Additional Material 2018 ENRTF Proposals

Page 3..... Aquatic Invasive Species (AIS) Proposals – 17 proposals, Response from Dr. Nicholas Phelps, AIS Center Director

- LCCMR email request
- Table of 2017 proposals with aquatic invasive species
- AIS center director response to LCCMR information request

Page 13..... Terrestrial Invasive Species (TIS) Proposals – 10 proposals, Response from Dr. Robert Venette, TIS Center Director

- LCCMR email request
- Table of 2017 proposals with TIS
- TIS center director response to LCCMR information request

Page 19..... 062-B Re-connecting Fish Habitat at Road-Stream Crossings

Page 21..... 092-B Geospatial Airborne Sensor Survey to Manage Water Resources

Page 23..... 127-C Wolf Discovery Center Supplement

Page 25..... 149-D Testing a New Method for Eradicating Dwarf Mistletoe Article

Page 27..... 194-F MN CREP for Water Quality and Habitat 09-06-17 BWSR Letter reducing amount requested by $5 million

Page 29..... 133-D Developing RNA Interference Genetic Controls for Zebra Mussels email regarding replacement proposal

Page 31..... 148-D Integrating Control of Zebra Mussels and Aquatic Vegetation email regarding replacement proposal

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

LEGISLATIVE-CITIZEN COMMISSION ON MINNESOTA RESOURCES
100 REV. DR. MARTIN LUTHER KING JR. BLVD.
ROOM 65 STATE OFFICE BUILDING
ST. PAUL, MINNESOTA 55155-1201

Phone: (651) 296-2406
Email: lccmr@lccmr.leg.mn
Web: www.lccmr.leg.mn
TTY: (651) 296-9896 or 1-800-657-3550

Susan Thornton, Director

DATE: July 26, 2017

TO: Dr. Nicholas Phelps, Co-Director
Minnesota Aquatic Invasive Species Research Center

FROM: Susan Thornton, Director ST

SUBJECT: Regarding 2018 Proposals Received Related to the Minnesota Aquatic Invasive Species Research Center

Dear Dr. Phelps,

The Legislative Citizen-Commission on Minnesota Resources (LCCMR) staff are currently reviewing 2018 project proposals received in response to the Environment and Natural Resources Trust Fund RFP. We received 17 proposals related to aquatic invasive species. They are listed below. By providing you the suite of projects related to AIS, we are seeking your expertise and sharing with you the range of AIS projects LCCMR will be reviewing. As part of the review process it is helpful to understand how these projects relate to Minnesota Aquatic Invasive Species Research Center mission, goals, and priorities.

We are requesting on behalf of the LCCMR, additional information, insight and expertise, to better understand the research context of these proposals. Questions we have include:

- Were these projects proposed to MAISRC?
- Based on MAISRC mission, goals, and priorities, do these proposals fit into identified priorities?
- Can you provide any insight regards to the status of research related to the topics of these proposals?
- Has MAISRC already provided funding to any of these initiatives or similar initiatives?
- Are any of these duplicative of MAISRC funding?

We would greatly appreciate MAISRC's feedback regarding the following proposals. Your insight will help the LCCMR better understand the context of these projects. We would like your feedback by Friday August 18th.

Feel free to contact LCCMR with any questions,

Proposals Related to Aquatic Invasive Species For Review (Attached)

Amberg, Jon (USGS):
New Tools for Fight Against Zebra Mussels-$539,323
Cotner, James (UMN):
Using CO2 to Kill Undesirable Fish including Carp-$470,000
Dieterman, Doug (DNR):
River Food Webs with and without Invasive Carp-$495,000
Elias, Mikael (UMN):
Innovative and Ecological Coatings to Mitigate Invasive Species-$321,500

Heathcote, Adam (St. Croix Watershed Research Station):
Determining Minnesota's Risk of a Toxic Algal Invader-$243,000
Karschnia, Maggie (Prior Lake-Spring Lake Watershed District):
Accelerated Watershed Approach to Invasive Carp Management-$342,796
Marko, Michelle (Concordia College):
Development of Predictive Tools for AIS Management-$331,644
McEwen, Daniel (Limnopro Aquatic Science Inc.):
Controlling Densities of Zebra Mussels in Infested Lakes-$428,864
Mensinger, Allen (UMN Duluth):
Sound Gradient for Acoustic Deterrence of Bigheaded Carp-$396,310
Merkes, Christopher (USGS):
Developing RNA Interference Genetic Controls for Zebra Mussel-$769,528
Pahs, Steven (Rice SWCD):
Circle Lake Wild Rice Restoration and Carp Management-$594,985
Peterson, Jason (DNR):
Invasive Species Wash Site Innovation, Improvements, and Standards-$908,023
Sadowsky, Michael (UMN):
Fish on a Chip: An AIS Detection Platform-$399,000
Sorensen, Peter (UMN):
An Effective and Practical Invasive Carp Deterrent-$998,000
Terrill, Tim (Mississippi Headwaters Board):
Minnesota Traditions Newspaper AIS Awareness Campaign-$230,000
Waller, Diane (USGS):
Integrating Control of Zebra Mussels and Aquatic Vegetation-$251,310
Windels, Steve (Voyageurs National Park):
Evaluate Control Methods for Invasive Hybrid Cattails-$131,920

cc:
Dr. Sue Galatowitsch, Co-Director
Minnesota Aquatic Invasive Species Research Center
Becca Nash, Associate Director
Minnesota Aquatic Invasive Species Research Center

