



Environment and Natural Resources Trust Fund (ENRTF)

M.L. 2013 Work Plan

Date of Status Update Report:

Date of Next Status Update Report:

Date of Work Plan Approval: xxxx

Project Completion Date: June 30, 2019

Is this an amendment request? No

Project Title: An Aquatic Invasive Species (AIS) Cooperative Research Center

Project Manager: Peter Sorensen

Affiliation: University of Minnesota

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Location:

Counties Impacted: Statewide

Ecological Section Impacted: Lake Agassiz Aspen Parklands (223N), Minnesota and Northeast Iowa Morainal (222M), North Central Glaciated Plains (251B), Northern Minnesota and Ontario Peatlands (212M), Northern Minnesota Drift and lake Plains (212N), Northern Superior Uplands (212L), Paleozoic Plateau (222L), Red River Valley (251A), Southern Superior Uplands (212J), Western Superior Uplands (212K)

Legal Citation: M.L. 2013, Chp. xx, Sec. xx, Subd. xx

Appropriation Language:

Total ENRTF Project Budget:	ENRTF Appropriation \$:	8,700,000
	Amount Spent \$:	<u>0</u>
	Balance \$:	8,700,000

I. PROJECT TITLE: An Aquatic Invasive Species (AIS) Cooperative Research Center

II. PROJECT SUMMARY: The Minnesota state legislature awarded the University of Minnesota \$3,800,000 in 2012 to create an Aquatic Invasive Species (AIS) Research Center. The goal of the Research Center (Laws of 2012, Chapter 264, article 2, section 4 and article 4, section 3) is to develop and implement solutions to control aquatic invasive species. It will do this by developing scientific expertise in variety of disciplines so that new solutions can be devised and extant ones improved while educating management agencies and the public. The Center will function in collaboration with the Minnesota Department of Natural Resources as well as other federal and state governmental agencies as well as private citizens groups. Initial funding was allocated to establish the administrative structure for this center, renovate University facilities, and start studies of zebra mussels and Asian carp. The present project will provide operating funds so that the scope of research can be extended to include common carp, pathogens designed to control invasive fishes, risk analysis of AIS, as well as establish as an extension and education component. This new funding will also establish an administrative structure for the Center which will both administer funds and reporting and coordinate collaborations with the DNR and other groups with an advisory board as well as a board of technical experts. The latter group will coordinate anonymous peer-reviews of center projects to insure high quality research. The new funding will give the center a life through 2019 and the opportunity to create to raise supplemental funding from other sources.

III. PROJECT STATUS UPDATES:

Project Status as of *December 31, 2013*

Project Status as of *June 30, 2014*

Project Status as of *December 31, 2014*

Project Status as of *June 30, 2015*

Project Status as of *December 31, 2015*

Project Status as of *June 30, 2016*

Project Status as of *December 31, 2016*

Project Status as of *June 30, 2017*

Project Status as of *December 31, 2017*

Project Status as of *June 30, 2018*

Project Status as of *December 31, 2018*

Project Status as of *June 30, 2019*

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Coordinating, synergizing and promoting expertise: Establishing an administrative structure

Description: The promise of the center lies in its ability to promote synergies, share facilities, and disseminate information. These activities require scientific and administrative leadership that can organize meetings of center participants as well as technical groups, arranging for peer review and sponsoring symposia while raising funds, and both creating and disseminating reports to the legislature. A particularly important role will be providing guidance for projects and faculty via peer-review which will be managed by the Center administration at the specific request of the LCCMR. Activity #1 provides the framework for this leadership. Because these roles are important, complex and somewhat novel for a LCCMR project, we describe them here.

The center’s Scientific Director and head is Dr. Sorensen. He will devote 60% of his time to administering the Center while providing overall leadership and direction; this will be paid from this activity. Dr. Sorensen will be assisted by a fulltime Administrative (Associate) Director who will be fully funded by this activity. The Administrative Director will work with the Scientific Director to establish and run an advisory board that includes the DNR (see below), coordinate a board of technical experts (see below), compile and produce reports and budgets, track spending, produce media releases, run peer review, and manage specialized facilities and technician time. Working with the scientific director and Extension specialist, the administrative director will organize a yearly workshop on campus. A yearly report for the center will be produced.

The Scientific Director will be advised by an Advisory Board (RCAB). This board will meet three times a year to review center activities, new AIS trends in the state, provide advice to the Director on overall research directions, new funding sources, and new collaborations. The Commissioner of the DNR (or designee) and the Scientific Director (or designee) will be co-leads on this board and will take turns chairing and compiling minutes. In addition, the Board will contain a representative from the US Geological Survey, US Fish & Wildlife Service, National Park Service, a watershed district, a lake association, and an environmental group (6). The board will be convened three times a year by the Administrative Director.

The Scientific Director will also head and be advised by a Board of Technical Experts (BOTE). This group will have 6 members from outside the university including two from the DNR as well as university research faculty (4-6) who are supported by the Center. The primary responsibility of this group will be to review progress of each research faculty at least once a year and to implement peer-reviews of their proposed research and report this to the director and ultimately the LCCMR. At least two reviewers from outside the state will be solicited for each project. Projects will run on 2-3 year cycles and be subject to change pending new developments in the field and state, and possible new funding sources as judged by peer-review. Flexibility is key to success of an AIS program as is access to state of the art information. Thus, while activities will not change, specific outcomes in them may be adjusted following peer review. If the Center obtains new funding or the primary goals (outcomes) of an activity are met, these too might be changed but this would require approval by the LCCMR. Final approval of all proposal and progress reports must come from the Scientific Director.

Summary Budget Information for Activity 1:

ENRTF Budget: \$1,089,229
Amount Spent: \$0
Balance: \$1,089,229

Outcome	Completion Date
Discussion with advisory group, workshops with technical advisor, grant writing, AIS permits, LCCMR reports, press releases, semi-annual report	2014
Discussion with advisory group, workshops with technical advisor, grant writing, AIS permits, LCCMR reports, press releases, semi-annual report	2015
Discussion with advisory group, workshops with technical advisor, grant writing, AIS permits, LCCMR reports, press releases, semi-annual report	2016
Discussion with advisory group, workshops with technical advisor, grant writing, AIS permits, LCCMR reports, press releases, semi-annual report	2017
Discussion with advisory group, workshops with technical advisor, grant writing,	2018

AIS permits, LCCMR reports, press releases, semi-annual report	
Discussion with advisory group, workshops with technical advisor, grant writing, AIS permits, LCCMR reports, press releases, semi-annual report	2019

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Activity Status as of June 30, 2016:

Activity Status as of December 31, 2016:

Activity Status as of June 30, 2017:

Activity Status as of December 31, 2017:

Activity Status as of June 30, 2018:

Activity Status as of December 31, 2018:

Final Report Summary:

ACTIVITY 2: Delaying the spread of AIS: Monitoring the abundance and distribution of AIS using new molecular tools so techniques to delay their spread can be targeted and enhanced.

