Invasive Terrestrial Plants and Pests Center

2015 Legislative Report

January 15, 2015

Brian L. Buhr, Dean

College of Food, Agricultural and Natural Resource Sciences
277 Coffey Hall
1420 Eckles Ave.
St. Paul, MN 55108

University of Minnesota

RE: MN Statute Chapter 312 – H.F. No. 3172, Article 13, Section 44

Contents

Overview

This report is intended to provide an overview of the activities to initiate the Invasive Terrestrial Plants and Pests Center at the University of Minnesota as provided during the 2014 legislative session.[1] This includes the activities and outcomes of the Center and recommendations for additional funding for education, implementation or other activities.

Establishment of the Center

As a newly defined center, the primary activities have related to the establishment of the Invasive Terrestrial Plants and Pests Center (ITPPC). This has included the following activities:

1. Administrative structure and oversight initiated

   Invasive terrestrial plants and pests encompass a broad range of plants and pests, and also a broad range of affected ecosystems and species. Therefore, the Center is established as a "college level center" which means the director will report directly to the dean of the College of Food, Agricultural and Natural Resource Sciences (CFANS). This alignment helps assure the cross-disciplinary conduct of research to address the problems as well as engage across other collegiate units within the University that may participate. Founding departments particularly related to addressing invasive species as indicated by existing research activities or capacities include: Bioproducts and Biosystems Engineering, Entomology, Horticultural Science, Plant Pathology, Fisheries, Wildlife and Conservation Biology, Forest Resources and Applied Economics.

   The Center structure will include a Center Faculty Group (CFG), to be established with overall guidance by a Center Advisory Board (CAB) that consists of the dean (or designate) of CFANS and the department heads (or designates) and designated representatives of related agencies and organizations which may include MISAC (Minnesota Invasive Species Advisory Council), MNDNR (Minnesota Department of Natural Resources), MDA (Minnesota Department of Agriculture), MFRC (Minnesota Forest Resources Council), USFS (US Forest Service), and others with similar expertise and interest.

2. Financial accounts and protocols have been established.

3. The Center office space has been identified and it is located in proximity to the Aquatic Invasive Species Research Center also located on the St. Paul Campus of the University of Minnesota in the USDA Forest Service building. This will enable improved interaction between biological researchers related to the two centers and improve administrative efficiencies for staff, researcher and constituent interactions.

4. In September 2014 a search committee was established to identify and hire a director for ITPPC as indicated in the statute for the Center. The position description for the Center director is attached (Appendix 1). This search was conducted by a committee that included members representing the University of Minnesota, the Minnesota Department of Natural Resources, the Minnesota Forest Products Research Council and was chaired by Dr. William Hutchison, head of

[1] Specifically, MN Statute Chapter 312 – HF. No. 3172, Article 13, Section 44

the Department of Entomology at the University of Minnesota. The position was posted for applications in October 2014 and the search and interviews were conducted during November 2014.

5. Dr. Robert C. Venette was selected as the inaugural director of the Invasive Terrestrial Plants and Pests Center and began his position on January 2, 2015. Dr. Venette is a research biologist for the US Department of Agriculture, Forest Service in St. Paul. He has an extensive research record that includes receipt of over $9.8 million in grants, 118 research presentations and 66 research publications with extensive attention to the behavior and control of invasive species. He holds an adjunct associate professor appointment in the Department of Entomology at the University of Minnesota and is currently serving as chair of the Minnesota Invasive Species Advisory Council which is a consortium of state agencies, universities and extension that coordinate to address invasive species research, education and outreach. Dr. Venette represents a unique combination of research excellence, engagement across numerous research agencies and leadership that makes him an outstanding person to lead this important effort for the State of Minnesota.

Outcomes of the Center

As indicated above, the primary outcome at this early date (6 months post legislation) has been the administrative establishment of the Center and the search and hiring of the director.

A key foundational principle of the Center will be to develop its research activities and portfolio based on net impact assessment of various invasive species and expected outcomes of intervention strategies. This approach would include consideration of pressing need, opportunity and practicality. This will allow for strategic management of the research portfolio to address existing invasive species or developing preventative strategies for rapidly spreading species that have not yet entered the state but could. To accomplish this, the Center will convene expert panels to create risk assessment frameworks and to conduct an initial assessment to prioritize investments in highest priority invasive species. With Dr. Venette hired as director, this work is commencing immediately and the inaugural prioritized research projects will be identified by August 2015. With the Center organized and director hired, we are aggressively moving ahead of schedule when we meet this proposed timeline upon financial appropriation in 2015 as indicated in the legislation.

Recommendations of Additional Funding, Education, Implementation or Other Activities

Immediately upon general appropriation from the Minnesota Legislature, a proposal was written in request of supporting funds from the Legislative-Citizen Commission on Minnesota Resources (LCCMR) under the Environment and Natural Resources Trust Fund (ENRTF) for 2015 (Appendix 2). The complete submitted proposal is included that includes expected timelines and indicates that we are ahead of schedule of our anticipated agenda.

Also attached are work plans for ENRTF 2014 (Appendix 3) and ENRTF 2015 (Appendix 4). The ENRTF request for 2014 is included in the legislative appropriation, while the work plan for ENRTF 2015 is associated with the new request indicated above.

These work plans provide an overview of how the research will proceed. In particular, expected research projects are modularized to include a principal researcher (likely a faculty member or other professional researcher), a post-doctoral research associate or assistant, a graduate student and research supplies. This approach assures that the intent of the funds related to future intellectual talent are implemented in support of graduate students who have the potential to add to the long term human resources strategy that is necessary to address ongoing invasive terrestrial plant and pest challenges.

Position Description
Director
Minnesota Invasive Terrestrial Plants and Pests Center
College of Food, Agricultural and Natural Resource Sciences

Position Title: Director of Minnesota Invasive Terrestrial Plants and Pests Center
Reports to: Dean, College of Food, Agricultural and Natural Resource Sciences
Classification: Program Director, Classification #9340 – 50% time
Position Number: 257097

Overview: The University of Minnesota Terrestrial Invasive Species Research Center

In 2014, the Minnesota legislature appropriated funds to create a Minnesota Invasive Terrestrial Plants and Pests Center research center at the University of Minnesota. The goal of the MITPPC is 'to develop solutions to Minnesota's Terrestrial Invasive Species (TIS) problems by developing an in-depth understanding of key terrestrial invasive species.' It seeks to accomplish this goal by prioritizing efforts to have the greatest potential impact on TIS, and fostering collaborative research across faculty disciplines to address the diverse challenges presented by TIS (plants, pathogens (viral and microbial), insects, and animals). The MITPPC resides in the College of Food, Agricultural and Natural Resource Sciences and functions in collaboration with the College of Biological Sciences, the Minnesota Department of Natural Resources (MNDNR), Minnesota Department of Agriculture (MDA), USDA Forest Service as well as other federal, state and local governmental agencies, private industry and citizens groups.

Position Overview: MITPPC Director

The director will provide intellectual leadership and administrative guidance to ensure the Center is focused on and effective in its mission. The director will be expected to work closely with non-profit and for-profit sectors, government and other educational and research organizations in shaping and fostering the research of the Center. This will include helping to translate scientific findings to support policy making, application, and resource management practices and to address the invasive species affecting Minnesota's forests, prairies, urban landscapes and agricultural systems.

MITPPC is led by a Director with an Associate Program Director and Center Faculty Group (CFG), to be established, and overall guidance by a Center Advisory Board (CAB) that consists of the Dean (or designate) of CFANS and the Department Heads (or designates) of named departments (ENRTF 2015) and designated representatives of related agencies and organizations which may include MISAC (Mn Invasive Species Advisory Council), MNDNR (Department of Natural Resources), MDA (Minnesota Department of Agriculture, MFRC (Minnesota Forest Resources Council), USFS (US Forest Service), and others with similar expertise and interest.

