TF

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RESEARCH

Appropriation Language

\$854,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to collaborate with the United States Army Corps of Engineers to develop ways, including new technologies, to modify the operations of Lock and Dam Numbers 2 to 8 to optimize their ability to impede invasive carp movement into the Minnesota, St. Croix, and Mississippi Rivers. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Invasive carp species, including silver carp and bighead carp, are migrating north up the Mississippi River and pose threats to the native fish and aquatic ecosystems of Minnesota rivers and lakes where they can become established. While individual carp have been found in Minnesota, it is not presently believed that there are established breeding populations in the state. Nevertheless, the only current impediments to the upstream travel of carp into Minnesota waterways are the various lock and dam systems located between the Iowa border and the Twin Cities and these systems do not create a constant barrier to carp passage. Researchers at the University of Minnesota, in cooperation with the U.S. Army Corps of Engineers, are using this appropriation to develop and test ways to modify and optimize the operations of the existing lock and dam systems in order to enhance their ability to deter and block carp passage without detrimentally affecting native fish or current lock and dam function. These efforts have the potential to delay or even prevent statewide invasion by invasive carp in Minnesota via the Mississippi River.

Project due to be completed: 6/30/2017

Bioacoustics to Detect, Deter and Eliminate Silver Carp

Subd. 04b \$262,000 TF

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RESEARCH

Appropriation Language

\$262,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota-Duluth to develop bioacoustics technology for detection and early warning systems, capture and elimination methods, and deterrent systems for silver carp. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Silver carp are migrating north up the Mississippi River and pose threats to the native fish and aquatic ecosystems of Minnesota rivers and lakes where they can become established. Additionally, the unique jumping ability of silver carp also places recreational boaters in danger of being injured during collisions with airborne fish. However, it is believed that this jumping ability could potentially be exploited as a weakness to help detect, manage, and control silver carp populations. Researchers at the University of Minnesota - Duluth, in cooperation with the U.S. Geological Survey, are using this appropriation to develop bioacoustics technologies that use sound to stimulate silver carp jumping in order to assist with strategies for detection, capture, and deterrence.

Project due to be completed: 6/30/2017

Northwest Minnesota Regional Aquatic Invasive Species Prevention Pilot

Subd. 04c \$219,000 TF

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Appropriation Language

\$219,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the Red River Basin Commission to develop aquatic invasive species prevention strategies on a watershed scale and develop materials to sustain watershed scale decision-making and

implementation. This initiative must be coordinated with the Department of Natural Resources and outdoor heritage fund activities for locally based invasive species control. Specific reporting and analysis of outcomes and findings of this alternative approach must be provided to enable duplication in other regions of the state.

Project Overview

Aquatic invasive species are a threat to the ecology and the recreational and economic viability of Minnesota's water resources. When an invasion is confined to a distinct lake or wetland, local government units will implement localized plans to address invasions. However, when a water body crosses jurisdictions, such as with river systems, to be effective a more coordinated, regional approach is necessary that is more attuned with the natural pathways for invasive species. The Red River Basin Commission is using this appropriation to pilot an effort to develop processes for addressing invasive species at a watershed scale using partnerships between local government units working collectively rather than individually. The pilot is intended to create a model for invasive species prevention that can be applied in other parts of the state.

Project due to be completed: 6/30/2016

Biosurveillance and Biocontrol of Emerald Ash Borer - Phase 2

Subd. 04d \$447,000 TF

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Appropriation Language

\$447,000 the second year is from the trust fund to the commissioner of agriculture in cooperation with the University of Minnesota to continue to monitor ash tree and emerald ash borer populations and expand the biological control implementation for emerald ash borer management. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

The Emerald Ash Borer (EAB) is an invasive insect that has been decimating ash trees throughout the Great Lake states and is currently advancing into Minnesota where it threatens the nearly 1 billion ash trees that occur throughout the state - the second most in any state. Loss of these trees would devastate ecosystems throughout Minnesota and have major economic impacts for the forest products industry as well as through the costs associated with treatment, removal, and replacement of lost trees. Biological control - the use of a natural enemy of a species from its native habitat to help with control of that species - is currently the only promising long-term management strategy for EAB. The Minnesota Department of Agriculture is using this appropriation to continue to implement and assess the effectiveness of a biocontrol method for EAB in Minnesota that involves the use of tiny, stingless wasps that are parasitoids of EAB.

Project due to be completed: 6/30/2017

Mountain Pine Beetle Invasive Threat to Minnesota's Pines

Subd. 04e \$250,000 TF

Subd. 04e1 \$175,000 TF

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Subd. 04e2 \$75,000 TF

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Appropriation Language

\$175,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota and \$75,000 the second year is from the trust fund to the commissioner of agriculture to survey for the presence and characterize the potential risk of the invasive mountain pine beetle to Minnesota's pine forests to inform early detection and rapid response. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Native to the western United States and Canada, mountain pine beetle is considered the most devastating forest insect in North America. Trees usually die as a result of infestation and an unprecedented outbreak in the west is currently decimating pine forests there. While mountain pine beetle is not presently believed to reside in Minnesota, there are risks posed by an expanding species range resulting from warming climate and the potential for accidental introduction via lumber imports from infested areas. It is estimated that Minnesota currently has about 200 million trees that would be susceptible to mountain pine beetle if it should become established here and loss of those trees would threaten wildlife habitat, water quality protection, and recreation. Researchers at the University of Minnesota and the Minnesota Department of Agriculture are using this appropriation to survey state locations for the presence of mountain pine beetle and to characterize the risk posed by the insect to Minnesota pine species. If detected early enough isolated populations of mountain pine beetle may be possible to control and a better understanding of how Minnesota's particular pine species might react to the insect would guide future management response strategies.

Project due to be completed: 6/30/2017

Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation

Subd. 04f \$266,000 TF

Subd. 04f1 \$167,000 TF

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Subd. 04f2 \$99,000 TF

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Appropriation Language

\$99,000 the second year is from the trust fund to the commissioner of agriculture and \$167,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to monitor for brown marmorated stink bugs to identify problem areas, target biocontrol efforts, and evaluate the suitability of candidate biological control agents for use in Minnesota. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Brown marmorated stink bug is a terrestrial invasive species in Minnesota that was first discovered in 2010 and has been expanding its range since. It is a generalist plant pest that attacks more than 300 species of plants in natural, agricultural, and horticultural settings and is known for its unpleasant odor, large numbers, and propensity for home invasion. Proactive management approaches are available and in development that can be used to slow and potentially control brown marmorated stink bug populations. Researchers at the Minnesota Department of Agriculture and the University of Minnesota are using this appropriation to establish a state framework for monitoring and biological control of brown marmorated stink bug; efforts will focus on identifying new infestations and potential problem locations and evaluating and implementing biological control options.

Project due to be completed: 6/30/2017

Subd. 05 Foundational Natural Resource Data and Information

Update Statewide Land Cover Use Map

Subd. 05a \$300,000 TF

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Appropriation Language

\$300,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to update Minnesota's land cover data at moderate spatial resolution statewide and at high resolution for selected areas, distribute products, and provide training. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Land and water conservation efforts require accurate information about land cover and land use. Minnesota's land cover and land use data has not been updated since 2000 and so does not reflect changes since that time resulting from growth and development, agricultural production, or landscape cover. Researchers at the University of Minnesota are using this appropriation to conduct a statewide update and enhancement of land cover and land use data and make it freely available online for use by government and non-government organizations involved in land and water conservation.

Project due to be completed: 6/30/2017

State Spring Inventory for Resource Management and Protection

Subd. 05b \$200,000 TF

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Appropriation Language

\$200,000 the second year is from the trust fund to the commissioner of natural resources to develop necessary protocols, processes, and definitions of springs along with limited field testing of inventory procedures in priority areas to enable a systematic inventory of springs statewide needed to maintain spring flows and protect groundwater-dependent resources. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Natural springs occur throughout Minnesota and provide critical services for the state, such as creating trout streams and cool water fisheries, sustaining base flows in streams, creating unique ecological habitats, and maintaining the integrity of aquatic ecosystems against invasive species. In order to protect springs and the groundwater-dependent resources that depend on them, though, it is important to understand spring locations and status - information that is currently lacking in many areas of the state. The Department of Natural Resources is using this appropriation to establish a foundation and plan to systematically inventory, assess, and monitor spring resources throughout the state.