LCCMR 2018 Proposals Related to Aquatic Invasive Species							
ID #	First Name	Last Name	Species	Title	Summary	Organization	$ Requesting
146-D	Amberg	Jon	Zebra Mussels	New Tools for Fight Against Zebra Mussels	We will validate, develop manuals and train people on the use of both a portable DNA detector and commercially available mapping technology for integration into their Zebra Mussel monitoring program.	U. S. Geological Survey	$ 539,323
142-D	Cotner	James	Carp	Using CO2 to Kill Undesirable Fish including Carp	We will develop techniques to for controlling nuisance and invasive fish species. Adding CO2 under ice is effective and inexpensive with great potential to improve water quality and aquatic habitat.	U of MN	$ 470,000
145-D	Dieterman	Doug	Carp	River Food Webs with and without Invasive Carp	This project will determine how Invasive Carp disrupt river food webs, effects of disruptions on important fishes and recommend best management practices to limit harm to over 500 river miles	MN DNR	$ 495,000
143-D	Elias	Mikael	Zebra Mussels	Innovative and Ecological Coatings to Mitigate Invasive Species	We propose to develop innovative coatings containing a revolutionary antifouling biological molecule: these coatings will contribute to coastal economy competitiveness and to mitigate the spread of invasive species.	U of MN	$ 321,500
139-D	Heathcote	Adam	Aglae	Determining Minnesota's Risk of a Toxic Algal Invader	This project will determine the historical distribution, abundance, and toxicity of the invasive blue-green alga, Cylindrospermopsis raciborskii, in Minnesota lakes using a combination of paleolimnological and contemporary monitoring techniques	Science Museum of Minnesota - St. Croix Research Station	$ 243,000
144-D	Karschnia	Maggie	Carp	Accelerated Watershed Approach to Invasive Carp Management	This project will take an accelerated watershed approach to invasive carp management that tests new, innovative techniques and ultimately restores and protects multiple, connected waterbodies within an important chain-of-lakes system.	Prior Lake-Spring Lake Watershed District	$ 342,796
150-D	Marko	Michelle	Zebra Mussels	Development of Predictive Tools for AIS Management	We will develop predictive modeling on which lakes are most susceptible to zebra mussel spread, which invasive species are most likely to arrive in Minnesota lakes and through which pathways.	Concordia College	$ 331,644
155-D	McEwen	Daniel	Zebra Mussels	Controlling Densities of Zebra Mussels in Infested Lakes	We will determine the metapopulation structure of zebra mussels within lakes, figure out source populations, and chemically treat those to reduce densities and overall impacts in whole lakes.	Limnopro Aquatic Science, Inc	$ 428,864
136-D	Mensinger	Allen	Carp	Sound Gradient for Acoustic Deterrence of Bigheaded Carp	Develop a sound gradient acoustic barrier for deployment in locks. As invasive carp swim upstream, they will encounter ever increasing, louder sound and be forced to turn back downstream	U of MN - Duluth	$ 396,310
133-D	Merkes	Christopher	Zebra Mussels	Developing RNA Interference Genetic Controls for Zebra Mussels	We will develop a microparticle using genetics (RNA interference) to specifically control zebra mussels.	U.S. Geological Survey	$ 769,528
153-D	Pahs	Steven	Carp	Circle Lake Wild Rice Restoration and Carp Management	The Circle Lake Wild Rice Restoration and Carp Management Project will, Provide a mechanism to restore wild rice to Circle Lake to increase waterfowl abundance and diversity and, Mitigate the negative effects of carp on water quality and fishery habitat and Serve as a model for other lakes within.	Rice SWCD	$ 594,985

ID #	First Name	Last Name	Species	Title	Summary	Organization	$ Requesting
154-D	Peterson	Jason	Both AIS/TIS Clea	Invasive Species Wash Site Innovation, Improvements, and Standards	Design and construction of innovative site improvements at five DNR offices for staff to clean equipment and contain invasive species so that they will not spread.	MN DNR	$ 908,023
137-D	Sadowsky	Michael	Multiple Fish	Fish on a Chip: An AIS Detection Platform	In this study we will develop and validate an new method for simultaneously determining the presence and relative quantity of 21 invasive fish species in any Minnesota waterway.	U of MN	$ 399,000
134-D	Sorensen	Peter	Carp	An Effective and Practical Invasive Carp Deterrent	Promising new carp deterrent system is tested in the Mississippi River along with an existing deterrent and predators; 99% blockage is suggested and Fish and Wildlife Service is a partner.	U of MN	$ 998,000
156-D	Terrill	Tim	AIS Cleaning	Minnesota Traditions Newspaper AIS Awareness Campaign	This project seeks to educate the outdoor enthusiast about the Clean, Drain, Dry prevention techniques by delivering positive legacy messaging through a Twin Cities/North Central newspaper insert.	Mississippi Headwaters Board	$ 230,000
148-D	Waller	Diane	Zebra Mussels	Integrating Control of Zebra Mussels and Aquatic Vegetation	The project investigates the use of aquatic pesticides for combined control of zebra mussels and nuisance aquatic vegetation by identifying efficacious pesticides to mussels and sites of nuisance species co-occurrence.	U. S. Geological Survey	$ 251,310
152-D	Windels	Steve	Cattails - Both AI	Evaluate Control Methods for Invasive Hybrid Cattails	This project will evaluate the effectiveness of two methods to remove exotic hybrid cattail to restore fish and wildlife habitat in Minnesota wetlands.	Voyageurs National Park	$ 131,920