Description: No good options exist for quantifying the distribution of aquatic organisms, making control of AIS nearly impossible. We propose to build off Center startup funding to employ environmental DNA (eDNA) to ascertain presence/absence of a few AIS and develop new techniques that precisely quantify the abundance of many AIS. Specifically, this activity will develop a metagenomic and sequencing approach to create tools to quantify the presence of thousands of species (vs. just one) in individual water samples. Species of interest will be identified and will include over a dozen AIS as well as key native species (ex. rare mussels) and their microbial communities. We will employ an approach that involves both quantitative PCR and metagenomic assessment of microbial populations associated with AIS. Our goal is to develop a standard set of protocols and data to systematically evaluate the distribution, spread, and effects of key aquatic species in MN waterways across time and space. A new faculty member in the Biotechnology Institute will spearhead this project. The project will proceed in two steps, with tentative outcomes listed below. The project will proceed in two steps (common carp will addressed first), with tentative outcomes listed below. Specific details will be determined by Center-led peer-review and reported in the center's semi-annual report to the LCCMR.

Summary Budget Information for Activity 2:

ENRTF Budget: \$1,012,231
Amount Spent: \$0
Balance: \$1,012,232

Outcome (Tentative, pending Center peer-review)	Tentative Completion Date
1. Molecular markers for key invasive and native species and	2015

associated microbes will have been developed	
2. The utility of the markers for key species validated in mesocosms	2016
3. Markers tested in field experiments	2017
4. State-wide sampling matrix established	2018
5. Analysis of sampling matrix complete	2019

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Activity Status as of June 30, 2016:

Activity Status as of December 31, 2016:

Activity Status as of June 30, 2017:

Activity Status as of December 31, 2017:

Activity Status as of June 30, 2018:

Activity Status as of December 31, 2018:

Final Report Summary:

Activity 3. Reducing and controlling AIS: Developing effective tools to locate aggregations of invasive carp.

Description: To remove fast-moving invasive fish, we must know where they are. Fortunately, carp are social animals that aggregate. Locating aggregations of carp will be especially useful because the USGS is developing poisoned nanoparticle baits for use in the summer, and seining can be used on natural aggregations in the winter. We will build off existing knowledge of the common carp and then extend it to the Asian carps. Two techniques will be explored to locate aggregations of carps: 1) Following radio-tagged ‘Judas’ fishes as they in turn find others; and 2) inducing aggregations using attractants and/or repellents. Efforts will perfect Judas fish technology and determine where and how common carp move across wetlands so they can be removed. Simultaneously new sensory tools (ex. sex pheromones, sound playback) will be developed to control the behavior and distribution of adult radio-tagged carp. Initial work will focus on silver carp, the most damaging of the Asian carp species. Once these objectives have been completed, we will focus on understanding, manipulating, and removing radio-tagged Asian carp in large rivers. Sterilized fish will be used if our studies find they can be rendered attractive using hormone treatments. This work will be directed by Dr. Peter Sorensen. The project will proceed in two steps (common carp will addressed first), with tentative outcomes listed below. Specific details will be determined by Center-led peer-review and reported in the center’s semi-annual report to the LCCMR.

Summary Budget Information for Activity 3:

ENRTF Budget: \$909,851
Amount Spent: \$0
Balance: \$909,851

Outcome (tentative, pending peer-review by Center)	Completion date
1. Distribution and movement of adult common carps in wetlands known	2016
2. Ability to control adult common carp using Judas fish in wetlands established	2017
3. Ability to evoke movement of adult common carp using sex pheromones	2017
4. Ability to use sterile Asian carp as Judas fish in rivers	2018
5. Ability to attract Asian carp with sex pheromones established	2018
6. Ability to locate sexually active silver carp in open rivers using hormone-implanted Judas fish established	2019

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Activity Status as of June 30, 2016:

Activity Status as of December 31, 2016:

Activity Status as of June 30, 2017:

Activity Status as of December 31, 2017:

Activity Status as of June 30, 2018:

Activity Status as of December 31, 2018:

Final Report Summary:

Activity 4: Reducing and controlling AIS: Developing effective bio-control techniques to control common and Asian carp.

Description: Initial work will extend and perfect ongoing research into integrated pest management (IPM) strategies previously funded by watershed districts and the ENRTF to control invasive common carp in several MN lakes by managing native fish that prey on carp eggs, larvae, and young while removing adults when they migrate/aggregate. Then we propose to test and apply these concepts in wetlands where carp suppress waterfowl populations. Simultaneously, we will determine if Asian carp eggs, larvae, and/or young are also consumed by any native fishes as a first step in determining how biocontrol might eventually be implemented. This field work will likely be conducted in Missouri where these fish are abundant and chances of success high. Findings will then be tested in ponds to identify the species and densities of native fish needed in MN. Results will be used to create explicit protocols to control silver and common carp and this will be shared with Extension specialists to be implemented. This work will be spearheaded by a new assistant research professor who will collaborate with the fish aggregation (Activity 3) and modeling (Activity 4) teams as well as the USGS. Specific details will be determined by Center-led peer-review and reported in the center's semi-annual report to the LCCMR.

Summary Budget Information for Activity 4:

ENRTF Budget: \$1,377,523

Amount Spent: \$0

Balance: \$1,377,527

Outcome (tentative, pending peer-review by Center)	Completion date
1. Ability of IPM technique to control adult common carp in lakes demonstrated	2015
2. Recruitment dynamics of common carp in waterfowl wetlands through aging analyses and lake surveys documented	2016
3. Natural mortality and abundance of common carp in wetlands known	2016
4. Native species that might prey on silver carp eggs and young in the field identified	2017
5. The species/density of native fish needed to control either silver or common carp in ponds established	2019

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Activity Status as of June 30, 2016:

Activity Status as of December 31, 2016:

Activity Status as of June 30, 2017:

Activity Status as of December 31, 2017:

Activity Status as of June 30, 2018:

Activity Status as of December 31, 2018:

Final Report Summary:

Activity 5: Reducing and controlling AIS: Developing and evaluating new techniques to selectively control invasive plants.

Description: University of Minnesota professor and invasive plant expert, Dr. Ray Newman, will work with the DNR to evaluate extant and new strategies to control submersed invasive plants selectively in ways that will also restore native plant communities. Strategies will include use of native herbivorous insects, integrated management with selective chemical or mechanical controls, and techniques to enhance native plant communities. Working with the DNR, at least one chemical treatment to control a species of invasive plant will also be examined and ecological effects will be evaluated. The focus will be a large-scale, multi-lake manipulation to determine if altering fish community structure can be accomplished to enhance the biological control of Eurasian watermilfoil with milfoil weevils, a species of native herbivorous insect. Previous research funded by ENRTF has shown weevils can control watermilfoil if sunfish do not consume the weevils. Our biocontrol experiment will determine if we can reduce sunfish populations and enhance herbivore populations

to control milfoil. The project will proceed in two steps (common carp will addressed first), with tentative outcomes listed below. Specific details will determined by Center-led peer-review and reported in the center’s semi-annual report to the LCCMR.