Project due to be completed: 6/30/2017

Drainage Records Modernization and Statewide Geographic Information System Database

Subd. 05c \$230,000 TF

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Appropriation Language

\$230,000 the second year is from the trust fund to the Board of Water and Soil Resources to develop a template and Web-based geographic information system (GIS) database portal to facilitate statewide modernization of public drainage records under Minnesota Statutes, chapter 103E, and integrate new specifications into existing drainage records modernization guidelines. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

There are currently more than 21,000 miles of drainage ditches and many thousands of miles of subsurface tile located throughout Minnesota and overseen by over 100 different local drainage authorities. Historically public records of these drainage systems have been maintained primarily in hard copy following differing protocols depending on local requirements. However, this antiquated approach limits the usability and accessibility of public drainage records creating various challenges for drainage management efforts. Modernizing drainage records involves creating and cataloguing electronic copies of the records. While many drainage authorities have begun at least some level of modernization, there is still much work to be done. The Board of Water and Soil Resources is using this appropriation to establish a standardized information system to house public drainage records in a consistent manner that integrates the data with overall statewide GIS data. The system will facilitate increased accessibility and usability to drainage records and benefit water planning, modeling, and management efforts.

Project due to be completed: 6/30/2017

Restoring Forest Inventory Data

Subd. 05d \$100,000 TF

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Appropriation Language

\$100,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to obtain and restore statewide forest inventories of 1935, 1953, and 1966 to link with more recent data to improve understanding of historical forest trends and enhance long-term ecological monitoring.

Project Overview

Long-term forest plot datasets are helpful for understanding the changing conditions and ecology of forestland over time. The USDA Forest Service produced statewide forest inventories in 1935, 1953, 1962, 1977, 1990, 2003, 2008, and 2013. Unfortunately, only the data from 1977 to the present is currently easily accessible and available in full. Researchers at the University of Minnesota are using this appropriations to locate and restore important information from the 1935, 1953, and 1962 surveys and link it to the more recent data from 1977 and later to generate more detailed understandings of changes in Minnesota's forests over time. Compiling this data will be useful for examining forests in terms of climate change implications for resilience and adaptability, carbon sequestration potential, habitat and biodiversity change, and overall forest health.

Project due to be completed: 6/30/2016

Assessing Species Vulnerability to Climate Change Using Phenology

Subd. 05e \$175,000 TF

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Appropriation Language

\$175,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to compile and use historical datasets to assess change over time in the ecology of Minnesota species, identify vulnerable species, and inform management strategies for climate change. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

There is a critical need to understand how our natural resources are already responding to climate change in order to develop tools for projecting natural resource responses into the future and to devise plans for actions that can be taken in reaction to observed and predicted changes. Phenology - the timing of seasonal biological events such as budburst, flowering, bird migration, and leaf coloring - provides a tested indicator of climate change response by plants and animals. A rich source of phenology datasets exists independently throughout the state, but these datasets are not compiled in a centralized manner. Furthermore, ongoing collection of phenology data is a cost efficient task that, done in an organized manner, can continue to provide valuable long-term evidence of climate change response. Researchers at the University of Minnesota are using this appropriation to compile and analyze historical phenology datasets and to establish a statewide network to collect future phenology data. This information will be helpful in identifying plant and animal species vulnerable to climate change and enhancing adaptive management strategies, such as for maintaining forest productivity, supporting plant pollination and reproduction, and supporting efforts to maintain the integrity of wildlife and fisheries populations.

Project due to be completed: 6/30/2017

Minnesota Breeding Bird Atlas - Final Phase

Subd. 05f \$300,000 TF

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Appropriation Language

\$300,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Audubon Minnesota to complete a statewide survey of Minnesota's breeding bird distributions through final analysis, preparation, and dissemination of information collected on an ongoing basis since 2008 on breeding birds in the state. The completed atlas must be available for download from the Internet free of charge. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

A state Breeding Bird Atlas is a comprehensive systematic field survey of the occurrence, distribution, diversity, and breeding status of bird species within every region of a state. Atlases are mainly used to set conservation priorities, develop conservation plans, and guide habitat protection, restoration, and management efforts - in addition to being useful for recreational bird watching. Minnesota is one of only seven states in the country that has yet to complete a Breeding Bird Atlas. Audubon Minnesota and the Natural Resources Research Institute at the University of Minnesota - Duluth will use this appropriation to complete the Minnesota Breeding Bird Atlas. This phase involves analyzing and synthesizing over 350,000 observations collected since this effort began in 2008 and producing and disseminating related information products.

Project due to be completed: 6/30/2017

Assessing Contaminants in Minnesota's Loons and Pelicans - Phase 2

Subd. 05g \$260,000 TF

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Appropriation Language

\$260,000 the second year is from the trust fund to the commissioner of natural resources to continue to assess the potential impact of petroleum, dispersants, and heavy metal contaminants from the Deepwater Horizon oil spill in the Gulf of Mexico on the wintering habitat of Minnesota's common loons and white pelicans using radiotelemetry, geolocators, and contaminant analysis.

Project Overview

Over a three-month period in 2010, approximately five million barrels of oil was spilled into the Gulf of Mexico causing extensive damage to marine and wildlife habitats and resulting in significant losses in fish and wildlife populations. A number of Minnesota's migratory bird species spend parts of their lives in the areas impacted by the spill and impacts on their populations in the state could become evident over time. Impacts could be from immediate losses of birds that were present at the time of the spill or from cumulative negative effects resulting from contamination of the food chain by petroleum chemicals and the dispersants used on the oil. The two Minnesota species that are potentially most vulnerable are the common loon and the American white pelican; some of their young would have been present in the Gulf at the time of the spill and their behavior and feeding patterns put them at greater risk of exposure to chemicals from the spill persisting in the environment. The Minnesota Department of Natural Resources is using this appropriation to continue efforts aimed at determining whether or not common loon or American white pelican populations in Minnesota have been impacted by the Gulf oil spill. Phase one revealed that there were population losses following the spill and that a significant percentage of Minnesota loons and pelicans have been exposed to oil and dispersant contaminants, which may be having long-term effects by causing changes in behavior, migratory abilities, reproductive success, or longevity. Any impacts documented will be critical for receiving remediation funds from the Federal Natural Resource Damage Assessment (NRDA) process currently underway, and those funds could be used to help restore the populations of these two species.

Project due to be completed: 6/30/2016

Sandhill Crane Populations and Management in Minnesota

Subd. 05h \$250,000 TF

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RESEARCH

Appropriation Language

\$250,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to delineate population boundaries, habitat use relative to crop depredation, and migration patterns and survival of Minnesota's two populations of sandhill cranes, Mid-continent and Eastern. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Sandhill cranes have expanded their range in Minnesota and elsewhere and as populations have expanded several states, including Minnesota, have initiated sandhill crane hunting seasons and other states are considering doing the same. Partially this is in response to increasing complaints of crop degradation by sandhill cranes. Despite expanding populations, though, sandhill cranes remain a species of management concern and current information on population distribution and migration patterns of

sandhill cranes in Minnesota is insufficient for projecting the impact of hunting or for making informed management decisions. Researchers at the University of Minnesota are using this appropriation to conduct a survey to better understand population distributions, movement patterns, habitat usage, and survival of sandhill cranes in Minnesota in order to inform harvest and management strategies that will minimize conflict with agricultural interests.

Project due to be completed: 6/30/2017

Wild Bee Pollinator Surveys in Prairie-Grassland Habitats

Subd. 05i \$370,000 TF

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Appropriation Language

\$370,000 the second year is from the trust fund to the commissioner of natural resources to assess the current status and distribution of wild bee pollinators in prairie-grassland habitats of Minnesota.