UNIVERSITY OF MINNESOTA

Minnesota Aquatic Invasive Species Research Center
College of Food, Agricultural, and Natural Resource Sciences

135A Skok Hall
2003 Upper Buford Circle
St. Paul, MN 55108

612-626-1412
maisrc@umn.edu
www.maisrc.umn.edu

Ms. Susan Thornton, Director
Legislative-Citizen Commission on Minnesota Resources
100 Rev. Dr. Martin Luther King Jr. Blvd
Room 65 State Office Building
St. Paul, MN 55155

August 18, 2017

Dear Susan Thornton,

In response to your request, please find the following summaries for the 17 AIS-related proposals submitted to the LCCMR. I hope these summaries are useful in complementing the normal full and thorough review process by the LCCMR. It is important to note that we will be updating our Research Needs Assessment in 2017, again considering current management needs, ongoing research and our current funding balance. We will share that with the LCCMR when available.

I was unable to answer your question about the status of related research for each of the projects. To do this in a way that is fair to all proposals, we would need to conduct a literature review and seek advice from the various subject matter experts. This is beyond the capacity for MAISRC to do outside of our own RFP process.

If you have any questions, please let me know.

Sincerely,

Nick Phelps, PhD
Director, Minnesota Aquatic Invasive Species Research Center

	Project Manager	Title	Requested funding	Based on MAISRC mission, goals, and priorities, do these proposals fit into identified priorities[b]?	Were these projects proposed to MAISRC?	Has MAISRC already provided funding to any of these initiatives or similar initiatives?	Are any of these duplicative of MAISRC funding?
146-D	Jon Amberg	New Tools for Fight Against Zebra Mussels	$539,323	Zebra mussels are a high priority species, however this project does not fit a prioritized research need used in the 2016 RFP.	No.	MAISRC has funded an effort to develop eDNA protocols to detect zebra and quagga mussels (See Clean Water Fund, M.L. 2012, Subproject #1).	The methods and application proposed here are different from the projects previously funded by MAISRC.
142-D	James Cotner	Using CO2 to Kill Undesirable Fish including Carp	$470,000	Common carp are a high priorities species, however this project does not fit a prioritized research need used in the 2016 RFP.	No. Project was discussed with MAISRC, however it did not fit a current prioritized research need so was not submitted.	MAISRC has funded multiple projects to reduce common carp abundance (See ENRTF M.L 2013 Subproject #4-1, #4-2 and others).	The methods proposed here are different from the projects previously funded by MAISRC.
145-D	Doug Dieterman	River Food Webs with and without Invasive Carp	$495,000	Invasive carp are high priorities species, however this project does not fit a prioritized research need used in the 2016 RFP.	Project was discussed with MAISRC Director after MAISRC's 2016 RFP.	No.	No.
143-D	Mikael Elias	Innovative and Ecological Coatings to Mitigate Invasive Species	$321,500	No. This project is focused on biofouling bacteria. The connection to AIS is unclear.	N/A	N/A	N/A
139-D	Adam Heathcote	Determining Minnesota's Risk of a Toxic Algal Invader	$243,000	Cylindro is a high priority species. This project fits with the prioritized research need to develop methods for detection of toxin-producing cyanobacteria outbreaks in MN lakes.	Yes, but not selected due, among other things, to limited funding availability. This version has been revised since submission to	No.	No.

153-D	Steven Pahs	Circle Lake Wild Rice Restoration and Carp Management	$594,985	No. This project is focused on management implementation, not research, and would therefore not qualify for MAISRC funding.	N/A	N/A	N/A
154-D	Jason Peterson	Invasive Species Wash Site Innovation, Improvements, and Standards	$908,023	No. This project is focused on management implementation, not research, and would therefore not qualify for MAISRC funding.	N/A	N/A	N/A
137-D	Michael Sadowsky	Fish on a Chip: An AIS Detection Platform	$399,000	This project includes multiple high priority AIS. This project fits with the prioritized research need to develop technologies to detect and monitor incipient fish invasions.	Yes, but not selected due to among other things to limited funding availability. This version has been revised since submission to MAISRC.	MAISRC has funded multiple projects to develop molecular diagnostic tests for early detection of invasive carp and zebra mussels (See CWF M.L. 2012 Subproject #1, ENRTF M.L. 2012 Activities #3 and #4, ENRTF M.L. 2013, Subprojects #3-1, and #3-2).	The methods proposed here are different than the projects previously funded by MAISRC.
134-D	Peter Sorensen	An Effective and Practical Invasive Carp Deterrent	$998,000	Bigheaded carp are a high priority species, however this project does not fit a prioritized research need used in the 2016 RFP.	No.	MAISRC has funded multiple projects using sound deterrents for bigheaded carps (See ENRTF M.L.2012 Activity #8, M.L. 2014 Activities #1-#4, OHF (amended M.L. 2017), and others).	This project aims to build upon previous MAISRC-supported research by the PM.
156-D	Tim Terrill	Minnesota Traditions Newspaper AIS Awareness Campaign	$230,000	No. This project is focused on education, not research, and would therefore not qualify for MAISRC funding.	N/A	N/A	N/A
148-D	Diane Waller	Integrating Control of Zebra Mussels and Aquatic Vegetation	$251,310	Zebra mussels and Eurasian watermilfoil are both high priority species, however this project does not fit a prioritized	No.	MAISRC has funded multiple projects to evaluate the use and optimization of herbicides and molluscicides to control AIS, but not together at the same time.	No.