Summary Budget Information for Activity 5:

ENRTF Budget: \$962,014
Amount Spent: \$0
Balance: \$962,014

Outcome (tentative, pending peer-review by Center)	Completion Date
1. Consult with DNR and lake stakeholders and choose potential study lakes	2014
2. Biological control study lakes selected and monitoring selected	2015
3. At least one new chemical weed-control strategy identified (with DNR)	2015
4. Pre-manipulation assessment completed and sunfish manipulation started	2016
5. Test of chemical control of weeds in another lake underway	2017
6. Assessment of fish, herbivore, and plant response to manipulations complete	2018
7. Recommendations on approaches for effective control of aquatic weeds made	2019

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Activity Status as of June 30, 2016:

Activity Status as of December 31, 2016:

Activity Status as of June 30, 2017:

Activity Status as of December 31, 2017:

Activity Status as of June 30, 2018:

Activity Status as of December 31, 2018:

Final Report Summary:

Activity 6: Reducing and controlling AIS: Simulation modeling and risk analysis to identify and evaluate AIS control methods.

Description: Simulation models are an efficient and low-cost means of developing and evaluating control scenarios for AIS and predicting outcomes that are prohibitively expensive and risky to determine in the field. We will use models to identify potential control measures, predict the impact of a given control measure (or a combination thereof), and determine how often and how much control we will need for it to be effective. Initial work will be on the common carp because data for these are in hand and this species is extremely damaging. We will then extrapolate to zebra mussels before tackling threats posed by silver carp (the most damaging species of Asian carp). Working with the DNR, we will also use risk analysis to prioritize management actions

based on simulation models, habitat suitability, and cost/benefit trade-offs. This activity will be led by Dr. Paul Venturelli (modeling expert) and Professor David Andow, head of the U of MN's risk assessment training program. The project will proceed in two steps (common carp will be addressed first), with tentative outcomes listed below. Specific details will be determined by Center-led peer-review and reported in the center's semi-annual report to the LCCMR.

Summary Budget Information for Activity 6:

ENRTF Budget: \$700,909
Amount Spent: \$0
Balance: \$700,909

Outcome (tentative, pending peer-review by Center)	Completion date
1. Model developed for common carp management in MN lakes	2014
2. Population viability model to determine impact or degree of control required to ensure probability of eradicating common carp and zebra mussel from lakes completed	2016
3. Risk assessment models of Asian carp management options completed	2016
4. Age-structured matrix population of silver carp to estimate rates of population increase and identify facets of life history that can be controlled in MN completed	2017
5. A user-friendly model to control common carp in lakes and wetlands completed	2019

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Activity Status as of June 30, 2016:

Activity Status as of December 31, 2016:

Activity Status as of June 30, 2017:

Activity Status as of December 31, 2017:

Activity Status as of June 30, 2018:

Activity Status as of December 31, 2018:

Final Report Summary:

Activity 7. Developing eradication tools: Exploring whether native pathogens can be used to control AIS

Description: Although ambitious, eradication is our ultimate goal. Only 3 techniques appear capable of achieving it: 1) introduction of exotic predators, 2) introduction or promotion of species-specific pathogens, 3) genetic-engineering and release of AIS with lethal genes. We presently believe the second option has the most promise in Minnesota and also poses the least risk. However, using infectious agents to target specific species is a high-risk, high-reward approach that must be evaluated carefully. This activity will focus on the first step of

this evaluation, which is identifying pathogens of the carps. Koi Herpes virus (KHV) is of special interest, partly because similar work is being conducted by the Australian government with whom we plan to collaborate (Dr. McColl, CSIRO). Because there has little research on infectious agents that control, or might control fishes in Minnesota, we must first perform a survey to identify endogenous infectious agents of native fish and carps. Common carp and silver carp will both be examined. Once viruses have been identified we will look for them in local fishes in lakes and rivers to determine if they are already having effects. Depending on these results, future studies would then either explore in detail whether/how local pathogens are already controlling local fishes to see exactly how their effects might be enhanced, or if they are not already present, if they might be released and if so how and with what effects. The identified agents will be fully characterized by molecular, microbiological, and other methods to better understand their etiology. From this research, candidate agents suitable for species-specific control will be identified for further investigation in subsequent proposals. The project will proceed in multiple steps with tentative outcomes listed below. Specific details will be determined by Center-led peer-review and reported in the center's semi-annual report to the LCCMR. If successful, new funding will be requested by the LCCMR and other agencies to develop the technology to apply identifies pathogens.

Summary Budget Information for Activity 7:

ENRTF Budget: \$1,382,155
Amount Spent: \$0
Balance: \$1,382,155

Outcome (Tentative, pending peer-review by Center)	Completion Date
1. Endogenous infectious agents of invasive carps and native fish identified	2015
2. Local lakes and carp will be examined for the presence of these viruses	2016
2. The potential to release or promote local virus evaluated and identified	2018

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Activity Status as of June 30, 2016:

Activity Status as of December 31, 2016:

Activity Status as of June 30, 2017:

Activity Status as of December 31, 2017:

Activity Status as of June 30, 2018:

Activity Status as of December 31, 2018:

Final Report Summary:

Activity 8. Implementing Center findings: An Extension Specialist position.

Description: A faculty Extension Specialist will link the scientific advances being made on AIS to the application of knowledge and practices of AIS control throughout Minnesota by working directly with those struggling with AIS control. This individual will develop and implement engagement opportunities and educational programs that will target state and local agencies and organizations (ex. watershed districts). In addition, this position will work directly with Center scientists to implement monitoring and control strategies for AIS at test sites. The DNR and watershed districts will be involved in this process. The overall goal is to create a program that results in a change in condition (management or elimination of AIS) due to a change in behavior and expectation through increased understanding. The project will proceed in two steps (common carp will addressed first), with tentative outcomes listed below. Specific details will be determined by Center-led peer-review and reported in the center’s semi-annual report to the LCCMR.

Summary Budget Information for Activity 8:

ENRTF Budget: \$1,265,989
Amount Spent: \$0
Balance: \$1,265,989

Outcome (Tentative, pending peer-review by Center)	Completion Date
1. Ongoing startup education efforts expanded and consolidated, annual state-wide workshops on zebra mussel, invasive plants, carp other AIS	2014
2. Application of AIS protocols developed by the Center at a lake test site	2015
3. On an annual basis: outstate workshops on AIS; educational materials developed and distributed	2015; 2016; 2017; 2018; 2019
4. Application of AIS protocols developed by the Center at a selected test site(s)	2016
5. Application of AIS protocols developed by the Center at a selected test site(s)	2018

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Activity Status as of June 30, 2016:

Activity Status as of December 31, 2016:

Activity Status as of June 30, 2017:

Activity Status as of December 31, 2017:

Activity Status as of June 30, 2018:

Activity Status as of December 31, 2018:

Final Report Summary:

V. DISSEMINATION:

Description: Findings will be disseminated by annual public workshops organized by the Center, the Center’s web site, collaborative meetings with our advisory boards, peer-reviewed publications and student theses.