Project Overview

Wild bees are important for their pollination services and for their contribution to species diversity; for example, many prairie-grassland plant species require pollinators for seed production. However, while the importance of plant-pollinator interactions is well recognized, there are large gaps in our knowledge of Minnesota's wild bees. The only statewide list of bee species was published in 1919 and it reported only 88 species, whereas it is currently estimated that there are approximately 350-400 native bee species in the state. The Minnesota Department of Natural Resources is using this appropriation to conduct field surveys throughout the prairie-grassland region of MN to document the diversity and distribution of wild bees and related vegetation diversity and quality in order to assess the current status of wild bees and provide a baseline for comparing to past and future data. This information will be used to refine conservation and management decisions to enhance bee pollinator populations and prairie-grassland habitat. Future efforts could further expand knowledge by extending surveys into forested and forest-transition regions of the state.

Project due to be completed: 6/30/2016

Imperiled Prairie Butterfly Conservation, Research and Breeding Program

Subd. 05j \$625,000 TF

Subd. 05j1 \$380,000 TF

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Subd. 05j2 \$245,000 TF

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RESEARCH

Appropriation Language

\$380,000 the second year is from the trust fund to the Minnesota Zoological Garden and \$245,000 the second year is from the trust fund to the commissioner of natural resources to prevent the extirpation and possible extinction of imperiled native Minnesota butterfly species through breeding, genetics and mortality research, inventory, monitoring, and public education. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

With only 1% of Minnesota's native prairie remaining, many prairie plant and animal species have dramatically declined. Of the 12 butterfly species native to Minnesota prairies, two species, the Poweshiek skipperling and the Dakota skipper, have already largely disappeared from the state and are proposed for listing under the U.S. Endangered Species Act despite being historically among the most common prairie butterflies and having their historic ranges concentrated in Minnesota. The Minnesota Zoo and the Minnesota Department of Natural Resources are using this appropriation to conduct efforts aimed at preventing the extirpation and possible extinction of these butterfly species in Minnesota. Efforts will include expansion of both a butterfly research and conservation breeding program and ongoing butterfly survey and monitoring programs. Because of the ecological role of butterflies as pollinators and a food source for wildlife, analysis should also reveal important information about the greater prairie ecosystem and guide actions to be taken to protect it.

Project due to be completed: 6/30/2017

Conserving Minnesota's Native Freshwater Mussels

Subd. 05k \$350,000 TF

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RESEARCH

Appropriation Language

\$350,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota in cooperation with Macalester College to document native freshwater mussel abundance and distribution, quantify environmental conditions necessary to conserve Minnesota's native freshwater mussels, and conduct outreach to local organizations and the public. This appropriation is available until June 30, 2018, by which time the project must be completed and final products delivered.

Project Overview

Though they are a relatively unnoticed group of species, native freshwater mussels are a critical part of river ecosystems because they provide a variety of important functions including improved water clarity, enhanced streambed stability, reduced downstream transport of contaminants, and creation of habitat for other aquatic life. However, mussel populations in Minnesota have declined in recent decades as a result of habitat destruction, pollution, land-use change, over-harvesting, and the introduction of exotic species. Researchers at the University of Minnesota are using this appropriation to conduct surveying and analysis to better understand mussel abundance, distribution, and interactions with habitats in order to guide efforts to preserve and restore native mussel populations and maintain the ecosystem services they provide.

Project due to be completed: 6/30/2018

Impacts of Forest Quality on Declining Minnesota Moose

Subd. 05I \$300,000 TF

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RESEARCH**Appropriation Language**

\$300,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota in cooperation with the Department of Natural Resources to link regional patterns of moose abundance through time to the distribution of food and cover and determine if this distribution affects the diet and survival of individual moose. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Moose, one of Minnesota's prized wildlife species, are dying at much higher rates in Minnesota than elsewhere in North America. Recently observed increases in mortality rates amongst some moose in northeastern Minnesota have led to concern that the population there may be entering a decline like that seen in the northwestern part of the state, where moose populations fell from over 4,000 to fewer than 100 in less than 20 years. Additionally the specific causes of increased mortality amongst individual moose remain under investigation. Scientists at the University of Minnesota are using this appropriation to examine the role of habitat quality and landscape change and how it impacts moose diet, body

condition, and mortality risk, specifically the role of forest age, structure, and composition in distribution of food and cover. Knowledge gained will be used by federal, state, and local natural resource agencies to identify appropriate management and habitat needs and actions that can be taken to help slow or prevent continued population declines in northeastern Minnesota of this iconic, keystone species.

Project due to be completed: 6/30/2017

Moose Decline and Air Temperatures in Northeastern Minnesota

Subd. 05m \$600,000 TF

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RESEARCH

Appropriation Language

\$600,000 the second year is from the trust fund to the commissioner of natural resources in cooperation with the University of Minnesota to study the physiology and behavior of adult moose and effects of female condition on calf production and survival to determine the impact of air temperature on moose population performance and decline. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Moose, one of Minnesota's prized wildlife species, are dying at much higher rates in Minnesota than elsewhere in North America. Recently observed increases in mortality rates amongst some moose in northeastern Minnesota have led to concern that the population there may be entering a decline like that seen in the northwestern part of the state, where moose populations fell from over 4,000 to fewer than 100 in less than 20 years. Additionally the specific causes of increased mortality amongst individual moose remain under investigation. Scientists at the Minnesota Department of Natural Resources are using this appropriation to help understand how air temperature affects moose habitat use and behavior, reproductive success, and survival in order to determine if, when, and how moose are able to successfully modulate internal body temperature. Knowledge gained will be used by federal, state, and local natural resource agencies to identify appropriate management and habitat needs and actions that can be taken to help slow or prevent continued population declines in northeastern Minnesota of this iconic, keystone species.

Project due to be completed: 6/30/2017

Expansion of Minnesota Wildflowers Online Botanical Reference

Subd. 05n \$150,000 TF

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Appropriation Language

\$150,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Minnesota Wildflowers Information to accelerate field work for surveying and imaging of plant species and publication of species profiles to a plant identification reference Web site available to the public and land managers. Images acquired and information compiled using these funds are for purposes of public information available on a Web site. If the organization is no longer able to maintain the Web site, the organization shall work with the state and the University of Minnesota Bell Museum of Natural History to ensure the materials remain publicly available on the Web. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

The average Minnesotan and even most natural resource managers are not skilled in plant identification, yet the ability to positively identify plants is crucial to a number of conservation activities, including identifying areas that need protection, recognizing new or existing invasive species, monitoring restoration projects, and delineating wetlands. The Minnesota Wildflowers project attempts to fill this need with a free web-based field guide ultimately aimed at providing profiles for each of the over 2,100 vascular plant species in Minnesota. Minnesota Wildflowers Information is using this appropriation to continue to update and expand the information contained on its online field guide by doubling the number of new species profiled. Information will be freely available to the public, students, and natural resource professionals as a learning reference and to assist in plant identification.

Project due to be completed: 6/30/2017

Subd. 06 Methods to Protect, Restore, and Enhance Land, Water, and Habitat

Enhancing Pollinator Landscapes

Subd. 06a \$864,000 TF

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Appropriation Language

\$864,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to identify sources of nectar and pollen for native pollinators and honey bees and coordinate ongoing and future efforts to enhance pollinator habitat and opportunities for pollinator nesting and foraging. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Pollinators play a key role in ecosystem function and in agriculture, including thousands of native plants and more than one hundred U.S. crops that either need or benefit from pollinators. However, pollinators are in dramatic decline in Minnesota and throughout the country. The causes of the decline are not completely understood, but identified factors include loss of nesting sites, fewer flowers, increased disease, and increased pesticide use. Fortunately, there are known actions that can be taken to help counteract some of these factors. Researchers at the University of Minnesota are using this appropriation to conduct efforts aimed at increasing reliable supplies of nectar and pollen for pollinators by surveying for existing populations, identifying plants that contribute the most resources to pollinator production and survival, and identifying areas where pollinators nest and overwinter. Information will be used to develop maps, demonstration sites, best management strategies, and long term plans for sustaining pollinators that will assist private landowners and public land managers in efforts to enhance landscapes for the benefit of pollinators.