				MAISRC.		
Maggie Karschnia	Accelerated Watershed Approach to Invasive Carp Management	$342,796	No. This project is focused on management implementation, not research, and would therefore not qualify for MAISRC funding.	N/A	N/A	N/A
Michelle Marko	Development of Predictive Tools for AIS Management	$331,644	Includes multiple high priority AIS. With some modification, Activity 3 could fit with a current prioritized research need to quantify the risks of the live fish trade to introduce AIS.	No.	MAISRC has funded multiple projects to predict the risk of AIS introduction and establishment (See ENRTF M.L. 2013 Subprojects #8, #11, #13 and #19).	There is overlap with ongoing MAISRC research led by Dr. Nick Phelps, Dr. Dan Larkin and Dr. David Andow.
Daniel McEwen	Controlling Densities of Zebra Mussels in Infested Lakes	$428,864	Zebra mussels are a high priority species, however this project does not fit a prioritized research need used in the 2016 RFP.	No.	MAISRC has funded multiple projects to survey and control zebra mussels (See Clean Water Fund, Subproject #1 and #2; Hennepin County 2016-2017, ENRTF M.L. 2013 Subproject # 14).	There is some overlap with ongoing MAISRC research led by Dr. Mike McCartney and Jim Luoma. However, this project also includes novel research approaches and management implementation not being done by MAISRC.
Allen Mensinger	Sound Gradient for Acoustic Deterrence of Bigheaded Carp	$396,310	Bigheaded carp are a high priority species, however this project does not fit a prioritized research need used in the 2016 RFP.	No.	MAISRC has funded multiple projects using sound deterrents for bigheaded carps (See ENRTF M.L.2012 Activity #8, M.L. 2014 Activities #1-#4, OHF (amended M.L. 2017), and other projects).	There is significant overlap with ongoing MAISRC research led by Dr. Peter Sorensen, however the methods proposed are different.
Christopher Merkes	Developing RNA Interference Genetic Controls for Zebra Mussel	$769,528	Zebra mussels are a high priority species, however this project does not fit a prioritized research need used in the 2016 RFP.	No.	MAISRC has funded an effort to identify target genes and potential methods for genetic biocontrol of zebra mussels (ENRTF 2013, Subproject #9).	There is significant overlap in Activity 1 with ongoing MAISRC research led by Dr. Mike McCartney. The remaining Activities do not overlap with MAISRC research.

144-D

150-D

155-D

136-D

133-D

			research need used in the 2016 RFP.		(For Mulluscicides, see CWF M.L. 2012 Subproject #2; Hennepin County 2016-2017; ENRTF M.L. 2013 Subproject # 14. For herbicides, see: ENRTF M.L. 2013 Subprojects #5 and #8).	
152-D Steve Windels	Evaluate Control Methods for Invasive Hybrid Cattails	$131,920	Hybrid cattail is a high priority species, however this project does not fit a prioritized research need used in the 2016 RFP.	No.	No.	No.

LEGISLATIVE-CITIZEN COMMISSION ON MINNESOTA RESOURCES
100 REV. DR. MARTIN LUTHER KING JR. BLVD.
ROOM 65 STATE OFFICE BUILDING
ST. PAUL, MINNESOTA 55155-1201

Phone: (651) 296-2406
Email: lccmr@lccmr.leg.mn
Web: www.lccmr.leg.mn
TTY: (651) 296-9896 or 1-800-657-3550

Susan Thornton, Director

DATE: July 26, 2017

TO: Dr. Rob Venette, Director
Minnesota Invasive Terrestrial Plants and Pests Center

FROM: Susan Thornton, Director ST

SUBJECT: Regarding 2018 Proposals Received Related to Minnesota Invasive Terrestrial Plants and Pests Center

Dear Dr. Venette,

The Legislative Citizen-Commission on Minnesota Resources (LCCMR) staff are currently reviewing 2018 project proposals received in response to the Environment and Natural Resources Trust Fund RFP. We received 10 proposals related to terrestrial invasive species. They are listed below. By providing you the suite of projects related to TIS, we are seeking your expertise and sharing with you the range of TIS projects LCCMR will be reviewing. As part of the review process it is helpful to understand how these projects relate to Minnesota Invasive Terrestrial Plants and Past Center mission, goals, and priorities.