Status as of December 31, 2013:

Status as of June 30, 2014:

Status as of December 31, 2014:

Status as of June 30, 2015:

Status as of December 31, 2015:

Status as of June 30, 2016:

Status as of December 31, 2016:

Status as of June 30, 2017:

Status as of December 31, 2017:

Status as of June 30, 2018:

Status as of December 31, 2018:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget:

Budget Category	\$ Amount	Explanation
Personnel:	\$7,180,575	Director, administrator, 4 professor, postdocs, graduate students
Professional/Technical Contracts:	\$0	
Service Contracts	\$270,000	qPCR machine DNA sequencing, mass spectrometry, pond rental, repairs
Equipment/Tools/Supplies:	\$965,000	Lab and field supplies for eDNA, radiotags, etc
Capital Equipment over \$3,500:	\$6,000	Oxygen meter
Fee Title Acquisition:	\$0	
Easement Acquisition:	\$0	
Professional Services for Acq:	\$0	
Printing:	\$0	
Travel Expenses:	\$461,196	
Other:	6,000	
TOTAL ENRTF BUDGET:	\$8,700,000	

Explanation of Use of Classified Staff: *n.a.*

Explanation of Capital Expenditures Greater Than \$3,500:

Oxygen meter needed to measure oxygen under lake ice for activity 4

Number of Full-time Equivalent (FTE) funded with this ENRTF appropriation:

Scientific director: 3.5
 Administrative director: 4.0
 Professors (Sorensen, Sadoswki, Newman, Ventureli, Andow): 0.25
 Graduate students: 30
 Postdoctoral associates: 12.0
 Research assistant professors: 20.0
 Technicians: 16

Number of Full-time Equivalent (FTE) estimated to be funded through contracts with this ENRTF appropriation:

0

B. Other Funds (related projects that can synergize this one):

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
National Science Foundation	\$234,000	\$50,000	Radio-tags for Judas fish
USGS	\$97,646	\$20,000	Preliminary work with Asian carp
Riley Purgatory Bluff Watershed District	\$2,728,771	\$1,320,000	Preliminary work on Judas carp
State			
Clean Water Legacy Funds	\$1,800,000	\$0	Startup for Center
TOTAL OTHER FUNDS:	\$4,8649,817	\$1,390,00	

VII. PROJECT STRATEGY:

A. Project Partners:

DNR (a full partner with whom the University will have a memorandum of understanding), USGS (LaCrosse WI; and Columbia, MI; former with a memorandum of understanding), Riley Purgatory Bluff Watershed District (Chanhassen, MN), Ramsey Washington Metro Watershed District (Maplewood, MN), Minnehaha Watershed District (Minnetonka, MN)

B. Project Impact and Long-term Strategy: This project will establish a new national center of excellence for AIS in Minnesota that will develop and disseminate new information and useful techniques for their control to public agencies and the private sector.

C. Spending History:

Funding Source	M.L. 2005 or FY 2006-07	M.L. 2007 or FY 2008	M.L. 2008 or FY 2009	M.L. 2009 or FY 2010	M.L. 2010 or FY 2011
ENRTF (Accelerating plans for integrated control of common carp; Sorensen is PI)		550,000			
ENRTF (Novel barriers for invasive species of fish, Voller PI, Sorensen Co-Pi with Mensinger and Honzo)			300,000		

ENRTF (AIS Center)					2,000,000
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VIII. ACQUISITION/RESTORATION LIST: n.a.

IX. MAP(S): Entire state of Minnesota

X. RESEARCH ADDENDUM: *not applicable (peer review of all activities will completed by the Center)*

XI. REPORTING REQUIREMENTS: Periodic work plan status update reports will be submitted not later than June 30, 2014, June 30, 2015, June 30, 2016, June 30, 2017, June 30, 2018, and June 30, 2019. A final report and associated products will be submitted between June 30 and August 15, 2019 as requested by the LCCMR.

Attachment A: Budget Detail for M.L. 2013 Environment and Natural Resources Trust Fund Projects

Project Title: An Aquatic Invasive Species Research Center

Legal Citation: MI 2013, Chp. xx, Sec. xx, Subd. xx

Project Manager: Peter Sorensen

M.L. 2013 ENRTF Appropriation: \$ 8,700,000

Project Length and Completion Date: 6 years, June 30, 2019

Date of Update:

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET - YEAR 1 and YEAR 2	Year 1	Amount Spent	Balance	Year 2	Amount Spent	Balance	Year 1-2 Total Budget	Year 1-2 Total Balance	TOTAL BUDGET ALL YEARS	TOTAL BALANCE ALL YEARS
	2013-2014			2014-2015						
BUDGET ITEM										
Personnel:										
Research Assistant Professor #1 - Metagenomics (Activity #2, fulltime)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$355,608	\$355,608
Graduate student#1 (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$85,974	\$85,974
Michael Sadowsky (Activity #2, 1 week/yr)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$36,573	\$36,573
Peter Sorensen- Fish behavior/aggregation (Activity #3, 2 mo/yr)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$125,157	\$125,157
Postdoc#1- fish behavior/Judas fish (Activity# 3)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$195,292	\$195,292
Graduate Student#2 (Behavior; Activity #3)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$85,974	\$85,974
Research Assistant Professor #2 - fish ecology/ IPM (Activity #4)	\$38,000	\$0	\$38,000	\$76,000	\$0	\$76,000	\$114,000	\$114,000	\$441,494	\$441,494
Graduate Students #3,4 (Ecology; 1 -6 yrs, 2 - 2 yrs; Activity #4)	\$19,570	\$0	\$19,570	\$20,157	\$0	\$20,157	\$39,727	\$39,727	\$168,733	\$168,733
Paul Venturelli - Modeler (Activity #6Ven, 1 mo)	\$7,650	\$0	\$7,650	\$7,880	\$0	\$7,880	\$15,530	\$15,530	\$49,483	\$49,483
Graduate Student#5 (Activity #6Ven)	\$19,750	\$0	\$19,750	\$20,343	\$0	\$20,343	\$40,093	\$40,093	\$127,751	\$127,751
Ray Newman (1mo) (Activity #5, 1 mo)	\$10,872	\$0	\$10,872	\$11,198	\$0	\$11,198	\$22,070	\$22,070	\$70,325	\$70,325
Postdoctoral fellow#2 (Activity #5 Newman)	\$45,000	\$0	\$45,000	\$46,350	\$0	\$46,350	\$91,350	\$91,350	\$291,078	\$291,078
Undergraduates (Activity #5;4 fulltime summer, 2 halftime winter)	\$28,920	\$0	\$28,920	\$29,788	\$0	\$29,788	\$58,708	\$58,708	\$187,066	\$187,066
2 Field and fish care technicians (ALL Field and lab activities)	\$105,000	\$0	\$105,000	\$108,150	\$0	\$108,150	\$213,150	\$213,150	\$744,471	\$744,471
Research Assistant Professor#3 - Pathogens (Activity #7, fulltime, 4yrs)	\$85,000	\$0	\$85,000	\$87,550	\$0	\$87,550	\$172,550	\$172,550	\$355,608	\$355,608
Senior Lab technician (activity #7)	\$32,000	\$0	\$32,000	\$32,960	\$0	\$32,960	\$64,960	\$64,960	\$133,876	\$133,876
Graduate student#6 (Activity#7)	\$22,506	\$0	\$22,506	\$23,181	\$0	\$23,181	\$45,687	\$45,687	\$94,157	\$94,157
David Andow (Activity#AAand, risk assessment, 2wks_yr)	\$12,000	\$0	\$12,000	\$12,360	\$0	\$12,360	\$24,360	\$24,360	\$24,360	\$24,360
Postdoctoral fellow#3 (Activity #6And-)	\$45,000	\$0	\$45,000	\$45,000	\$0	\$45,000	\$90,000	\$90,000	\$90,000	\$90,000
Scientific Director (Activity #1, 4.5 mo/yr, after year 2)	\$0	\$0	\$0	\$66,837	\$0	\$66,837	\$66,837	\$66,837	\$354,847	\$354,847
Administrative Director (Activity #1, fulltime, after year2)	\$0	\$0	\$0	\$79,568	\$0	\$79,568	\$79,568	\$79,568	\$422,437	\$422,437
New Research Assistant Prof#4 (Activity #8, Extension, fulltime)	\$83,000	\$0	\$83,000	\$85,490	\$0	\$85,490	\$168,490	\$168,490	\$536,878	\$536,878
Graduate Student #7 Activity #8)	\$19,750	\$0	\$19,750	\$20,343	\$0	\$20,343	\$40,093	\$40,093	\$127,751	\$127,751
									\$0	\$0
									\$0	\$0
Fringe:										
Research Assistant Professor#1 (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$119,840	\$119,840
Graduate student #1 w/tuition (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$67,449	\$67,449
Michael Sadowsky (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12,325	\$12,325
Peter Sorensen- Fish behavior/aggregation(Activity #3)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$42,178	\$42,178
Postdoc (Activity#3)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$65,813	\$65,813
Grad Student (Activity #3)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$67,449	\$67,449
Research Assistant Professor #2 (fish ecology IPM, Activity #4)	\$13,680	\$0	\$13,680	\$27,360	\$0	\$27,360	\$41,040	\$41,040	\$153,373	\$153,373
Graduate Students w/tuition (Activity #2)	\$16,540	\$0	\$16,540	\$16,638	\$0	\$16,638	\$33,178	\$33,178	\$134,360	\$134,360
Paul Venturelli (Activity #6V)	\$2,578	\$0	\$2,578	\$2,655	\$0	\$2,655	\$5,233	\$5,233	\$16,676	\$16,676
Graduate student w/tuition (Activity #6V)	\$16,570	\$0	\$16,570	\$16,669	\$0	\$16,669	\$33,240	\$33,240	\$100,971	\$100,971
Ray Newman (Activity #5)	\$3,664	\$0	\$3,664	\$3,774	\$0	\$3,774	\$7,438	\$7,438	\$23,699	\$23,699
Postdoctoral fellow#2 (Activity #5)	\$15,165	\$0	\$15,165	\$15,620	\$0	\$15,620	\$30,785	\$30,785	\$98,093	\$98,093
Undergraduates (Activity #5)	\$4,049	\$0	\$4,049	\$4,170	\$0	\$4,170	\$8,219	\$8,219	\$26,189	\$26,189
2 field and fish care technicians (ALL ACTIVITIES) frg @ 41.3%	\$43,365	\$0	\$43,365	\$44,666	\$0	\$44,666	\$88,031	\$88,031	\$307,466	\$307,466
Research Assistant Professor (Activity #7)	\$28,645	\$0	\$28,645	\$29,504	\$0	\$29,504	\$58,149	\$58,149	\$119,840	\$119,840
Senior Lab technician (#7) frg@41.3	\$13,216	\$0	\$13,216	\$13,612	\$0	\$13,612	\$26,828	\$26,828	\$55,291	\$55,291
Graduate Student (#7)	\$17,032	\$0	\$17,032	\$17,145	\$0	\$17,145	\$34,177	\$34,177	\$68,821	\$68,821
David Andow (#6And, risk assessment)	\$4,044	\$0	\$4,044	\$12,731	\$0	\$12,731	\$16,775	\$16,775	\$16,775	\$16,775
Postdoctoral fellow#3 (Activity #6And)	\$15,165	\$0	\$15,165	\$15,165	\$0	\$15,165	\$30,330	\$30,330	\$30,330	\$30,330
Scientific Director (#1)	\$0	\$0	\$0	\$22,524	\$0	\$22,524	\$22,524	\$22,524	\$119,583	\$119,583
Administrative Director (Activity#1)	\$0	\$0	\$0	\$26,814	\$0	\$26,814	\$26,814	\$26,814	\$142,361	\$142,361
New Research Assistant Professor (Activity #8, Extension)	\$27,971	\$0	\$27,971	\$28,810	\$0	\$28,810	\$56,781	\$56,781	\$180,928	\$180,928
Graduate Student w/tuition (Activity #8)	\$16,570	\$0	\$16,570	\$16,669	\$0	\$16,669	\$33,240	\$33,240	\$105,870	\$105,870
Total salary and fringe	\$812,272	\$0	\$812,272	\$1,087,682	\$0	\$1,087,682	\$1,899,954	\$1,899,954	\$7,180,575	\$7,180,575
SUPPLIES:										
Metagenomics (Activity #2 w startup)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$100,000	\$100,000
Fish Behavior/aggregation (Activity #3, radiotags, receiver, pheromones)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$113,425	\$113,425
Fish ecology/IPM (Activity #4; field supplies, newts, gas)	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$30,000	\$30,000	\$100,000	\$100,000
Modelling (Activity #6V+6V, computers, software, risk and simulation)	\$20,000	\$0	\$20,000	\$20,000	\$0	\$20,000	\$40,000	\$40,000	\$60,000	\$60,000
Invasive plants (Activity #2C gas, nets, bags,etc)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$20,000	\$20,000	\$60,000	\$60,000
Pathogens (Activity#7)	\$95,000	\$0	\$95,000	\$95,000	\$0	\$95,000	\$190,000	\$190,000	\$380,000	\$380,000
Administration (computer and related supplies; Activity #1)	\$0	\$0	\$0	\$5,000	\$0	\$5,000	\$5,000	\$5,000	\$25,000	\$25,000
Extension (Activity #8; field supplies)	\$50,000	\$0	\$50,000	\$10,000	\$0	\$10,000	\$60,000	\$60,000	\$100,000	\$100,000
Total Supplies	\$190,000	\$0	\$190,000	\$155,000	\$0	\$155,000	\$345,000	\$345,000	\$938,425	\$938,425
TRAVEL										
Metagenomics (Activity #2 sampling, conferences)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$20,000	\$20,000
Fish Behavior, biochemistry (Activity #3, experiments for 2 conferences)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$30,000	\$30,000
Fish Ecology (#4; sampling MN, then MI- house rent, van,air, food)	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$15,000	\$15,000	\$75,000	\$75,000
Modeling (Activity #6Ven+#6A)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$30,000	\$30,000
Invasive plants (#2C)	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$15,000	\$15,000	\$45,000	\$45,000
Pathogens (Activity#7)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$20,000	\$20,000
Administration (#1; meetings, expert advisors)	\$0	\$0	\$0	\$5,000	\$0	\$5,000	\$5,000	\$5,000	\$25,000	\$25,000
Extension (travel, conferences, experiments; Activity #8)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$20,000	\$20,000	\$60,000	\$60,000
Total Travel	\$35,000	\$0	\$35,000	\$40,000	\$0	\$40,000	\$75,000	\$75,000	\$305,000	\$305,000
OTHER DIRECT COSTS:										
Services (qPCR machine contract, sequencing, repairs) (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$60,000	\$60,000
Radio-receivers, Services (Biochemistry) (Activity #3)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$30,000	\$30,000
Pond rental with fish and technician (USGS reimbursable; Activity #4)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$150,000	\$150,000
Oxygen meter, GPS (Activity #4)	\$6,000	\$0	\$6,000	\$0	\$0	\$0	\$6,000	\$6,000	\$6,000	\$6,000
Equipment repairs(All Activities; field and lab, divided by 7)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$30,000	\$30,000
Total Other Direct Costs	\$11,000	\$0	\$11,000	\$5,000	\$0	\$5,000	\$16,000	\$16,000	\$276,000	\$276,000
TOTAL DIRECT COSTS	\$1,048,272	\$0	\$1,048,272	\$1,287,682	\$0	\$1,287,682	\$2,335,954	\$2,335,954	\$8,700,000	\$8,700,000