Project due to be completed: 6/30/2017

Understanding Systemic Insecticides as Protection Strategy for Bees

Subd. 06b \$326,000 TF

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RESEARCH

Appropriation Language

\$326,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to continue research on how native bee and honey bee colonies are impacted by systemic, neonicotinyl insecticides in pollen and nectar of plants growing in fields and landscapes. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

A class of insecticides known as systemic neonicotinyl insecticides has been identified as a potential factor in recently observed declines in pollinators, including the phenomenon amongst honeybees known as Colony Collapse Disorder. Previous research examining the effects of neonicotinyl insecticides on lab colonies of bumblebees found that exposure to these insecticides at various levels increased queen bee mortality and detrimentally altered bee behavior and production. Researchers at the University of Minnesota are using this appropriation to continue this research aimed at quantifying levels of insecticide residues in pollen and nectar of plants treated with systemic insecticides to determine how exposure to these residues affects bee colony health. This phase expands the research to conduct studies in the field in a natural setting.

Project due to be completed: 6/30/2017

Prairie Sustainability through Seed Storage, Beneficial Microbes, and Adaptation

Subd. 06c \$600,000 TF

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RESEARCH

Appropriation Language

\$600,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to collect and preserve germplasm of plants throughout Minnesota's prairie region, study the microbial effects that promote plant health, analyze local adaptation, and evaluate the adaptive capacity of prairie plant populations. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Healthy prairies contribute numerous benefits, such as providing habitat for wildlife and pollinators, maintaining and improving water quality, stabilizing roadsides, and providing a sustainable source of materials for bioenergy production and other products. Since European settlement the once vast expanses of Minnesota prairie covering 18 million acres have been reduced to small remnants totaling about 235,000 acres. With this decline has also come a drastic reduction in the genetic diversity of the various species typical of Minnesota prairies. This has resulted in inbreeding of remnant species populations, which reduces the robustness of plants and can result in yet further population decline. Researchers at the University of Minnesota are using this appropriation for efforts aimed at protecting the long-term health and sustainability of remaining prairie in the state by collecting prairie plant genetic material for long-term preservation, collecting and studying microbes that promote prairie plant health, and examining the capacity for prairie plants to adapt to changing conditions. Information and resources derived from this effort will contribute to improving restoration techniques and ensuring healthy prairies into the future.

Project due to be completed: 6/30/2017

Northeast Minnesota White Cedar Restoration - Phase 2

Subd. 06d \$335,000 TF

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Board of Water and Soil Resources

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Appropriation Language

\$335,000 the second year is from the trust fund to the Board of Water and Soil Resources to continue an assessment of the decline of northern white cedar plant communities in northeast Minnesota, demonstrate restoration techniques, and provide cedar restoration training to local units of government. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Northern white cedar wetland plant communities provide unique ecological, economic, and wetland functions, including high value timber, long-term carbon storage, winter refuge for deer and other wildlife, wildlife habitat, and thermal buffering for brook trout streams. However, these plant communities have been declining in Minnesota for decades mostly as a result of development impacts. The Minnesota Board of Water and Soil Resources is using this appropriation to continue efforts aimed at improving the quantity and quality of white cedar wetland plant communities in Minnesota. Efforts will include assessing existing white cedar communities to prioritize sites for restoration and then providing training and demonstration of restoration and re-vegetation techniques for local natural resource managers.

Project due to be completed: 6/30/2017

Southeast Minnesota Watershed Protection Plan

Subd. 06e \$200,000 TF

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Appropriation Language

\$200,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with The Nature Conservancy to provide a framework and plans for the protection and stewardship of unimpaired waters in southeast Minnesota. The result will be a template for watershed protection in Minnesota. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Oftentimes water conservation efforts are directed toward impaired waters. However, it is much more cost-effective to protect habitat and water resources before they become degraded. The Nature Conservancy is using this appropriation to create a broader, long-term, watershed-based framework for proactively protecting habitat and water resources in southeast MN, specifically the Cannon River and Zumbro River watersheds, before they become degraded. Information will help guide efforts for assessing and prioritizing conservation efforts in southeast MN and provide a framework for other watersheds in the state to replicate.

Project due to be completed: 6/30/2017

Upland and Shoreline Restoration in Greater Metropolitan Area

Subd. 06f \$300,000 TF

Wiley Buck

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Appropriation Language

\$300,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Great River Greening to restore and enhance upland, shoreline, and approximately 150 acres of forests, woodlands, savanna, and prairie and to provide related educational opportunities for volunteers in the greater metropolitan area. A list of proposed restorations and enhancements must be provided as part of the required work plan. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Though many parts of the Twin Cities metropolitan area are urbanized, there are also has large areas of natural lands that continue to serve as important habitat for fish, wildlife, and plant communities. However, pressure on these remaining lands continues to intensify as population and development pressures increase. This appropriation continues the efforts of the Metro Conservation Corridors (MeCC) partnership, an ongoing effort by a partnership of state and non-profit organizations, to conduct strategic and coordinated land conservation activities that build connections between remaining high quality natural areas in the greater Twin Cities metropolitan area and ensures their benefits are available for future generations. Great River Greening is using this appropriation to restore approximately 150 acres of permanently protected forest, woodland, savanna, and prairie habitat while engaging hundreds of volunteers in the stewardship of the metropolitan area's remaining natural areas.

Project due to be completed: 6/30/2017

Prairie, Forest, and Savanna Restoration in Greater Metropolitan Area

Subd. 06g \$200,000 TF

Tom Lewanski

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Appropriation Language

\$200,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Friends of the Mississippi River to restore approximately 150 acres of prairie, forests, and oak savanna in the greater metropolitan area. A list of proposed restorations and enhancements

must be provided as part of the required work plan. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Though many parts of the Twin Cities metropolitan area are urbanized, there are also has large areas of natural lands that continue to serve as important habitat for fish, wildlife, and plant communities. However, pressure on these remaining lands continues to intensify as population and development pressures increase. This appropriation continues the efforts of the Metro Conservation Corridors (MeCC) partnership, an ongoing effort by a partnership of state and non-profit organizations, to conduct strategic and coordinated land conservation activities that build connections between remaining high quality natural areas in the greater Twin Cities metropolitan area and ensures their benefits are available for future generations. Friends of the Mississippi River is using this appropriation to restore approximately 150 acres of permanently protected prairie, forest, and oak savanna habitat in the metropolitan area.

Project due to be completed: 6/30/2017

Nutrient Capture Through Water Management and Biomass Harvesting

Subd. 06h \$300,000 TF

Jeff Lewis

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Appropriation Language

\$300,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the Red River Basin Commission to evaluate the potential capture of excess nutrients using cattails grown and harvested within shallow flood reservoirs for bioenergy use. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Excess nutrients are among the most common impairments of water resources in the Red River Basin, as well as the rest of Minnesota. About 80% of the land use in the Red River Basin is for agricultural cropland and over 90% of phosphorus and nitrogen found in rivers and streams in the area originate from nonpoint sources, such as cropland. Excess nutrients are also one of the most difficult impairments to correct. The Red River Basin Commission is attempting to help correct this problem by using this appropriation to develop and evaluate an innovative, multipurpose method to use cattails and other vegetation within existing flood storage reservoirs to capture and reduce nutrient loads from runoff originating from mostly non-point sources and then use the harvested vegetation for purposes including bioenergy production and fertilizer. If effective this technique could be implemented in multiple locations in the Red River Basin and in other agricultural regions of the state to assist in reducing nutrient loads in waterways.

Project due to be completed: 6/30/2017

Cattail Management for Wetland Wildlife and Bioenergy Potential

Subd. 06i \$74,000 TF

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Appropriation Language

\$74,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota for the Northwest Research and Outreach Center in Crookston to evaluate different management techniques for cattail control and related wildlife impacts in northwest Minnesota and to assess the use of cattails as a biofuel feedstock.