The major responsibilities of the Director are setting the vision and goals for the Center, facilitating continuous progress toward these goals, and developing research programs. The director will do this by establishing and working with the CAB, promoting the MITPPC, and attracting new MITPPC funds. The director will also do this by identifying MITPPC research topic priorities and recruiting MITPPC faculty members, to address prioritized research areas. The Director leads the identification of research priorities, developing strategies for attracting funding, and engaging with partner organizations to leverage respective resources. The Director also decides on MITPPC budgets, including how unrestricted funding, ICR, and salary savings returned to MITPPC are used after consultation with the CAB. The Director works with appropriate department heads to review research productivity of MITPPC faculty. The Director works with the Associate Program Director to develop and communicate the vision and goals of MITPPC, and report to the legislature and other funders on progress and accomplishments.

The Director provides innovative leadership and vision, management and insight, and an ability to manage relationships across a wide spectrum of institutions and intellectual disciplines. Fostering an organizational and educational climate that promotes and celebrates interdisciplinary excellence is an important priority. This position is responsible for: ensuring that multiple research projects are funded to identify solutions to this critical issue; securing financial resources from a variety of potential funders; working with Development staff and departments to increase gifts and endowments; managing and directing staff and researchers; and maintaining responsibility for the Center's budget and annual budget development.

Leadership Competencies:
The successful candidate will be committed to working effectively across all relevant departments within the College and outside stakeholders. Our search process will include a review and discussion of leadership competencies, specifically in the following areas:

- Driving Results – creating a culture of innovation, accountability, high quality and service.
- Vision – establishing direction through clear communication and aligning resources with priorities.
- Engagement – building, sustaining and retaining high performance individuals and teams.
- Collaboration – effective at building consensus, valuing diversity and inclusion, influencing others, and problem-solving.
- Accountability – high standards for self and team, fostering a strong culture of accountability.

Nature of Appointment:
This is a 50% time, 12-month (A-term) academic professional and administrative appointment, annually renewable (K-type); reappointment is contingent upon successful performance and availability of funding. The individual hired into this position will be expected to carry out their current responsibilities at 50% time.

Required Qualifications:
The successful candidate must have a PhD in basic or applied ecology, biology, applied economics or related field; experience in interdisciplinary research; administrative experience, including budget development and management; and a track record of raising research funds. In addition the candidate will have a commitment to diversity and inclusion.

Preferred Qualifications:
Demonstrated commitment to interdisciplinary systems research; commitment to team collaboration and shared decision-making; demonstrated leadership skills; demonstrated ability to lead large collaborative research projects and partnering with private and public sector entities on joint research projects and initiatives. This also includes qualifications related to the "Position Overview" section above.

The University of Minnesota provides equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. The College of Food, Agricultural and Natural Resource Sciences and the University are committed to hiring a diverse faculty and staff, and strongly encourage candidates from historically underrepresented groups to apply. We welcome you to visit our college's Diversity and Inclusion web page at: http://www.cfans.umn.edu/diversity/

Environment and Natural Resources Trust Fund (ENRTF)
2015 Main Proposal
Project Title: *Minnesota Invasive Terrestrial Plants and Pests Center*

PROJECT TITLE: Minnesota Invasive Terrestrial Plants and Pests Center

I. PROJECT STATEMENT

The Minnesota Invasive Terrestrial Plants and Pests Center (MITPPC), is requested to be established at the University of Minnesota by Minnesota's 88th Legislature (Chapter 312, Article 13, Section 44). MITPPC will serve a lead role in terrestrial invasive species research, coordinating initiatives 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. The mission of the Center will be to offer science-based solutions to pest invasions that ensure the protection of the state's healthy prairies, forests, wetlands and agricultural resources. The research and educational programs of the Center will be pursued in collaboration with state, local, tribal and federal governments, nongovernmental agencies, the private sector, Extension, and other colleges and universities.

The Center will be administratively located in the College of Food, Agricultural and Natural Resource Science (CFANS) in coordination with the College of Biological Sciences (CBS). CFANS and CBS have the intellectual and physical capacity in place to effectively address the multidisciplinary challenges posed by invasive species. This includes Departments of Entomology (insect invasives e.g., emerald ash borer, western pine bark beetles, spotted wing drosophila), Plant Pathology (microbial invasives e.g., oak wilt, soybean rust), Forest Resources (e.g., forest pests & diseases, earth worms), Agronomy & Plant Genetics (plant bio-control such as cover plants and establishment of native prairies), Horticultural Science (invasive ornamentals, fruit and vegetable plant protection), Applied Economics (risk assessment and policy strategies for intervention and investment in effective controls), Fisheries Wildlife and Conservation Biology (e.g., invasive wildlife species, non-target impacts in prairies and wetlands), and Bioproducts and Biosystems Engineering (technology for detection and bio-physical control), and Plant Biology and Ecology, Evolution and Behavior Departments in CBS. In addition, CFANS oversees eight research and outreach centers located in diverse agro-ecological areas of the state allowing research to be conducted across Minnesota's rich and varied landscapes. Together these departments and research centers will address invasives in prairies, forests, agricultural landscapes and wetlands in urban, developing and rural contexts and develop control methods, management strategies and policy to achieve effective outcomes.

A significant share of research funding will be directed toward graduate student and post-doctoral research assistantships. At the funding levels proposed here (ENRTF 2015 - $10.1 million), the Minnesota State appropriated general funds ($3.4 million) and the ENRTF 2014 funds ($1.46 million), and there is sufficient investment to fully support 10 graduate students assuming 4 years of funding each. This is a total of $1,897,048 invested in graduate students over the 8 years (5 grads/year * 8 years * $47,426 salary, benefits and tuition = $1,897,048). In addition it will support approximately 8 post-doctoral research associates also assuming 4 years of funding each for a total of another $1,783,216 (4 post-docs/year * 8 years * $55,725 salary and benefits = $1,783,216.) We expect the graduate students and post docs to work with one faculty advisor each, resulting in roughly 9 projects in progress each year. It is difficult to determine how many years will be spent on each project which depends on the scope of research that likely varies by species addressed, but if we use the 4 years of and average graduate student or post-doc we should expect 18-25 species or projects to be initiated because of this investment. However, we expect that the center is likely to train 25 graduate students and postdocs because these funds will be leveraged with other sources and some projects will train MS students (which are shorter-term than PhDs). We believe building professional capacity related to terrestrial invasive species is critical because we consistently hear from government agencies, industries, and other non-governmental organizations that there are not enough well-trained professionals to address their workforce needs. This program will assist with workforce development along with research outcomes.

Most importantly this investment will result in a comprehensive, planned and multi-disciplinary approach to addressing terrestrial invasive species. Individual faculty typically initiate grants on specific topics, such as an entomologist working on bio-control of emerald ash borer. However, to effectively address this effectively also requires assessment of the forest health and ecology which very likely impacts the effectiveness of this control. Investment in a comprehensive center approach across several departments helps assure the coordination of the research projects, focusing on the identified priorities from the over 100 potential invasives.

Legislative appropriations for MITPPC are provided in Chapter 312, HF 3172, Article 12, Section 8 of the 2014 Legislative Record. A total of $4,860,000 is appropriated from the following funds:

General Fund	$3,400,000
ENRTF 2014	$1,460,000

These funds are designated to include a director, graduate students and necessary supplies to conduct the research and are available until June 30, 2022 (eight years).