Attachment A: Budget Detail for M.L. 2013 Environment and Natural Resources Trust Fund Projects

Project Title: An Aquatic Invasive Species Research Center

Legal Citation: MI 2013, Chp. xx, Sec. xx, Subd. xx

Project Manager: Peter Sorensen

M.L. 2013 ENRTF Appropriation: \$ 8,700,000

Project Length and Completion Date: 6 years, June 30, 2019

Date of Update:

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET - YEAR 3 and YEAR 4	Year 3	Amount Spent	Balance	Year 4	Amount Spent	Balance	Year 3-4 Total Budget	Year 3-4 Total Balance	TOTAL BUDGET ALL YEARS	TOTAL BALANCE ALL YEARS
	2015-2016			2016-2017						
BUDGET ITEM										
Personnel:										
Research Assistant Professor #1 - Metagenomics (Activity #2, fulltime)	\$85,000	\$0	\$85,000	\$87,550	\$0	\$87,550	\$172,550	\$172,550	\$355,608	\$355,608
Graduate student#1 (Activity #2)	\$20,550	\$0	\$20,550	\$21,167	\$0	\$21,167	\$41,717	\$41,717	\$85,974	\$85,974
Michael Sadowsky (Activity #2, 1 week/yr)	\$8,742	\$0	\$8,742	\$9,004	\$0	\$9,004	\$17,746	\$17,746	\$36,573	\$36,573
Peter Sorensen- Fish behavior/aggregation (Activity #3, 2 mo/yr)	\$29,916	\$0	\$29,916	\$30,813	\$0	\$30,813	\$60,729	\$60,729	\$125,157	\$125,157
Postdoc#1- fish behavior/Judas fish (Activity# 3)	\$46,680	\$0	\$46,680	\$48,080	\$0	\$48,080	\$94,760	\$94,760	\$195,292	\$195,292
Graduate Student#2 (Behavior; Activity #3)	\$20,550	\$0	\$20,550	\$21,167	\$0	\$21,167	\$41,717	\$41,717	\$85,974	\$85,974
Research Assistant Professor #2 - fish ecology/ IPM (Activity #4)	\$78,280	\$0	\$78,280	\$80,628	\$0	\$80,628	\$158,908	\$158,908	\$441,494	\$441,494
Graduate Students #3,4 (Ecology; 1 -6 yrs, 2 - 2 yrs; Activity #4)	\$41,524	\$0	\$41,524	\$42,769	\$0	\$42,769	\$84,293	\$84,293	\$168,733	\$168,733
Paul Venturelli - Modeler (Activity #6Ven, 1 mo)	\$8,116	\$0	\$8,116	\$8,359	\$0	\$8,359	\$16,475	\$16,475	\$49,483	\$49,483
Graduate Student#5 (Activity #6Ven)	\$20,953	\$0	\$20,953	\$21,581	\$0	\$21,581	\$42,534	\$42,534	\$127,751	\$127,751
Ray Newman (1mo) (Activity #5, 1 mo)	\$11,534	\$0	\$11,534	\$11,880	\$0	\$11,880	\$23,414	\$23,414	\$70,325	\$70,325
Postdoctoral fellow#2 (Activity #5 Newman)	\$47,741	\$0	\$47,741	\$49,173	\$0	\$49,173	\$96,913	\$96,913	\$291,078	\$291,078
Undergraduates (Activity #5;4 fulltime summer, 2 halftime winter)	\$30,681	\$0	\$30,681	\$31,602	\$0	\$31,602	\$62,283	\$62,283	\$187,066	\$187,066
2 Field and fish care technicians (ALL Field and lab activities)	\$127,000	\$0	\$127,000	\$130,810	\$0	\$130,810	\$257,810	\$257,810	\$744,471	\$744,471
Research Assistant Professor#3 - Pathogens (Activity #7, fulltime, 4yrs)	\$90,177	\$0	\$90,177	\$92,882	\$0	\$92,882	\$183,058	\$183,058	\$355,608	\$355,608
Senior Lab technician (activity #7)	\$33,949	\$0	\$33,949	\$34,967	\$0	\$34,967	\$68,916	\$68,916	\$133,876	\$133,876
Graduate student#6 (Activity#7)	\$23,877	\$0	\$23,877	\$24,593	\$0	\$24,593	\$48,470	\$48,470	\$94,157	\$94,157
David Andow (Activity#AAand, risk assessment, 2wks_yr)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$24,360	\$24,360
Postdoctoral fellow#3 (Activity #6And-)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$90,000	\$90,000
Scientific Director (Activity #1, 4.5 mo/yr, after year 2)	\$68,842	\$0	\$68,842	\$70,907	\$0	\$70,907	\$139,749	\$139,749	\$354,847	\$354,847
Administrative Director (Activity #1, fulltime, after year2)	\$81,955	\$0	\$81,955	\$84,414	\$0	\$84,414	\$166,369	\$166,369	\$422,437	\$422,437
New Research Assistant Prof#4 (Activity #8, Extension, fulltime)	\$88,055	\$0	\$88,055	\$90,696	\$0	\$90,696	\$178,751	\$178,751	\$536,878	\$536,878
Graduate Student #7 Activity #8)	\$20,953	\$0	\$20,953	\$21,581	\$0	\$21,581	\$42,534	\$42,534	\$127,751	\$127,751
Fringe:										
Research Assistant Professor#1 (Activity #2)	\$28,645	\$0	\$28,645	\$29,504	\$0	\$29,504	\$58,149	\$58,149	\$119,840	\$119,840
Graduate student #1 w/tuition (Activity #2)	\$16,704	\$0	\$16,704	\$16,808	\$0	\$16,808	\$33,512	\$33,512	\$67,449	\$67,449
Michael Sadowsky (Activity #2)	\$2,946	\$0	\$2,946	\$3,034	\$0	\$3,034	\$5,980	\$5,980	\$12,325	\$12,325
Peter Sorensen- Fish behavior/aggregation(Activity #3)	\$10,082	\$0	\$10,082	\$10,384	\$0	\$10,384	\$20,466	\$20,466	\$42,178	\$42,178
Postdoc (Activity#3)	\$15,731	\$0	\$15,731	\$16,203	\$0	\$16,203	\$31,934	\$31,934	\$65,813	\$65,813
Grad Student (Activity #3)	\$16,704	\$0	\$16,704	\$16,808	\$0	\$16,808	\$33,512	\$33,512	\$67,449	\$67,449
Research Assistant Professor #2 (fish ecology IPM, Activity #4)	\$26,380	\$0	\$26,380	\$27,172	\$0	\$27,172	\$53,552	\$53,552	\$153,373	\$153,373
Graduate Students w/tuition (Activity #2)	\$33,479	\$0	\$33,479	\$33,688	\$0	\$33,688	\$67,168	\$67,168	\$134,360	\$134,360
Paul Venturelli (Activity #6V)	\$2,735	\$0	\$2,735	\$2,817	\$0	\$2,817	\$5,552	\$5,552	\$16,676	\$16,676
Graduate student w/tuition (Activity #6V)	\$16,772	\$0	\$16,772	\$16,877	\$0	\$16,877	\$33,649	\$33,649	\$100,971	\$100,971
Ray Newman (Activity #5)	\$3,887	\$0	\$3,887	\$4,004	\$0	\$4,004	\$7,891	\$7,891	\$23,699	\$23,699