Project Overview

On many public lands in northwest Minnesota, cattail growth has far exceeded the distribution recommended for optimum wetland wildlife habitat and a need for cattail control has become recognized. Cattails have also recently been demonstrated to have bioenergy potential. Researchers at the University of Minnesota in Crookston are using this appropriation to evaluate cattail management and harvesting techniques in various northwest Minnesota habitats as a means of reducing an increasing overabundance of exotic cattails in wetlands, which are degrading wildlife habitat, while providing a value-added feedstock for sustainable bioenergy in the region.

Project due to be completed: 6/30/2016

Dredged Sediment for Forest Restoration on Unproductive Minelands

Subd. 06j \$300,000 TF

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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.

Project Overview

Mine stockpiles are unproductive due to soil deficiencies of organic matter, nutrients, and soil organisms, which are essential to supporting healthy plant growth, diversity, and succession. Waste products, including biosolids, composts, and dredged materials, have the potential to be used to address some of these deficiencies and make the lands productive again. Researchers at the Natural Resources Research Institute at the University of Minnesota in Duluth are using this appropriation to demonstrate and evaluate methods for using dredged sediment and treated biosolids as a substrate for restoring up to 136 acres of unproductive minelands to productive forestland. If effective this technique could be applied more broadly to minelands in Minnesota and elsewhere with potential benefits including production of materials for the biofuels and forest products industries, increased wildlife habitat, restoration of unproductive lands, and re-utilization of waste products.

Project due to be completed: 6/30/2018

Expansion of Greenhouse Production

Subd. 06k \$176,000 TF

Lana Fralich

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Appropriation Language

\$176,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the city of Silver Bay to expand and enhance a city-owned greenhouse facility to increase system production for locally grown food on a year-round basis and reduce water usage.

Project Overview

New and innovatively designed greenhouse facilities have the potential to provide sustainable food, fuel, and other products year round by utilizing ecological processes and other practices to integrate production of fish, plants, and algae in a low input, self-sustainable system. The City of Silver Bay and researchers at the University of Minnesota - Duluth are using this appropriation to expand and enhance a demonstration greenhouse facility. Refined techniques developed at the facility have the potential to be transferred and replicated at similar facilities throughout the state.

Project due to be completed: 6/30/2016

Subd. 07 Land Acquisition, Habitat, and Recreation

Scientific and Natural Area Acquisition, Restoration, Improvement and Citizen Engagement

Subd. 07a \$2,540,000 TF

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Appropriation Language

\$2,540,000 the second year is from the trust fund to the commissioner of natural resources to acquire lands with high-quality native plant communities and rare features to be established as scientific and natural areas as provided in Minnesota Statutes, section 86A.05, subdivision 5, restore and improve parts of scientific and natural areas, and provide technical assistance and outreach. A list of proposed acquisitions must be provided as part of the required work program. Land acquired with this appropriation must be sufficiently improved to meet at least minimum management standards, as determined by the commissioner of natural resources. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Minnesota's Scientific and Natural Areas (SNA) Program is an effort to preserve and perpetuate the state's ecological diversity and ensure that no single rare feature is lost from any region of the state. This includes landforms, fossil remains, plant and animal communities, rare and endangered species, and other unique biotic or geological features. These sites play an important role in scientific study, public education, and outdoor recreation. The Minnesota Department of Natural Resources is using this appropriation to permanently protect approximately 240 acres of high quality habitat with rare species and unique natural resources of statewide significance; to restore approximately 770 acres of existing SNAs to conserve the rare features they protect; and to monitor existing SNAs to gauge, improve, and verify that site specific conservation values are protected and achieved. The project includes engagement activities for local communities to help build a network of people to be involved with their local SNAs.

Project due to be completed: 6/30/2017

Metropolitan Regional Park System Acquisition

Subd. 07b \$1,500,000 TF

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Appropriation Language

\$1,500,000 the second year is from the trust fund to the Metropolitan Council for grants for the acquisition of lands within the approved park unit boundaries of the metropolitan regional park system. This appropriation may not be used for the purchase of habitable residential structures. A list of proposed fee title and easement acquisitions must be provided as part of the required work program. This appropriation must be matched by at least 40 percent of nonstate money that must be committed by December 31, 2014, or the appropriation cancels. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

The Twin Cities area is host to a nationally renowned system of regional parks and trails that provides numerous outdoor recreational opportunities for the public while preserving green space for wildlife habitat and other natural resource benefits. Currently the regional parks and trails system consists of 51 parks and park reserves containing more than 54,000 acres, more than 300 miles of interconnected trails, and has more than 46 million visits each year. Through an existing grant program, the Metropolitan Council is using this appropriation to partner with local metropolitan communities to partially finance the acquisition of approximately 200 acres to be added to existing metropolitan regional parks. Priority will be given to lands with shoreland, lands that provide important natural resource connections, and lands containing unique natural resources.

Project due to be completed: 6/30/2017

Mesabi Trail Development - Soudan to Ely Segment

Subd. 07c \$1,000,000 TF

Bob Manzoline

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Appropriation Language

\$1,000,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with St. Louis and Lake Counties Regional Rail Authority for the right-of-way acquisition, design, and construction of segments of the Mesabi Trail totaling approximately 11 miles east of Soudan towards Ely. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Running through the Iron Range of northeastern Minnesota, the Mesabi Trail provides a recreational and alternate transportation corridor for hikers, bikers, skiers, and horseback riders, as well as some designated snow snowmobile use areas. When completed the trail will include 145 paved miles extending from the Mississippi River in Grand Rapids to the Boundary Waters Canoe Area in Ely - 115 miles have been finished to date. The St. Louis and Lake Counties Regional Railroad Authority are using this appropriation to develop 11 miles of trail segments near Vermilion State Park.

Project due to be completed: 6/30/2017

Shoreland Acquisition on St. Croix River

Subd. 07d \$1,250,000 TF

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Appropriation Language

\$1,250,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Washington County to purchase 15 acres, encompassing 3,500 feet of St. Croix shoreland paralleling Brown's Creek State Trail in the city of Stillwater. The county will transfer the parcel to the city of Stillwater. This appropriation is contingent on the expenditure of at least \$2,500,000 of nonstate match.

Project Overview

The St. Croix River is one of the most pristine, large river ecosystems remaining in the upper Mississippi River System. Washington County, in partnership with the City of Stillwater, is using this appropriation to acquire 15 acres containing 3,500 feet of St. Croix River shoreline just north of downtown Stillwater and parallel to the Brown's Creek State Trail. The land will be turned into a local nature park for trail users, river users, tourists, and area residents with passive recreation including fishing, boat launching, walking, and picnicking.

Project due to be completed: 6/30/2016

Martin County Park and Natural Area Acquisition

Subd. 07e \$435,000 TF

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Web: <http://www.martinswcd.net>

Appropriation Language

\$435,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the Fox Lake Conservation League, Inc. and Martin County to acquire approximately 40 acres in Martin County, including a ten-acre prairie remnant to be owned and managed by Martin County as part of its park system. A vegetation management plan must be developed and implemented and public access must be provided to the native prairie remnant. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

After years of discussions, some of the most diverse riparian, mesic, and dry hillside native prairie containing the only identified remnant population of Prairie Bush Clover in Martin County is available for permanent protection. Martin County is using this appropriation to acquire and permanently protect approximately 40 acres, including 10 acres of remnant prairie. The land will be turned into a county park providing recreational opportunities for local residents and educational opportunities for area students.

Project due to be completed: 6/30/2017

Minnesota River Water Trailhead and Landing in Morton

Subd. 07f \$198,000 TF

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Appropriation Language

\$198,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the city of Morton to transform a municipal parcel from a compost site into a Minnesota River water trailhead and landing and to design and build interpretative trails around the landing complex. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Morton, Minnesota is home to many unique natural, cultural, and historic sites, including sites from the US-Dakota War and some of the oldest exposed rock, called Morton Gneiss, on the planet. The City of Morton is using this appropriation to develop a municipal site along the Minnesota River in Morton to be converted into a public canoe landing and campground and a trail connection between the Minnesota River State Water Trail and natural and cultural sites in the area including the Morton Outcrop Scientific and Natural Area. The project will provide increased recreational opportunities and amenities for users and provide a natural classroom for students to learn about the river.