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Catalyzing research & education: establishing administrative structure **Budget: $0 ENRTF**

Success will depend on the ability to marshal multi-disciplinary teams in timely and prioritized ways to deliver results. The best way to approach this is to have a collegiate-level center directed by a faculty researcher who reports to the dean of CFANS (similar to the existing Water Resources Center). The Center Director would be primarily responsible for prioritizing the research agenda of the MITPPC, for overseeing the implementation and completion of the research projects and to coordinate faculty, student and staff resources to complete projects. Administrative oversight would be provided by existing collegiate and departmental staff and administration and one administrative assistant in an effort to ensure that funding goes to mission-specific investments. This is completely funded by the 2014 Legislative Appropriation (Chapter 132 – H. F. 3172, Sec. 8) from general legislative funds, and is not a part of the request in this proposal. This totals $2,417,196 of the general funds provided by the legislature and as such is not part of this request.

A key foundational principle of the center will be to develop its research activities and portfolio based on net impact assessment of various invasive species and expected outcomes of intervention strategies. This approach would include consideration of pressing need, opportunity and practicality. This will allow for strategic management of the research portfolio to address existing invasive species or developing preventative strategies for rapidly spreading species that have not yet entered the state but could. To accomplish this, the Center will convene expert panels to create risk assessment frameworks and to conduct an initial assessment that can prioritize investments in highest priority invasive species. This is also completely funded by the 2014 legislative appropriation, and is not part of this proposal. It totals $113,537 of the general funds provide by the legislature and as such is not part of this request.

Outcome	Completion Date
1. Recruit the Center Director and establish administrative structure for research	*Aug 15, 2015*
2. Establish a council of internal and external expertise to provide input on strategic direction and funding priorities (to be supported by preliminary net impact assessment).	*Sept 15, 2015*
3. Convene expert panels to begin creating frameworks for assessing net impacts of invasive species and control responses, revisit per needs assessments.	*Oct 15, 2015*

Activity 2: Launch research on high priority, established terrestrial invasive species **Budget: $4,647,264**

The Center will initiate or accelerate applied research on high risk invasive species already present in Minnesota. This will include creating a prioritized list of pest and plant species that threaten the state's prairies, forests, wetlands, and agricultural resources. Depending on the net impacts associated with each species, this research may include new control methods including bio-control and technology, and development of integrated pest management tools that minimize non-target impacts of control. This will include an analysis of any consequences related to the management of prioritized species to the state's water, pollinators, and native prairies or other native species. In addition to this ENRTF 2015 budget request of $4,647,264, legislatively appropriated general funds of $470,352 will be designated to Activity 2 and $1,460,000 will be used from the 2014 ENRTF Funding. The 2015 ENRTF request will enable the multi-disciplinary coordination missing in one-by-one identification of TIS research projects by individual researchers. While led by faculty researchers, its emphasis on graduate student and post-doctoral researchers will expand the available long run intellectual research capital to address the ongoing multi-faceted challenges posed by terrestrial invasive species. Over an 8-year period, the Center will support approximately 5 team projects dedicated to established, high-risk species (e.g., funding $100,000-200,000+/yr, for 3-5 years). Training experts in invasive species is also critical so a core component of these projects will be funding of graduate students to work with existing faculty. The total use of 2014 funds for this activity is $1,460,000.

Outcome	Completion Date
1. Risk focused research on invasive species, new control methods and technology	*July 1, 2023*
2. Research on integrated pest management approaches and strategies	*July 1, 2023*
3. Research on minimizing non-target impacts of control	*July 1, 2023*

Activity 3: Research on prevention of establishment of new threats: Rapid Response Budget: $5,703,111

The Center will emphasize "Prevention and Early Detection" capabilities for responding to new threats to include projects focused on establishment prevention, early detection and rapid response. In addition to the ENRTF budget request of $5,703,111, legislatively appropriated general funds of $398,915 will be designated to Activity 3. The 2015 ENRTF will fund an expected four post-doc students and two graduate students and over an 8-year period, the Center will support approximately 6 projects, generally 1-3 years in duration. The 2015 ENRTF is particularly important in this case because it provides the underlying infrastructure of support and coordination to be able to respond quickly rather than the typical nearly one year lag between identification of a potential new TIS and the funding being released, and only then being able to hire graduate students or post-docs which requires additional time. Given that the greatest impact that we can have on any potential invasive species is the time before it becomes established or even enters the state, this is a vital investment that will improve our capacity and our response time to preventing and limiting introduction of new terrestrial invasive species.

Outcome	Completion Date
1. Research findings providing for early detection	*July 1, 2023*
2. Research results for preventing establishment, mitigating impacts, restoration and fostering ecosystem resilience at diverse scales from very local to large landscape levels.	*July 1, 2023*

III. PROJECT STRATEGY

A. Project Team/Partners

The project teams will be comprised of faculty members and staff from eight departments of CFANS with potential for other collaborations was necessary upon identified priority species, as well as administrative staff of the Center and the Center Director established by the legislature. The Director will report to the dean of the College of Food, Agricultural and Natural Resource Sciences. Partnering organizations include the USDA Forest Service Northern Research Station, the Minnesota Department of Agriculture, Minnesota Department of Natural Resources and the Minnesota Forest Resource Council as well as the College of Biological Sciences at the University of Minnesota.

B. Project Impact and Long-Term Strategy

Terrestrial invasive species impact every citizen in Minnesota: from the damage the emerald ash borer does to forests and urban landscapes, to weeds that diminish the biodiversity of prairies and wetlands and to economic costs to grain and fruit producers from harvests destroyed by pests and pathogens. A study published in the journal Agricultural and Resource Economic Review in 2006 estimates the combined economic impact of plant, animal, and microbial invasives in the U.S. to be $134 billion annually. If Minnesota's share of this loss is typical of the 50 states, the loss is roughly $3 billion annually.

The array of terrestrial invasive species of high concern for Minnesota are numerous and diverse. They include invasive grasses, trees, shrubs, insects, earthworms, mammals, fungal pathogens, and other microbes. Because there has been no comprehensive assessment of terrestrial invasive species risks to Minnesota, it is impossible to know how many species should be considered high risk. The initial assessment we propose will screen at least 100 species to arrive at scientifically-defensible research priorities. We will identify research priorities for species already established in Minnesota and for those that appear likely to arrive and do harm. After the impact assessment working group meets to begin to establish priorities, these will be presented to research in the form of requests for proposals and work-plans to conduct research to address these invasive species. These will be reviewed by the impact assessment teams which will allow for rapid turnaround of proposals to expedite work to be completed.

Although not part of this proposal, it will be important to incorporate public outreach and citizen science. One of the greatest factors causing introduction and spread of invasive species is human transport. It will be crucial for the center to work with agencies and organizations involved in invasive species outreach programs so public information is based on the best available science. Networks of citizen scientists could be an important part of implementing early detection programs and monitoring the effectiveness of control efforts.

C. Timeline Requirements

Spread of invasive species, is by definition nearly impossible to prevent or reverse. There are dozens of examples worldwide (including several in Minnesota) where effective methods have been devised that result in long-term control with limited non-target impacts. All have required many years to develop the method, followed by additional time to verify results and secure permits needed for widespread use. By providing adequate funding to support multi-disciplinary teams, it is realistic to expect the center to develop effective prevention and control methods within an 8 year time frame for a significant portion of the 15-20 species we would focus on.