We are requesting on behalf of the LCCMR, that you as director provide us, additional information to understand the research context of these proposals. Questions we have include:

- Were these projects proposed to MITPPC?
- Based on MITPPC mission, goals, and priorities, do these proposals fit into identified priorities?
- Can you provide any insight regards to the status of research related to the topics of these proposals?
- Has MITPPC already provided funding to any of these initiatives or similar initiatives?
- Are any of these duplicative of MITPPC funding?

We would greatly appreciate MITPPC's feedback regarding the following proposals. Your insight will help the LCCMR better understand the context of these projects. We would like your feedback by Friday August 18th.

Feel free to contact LCCMR with any questions,

Proposals Related to Terrestrial Invasive Species (Attached)

For MTIPPC Review:

Abrahamson, Mark (MDA):
Slow the Spread of the Emerald Ash Borer- $14,689,500
Ambourn, Angie (MDA):
Monitoring and Biocontrol of Brown Marmorated Stink Bug- $199,224
Burks, Susan (DNR):
Boot Brush Use to Prevent Spreading Invasive Species- $267,208

Burks, Susan (DNR):
Terrestrial Invasive Plant Detection Methods for Forest Lands- $300,000
Chandler, Monika (MDA):
Palmer Amaranth Detection and Eradication, $653,300
Peterson, Jason (DNR):
Invasive Species Wash Site Innovation, Improvements, and Standards- $908,023
Russell, Matthew (U of M):
Testing a New Method for Eradicating Dwarf Mistletoe, $352,000
Tiffin, Peter (U of M):
Stopping Invasive Species by Attacking from Below, $491,515
Windels, Steve (Voyageurs National Park):
Evaluate Control Methods for Invasive Hybrid Cattails, $131,920

Not For MTIPPC Review:

Venette, Robert (U of M):
Minnesota Invasive Terrestrial Plants and Pests Center 4, $7,000,000

cc: Heather Koop, Associate Director
Minnesota Terrestrial Invasive Plants and Pests Center

LCCMR 2018 Proposals Related to Terrestrial Invasive Species							
ID #	Last Name	First Name	Species	Title	Summary	Organization	$ Requesting
135-D	Abrahamson	Mark	Emerald Ash Borer	Slow the Spread of the Emerald Ash Borer	Reducing the yearly rate of spread of the emerald ash borer through outreach and strategic management grants could delay spread throughout Minnesota for decades and save billions of dollars.	Minnesota Department of Agriculture	$ 14,689,500
138-D	Ambourn	Angie	Brown Marmorated Sti	Monitoring and Biocontrol of Brown Marmorated Stink Bug	Brown marmorated stink bug is increasing in Minnesota. This project will expand monitoring to identify areas of spread, and gather data on native parasitoids and predators and implement biological control.	Minnesota Department of Agriculture	$ 199,224
151-D	Burks	Susan	TIS Cleaning	Boot Brush Use to Prevent Spreading Invasive Species	A better understanding of Minnesota hikers and the tools they use to clean their gear will prevent the spread of terrestrial invasive species and protect natural and scenic resources.	MN DNR	$ 267,208
147-D	Burks	Susan	TIS Detection	Terrestrial Invasive Plant Detection Methods for Forest Lands	Develop and test aerial buckthorn detection methods in northern Minnesota; upgrade invasive plant risk model to prioritize forest surveys; design/test ground survey methods and integrate into annual work planning.	MN DNR	$ 300,000
141-D	Chandler	Monika	Palmer Amaranth	Palmer Amaranth Detection and Eradication	Find and control Palmer amaranth in conservation plantings to prevent severe economic damage and protect prairies.	Minnesota Department of Agriculture	$ 653,300
154-D	Peterson	Jason	Both AIS/TIS Cleaning	Invasive Species Wash Site Innovation, Improvements, and Standards	Design and construction of innovative site improvements at five DNR offices for staff to clean equipment and contain invasive species so that they will not spread.	MN DNR	$ 908,023
149-D	Russell	Matthew	Dwarf Mistletoe	Testing a New Method for Eradicating Dwarf Mistletoe	This projects seeks to use new technology that gives natural resource managers another tool to maintain healthy and productive black spruce forests across Minnesota.	U of MN	$ 352,000
140-D	Tiffin	Peter	TIS Management	Stopping Invasive Species by Attacking from Below	Invasive plants strongly impact soil microbes, fungi, and fertility; we will evaluate innovative and potentially effective methods to manipulate these soil properties to control invasive plants in prairies and forests.	U of MN	$ 491,515
132-D	Venette	Robert	TIS Management	Minnesota Invasive Terrestrial Plants and Pests Center 4	Funding is requested to accelerate high priority research that will protect Minnesotas wetlands, forests, prairies, and agricultural resources from terrestrial invasive plants, pests, and pathogens.	U of MN	$ 7,000,000
152-D	Windels	Steve	Cattails - Both AIS/TIS	Evaluate Control Methods for Invasive Hybrid Cattails	This project will evaluate the effectiveness of two methods to remove exotic hybrid cattail to restore fish and wildlife habitat in Minnesota wetlands.	Voyageurs National Park	$ 131,920

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Minnesota Invasive Terrestrial Plants and Pests Center

College of Food, Agricultural and Natural Resource Sciences

1992 Folwell Avenue
St. Paul, MN 55108-6125

612-626-1914

Ms. Susan Thornton, Director
Legislative-Citizen Commission on Minnesota Resources
100 Rev. Dr. Martin Luther King Jr. Blvd
Room 65 State Office Building
St. Paul, MN 55155-1201

August 17, 2017

Dear Ms. Thornton,

On July 26, 2017, you forwarded nine proposals that were related to terrestrial invasive species (TIS). This letter is in response to your request for feedback from the Minnesota Invasive Terrestrial Plants and Pests Center. As a matter of full disclosure, a tenth proposal was submitted by us at MITPPC for $7 million. Thus, we have a clear conflict of interest, and our comments on the proposals are not meant to be evaluative.