Project due to be completed: 6/30/2017

Subd. 08 Air Quality, Climate Change, and Renewable Energy

Solar Cell Materials from Sulfur and Common Metals

Subd. 08a \$494,000 TF

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RESEARCH

Appropriation Language

\$494,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota

to develop solar cell materials using nontoxic and common metals combined with sulfur. This appropriation is subject to Minnesota Statutes, section 116P.10. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Sustainable energy production is a major challenge facing our society. Solar energy is renewable and is a viable and attractive option. However, there are obstacles to widespread use. Current technology is expensive, making it difficult for businesses and homeowners to implement, and solar cells are commonly made using toxic and rare elements or using processes that require large amounts of energy. To become commonplace, solar cells must be inexpensive and robust, and they must be made of abundant, cheap, nontoxic materials. Researchers at the University of Minnesota are using this appropriation to develop and test an innovative, more energy and time-efficient method for producing thin film solar cells made of sulfur and common metals instead of the more toxic and rare elements currently used in most cases.

Project due to be completed: 6/30/2017

Innovative Groundwater-Enhanced Geothermal Heat Pump Study

Subd. 08b \$196,000 TF

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Appropriation Language

\$196,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to analyze and validate a new geothermal pump method and technology that will reduce heat pump costs and improve performance and predictability. This appropriation is subject to Minnesota Statutes, section 116P.10.

Project Overview

Space and water heating and cooling consume 48% of all energy used in an average U.S. residence, and usually that energy is supplied by natural gas or fossil-fuel derived electricity. Geothermal heat pumps can reduce energy requirements for heating and cooling by up to 75%. However, traditional geothermal heat pumps are expensive and their performance is difficult to predict before installation. Researchers at the University of Minnesota are using this appropriation to develop, test, and demonstrate a novel geothermal heat pump technology that utilizes the heat exchange of groundwater flow to be more efficient, less space intensive, and less costly than current conventional geothermal systems. The technology has the potential to make geothermal heat pump systems have a faster payback period, resulting in more widespread use, and give geothermal a larger role in renewable energy production.

Project due to be completed: 6/30/2016

Demonstrating Innovative Technologies to Fully Utilize Wastewater Resources

Subd. 08c \$1,000,000 TF

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RESEARCH

Appropriation Language

\$1,000,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to demonstrate innovative technologies to utilize and treat wastewater streams for conversion of treatment by-products to biofuels. This appropriation is subject to Minnesota Statutes, section 116P.10. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Each year Minnesota municipal wastewater treatment plants generate large amounts of oily scum, concentrated liquid called centrate, and sludge. These waste streams are disposed of either in landfills or by burning or subjected to additional treatment. However, new technologies have shown potential to capture resource values from these waste products while lowering the treatment costs for these waste streams. Researchers at the University of Minnesota are using this appropriation to demonstrate the feasibility and effectiveness of several technologies that implemented together in a wastewater treatment system could improve wastewater treatment while generating valuable biofuel byproducts. Expected benefits of the technologies include reduced landfill contributions, reduced fossil fuel use, cost savings and revenue generation for wastewater treatment plants, and reduced air and water pollution.

Project due to be completed: 6/30/2017

Transitioning Minnesota Farms to Local Energy

Subd. 08d \$500,000 TF

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Appropriation Language

\$500,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota for the West Central Research and Outreach Center in Morris to develop clean energy strategies for Minnesota farms in order to reduce fossil fuel energy use and increase local energy production. Any installation of infrastructure or improvements must be at the University of Minnesota West Central Research and Outreach Center. This appropriation is available until June 30, 2017, by which time the

project must be completed and final products delivered.

Project Overview

Production agriculture's dependence on fossil fuel energy carries significant economic and ecological risks. The energy consumed within livestock facilities alone is the equivalent consumption of several large cities, and agriculture currently contributes approximately 14% of the total greenhouse gas emissions in the state. As consumers increasingly demand low carbon footprint products, adoption of clean energy systems in crop and livestock production would position Minnesota's agricultural sector with a competitive advantage. While Minnesota farmers have historically adopted technology to more efficiently use resources and optimize production, implementation of clean energy technologies on farms has been slow to date and farmers continue to opt for conventional fossil-based energy. In response to this, researchers at the University of Minnesota West Central Research and Outreach Center are using this appropriation to develop, test, and evaluate options for clean energy systems for modern swine production facilities and conduct associated outreach to increase adoption of clean energy systems at these facilities.

Project due to be completed: 6/30/2017

Life Cycle Energy of Renewably Produced Nitrogen Fertilizers

Subd. 08e \$250,000 TF

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Appropriation Language

\$250,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota for the West Central Research and Outreach Center in Morris to calculate fossil fuel energy savings and greenhouse gas reductions resulting from the use of local renewable energy technologies, including biomass gasification, anaerobic digestion, and hydroelectricity to produce fertilizer. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Minnesota supports over 14 million acres of cropland in grain production. Almost 600,000 tons of synthetic nitrogen fertilizers are needed annually to maintain productivity on this land, which requires the equivalent of 3,000,000 barrels of oil and costs farmers over \$400 million dollars per year. This amount of fossil fuel use results in a significant amount of greenhouse gas emissions, while the absence of fossil energy resources in the state means that these synthetic nitrogen fertilizers must be imported into Minnesota from other states and overseas. In response to this, researchers at the University of Minnesota West Central Research and Outreach Center are using this appropriation to conduct modeling and analysis of the viability of options for using different renewable energy technologies that could be implemented in Minnesota for generating nitrogen fertilizer. Findings have the potential to help reduce agricultural energy related production costs and make rural communities more energy independent.

Project due to be completed: 6/30/2017

Clean Water and Renewable Energy from Beet Processing Wastewater and Manure

Subd. 08f \$400,000 TF

Xiao Wu

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RESEARCH

Appropriation Language

\$400,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota for the Southern Research and Outreach Center in Waseca to research the cofermentation of sugar beet processing wastewater and swine manure for hydrogen and methane production and to install and evaluate a pilot-scale system. This appropriation is subject to Minnesota Statutes, section 116P.10. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Minnesota ranks #2 in hog production and #1 in sugar beet production in the U.S., generating about 11 million tons of pig manure and over one million tons of sugar processing wastes annually. Presently there are not cost-effective methods available to deal with these waste streams other than land application, which usually results in nutrient runoff into ground and surface water resources. Better treatment of these waste streams is necessary, but treatment alone is not only expensive but usually fails to capture resource values contained within these waste streams that could be put to other uses. Additionally, these two waste streams together contain complimentary nutrients needed for biological processes such as fermentation and anaerobic digestion. Researchers at the University of Minnesota Southern Research and Outreach Center are using this appropriation to develop, test, and evaluate technologies that utilize these two different agricultural waste streams containing complementary nutrients to produce value-added byproducts in the forms of bioenergy and fertilizer while reducing the negative impact of both waste streams on water quality.

Project due to be completed: 6/30/2017

Next Generation Large-Scale Septic Tank Systems

Subd. 08g \$258,000 TF

Bo Hu

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RESEARCH

Appropriation Language

\$258,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to develop a dual utility large-scale septic tank system designed for nutrient recuperation, bioenergy generation, and environmental protection using a bio-electrochemical system. This appropriation is subject to Minnesota Statutes, section 116P.10. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Septic tank systems aim to treat sewage generated by homes and facilities that do not have access to centralized wastewater treatment plants. Currently 25% of the U.S. population relies on these systems as their primary means of wastewater treatment. However, the treatment capabilities of these systems are limited and so byproducts can contribute to degradation of water resources and other environmental problems and the systems emit instead of collect powerful greenhouse gases such as methane. Additionally, the systems are actually an untapped source for recovering nutrients for other uses. Researchers at the University of Minnesota are using this appropriation to develop, test, and evaluate technologies to improve large-scale septic systems to be more effective and capable of capturing valuable nutrients from the waste stream and generating bioenergy. The technologies could be integrated into existing septic tank systems and the information will be helpful to wastewater professionals in designing next generation septic systems.