Environment and Natural Resources Trust Fund (ENRTF)
2015 Main Proposal
Project Title: *Minnesota Invasive Terrestrial Plants and Pests Center*

2015 Detailed Project Budget

Project Title: Minnesota Invasive Terrestrial Plants and Pests Center

IV. ENRTF PROPOSAL REQUEST BUDGET 8 years

BUDGET ITEM *(See "Guidance on Allowable Expenses", p. 13)*	**AMOUNT**
Personnel: Established TIS - Two Post-Doctoral researchers (100%) $45.9K/yr salary + $9,860/yr benefits for eight years = $891,608. Four Faculty Principal Investigators (25%) $27.3K/yr salary + $9,251/yr benefits for eight years = $1,169,766.	$ 2,061,374
Personnel: Rapid Response TIS - One Graduate Research Assistants (50%) $24K/yr salary + $23,402/yr tuition and benefits for eight years = $758,819. Two Post-Doctoral researchers (100%) $45.9K/yr salary + $9,860/yr benefits for eight years = $891,608. Four Faculty Principal Investigators (25%) $27.3K/yr salary + $9,251/yr benefits for eight years = $1,169,766.	$ 2,820,193
Equipment/Tools/Supplies: Established TIS - Direct research expenses include only expenses related directly to research including consumable lab materials, specimens, field trial related expenses. $80.8K/yr for four Investigators for eight years = $2,585,600.	$ 2,585,890
Equipment/Tools/Supplies: Rapid Response TIS - Similar expenses as established TIS although less research intensity than established TIS is assumed as Rapid Response personnel (faculty PI, Post-docs and Grad RAs) are able to handle two projects. $55K/yr for six Investigators for eight years = $2,685,502.	$ 2,882,918
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	**$ 10,350,375**

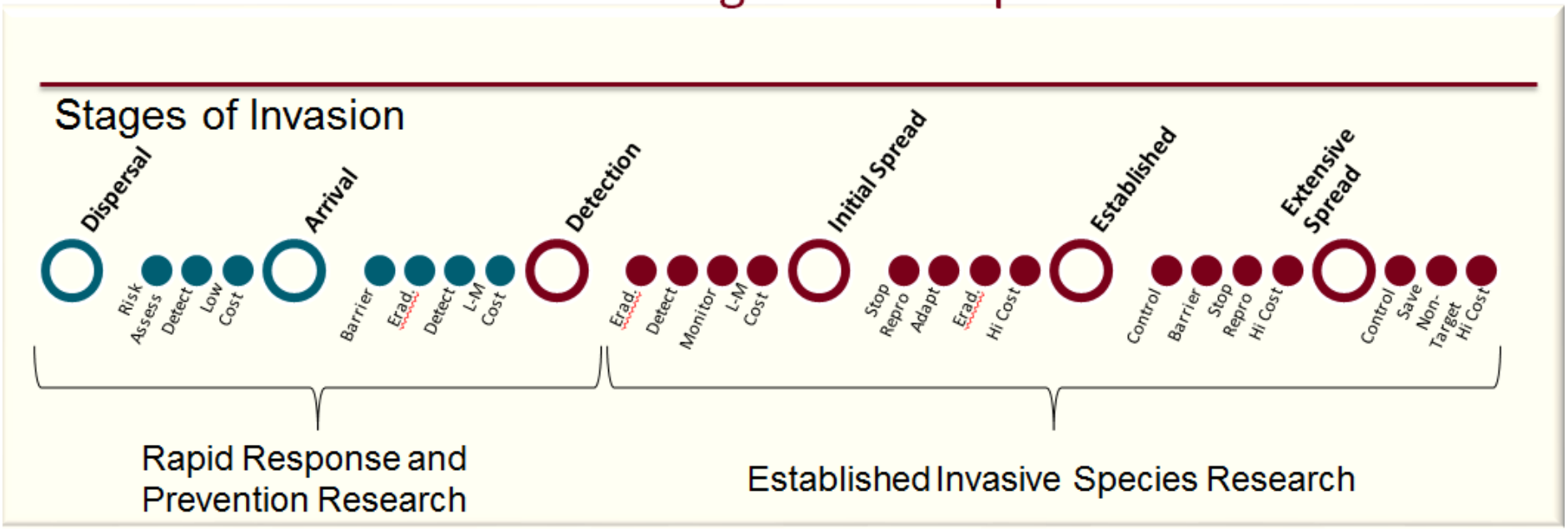
V. ENRTF 2014 Fund Allocation

AMOUNT	**ENTRF 2014 Appropriation**
$ 1,460,000	**Revenue: Other State $ To Be Applied To Project During Project Period:** Legislative appropriations for MITPPC are provided in Chapter 312, HF 3172, Article 12, Section 8 of the 2014 Legislative Record. ENTRF FUNDS IDENTIFIED.
$ 758,819	**Expense: Personnel Graduate Students- Established TIS** Two Graduate Research Assistants (50%) $22K/yr salary + $21,430/yr tuition and benefits for eight years = $758,819. Expected four total students funded over 8 years (4 year graduate PhD).
$ 646,473	**Expense: Equipment/Tools/Supplies: Established TIS** - Direct research expenses include only expenses related directly to research including consumable lab materials, specimens, field trial related expenses. $74K/yr for one project for eight years = $646,473
$ 54,708	**Expense: - Established TIS**- Direct research expenses include only expenses related directly to research including consumable lab materials, specimens, field trial related expenses.

VI. OTHER FUNDS

AMOUNT	**General Fund Appropriation MN Legislature**
$3,400,000	**Other State $ To Be Applied To Project During Project Period:** Legislative appropriations for MITPPC are provided in Chapter 312, HF 3172, Article 12, Section 8 of the 2014 Legislative Record. **General Funds Only.**
$2,417,196	**Personnel: Administrative -** Faculty Research Director (100%) average $164K/yr salary + $55,529/yr benefits for eight years = $1,754,609. Administrative Assistant (100%) $66K/yr salary + $17,298/yr benefits for eight years = $662,547.
$113,537	**Travel and Expert Priority:** Expert Panel Net Impact Assessment expenses include coordination and meetings of experts to identify priority TIS for both existing and rapid response. Two meetings for two days at $210/day for 12 people each year for five years = $50,461 Honorarium to be paid for time contributed by participants. 12 participants at $1,050 honorarium for five years = $63,076.
$671,851	**Personnel: Graduate Student and Faculty Researcher:** 1 graduate student 1/2 time, salary $22,000/year and Benefits $21,430/year. 1 Faculty Investigator/advisor, 1/4 time, salary $100,000/year and benefits $33,900/year.
$197,416	**Supplies and EquipmentEquipment/Tools/Supplies:** Up to 2 established TIS projects supplies or 1 established and 1 rapid reponse funds.

Multi-disciplinary and Two Pronged Approach for Controlling Invasive Species



Forestry Resources

Entomology/ Horticulture

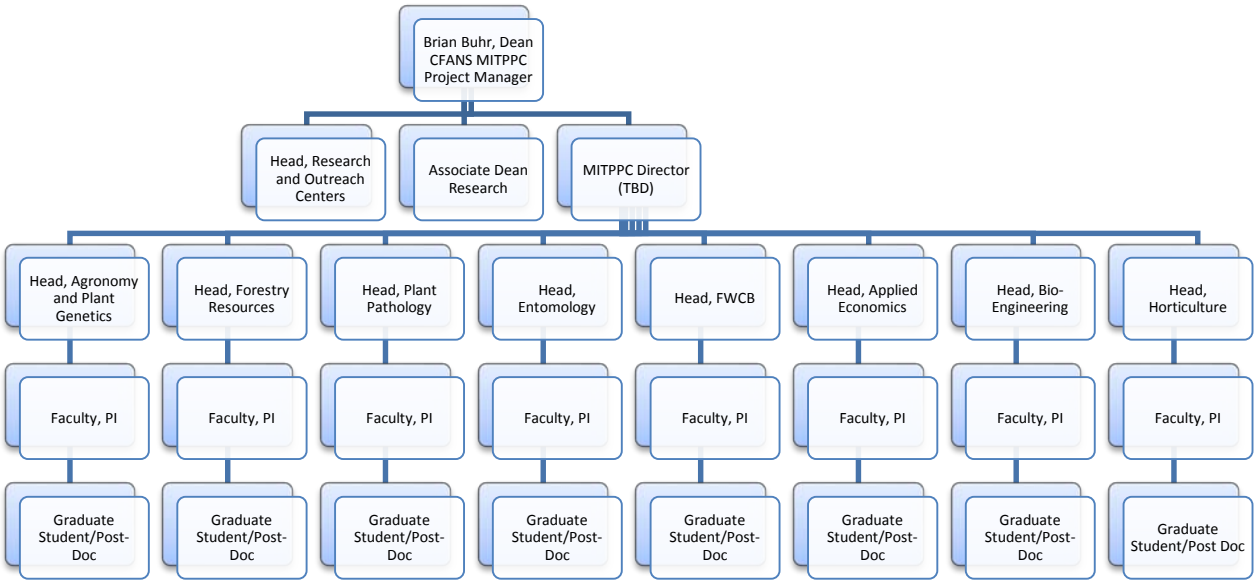
Weed Science/ Agronomy/ FWCB

Plant Pathology

Project Manager Qualifications: Minnesota Invasive Terrestrial Plants and Pests Center