The table below summarizes proposals from LCCMR that were submitted to us for comment. Proposals that do not have a project manager from the University of Minnesota, are not focused on research, and/or do not address a priority species are not eligible for funding from MITPPC.

Project Manager (PM)	Title	U of M PM?	Research?	Target taxa (priority)	MITPPC eligible?
Abrahamson	Slow the spread of emerald ash borer	No	No	Emerald ash borer (#2 of TIS insects)	No
Ambourn	Monitoring and biocontrol of brown marmorated stink bug	No	No	Brown marmorated stink bug (#4 of TIS insects)	No
Burks	Boot brush to prevent spreading invasive species	No	No	Multiple-unspecified	No
Burks	Terrestrial invasive plant detection methods for forest lands	No	Maybe	Glossy buckthorn (#4) and common buckthorn (#7 of TIS plants)	No

135-D
138-D
151-D
147-D

Project Manager (PM)	Title	U of M PM?	Research?	Target taxa (priority)	MITPPC eligible?
Chandler	Palmer amaranth detection and eradication	No	No	Palmer amaranth (#9 of TIS plants)	No
Peterson	Invasive species wash site innovation, improvements, and standards	No	No	Multiple-unspecified	No
Russell	Testing a new method for eradicating dwarf mistletoe	Yes	Yes	Eastern spruce dwarf mistletoe **(Not a TIS)**	No
Tiffin	Stopping invasive species by attacking from below	Yes	Yes	Norway maple (#23), glossy buckthorn (#4), yellow sweetclover (#26), crown vetch (#15 of TIS plants)	With modification
Windels	Evaluate control methods for invasive hybrid cattails	No	Yes	Hybrid cattails (Not evaluated)	No

141-D

154-D

149-D

140-D

152-D

None of the TIS proposals to LCCMR were submitted to MITPPC in its most recent or earlier requests for proposals (RFP). MITPPC issued its latest RFP in March 2017 with proposals due May 19, 2017. This date was selected to better align with LCCMR's application deadline of May 15, 2017. MITPPC received 13 proposals, requesting $6 million.

Two proposals to LCCMR are applied research projects that are being led by faculty from the University of Minnesota. The first proposal "Testing a new method for eradicating dwarf mistletoe" (Dr. Matthew Russell; $352,000) does not address an invasive species. The project seeks to find a management alternative for eastern spruce dwarf mistletoe (*Arceuthobium pusillum*), a species that is native to Minnesota and is, nevertheless, a significant issue for black spruce in the state. As the project addresses a native pest species, it is not eligible for funding from MITPPC. This proposal was submitted to LCCMR under Category A. Foundational Natural Resource Data and Information, so perhaps it was forwarded to us inadvertently. A related species, *Arceuthobium americanum*, is a priority pathogen (#7 of pathogens) for MITPPC.

The proposal "Stopping invasive species by attacking from below" (Dr. Peter Tiffin; $491,000) focuses on four invasive plant species: Norway maple, *Acer platanoides*; glossy buckthorn, *Frangula alnus*; yellow sweetclover, *Melilotus officinalis*; and crown vetch, *Coronilla varia*. Of these, only glossy buckthorn and crown vetch would be of high enough priority (#4 and #15,

respectively, among TIS plants) to be eligible for funding through MITPPC. A growing body of research is demonstrating that invasive plants change microbial communities in soils, often to the benefit of the invaders. A limited number of studies have attempted to manipulate microbial communities (e.g., by inoculating plants with native mycorrhizae or incorporating activated carbon into soils) to manage invasive plants, but early results have been encouraging. MITPPC has not funded any similar research.

Two of the proposed projects relate to research that is currently being funded by MITPPC. Part of the proposal "Monitoring and biocontrol of brown marmorated stink bug" (Angie Ambourn, MDA, $199,224) seeks to expand a network of monitoring traps to detect this invasive pest as it moves further into the state. The application acknowledges the MITPPC-funded effort "Early detection, forecasting and management of *Halyomorpha halys*" (Dr. William Hutchison, U of M, Entomology) which is working to develop dynamic maps to forecast where brown marmorated stink bug (scientific name: *Halyomorpha halys*) might occur now and in the future. A component of his project includes the testing of two trap types and the maintenance of a series of traps in the state to help calibrate and test the map products. Dr. Hutchison's project has been coordinated from the outset with other trapping efforts by MDA for brown marmorated stink bug and has not been duplicative. Ms. Ambourn proposes to use some of the maps from the research project to inform placement of MDA's traps.