Project due to be completed: 6/30/2017

Solar Photovoltaic Installation at Residential Environmental Learning Centers

Subd. 08h \$150,000 TF

Dale Yerger

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Appropriation Language

\$150,000 the second year is from the trust fund to the commissioner of natural resources for agreements with Deep Portage Learning Center to coordinate with Audubon Center of the North Woods; Eagle Bluff Environmental Learning Center; Laurentian Environmental Learning Center; Long Lake Conservation Center; and Wolf Ridge Environmental Learning Center the installation of at least five kilowatt institutional solar arrays at each of the six residential environmental learning centers as a teaching tool. Prior to the installation, the proposed placement of the solar arrays must be submitted to the Legislative-Citizen Commission on Minnesota Resources office to ensure the demonstration of the maximum educational value.

Project Overview

Over the past several years six environmental learning centers located around the state - Audubon Center of the North Woods, Deep Portage Learning Center, Eagle Bluff Environmental Learning Center, Laurentian Environmental Learning Center, Long Lake Conservation Center and Wolf Ridge Environmental Learning Center - have been implementing demonstrations of energy conservation, energy efficiency, and renewable energy on their campuses for use as educational tools for the thousands of students and visitors that come to the centers each year. The six environmental learning centers are using this appropriation to expand their energy demonstration offerings by installing 5-kilowatt solar photovoltaic systems at each of the centers.

Project due to be completed: 6/30/2016

Itasca Community College Woody Biomass Utilization Project Design

Subd. 08i \$112,000 TF

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Appropriation Language

\$112,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Itasca Community College to develop a final design for installation of a boiler heating system using woody biomass. Students at the college must be involved in the final design process.

Project Overview

Woody biomass energy systems have shown themselves to offer more locally-based, stable energy supplies for some communities. Itasca Community College is using this appropriation to design a renewable energy system based on woody biomass that will serve as a demonstration and educational tool in the region.

Project due to be completed: 6/30/2016

Subd. 09 Environmental Education

Minnesota Conservation Apprenticeship Academy

Subd. 09a \$392,000 TF

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Appropriation Language

\$392,000 the second year is from the trust fund to the Board of Water and Soil Resources in cooperation with Conservation Corps Minnesota to continue a program to train and mentor future conservation professionals by providing apprenticeship service opportunities with soil and water conservation districts. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Many of the most experienced conservation practitioners at local soil and water conservation districts throughout the state are nearing retirement, and with their departure will go much of their practical, on-the-ground knowledge, experience, and skills. Meanwhile, college students seeking to be the next generation of conservation practitioners have knowledge of emerging technologies and other innovations that can improve and contribute to current conservation efforts. Through this appropriation the Minnesota Board of Soil and Water Resources will work with the Minnesota Conservation Corps to continue a program that places students in apprenticeship positions with county soil and water conservation district offices throughout the state. This unique program provides an opportunity for interns to gain valuable in-the-field experience from current practitioners while sharing their knowledge with those practitioners about the newest ideas and solutions for meeting today's natural resource challenges.

Project due to be completed: 6/30/2017

Youth-led Sustainability Initiatives in 40 Greater Minnesota Communities

Subd. 09b \$350,000 TF

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Appropriation Language

\$350,000 the second year is from the rust fund to the commissioner of natural resources for an agreement with Prairie Woods Environmental Learning Center and Laurentian Environmental Learning Center to complete over 100 youth-led sustainability action projects in 40 communities in southwest, southeast, central and northeastern Minnesota.

Project Overview

Adoption of renewable energy technologies and energy conservation practices can contribute in a variety of ways to the environmental and economic health of rural Minnesota communities through costs savings and emissions reductions. Engaging and coaching students as the leaders in the process of implementing such practices provides the added benefit of increasing knowledge, teaching about potential career paths, and developing leadership experience. Using this appropriation the Prairie Woods Environmental Learning Center and its partners are expanding an existing program called the Youth Energy Summit (YES!) to engage approximately 650 students in implementing 150 additional youth-led renewable energy and energy conservation projects in over 40 communities in central, northeastern, southwestern, and southeastern Minnesota. These projects will be driven by collaboration

between students, community members, and local businesses and organizations.

Project due to be completed: 6/30/2016

Urban Environmental Education Engaging Students in Local Resources

Subd. 09c \$1,093,000 TF

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Appropriation Language

\$1,093,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Wilderness Inquiry for a collaborative partnership, including the National Park Service, Minneapolis Public Schools, and St. Paul Public Schools, to establish a metrowide system providing place-based environmental education experiences using existing, but underutilized, outdoor environmental resources serving over 15,000 middle and high school students. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

There has been a sharp decline in participation in outdoor recreation and education amongst youth, particularly in urban areas. Some argue that youth who have meaningful outdoor education experiences are more likely to become engaged in environmental stewardship and invested in outdoor resources as adults. Wilderness Inquiry - in partnership with state and federal agencies, non-profits, and local school districts - is using this appropriation to expand an environmental education and recreation program that provides youth with hands-on educational and recreational experiences centered around the Mississippi River. Funds enable the program to offer experiential, place-based educational experiences to nearly 16,000 additional disadvantaged middle and high school students in Minneapolis, St. Paul, and six greater Minnesota school districts. Experiences will include hiking, canoeing, fishing, aquatic sampling, camping, and conservation-related summer employment.

Project due to be completed: 6/30/2017

Diversifying Involvement in the Natural Resources Community

Subd. 09d \$500,000 TF

Subd. 09d1 \$416,000 TF

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Subd. 09d2 \$84,000 TF

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Appropriation Language

\$416,000 the second year is from the trust fund to the commissioner of natural resources and \$84,000 is to the Board of Regents of the University of Minnesota to increase participation of under-represented communities in the natural resource professions and in outdoor recreation by means of targeted urban outreach and stronger linkages between Department of Natural Resources programs and academic offerings. This initiative must be coordinated with other environmental education appropriations in this subdivision. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Minnesota's natural resource professional workforce is much less diverse than its citizenry and many other professional fields. The benefits of a more diverse workforce are many, including the ability of organizations to increase innovation and creativity, attract higher qualified candidate pools, and ensure services that meet the diverse interests and needs of all citizens. The Department of Natural Resources and the University of Minnesota are using this appropriation to engage diverse urban youth, under-represented in the natural resources community, in natural resources education and developing outdoor recreational skills. Project efforts include connecting youth with close-to-home natural resource recreation and protection issues, a recruitment and retention program to introduce potential career opportunities, support and mentoring for those interested in pursuing natural resources college education and careers, and introductory experiences and internships in natural resources jobs.

Project due to be completed: 6/30/2017

Educating Minnesotans about Potential Impacts of Changing Climate

Subd. 09e \$325,000 TF

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Appropriation Language

\$325,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the Will Steger Foundation to plan and conduct forums, workshops, and trainings on Minnesota's changing climate and the potential impacts on ecosystems and natural resources. An

accompanying television program and information spots must be produced for broadcast and use at the forums.

Project Overview

Climate change has and will have profound effects on Minnesota's economy, agriculture, tourism, and natural resources. While climate change is often discussed in the broader contexts of its potential impacts at a national or international level, research has shown that climate change education and behavior change happens more effectively when the issue is made local and relevant. The Will Steger Foundation is using this appropriation to develop and implement efforts aimed at increasing understanding of the potential impacts of climate change for Minnesota and changing related behavioral norms of Minnesotans through the use of stories of individuals' experiences, facilitation of related discussions, and guidance toward additional available resources. Activities include holding public forums and educator workshops around the state, establishment of peer support networks, and the production and broadcast of information spots and a documentary on public television. Approximately 100,000 people are expected to be reached statewide.

Project due to be completed: 6/30/2016

Pollinator Education Center at the Minnesota Landscape Arboretum

Subd. 09f \$615,000 TF

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Appropriation Language

\$615,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to develop exhibits for an educational center that will offer hands-on learning experience about the role of pollinators and importance of pollinator habitat. Exhibits must utilize and integrate the best available science pertaining to all pollinator types, particularly native species. Approval of the work plan for this appropriation is contingent upon the organization addressing how it will increase access to the center by youth at no or limited cost.