The Minnesota Terrestrial Invasive Species Research Center (MTISRC) is conceived as a collegiate level initiative in the College of Food, Agricultural and Natural Resource Sciences (CFANS) at the University of Minnesota. The research by its nature is multi-disciplinary (FWCB, Entomology, Horticulture, Agronomy, Forestry, Plant Pathology, Bio-Engineering and Applied Economics) all have a role to play. As such the overall project management will reside with the Dean of CFANS as with all academic programs. Currently that position is held by Professor Brian Buhr as Dean and Director of the Minnesota Agricultural Experiment Station. Based on 2014 legislation, the MITPPC will eventually be led by a Faculty Director as described in the legislation and to be determined.

Dr. Buhr received his PhD in Economics from Iowa State University in 1992 and was appointed as Assistant Professor in Applied Economics at the University of Minnesota in September 1992. Dr. Buhr's research is primarily in the area of commodity marketing and risk management and has extensive experience in quantitative modeling of markets and bio-physical processes in agriculture. In 2004, Dr. Buhr was appointed the E. Fred Koller Chair in Applied Economics, and in 2008 was appointed head of Applied Economics, a position he held until assuming his current role as Interim Dean of CFANS. Dr. Buhr successfully led the Applied Economics with 34 faculties, over 140 graduate students and 230 undergraduate students and budget of over $5 million for five years, expanding their research funding, improving facilities, and enhancing the quality of their graduate and undergraduate programs while securing new sources of funding for both graduate funding and research projects. As such Dr. Buhr has the qualifications to manage joint and interdisciplinary projects such as MITPPC and has demonstrated success in doing so throughout his career. This includes managerial, personnel and financial skills necessary to successfully implement a diverse project of this scale.



Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2014 Work Plan

Date of Report: June 27, 2014

Date of Next Status Update Report: January 31, 2015

Date of Work Plan Approval: July 10, 2014

Project Completion Date: June 30, 2022

Does this submission include an amendment request? No

PROJECT TITLE: Minnesota Invasive Terrestrial Plants and Pests Center

Project Manager: Brian Buhr

Organization: Regents of the Univeristy of Minnesota

Mailing Address: 1420 Eckles Avenue

City/State/Zip Code: St. Paul, Minnesota 55108

Telephone Number: (612) 624-1234

Email Address: bbuhr@umn.edu

Web Address: http://www.cfans.umn.edu/

Location: Statewide

Total ENRTF Project Budget:	**ENRTF Appropriation:**	**$1,460,000**
	Amount Spent:	**$0**
	Balance:	**$1,460,000**

Legal Citation: M.L. 2014, Chapter 312, Article 12, Section 8

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.

Environment and Natural Resources Trust Fund (ENRTF) M.L. 2014 Work Plan

I. PROJECT TITLE: Minnesota Invasive Terrestrial Plants and Pests Center

II. PROJECT STATEMENT:
The Minnesota Invasive Terrestrial Plants and Pests Center (MITPPC) will serve a lead role in terrestrial invasive species research – coordinating initiatives 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. The MITPPC mission is to offer science-based solutions to pest invasions that ensure the protection of Minnesota's healthy prairies, forests, wetlands and agricultural resources. The goal is to eliminate, reduce, mitigate and prevent the introduction, expansion, or damage caused by terrestrial invasive species in Minnesota.

The array of terrestrial invasive species (TIS) of high concern for Minnesota are numerous and diverse, and include invasive grasses, trees, shrubs, insects, earthworms, mammals, fungal pathogens, and other microbes. TIS impact every citizen in the State: emerald ash borer damages our forests and urban landscapes; weeds diminish the biodiversity of our prairies and wetlands; and pests and pathogens destroy fruit and grain harvests resulting in significant economic costs. The annual, combined economic impact of plant, animal, and microbial invasives in the U.S. is estimated at $134 billion (Agricultural and Resource Economic Review, 2006). Minnesota's share of this loss is estimated at $3 billion annually, which is typical of the 50 states.

This investment will result in a comprehensive assessment of TIS risks to Minnesota and a comprehensive, planned, multi-disciplinary approach to addressing risk. MITPPC will involve researchers from multiple disciplines, and will address invasives affecting our prairies, forests, agricultural landscapes and wetlands in urban, developing and rural contexts. The Center will identify research priorities for TIS already established in Minnesota and for those that appear likely to arrive and do harm, and develop control methods, management strategies, and policy to achieve effective outcomes. Upon the completion of an initial impact assessment, the expert panel working group will establish priorities and present requests for proposals and work-plans to conduct research to address identified priority invasive species. Proposals will be sent out for peer review to ad hoc scientific reviewers in the field of research, which will allow for rapid turnaround of proposals to expedite work to be completed. The ad hoc scientific reviewers will make award recommendations. These specific initiatives selected and their budgets will be provided to LCCMR for approval as the selections are made and the work progresses.

The Center will prioritize and support multiple projects by research teams comprised of faculty, students, and staff from one of 10 participating departments. UMN faculty will work with both graduate students and post-doctoral associates on any given project. The scope of each research project will likely vary by species addressed. With this and additional planned funding, it is expected that over an eight-year period the Center will conduct an estimated 18-25 projects and train roughly 25 graduate students and postdocs.
The Center will be administratively located in the College of Food, Agricultural and Natural Resource Sciences (CFANS) in coordination with the College of Biological Sciences (CBS). Participating departments within CFANS include Entomology, Plant Pathology, Forest Resources, Agronomy & Plant Genetics, Horticultural Science, Applied Economics, Fisheries, Wildlife and Conservation Biology, and Bioproducts and Biosystems Engineering. Participating departments within CBS include Plant Biology and Ecology, Evolution and Behavior. Additionally, research will be possible on CFANS' eight research and outreach centers located in diverse agro-ecological areas of the State.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2014 Work Plan

III. PROJECT STATUS UPDATES:

Project Status as of *January 31, 2015*:

Project Status as of *July 31, 2015*:

Project Status as of *January 31, 2016*:

Project Status as of *July 31, 2016*:

Project Status as of *January 31, 2017*:

Project Status as of *July 31, 2017*:

Project Status as of *January 31, 2018*:

Project Status as of *July 31, 2018*:

Project Status as of *January 31, 2019*:

Project Status as of *July 31, 2019:*

Project Status as of *January 31, 2020:*

Project Status as of *July 31, 2020*:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Catalyzing Research & Education: Conduct Net Impact Risk Assessment
Description: A key foundational principle of the MITPPC will be to develop its research activities and portfolio based on net impact assessment of various invasive species and expected outcomes of intervention strategies. This approach will include consideration of pressing need, opportunity and practicality, which will allow for strategic management of the research portfolio. The Center will establish a 12-member expert panel to create risk assessment frameworks and conduct net impact assessments that will prioritize investments in research to address existing invasive species as well as rapidly spreading invasive species that have not yet but are highly likely to enter the State. The panel will meet annually (years 1-3) to assess progress and re-prioritize as necessary.