The proposal "Terrestrial invasive plant detection methods for forest lands" (Susan Burks, DNR, $300,000) describes the implementation of two approaches to better characterize the distribution of buckthorn in the state. A project recently funded by MITPPC, "Will future weather favor Minnesota's woody invaders?" (Dr. Peter Reich, U of M, Forest Resources) includes the development of current and projected-future distribution maps for common and glossy buckthorn. The maps are based upon extensive field observations provided by a number of organizations and the use of statistical tools to "connect the dots." The methods for the proposed project and the funded project differ.

Please feel free to contact us if you have any remaining questions.

Sincerely,

Robert C. Venette, PhD
Director, MITPPC

Cc: H. Koop, Associate Director, MITPPC

062-B “Re-connecting Fish Habitat at Road-Stream Crossings"

Summary of LCCMR Staff follow up conversation with Peter Leete Transportation Hydrologist (DNR-MnDOT Liason) Division of Ecological and Water Resources.

- This problem is more prominent out west where salmon and trout passage is needed. Here the concern is with trout, reproduction, and mussel species that rely on fish.
- Peter has worked with Jessica on all previous related research that this proposal builds upon.
- He said yes this proposal is in line with DNR and MnDOT activity related to roads and ecosystems.
- Previously the state had a single culvert standard, which resulted in the habitat fragmentation we are now seeing and was not appropriate for the flood events seen in the past 5 years.
- With the increase in 500 year flood events MnDOT has already begun increasing the size of culverts however they have no method for determining when greater habitat connectivity is needed and this proposal gets at that.
- The other main problem is at the local level and not having this information to determine ecological culvert needs with local road construction

Peter Leete provided links to projects related to the topic.

Work plan for the culvert design project currently underway. A link is here:
http://dotapp7.dot.state.mn.us/projectPages/pages/projectDetails.jsf?id=16010&type=CONTRACT

092-B " Geospatial Airborne Sensor Survey to Manage Water Resources "

Summary of LCCMR Staff follow up conversation with Bryon Malone Pennington SWCD Manager.

The $332,749 in “other funds” from BWSR is for a FY17 Clean Water Fund Accelerated Implementation Grant awarded to the Pennington Soil and Water Conservation District for their Drainage System Outlet Analysis. Pennington SWCD is training Northland Community Technical College (NCTC) to do conservation work utilizing the drone and aerial survey expertise at NCTC . This training will provide the needed experience to do the work described in the LCCMR proposal.

The dean of the geospatial program at NCTC reached out to the conservation entities in the region to build partnerships between the program resources and conservation needs.

The college has the experience and knows the technology but they do not have the conservation expertise to know what they are looking for when doing remote sensing or what they are looking at, thus the training that the SWCD is providing.

International Wolf Center
Teaching the World about Wolves

September 7, 2017

At the request of Susan Thornton, we are pleased to submit this supplemental information regarding our project proposal titled: **Preparing Minnesotans for Changes in Wolf Management**. When our current exhibit was created in the early 1980's, its purpose was to promote species survival. Although beautifully and professionally created, the success of wolf recovery over the past three decades in Minnesota has resulted in it becoming outdated. Display materials were made with a high-quality printing process on permanent materials, making it cost-prohibitive to update exhibit displays. A major overhaul of the exhibit is needed to celebrate Minnesota's historic success in recovering this endangered species, as well as to educate Minnesotan's about the need for their management. The new *Wolf Discovery Center* will have three distinct interpretive components:

1. **History of Wolves: Extirpation and the Journey to Recovery in Minnesota**
    a. New stations will display a selection of repurposed artifacts from the original exhibit
    b. Interactive screens will highlight the historic timeline of extirpation and the successful recovery of wolves in Minnesota – the last place in the lower 48 where wolves survived
    c. Electronic kiosks will demonstrate historic and modern wolf ranges, wolves in various cultures, folklore/myths, legal challenges, and management practices throughout history
2. **Science of Wolves: Their Biology and Role in Nature as an Apex Predator**
    a. Using the latest technology, visitors will discover the science and biology of wolves
    b. A wolf tracking station will simulate the tracking of wolves using GPS and radio telemetry
    c. A "Howling Room" sound chamber will simulate an outdoor experience where visitors will learn how to communicate with packs
    d. Touch-screen displays will feature a variety of topics including wolf/canid evolution, wolves cascading effect on landscapes, pup development stages, wolf behavior charts, the five senses wolves use, how wolves define their territory, diseases, and wolf/prey interactions
3. **Co-Existence with Wolves: The Need for Wolf Management**
    a. Through immersive experiences, visitors will learn about the complicated issues in Minnesota surrounding human interactions with wolves
    b. HD displays will provide a real-life look into the perspectives of farmers, ranchers and pet owners living in wolf country and the challenges they face
    c. Kiosk stations will use interactive technology to disseminate practical advice to keep pets and livestock safe from predators
    d. HD displays will outline wolf management practices in Minnesota with facts that will prepare Minnesotans for challenges our DNR will face when federal control reverts back to the states
    e. Interactive displays answering frequently asked questions like safety in wolf territory

Many of the elements of the *Wolf Discovery Center* will use technology that allows for frequent and low-cost updates of information. Interior construction will occur to move walls and install wiring for the new elements. Some exhibit displays will be movable, allowing the space to be reconfigurable in accommodating special displays and the future addition of more learning modules.