Project Overview

Pollinators play a key role in ecosystem function and in agriculture, including thousands of native plants and more than one hundred U.S. crops that either need or benefit from pollinators. However, pollinators are in dramatic decline in Minnesota and throughout the country. The causes of the decline are not completely understood, but identified factors include loss of nesting sites, fewer flowers, increased disease, and increased pesticide use. Developing an aware, informed citizenry that understands this issue is one key to finding and implementing solutions to counteract these factors. The Minnesota Landscape Arboretum is using this appropriation to implement educational efforts designed to raise awareness about pollinators, their role in the environment and the economy, and the challenges they currently face due to recent unprecedented decline. Exhibits, programming, and demonstration sites will explore the role of pollinators in plant reproduction, maintaining biodiversity, and supporting agriculture and provide guidance on actions individuals can take, such as with their landscaping choices,

to help pollinators.

Project due to be completed: 6/30/2016

Minnesota Pollinator Partnership

Subd. 09g \$100,000 TF

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Appropriation Language

\$100,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Pheasants Forever to complete 40 community pollinator education and habitat projects. This appropriation must be coordinated with appropriations provided by the outdoor heritage fund. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

Project Overview

Pollinators play a key role in ecosystem function and in agriculture, including thousands of native plants and more than one hundred U.S. crops that either need or benefit from pollinators. However, pollinators are in dramatic decline in Minnesota and throughout the country. The causes of the decline are not completely understood, but identified factors include loss of nesting sites, fewer flowers, increased disease, and increased pesticide use. Fortunately, there are known actions that can be taken to help counteract some of these factors, such as adding diversity of flowering plants to the landscape in order to provide nectar and habitat for pollinators. Pheasants Forever is using this appropriation to pilot an education and habitat restoration program in 40 communities around the state that will involve 800 youth and 200 adults in learning about pollinators and their habitat and engaging them in conducting community pollinator projects that establish pollinator foraging habitat on a total of at least 40 acres.

Project due to be completed: 6/30/2017

Raptor Lab Integrating Online and Outdoor Learning Environments

Subd. 09h \$186,000 TF

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Appropriation Language

\$186,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota for the Raptor Center to develop an environmental education program on raptors for middle schools that integrates outdoor experiences with technology and scientific investigation.

Project Overview

Increasingly many youth are disconnected from the outdoors and the natural world and many of these same youth, nearly 50% in Minnesota, are also not proficient in science. Yet such experiences and knowledge are necessary components for this next generation to understand and participate in solving the complex environmental challenges facing our world. The University of Minnesota's Raptor Center is using this appropriation to develop and implement an online learning environment for 7th and 8th grade students that links outdoor experiential learning with classroom curriculum by engaging students in the design and execution of student-based research projects that utilize real-world data from raptors admitted to the Raptor Center in conjunction with students' outdoor exploration of their local environment. Initially the program will be tested with a minimum of 900 students at five schools in different regions of the state with varying demographics and then made available to schools statewide.

Project due to be completed: 6/30/2016

Wolf Management Education

Subd. 09i \$120,000 TF

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Appropriation Language

\$120,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the International Wolf Center for outreach to metro area kindergarten through grade 12 classrooms and nature centers to help children understand wolf management issues.

Project Overview

Wolves are a hot topic in Minnesota, with the public sharply divided on management issues such as wolf hunting. The complexity of the topic lends itself to a lot of misunderstanding and misinformation that is not always helpful to resolving the polarized debate. The International Wolf Center is using this appropriation to help bridge the gap with science-based information by delivering on-site programs to approximately 460 classrooms in the Twin Cities metro area to teach approximately 16,000 students about wolf biology and behavior, the social and political conflicts surrounding wolves, and the overall effects of wildlife habitat loss throughout the state.

Project due to be completed: 6/30/2016

Subd. 10 Administration and Contract Agreement Reimbursement

Contract Agreement Reimbursement

Subd. 10a \$135,000 TF

Amanda Graeber

MN DNR

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Phone: (651) 259-5533**Email:** amanda.graeber@state.mn.us**Web:** <http://dnr.state.mn.us/grants/passthrough/index.html>**Appropriation Language**

\$135,000 the second year is from the trust fund to the commissioner of natural resources at the direction of the Legislative-Citizen Commission on Minnesota Resources for expenses incurred for contract agreement reimbursement for the agreements specified in this section. The commissioner shall provide documentation to the Legislative-Citizen Commission on Minnesota Resources on the expenditure of these funds.

Project Overview

Appropriations to non-state entities must be made through a formal contract with a state entity that manages all of the funds for the project on a reimbursement basis. This appropriation to Minnesota's Department of Natural Resources (DNR) funds the expenses incurred by the DNR in contracting, contract management, and expense re-imbursement for most of the Environment and Natural Resources Trust Fund appropriations made to non-state entities, including both new projects funded during the biennium and existing projects funded in previous bienniums.

Project due to be completed: 6/30/2016

Legislative Coordinating Commission Legacy Web Site

Subd. 10b \$9,000 TF

Sally Olson

Legislative Coordinating Commission

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Phone: (651) 296-2963**Email:** sally.olson@lcc.leg.mn**Web:** <http://www.legacy.leg.mn/>**Appropriation Language**

\$9,000 the second year is from the trust fund to the Legislative Coordinating Commission for the Web site required in Minnesota Statutes, section 3.303, subdivision 10.

Project Overview

A website called "[Minnesota's Legacy](#)" was created by the Minnesota Legislature to help citizens monitor how dollars from the Legacy Amendment and the Environment and Natural Resources Trust Fund are being invested in the state. This appropriation is being used by the Legislative Coordinating Commission to assist with the administration of the website.

Project due to be completed: 6/30/2016

Environment and Natural Resources Trust Fund (ENRTF) Project Records System Upgrade

Subd. 10c \$100,000 TF

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Appropriation Language

\$100,000 the second year is from the trust fund to the LCCMR for upgrade and modernization of a project records management system.

Project Overview

Per M.S. 116P.09, up to 4% of the amount available for appropriation from the Environment and Natural Resources Trust Fund (ENRTF) for a biennium is available for expenses related to LCCMR administration. These expenses include the LCCMR's project selection and approval process and its ongoing oversight of projects funded by the ENRTF, including both new projects funded during the biennium and existing projects funded in previous bienniums. This appropriation is for the upgrade and modernization of a project records management system.

Project due to be completed: 6/30/2016

MN Laws 2014, Chapter 312, Article 12, Section 8

Invasive Terrestrial Plants and Pests Center

Sec. 08 \$1,460,000 TF

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Appropriation Language

\$490,000 in 2015 is from the environment and natural resources trust fund for the Invasive Terrestrial Plants and Pests Center requested under this act, including a director, graduate students, and necessary supplies. This is a onetime appropriation and is available until June 30, 2022.

\$970,000 from the environment and natural resources trust fund appropriated in Laws 2011, First Special Session chapter 2, article 3, section 2, subdivision 9, paragraph (d), Reinvest in Minnesota Wetlands Reserve Acquisition and Restoration Program Partnership, is transferred to the Board of Regents of the University of Minnesota for the Invasive Terrestrial Plants and Pests Center requested

under this act, including a director, graduate students, and necessary supplies and is available until June 30, 2022.

Project Overview

Terrestrial invasive species are species that are not native to a location and that pose critical ecological and economic challenges once they become established in that location. They come in the form of plants, animals, insects, pathogens, and microbes that can cause harm to natural habitat, urban landscapes, and agricultural systems. The problems posed by terrestrial invasive species continue to grow as existing infestations expand and new exotic species arrive, many of which are poorly understood. New ideas and approaches are needed to develop solutions and to stay on top of emerging threats. The University of Minnesota is using this appropriation to help launch a new interdisciplinary Terrestrial Invasive Species Research Center charged with using scientific findings to support policy-making, application, and resource management practices that address the terrestrial invasive species affecting Minnesota. The center will coordinate initiatives focused on prevention of establishment, early detection and rapid response, development of new control methods and technology, integrated pest management, and minimizing non-target impacts of control. Proven tools and techniques developed at the center are intended to be implemented statewide as applicable.

Project due to be completed: 6/30/2022