We will create the panel using national level scientists with demonstrated research expertise (advanced degrees in related field, publications in related discipline, affiliation with recognized research centers in related disciplines). The twelve members will include 8 Minnesota experts (faculty at University of Minnesota, or Minnesota government or non-governmental organizations with credentials as above) and 4 external experts (similar credentials as internal but from out of state). The goal is to provide input from broader national experiences with similar challenges. The external experts will receive an honorarium of $1,000 per meeting as well as travel

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2014 Work Plan

expenses such as lodging, transportation and meals. The $1,000 includes not only the 2 days of on-site meetings, but also it is expected that external experts will spend significant time reviewing literature and other information regarding Minnesota's invasive species challenges. Internal experts will receive travel related and meal expenses to the extent the sessions are held off their home site and are likely to include lodging and meals.

Summary Budget Information for Activity 1:

ENRTF Budget: $ 25,381
Amount Spent: $ 0
Balance: $ 25,381

Activity Completion Date:

Outcome	Completion Date	Budget
1. *Establish a panel of internal and external experts to provide input on strategic direction and research priorities*	Sept 15, 2015	$0
2. *Convene expert panel to create framework and then to conduct initial assessment to establish highest priority species*	Oct 15, 2015	$8,461
3. *Convene expert panel annually (years 2-3) to assess net impacts of invasive species and control responses.*	Oct 15, 2017	$16,920

Activity Status as of *January 31, 2015*:

Activity Status as of *July 31, 2015:*

Activity Status as of *January 31, 2016:*

Activity Status as of *July 31, 2016:*

Activity Status as of *January 31, 2017*:

Activity Status as of *July 31, 2017:*

Activity Status as of *January 31, 2018:*

Activity Status as of *July 31, 2018*:

Activity Status as of *January 31, 2019*:

Activity Status as of *July 31, 2019:*

Activity Status as of *January 31, 2020:*

Activity Status as of *July 31, 2020*:

Final Report Summary:

ACTIVITY 2: Launch research on high priority, established terrestrial invasive species and rapid response for the prevention of establishment of new threats.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2014 Work Plan

Description: Upon the completion of an initial impact assessment, the expert panel working group will establish priorities and present requests for proposals and work-plans to conduct research to address identified priority invasive species. Proposals will be sent out for peer review to ad hoc scientific reviewers in the field of research, which will allow for rapid turnaround of proposals to expedite work to be completed. The ad hoc scientific reviewers will make final award recommendations.

The Center will initiate and/or accelerate coordinated, applied research according to the prioritized list of pest and plant species that threaten Minnesota's prairies, urban and rural forests, wetlands, and agricultural resources as identified in Activity 1. Depending on the net impacts associated with each species, research may include new control methods including bio-control and technology, development of integrated pest management tools that minimize non-target impacts of control, early detection of and/or rapid response to new threats, and establishment prevention. The Center infrastructure is vital to improving Minnesota's capacity and response time to preventing and limiting introduction of new terrestrial invasive species. All research projects will include an analysis of any consequences related to the management of prioritized species to the State's non-target flora, fauna or our soils, water and climate.

Workforce development and training experts in invasive species management is also critical. A core component of each project will be funding of graduate students and postdoctoral associates to work with existing faculty. Since University faculty are expected to acquire grants that cover their research salary, existing faculty are accounted for in the budget at 25% time in their role as the project leader. Providing salary through these awards will secure faculty time and intellectual effort in the projects, assuring that we are attracting the resources to provide project design, effort, and mentoring of the graduate students and post-docs in their research development. We do not anticipate hiring any new faculty for the projects.

The Center will support multiple projects by research teams, each comprised of a UMN faculty member from one of the participating departments, one graduate student and one postdoctoral associate. Estimated funding per project will be $180,000-210,000 per year, for 3-4 years. We expect this to result in 2-3 projects depending upon the priority identified by the risk assessment planning. It is expected that per project expenses for established invasive species will be higher as compared to prevention strategies. As the priorities are established and research projects are reviewed and approved for funding as we describe here, the project specific work plan activities and budgets will be updated.

Summary Budget Information for Activity 2:

ENRTF Budget: $ 1,434,619
Amount Spent: $ 0
Balance: $ 1,434,619

Activity Completion Date:

Outcome	Completion Date	Budget
1. *RFP released for first phase of projects*	Dec 15, 2015	$0
2. *First two research projects selected and launched; 2 graduate students and 2 postdoctoral associates hired for 4 years*	May 15, 2016	$0
3. *Research findings for first two projects*	May 15, 2020	$1,434,619

Activity Status as of *January 31, 2015*:

Activity Status as of *July 31, 2015:*

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2014 Work Plan

Activity Status as of *January 31, 2016:*

Activity Status as of *July 31, 2016:*

Activity Status as of *January 31, 2017*:

Activity Status as of *July 31, 2017:*

Activity Status as of *January 31, 2018:*

Activity Status as of *July 31, 2018*:

Activity Status as of *January 31, 2019*:

Activity Status as of *July 31, 2019:*

Activity Status as of *January 31, 2020:*

Activity Status as of *July 31, 2020*:

Final Report Summary:

V. DISSEMINATION:
Description: Findings will be shared with agencies and citizen groups so that public information and decision making is based on the best available science. Updates on progress and research results will be disseminated through University of Minnesota, College of Food, Agricultural, and Natural Resource Sciences, and College of Biological Sciences via websites, social media, and publications. Media releases will also be used when warranted. Additionally, findings will be presented at local and national conferences and via peer-reviewed publication and student theses.

Status as of *January 31, 2015*:

Status as of *July 31, 2015:*

Status as of *January 31, 2016:*

Status as of *July 31, 2016:*

Status as of *January 31, 2017*:

Status as of *July 31, 2017:*

Status as of *January 31, 2018:*

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2014 Work Plan

Status as of *July 31, 2018:*

Status as of *January 31, 2019*:

Status as of *July 31, 2019:*

Status as of *January 31, 2020:*

Status as of *July 31, 2020*:

Final Report Summary:

Environment and Natural Resources Trust Fund (ENRTF) M.L. 2014 Work Plan

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Budget Category	$ Amount	Explanation
Personnel:	$ 949,619	• one research faculty PI: $27,300 (66% salary, 33.8% benefits); 25% FTE for 3 years • one research faculty PI: $27,300 (66% salary, 33.8% benefits); 25% FTE for 4 years • one graduate research assistant: $22,000 (56% salary 35% tuition 9% benefits); 50% FTE for 3 years • one graduate research assistant: $22,000 (56% salary 35% tuition 9% benefits); 50% FTE for 4 years • one postdoctoral associate: $45,900 (79% salary, 21.4% benefits); 100% FTE for 3 years • one postdoctoral associate: $45,900 (79% salary, 21.4% benefits); 100% FTE for 4 years
Professional/Technical/Service Contracts:	$ 12,000	Expert panel member honoraria- approx.4 people x $500 x 2 days (years 1, 2, and 3)
Equipment/Tools/Supplies:	$ 464,000	Consumable lab materials, specimens and other expenses directly related to research (more detail to be provided as specific research projects are proposed)
Capital Expenditures over $5,000:	$	More detail to be provided as specific research projects are proposed (if applicable)
Travel Expenses in MN:	$ 13,381	• Expert panel travel - approx.12 people x $200 x 2 days (years 1, 2 and 3) • Travel directly related to research (more detail to be provided as specific research projects are proposed)
Other:		
TOTAL ENRTF BUDGET:	**$ 1,460,000**	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than $5,000: More detail to be provided as specific research projects are proposed (if applicable)

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 14

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: none

Environment and Natural Resources Trust Fund (ENRTF) M.L. 2014 Work Plan

B. Other Funds:

Source of Funds	$ Amount Proposed	$ Amount Spent	Use of Other Funds
Non-state			
State			
General Fund Appropriation MN Legislature 2014: Chapter 312, HF 3172, Article 12, Section 8	$3,400,000		Funds will be used to support the hire of a Center Director and administrative support for the 8-year project period, and to support additional research projects and will include personnel costs (faculty, graduate students, postdoctoral associates), equipment, materials and supplies necessary for research. Each project is estimated at $100-200K/year for 3-5 years.
Requested funds - ENTRF 2015	$10,350,375	$	Funds will be used to support additional research projects and will include personnel costs (faculty, graduate students, postdoctoral associates), equipment, materials and supplies related directly to research. Each project is estimated at $100-200K/year for 3-5 years.
TOTAL OTHER FUNDS:	**$13,750,375**	**$**	

VII. PROJECT STRATEGY:

A. Project Partners:

Project Partners (not receiving funds):

- USDA Forest Service Northern Research Station
- Minnesota Department of Agriculture,
- Minnesota Department of Natural Resources
- Minnesota Forest Resource Council
- Agencies and organizations involved in invasive species outreach programs so public information is based on the best available science.
- Networks of citizen scientists could be an important part of implementing early detection programs and monitoring the effectiveness of control efforts.