Cost estimates are based on square footage estimates for high-tech, mid-tech and low-tech displays. A professional exhibit planner will design and build the new exhibit to avoid the need for future massive overhauls. The exhibit space that will be renovated is 4,872 square feet, and the investment would pay for itself in local economic tourism growth over an estimated two-year period.

Fun Fact:

Porcupines, birds, squirrels, and other animals eat mistletoe.

Tree Freeloader

Eastern Spruce Dwarf Mistletoe
(Arceuthobium pusillum)

Roots in the ground, leaves in the sky—that seems like a pretty normal thing to expect from forest plants. But not eastern spruce dwarf mistletoe! This tiny plant is a parasite: It grows in and on another plant, instead of in the soil.

Dwarf mistletoe starts its life as a tiny seed stuck to the branch of a coniferous tree, most often a black spruce or white spruce but sometimes a tamarack. When the seed *germinates*, or begins to grow, it works its way inside the branch. There it grows for several years, gathering energy and nutrients from its host like a freeloading guest who moves into your house, takes over your bedroom, and raids your refrigerator every day.

After two to four years of growing inside the host, the mistletoe sends tiny shoots out into the open air in between the tree's needles. The orangish or yellowish shoots grow to be about as tall as a spruce needle is long, with leaves about the size of a sesame seed. By April or May each shoot has formed four or five tiny flowers that are pollinated by insects such as flies, beetles, or wasps. Over a period of about five months, the flowers mature into fruits containing liquid and seeds. The fruits swell until they burst, shooting sticky seeds up to 20 feet away. Any seeds that land on and stick to another conifer may start the cycle again.

The mistletoe's relationship with its coniferous host is a one-way street: The tiny plant benefits but the tree does not. In fact, the mistletoe changes the way the tree grows, causing it to form a gnarly cluster of branches called a witch's broom. The mistletoe steals food and nutrients the tree needs to grow. If the infestation is bad enough, it can reduce the tree's ability to grow and make its own seeds and can even kill it.

SPARKY STENSAAS

September 6, 2017

Michael McDonough, Interim Director
Legislative-Citizen Commission on Minnesota Resources
100 Rev. Dr. Martin Luther King Jr. Blvd
Room 65 State Office Building
St. Paul, MN 55155

Dear Michael:

The Board of Water and Soil Resources (BWSR) submitted an FY19 LCCMR proposal for $20 million for the Minnesota Conservation Reserve Enhancement Program (MN CREP). The MN CREP for Water Quality and Habitat will target certain riparian areas, wetlands and wellhead protection areas, providing multiple benefits to water quality and wildlife habitat.

The Legislature appropriated $13.5 million to BWSR for the MN CREP, of which $5 million is designated as FY19 funds from the Environment and Natural Resource Trust Fund. Given that FY19 appropriation, BWSR will amend our $20 million proposal to $15 million. If requested, BWSR will work with LCCMR staff to make necessary changes to the proposal.

We appreciate the hard work of the commission, and your support for this program.

Sincerely,

John Jaschke
Executive Director

Michael Varien

Subject: 133-D Developing RNA Interference Genetic Controls for Zebra Mussels

From: Merkes, Christopher [mailto:cmerkes@usgs.gov]
Sent: Wednesday, August 23, 2017 4:09 PM
To: Michael Varien <Michael.Varien@lccmr.leg.mn>; Diana Griffith <diana.griffith@lccmr.leg.mn>
Subject: LCCMR proposal: Developing RNA interference genetic controls for zebra mussels

Dear Michael and LCCMR,

One of my collaborators, Michael McCartney will be unable to complete his part of the project identified as activity 1.

If this proposal is selected for presentation, we would like to strike activity 1 going forward. This will reduce the budget by $53,320 from $769,526 to $716,206.

Having additional genes annotated would have made activity 2 easier by giving us more flexibility in potential targets to screen, but we will be able to still accomplish activity 2 and 3 without activity 1 using the sequence information that will be available.

Regards,

Chris Merkes
Geneticist
Upper Midwest Environmental Sciences Center, U.S. Geological Survey
2630 Fanta Reed Road, La Crosse, WI, 54603
(608) 781-6316
https://www.usgs.gov/staff-profiles/chris-m-merkes

Michael Varien

Subject: 148-D Integrating Control of Zebra Mussels and Aquatic Vegetation

From: Waller, Diane [mailto:dwaller@usgs.gov]
Sent: Wednesday, August 23, 2017 11:12 AM
To: Diana Griffith <diana.griffith@lccmr.leg.mn>
Cc: Michael Varien <Michael.Varien@lccmr.leg.mn>
Subject: LCCMR proposal modification

Good day,
This email is to inform the LCCMR proposal committee of a slight modification in our proposal

"**Integrating control of zebra mussels and aquatic vegetation."** In the original submission, MAISRC was included as a partner in Activity 2 and was budgeted to receive $40,000 in support of a graduate student. The revised proposal will direct the work and monies in Activity 2 to the MNDNR. This revision will have no effect on the proposed budget, work and outcomes.

Please let me know if you have any questions or concerns about the revision.
Thank you very much for your time and consideration,
Diane

--
Diane Waller, PhD
Research fisheries biologist, AEH
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Rd
LaCrosse, WI 54603
Office (608)781-6282