This will be updated in more detail once the priorities for research are established.

B. Project Impact and Long-term Strategy:

The Center's ultimate goal is to eliminate, reduce, mitigate or prevent the introduction, expansion or damage done by terrestrial invasive species in Minnesota. Metrics of success include: threat awareness, response efficiency, control effectiveness, non-target species protection, and mitigation strategies. Ancillary goals include: workforce development, citizen engagement, focused research strategies, improved response time to emerging threats, and improved coordination of efforts.

Environment and Natural Resources Trust Fund (ENRTF) M.L. 2014 Work Plan

Success will depend on the ability to marshal multi-disciplinary teams in timely and prioritized ways to deliver results. While ENRTF 2014 and General Fund dollars will be used to conduct a risk assessment and launch initial research or prioritized species, funding is being sought through ENRTF 2015 to support additional multi-disciplinary research teams. With adequate funding, the Center's efforts are expected to result in numerous, effective prevention and control methods within an 8-year time frame for a significant portion of the 15-20 species upon which we will focus.

C. Spending History: N/A

VIII. ACQUISITION/RESTORATION LIST: N/A

IX. VISUAL ELEMENT: see attached

X. ACQUISITION/RESTORATION REQUIREMENTS WORKSHEET: N/A

XI. RESEARCH ADDENDUM: Peer review will be conducted by internal U of MN process and documentation to be provided to LCCMR

XII. REPORTING REQUIREMENTS:
Periodic work plan status update reports will be submitted no later than January 31 and July 31 each year (every 6 months). A final report and associated products will be submitted between June 30 and August 15, 2022.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

Date of Report: October 10, 2014

Date of Next Status Update Report: January 15, 2016

Date of Work Plan Approval:

Project Completion Date: August 15, 2022

Does this submission include an amendment request? No

PROJECT TITLE: Minnesota Invasive Terrestrial Plants and Pests Center

Project Manager: Brian Buhr

Organization: Regents of the Univeristy of Minnesota

Mailing Address: 1420 Eckles Avenue

City/State/Zip Code: St. Paul, Minnesota 55108

Telephone Number: 612) 624-1234

Email Address: bbuhr@umn.edu

Web Address: http://www.cfans.umn.edu/

Location: Statewide

Total ENRTF Project Budget:	**ENRTF Appropriation:**	**$5,000,000**
	Amount Spent:	**$0**
	Balance:	**$5,000,000**

Legal Citation: M.L. 2015, Chp. xx, Sec. xx, Subd. xx

Appropriation Language:

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

I. PROJECT TITLE: Minnesota Invasive Terrestrial Plants and Pests Center

II. PROJECT STATEMENT:
The Minnesota Invasive Terrestrial Plants and Pests Center (MITPPC) will serve a lead role in terrestrial invasive species research – coordinating initiatives 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. The MITPPC mission is to offer science-based solutions to pest invasions that ensure the protection of Minnesota's healthy prairies, forests, wetlands and agricultural resources. The goal is to eliminate, reduce, mitigate and prevent the introduction, expansion, or damage caused by terrestrial invasive species in Minnesota.

The array of terrestrial invasive species (TIS) of high concern for Minnesota are numerous and diverse, and include invasive grasses, trees, shrubs, insects, earthworms, mammals, fungal pathogens, and other microbes. TIS impact every citizen in the State: emerald ash borer damages our forests and urban landscapes; weeds diminish the biodiversity of our prairies and wetlands; and pests and pathogens destroy fruit and grain harvests resulting in significant economic costs. The annual, combined economic impact of plant, animal, and microbial invasives in the U.S. is estimated at $134 billion (Agricultural and Resource Economic Review, 2006). Minnesota's share of this loss is estimated at $3 billion annually, which is typical of the 50 states.

With support from additional appropriations, the MITPPC will conduct a comprehensive assessment of TIS risks to Minnesota and a take a comprehensive, planned, multi-disciplinary approach to addressing risk. MITPPC will involve researchers from multiple disciplines, and will address invasives affecting our prairies, forests, agricultural landscapes and wetlands in urban, developing and rural contexts. The Center will identify research priorities for TIS already established in Minnesota and for those that appear likely to arrive and do harm, and develop control methods, management strategies, and policy to achieve effective outcomes. Upon the completion of an initial impact assessment, the expert panel working group will establish priorities and present requests for proposals and work-plans to conduct research to address identified priority invasive species. Proposals will be sent out for peer review to ad hoc scientific reviewers in the field of research, which will allow for rapid turnaround of proposals to expedite work to be completed. The ad hoc scientific reviewers will make award recommendations. These specific initiatives selected and their budgets will be provided to LCCMR for approval as the selections are made and the work progresses.

The Center will prioritize and support multiple projects by research teams comprised of faculty, students, and staff from one of 10 participating departments. UMN faculty will work with both graduate students and post-doctoral associates on any given project. The scope of each research project will likely vary by species addressed. With this funding, it is expected that over a six-year period the Center will conduct an estimated 7 projects and train roughly 14 graduate students and postdocs.
The Center will be administratively located in the College of Food, Agricultural and Natural Resource Sciences (CFANS) in coordination with the College of Biological Sciences (CBS). Participating departments within CFANS include Entomology, Plant Pathology, Forest Resources, Agronomy & Plant Genetics, Horticultural Science, Applied Economics, Fisheries, Wildlife and Conservation Biology, and Bioproducts and Biosystems Engineering. Participating departments within CBS include Plant Biology and Ecology, Evolution and Behavior. Additionally, research will be possible on CFANS' eight research and outreach centers located in diverse agro-ecological areas of the State.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of *January 31, 2016:*

Project Status as of *July 31, 2016:*

Project Status as of *January 31, 2017*:

Project Status as of *July 31, 2017:*

Project Status as of *January 31, 2018:*

Project Status as of *July 31, 2018*:

Project Status as of *January 31, 2019*:

Project Status as of *July 31, 2019:*

Project Status as of *January 31, 2020:*

Project Status as of *July 31, 2020*:

Project Status as of *January 31, 2021*:

Project Status as of *July 31, 2021:*

Project Status as of *January 31, 2022:*

Overall Project Outcomes and Results:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Launch research on high priority, established terrestrial invasive species and rapid response for the prevention of establishment of new threats.

Description: Upon the completion of an initial net risk impact assessment (funded through the ENRTF 2014 appropriation to the MITPPC and described more fully in that work plan), the expert panel working group will establish priorities and present requests for proposals and work-plans to conduct research to address identified priority invasive species. Proposals will be sent out for peer review to ad hoc scientific reviewers in the field of research, which will allow for rapid turnaround of proposals to expedite work to be completed. The ad hoc scientific reviewers will make final award recommendations.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

The Center will initiate and/or accelerate coordinated, applied research according to the prioritized list of pest and plant species that threaten Minnesota's prairies, urban and rural forests, wetlands, and agricultural resources as identified through this assessment process. Depending on the net impacts associated with each species, research may include new control methods including bio-control and technology, development of integrated pest management tools that minimize non-target impacts of control, early detection of and/or rapid response to new threats, and establishment prevention. The Center infrastructure is vital to improving Minnesota's capacity and response time to preventing and limiting introduction of new terrestrial invasive species. All research projects will include an analysis of any consequences related to the management of prioritized species to the State's non-target flora, fauna or our soils, water and climate.

Workforce development and training experts in invasive species management is also critical. A core component of each project will be funding of graduate students and postdoctoral associates to work with existing faculty. Since University faculty are expected to acquire grants that cover their research salary, existing faculty are accounted for in the budget at 25% time in their role as the project leader. Providing salary through these awards will secure faculty time and intellectual effort in the projects, assuring that we are attracting the resources to provide project design, effort, and mentoring of the graduate students and post-docs in their research development. We do not anticipate hiring any new faculty for the projects.

The Center will support multiple projects by research teams, each comprised of a UMN faculty member from one of the participating departments, one graduate student and one postdoctoral associate. Estimated funding per project will be $180,000-210,000 per year, for 3-4 years. We expect this to result approximately 7 projects in two separate phases, depending upon the priority identified by the annual risk assessment planning. It is expected that per project expenses for established invasive species will be higher as compared to prevention strategies. As the priorities are established and research projects are reviewed and approved for funding as we describe here, new subproject work plans and budgets will be submitted to LCCMR by the new investigators for each approved project. This overarching Work Plan and budget will be updated to include an overall progress report on all of the subprojects.

Summary Budget Information for Activity 1:

ENRTF Budget: $5,000,000
Amount Spent: $ 0
Balance: $5,000,000

Activity Completion Date:

Outcome	Completion Date
4. *RFP released for first phase of projects*	Dec 15, 2015
5. *First phase research projects selected and launched (est. 4 projects, ranging from 3-4 years each)*	May 15, 2016
6. *Second phase research projects selected and launched (est. 3 projects, ranging from 3-4 years each)*	May 15, 2017
7. *Research findings for first phase of projects*	May 15, 2020
8. *Research findings for second phase of projects*	May 15, 2021

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

Activity Status as of *January 31, 2016:*

Activity Status as of *July 31, 2016:*

Activity Status as of *January 31, 2017*:

Activity Status as of *July 31, 2017:*

Activity Status as of *January 31, 2018:*

Activity Status as of *July 31, 2018*:

Activity Status as of *January 31, 2019*:

Activity Status as of *July 31, 2019:*

Activity Status as of *January 31, 2020:*

Activity Status as of *July 31, 2020*:

Activity Status as of *January 31, 2021*:

Activity Status as of *July 31, 2021:*

Activity Status as of *January 31, 2022:*

Final Report Summary:

V. DISSEMINATION:
Description: Findings will be shared with agencies and citizen groups so that public information and decision making is based on the best available science. Updates on progress and research results will be disseminated through University of Minnesota, College of Food, Agricultural, and Natural Resource Sciences, and College of Biological Sciences via websites, social media, and publications. Media releases will also be used when warranted. Additionally, findings will be presented at local and national conferences and via peer-reviewed publication and student theses.

Status as of *January 31, 2016:*

Status as of *July 31, 2016:*

Status as of *January 31, 2017*:

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

Status as of *July 31, 2017:*

Status as of *January 31, 2018:*

Status as of *July 31, 2018:*

Status as of *January 31, 2019*:

Status as of *July 31, 2019:*

Status as of *January 31, 2020:*

Status as of *July 31, 2020*:

Status as of *January 31, 2021*:

Status as of *July 31, 2021:*

Status as of *January 31, 2022:*

Final Report Summary:

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Budget Category	$ Amount	Overview Explanation
Personnel:	$ 3,350,000	3 x 0.25 x 4 years = 3 FTE Research Faculty 4 x 0.25 x 3 years = 3 FTE Research Faculty 3 x 0.5 x 4 years = 6 FTE Graduate Research Assistants 4 x 0.5 x years = 6 FTE Graduate Research Assistants 3 x 1 x 4 years = 12 FTE Post-Doctoral Associates 4 x 1 x 3 years = 12 FTE Post-Doctoral Associates ~42 total FTE
Professional/Technical/Service Contracts:		
Equipment/Tools/Supplies:	$1,590,000	Consumable lab materials, specimens and other expenses directly related to research (more detail to be provided as specific research projects are proposed)
Capital Expenditures over $5,000:		
Travel Expenses:	$60,000	Travel directly related to research (app. $2,500/year per project) more detail to be provided as specific research projects are proposed) All travel expenses will follow U of MN policy allowances.
Other:		
TOTAL ENRTF BUDGET:	**$5,000,000**	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than $5,000: More detail to be provided as specific research projects are proposed (if applicable)

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 42

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: None

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

B. Other Funds:

Source of Funds	$ Amount Proposed	$ Amount Spent	Use of Other Funds
Non-state			
State			
General Fund Appropriation MN Legislature 2014: Chapter 312, HF 3172, Article 12, Section 8	$3,400,000		Funds will be used to support the core operations and leadership of the Minnesota Invasive Terrestrial Plants and Pests Center by a Center Director and administrative support for the 8-year project period. This includes funding for est. 2 additional research projects, personnel costs (faculty, graduate students, postdoctoral associates), equipment, materials and supplies necessary for research. Each project is estimated at $180-210K/year for 3-4 years.
ENTRF 2014: M.L. 2014, Chapter 312, Article 12, Section 8	$1,460,000		Funds will be used to convene expert panel to create a framework and conduct initial assessment to establish highest priority species; convene expert panel annually in years 2 and 3 to assess net impacts of invasive species and control responses; and support 2-3 research projects (at $180-$210K/year for 3-5 years).
TOTAL OTHER FUNDS:	**$4,860,000**	**$**	

VII. PROJECT STRATEGY:
A. Project Partners:

Project Partners (not receiving funds):

- USDA Forest Service Northern Research Station
- Minnesota Department of Agriculture,
- Minnesota Department of Natural Resources
- Minnesota Forest Resource Council
- Agencies and organizations involved in invasive species outreach programs so public information is based on the best available science.
- Networks of citizen scientists could be an important part of implementing early detection programs and monitoring the effectiveness of control efforts.

This will be updated in more detail once the priorities for research are established.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2015 Work Plan

B. Project Impact and Long-term Strategy:

The Center's ultimate goal is to eliminate, reduce, mitigate or prevent the introduction, expansion or damage done by terrestrial invasive species in Minnesota. Metrics of success include: threat awareness, response efficiency, control effectiveness, non-target species protection, and mitigation strategies. Ancillary goals include: workforce development, citizen engagement, focused research strategies, improved response time to emerging threats, and improved coordination of efforts.

Success will depend on the ability to marshal multi-disciplinary teams in timely and prioritized ways to deliver results. While ENRTF 2014 and General Fund dollars will be used to conduct a risk assessment and launch initial research or prioritized species, funding is being sought through ENRTF 2015 to support additional multi-disciplinary research teams. With adequate funding, the Center's efforts are expected to result in numerous, effective prevention and control methods within an 8-year time frame for a significant portion of the 15-20 species upon which we will focus.

C. Funding History:

Funding Source and Use of Funds	Funding Timeframe	$ Amount

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

A. Parcel List: N/A

B. Acquisition/Restoration Information: N/A

IX. VISUAL COMPONENT or MAP(S): see attached

X. RESEARCH ADDENDUM: Peer review will be conducted by internal U of MN process and documentation to be provided to LCCMR

XI. REPORTING REQUIREMENTS:
Periodic work plan status update reports will be submitted no later than January 31 and July 31 each year (every 6 months). A final report and associated products will be submitted between June 30 and August 15, 2022.