Postdoctoral fellow#2 (Activity #5)	\$16,089	\$0	\$16,089	\$16,571	\$0	\$16,571	\$32,660	\$32,660	\$98,093	\$98,093
Undergraduates (Activity #5)	\$4,295	\$0	\$4,295	\$4,424	\$0	\$4,424	\$8,720	\$8,720	\$26,189	\$26,189
2 field and fish care technicians (ALL ACTIVITIES) frg @ 41.3%	\$52,451	\$0	\$52,451	\$54,025	\$0	\$54,025	\$106,476	\$106,476	\$307,466	\$307,466
Research Assistant Professor (Activity #7)	\$30,389	\$0	\$30,389	\$31,301	\$0	\$31,301	\$61,691	\$61,691	\$119,840	\$119,840
Senior Lab technician (#7) frg@41.3	\$14,021	\$0	\$14,021	\$14,441	\$0	\$14,441	\$28,462	\$28,462	\$55,291	\$55,291
Graduate Student (#7)	\$17,262	\$0	\$17,262	\$17,382	\$0	\$17,382	\$34,643	\$34,643	\$68,821	\$68,821
David Andow (#6And, risk assessment)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$16,775	\$16,775
Postdoctoral fellow#3 (Activity #6And)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$30,330	\$30,330
Scientific Director (#1)	\$23,200	\$0	\$23,200	\$23,896	\$0	\$23,896	\$47,096	\$47,096	\$119,583	\$119,583
Administrative Director (Activity#1)	\$27,619	\$0	\$27,619	\$28,447	\$0	\$28,447	\$56,066	\$56,066	\$142,361	\$142,361
New Research Assistant Professor (Activity #8, Extension)	\$29,674	\$0	\$29,674	\$30,565	\$0	\$30,565	\$60,239	\$60,239	\$180,928	\$180,928
Graduate Student w/tuition (Activity #8)	\$21,670	\$0	\$21,670	\$16,877	\$0	\$16,877	\$38,547	\$38,547	\$105,870	\$105,870
Total salary and fringe	\$1,395,809	\$0	\$1,395,809	\$1,429,853	\$0	\$1,429,853	\$2,825,661	\$2,825,661	\$7,180,575	\$7,180,575
SUPPLIES:										
Metagenomics (Activity #2 w startup)	\$25,000	\$0	\$25,000	\$25,000	\$0	\$25,000	\$50,000	\$50,000	\$100,000	\$100,000
Fish Behavior/aggregation (Activity #3, radiotags, receiver, pheromones)	\$23,425	\$0	\$23,425	\$30,000	\$0	\$30,000	\$53,425	\$53,425	\$113,425	\$113,425
Fish ecology/IPM (Activity #4; field supplies, newts, gas)	\$20,000	\$0	\$20,000	\$20,000	\$0	\$20,000	\$40,000	\$40,000	\$100,000	\$100,000
Modelling (Activity #6V+6V, computers, software, risk and simualtion)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$60,000	\$60,000
Invasive plants (Activity #2C gas, nets, bags,etc)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$20,000	\$20,000	\$60,000	\$60,000
Pathogens (Activity#7)	\$95,000	\$0	\$95,000	\$95,000	\$0	\$95,000	\$190,000	\$190,000	\$380,000	\$380,000
Administration (computer and related supplies; Activity #1)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$25,000	\$25,000
Extension (Activity #8; field supplies)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$20,000	\$20,000	\$100,000	\$100,000
Total Supplies	\$193,425	\$0	\$193,425	\$200,000	\$0	\$200,000	\$393,425	\$393,425	\$938,425	\$938,425
TRAVEL										
Metageomics (Activity #2 sampling, conferences)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$20,000	\$20,000
Fish Behavior, biochemistry (Activity #3, experiments for 2 conferences)	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$15,000	\$15,000	\$30,000	\$30,000
Fish Ecology (#4; sampling MN, then MI- house rent, van,air, food)	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$30,000	\$30,000	\$75,000	\$75,000
Modeling (Activity #6Ven+#6A)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$30,000	\$30,000
Invasive plants (#2C)	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$15,000	\$15,000	\$45,000	\$45,000
Pathogens (Activity#7)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$20,000	\$20,000
Administration (#1; meetings, expert advisors)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$25,000	\$25,000
Extension (travel, conferences, experiments; Activity #8)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$20,000	\$20,000	\$60,000	\$60,000
Total Travel	\$60,000	\$0	\$60,000	\$60,000	\$0	\$60,000	\$120,000	\$120,000	\$305,000	\$305,000
OTHER DIRECT COSTS:										
Services (qPCR machine contract, sequencing, repairs) (Activity #2)	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$30,000	\$30,000	\$60,000	\$60,000
Radio-receivers, Services (Biochemistry) (Activity #3)	\$15,000	\$0	\$15,000	\$5,000	\$0	\$5,000	\$20,000	\$20,000	\$30,000	\$30,000
Pond rental with fish and technician (USGS reimbursable; Activity #4)	\$50,000	\$0	\$50,000	\$50,000	\$0	\$50,000	\$100,000	\$100,000	\$150,000	\$150,000
Oxygen meter, GPS (Activity #4)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,000	\$6,000
Equipment repairs(All Activities; field and lab, divided by 7)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$30,000	\$30,000
Total Other Direct Costs	\$85,000	\$0	\$85,000	\$75,000	\$0	\$75,000	\$160,000	\$160,000	\$276,000	\$276,000
TOTAL DIRECT COSTS	\$1,734,234	\$0	\$1,734,234	\$1,764,853	\$0	\$1,764,853	\$3,499,086	\$3,499,086	\$8,700,000	\$8,700,000

Attachment A: Budget Detail for M.L. 2013 Environment and Natural Resources Trust Fund Projects

Project Title: An Aquatic Invasive Species Research Center

Legal Citation: MI 2013, Chp. xx, Sec. xx, Subd. xx

Project Manager: Peter Sorensen

M.L. 2013 ENRTF Appropriation: \$ 8,700,000

Project Length and Completion Date: 6 years, June 30, 2019

Date of Update:

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET - YEAR 5 and YEAR 6	Year 5	Amount Spent	Balance	Year 6	Amount Spent	Balance	Year 5-6 Total Budget	Year 5-6 Total Balance	TOTAL BUDGET ALL YEARS	TOTAL BALANCE ALL YEARS
	2017-2018			2018-2019						
BUDGET ITEM										
Personnel:										
Research Assistant Professor #1 - Metagenomics (Activity #2, fulltime)	\$90,177	\$0	\$90,177	\$92,882	\$0	\$92,882	\$183,058	\$183,058	\$355,608	\$355,608
Graduate student#1 (Activity #2)	\$21,801	\$0	\$21,801	\$22,456	\$0	\$22,456	\$44,257	\$44,257	\$85,974	\$85,974
Michael Sadowsky (Activity #2, 1 week/yr)	\$9,274	\$0	\$9,274	\$9,553	\$0	\$9,553	\$18,827	\$18,827	\$36,573	\$36,573
Peter Sorensen- Fish behavior/aggregation (Activity #3, 2 mo/yr)	\$31,738	\$0	\$31,738	\$32,690	\$0	\$32,690	\$64,428	\$64,428	\$125,157	\$125,157
Postdoc#1- fish behavior/Judas fish (Activity# 3)	\$49,523	\$0	\$49,523	\$51,008	\$0	\$51,008	\$100,531	\$100,531	\$195,292	\$195,292
Graduate Student#2 (Behavior; Activity #3)	\$21,801	\$0	\$21,801	\$22,456	\$0	\$22,456	\$44,257	\$44,257	\$85,974	\$85,974
Research Assistant Professor #2 - fish ecology/ IPM (Activity #4)	\$83,047	\$0	\$83,047	\$85,539	\$0	\$85,539	\$168,586	\$168,586	\$441,494	\$441,494
Graduate Students #3,4 (Ecology; 1 -6 yrs, 2 - 2 yrs; Activity #4)	\$22,026	\$0	\$22,026	\$22,687	\$0	\$22,687	\$44,713	\$44,713	\$168,733	\$168,733
Paul Venturelli - Modeler (Activity #6Ven, 1 mo)	\$8,610	\$0	\$8,610	\$8,868	\$0	\$8,868	\$17,479	\$17,479	\$49,483	\$49,483
Graduate Student#5 (Activity #6Ven)	\$22,229	\$0	\$22,229	\$22,896	\$0	\$22,896	\$45,124	\$45,124	\$127,751	\$127,751
Ray Newman (1mo) (Activity #5, 1 mo)	\$12,237	\$0	\$12,237	\$12,604	\$0	\$12,604	\$24,840	\$24,840	\$70,325	\$70,325
Postdoctoral fellow#2 (Activity #5 Newman)	\$50,648	\$0	\$50,648	\$52,167	\$0	\$52,167	\$102,815	\$102,815	\$291,078	\$291,078
Undergraduates (Activity #5;4 fulltime summer, 2 halftime winter)	\$32,550	\$0	\$32,550	\$33,526	\$0	\$33,526	\$66,076	\$66,076	\$187,066	\$187,066
2 Field and fish care technicians (ALL Field and lab activities)	\$134,734	\$0	\$134,734	\$138,776	\$0	\$138,776	\$273,511	\$273,511	\$744,471	\$744,471
Research Assistant Professor#3 - Pathogens (Activity #7, fulltime, 4yrs)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$355,608	\$355,608
Senior Lab technician (activity #7)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$133,876	\$133,876
Graduate student#6 (Activity#7)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$94,157	\$94,157
David Andow (Activity#AAand, risk assessment, 2wks_yr)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$24,360	\$24,360
Postdoctoral fellow#3 (Activity #6And-)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$90,000	\$90,000
Scientific Director (Activity #1, 4.5 mo/yr, after year 2)	\$73,035	\$0	\$73,035	\$75,226	\$0	\$75,226	\$148,260	\$148,260	\$354,847	\$354,847
Administrative Director (Activity #1, fulltime, after year2)	\$86,946	\$0	\$86,946	\$89,554	\$0	\$89,554	\$176,501	\$176,501	\$422,437	\$422,437
New Research Assistant Prof#4 (Activity #8, Extension, fulltime)	\$93,417	\$0	\$93,417	\$96,220	\$0	\$96,220	\$189,637	\$189,637	\$536,878	\$536,878
Graduate Student #7 Activity #8)	\$22,229	\$0	\$22,229	\$22,896	\$0	\$22,896	\$45,124	\$45,124	\$127,751	\$127,751
Fringe:										
Research Assistant Professor#1 (Activity #2)	\$30,389	\$0	\$30,389	\$31,301	\$0	\$31,301	\$61,691	\$61,691	\$119,840	\$119,840
Graduate student #1 w/tuition (Activity #2)	\$16,914	\$0	\$16,914	\$17,024	\$0	\$17,024	\$33,937	\$33,937	\$67,449	\$67,449
Michael Sadowsky (Activity #2)	\$3,125	\$0	\$3,125	\$3,219	\$0	\$3,219	\$6,345	\$6,345	\$12,325	\$12,325
Peter Sorensen- Fish behavior/aggregation(Activity #3)	\$10,696	\$0	\$10,696	\$11,017	\$0	\$11,017	\$21,712	\$21,712	\$42,178	\$42,178
Postdoc (Activity#3)	\$16,689	\$0	\$16,689	\$17,190	\$0	\$17,190	\$33,879	\$33,879	\$65,813	\$65,813
Grad Student (Activity #3)	\$16,914	\$0	\$16,914	\$17,024	\$0	\$17,024	\$33,937	\$33,937	\$67,449	\$67,449
Research Assistant Professor #2 (fish ecology IPM, Activity #4)	\$27,987	\$0	\$27,987	\$30,794	\$0	\$30,794	\$58,781	\$58,781	\$153,373	\$153,373
Graduate Students w/tuition (Activity #2)	\$16,952	\$0	\$16,952	\$17,062	\$0	\$17,062	\$34,014	\$34,014	\$134,360	\$134,360
Paul Venturelli (Activity #6V)	\$2,902	\$0	\$2,902	\$2,989	\$0	\$2,989	\$5,890	\$5,890	\$16,676	\$16,676
Graduate student w/tuition (Activity #6V)	\$16,986	\$0	\$16,986	\$17,097	\$0	\$17,097	\$34,083	\$34,083	\$100,971	\$100,971
Ray Newman (Activity #5)	\$4,124	\$0	\$4,124	\$4,247	\$0	\$4,247	\$8,371	\$8,371	\$23,699	\$23,699
Postdoctoral fellow#2 (Activity #5)	\$17,068	\$0	\$17,068	\$17,580	\$0	\$17,580	\$34,649	\$34,649	\$98,093	\$98,093
Undergraduates (Activity #5)	\$4,557	\$0	\$4,557	\$4,694	\$0	\$4,694	\$9,251	\$9,251	\$26,189	\$26,189
2 field and fish care technicians (ALL ACTIVITIES) frg @ 41.3%	\$55,645	\$0	\$55,645	\$57,315	\$0	\$57,315	\$112,960	\$112,960	\$307,466	\$307,466
Research Assistant Professor (Activity #7)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$119,840	\$119,840
Senior Lab technician (#7) frg@41.3	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$55,291	\$55,291
Graduate Student (#7)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$68,821	\$68,821
David Andow (#6And, risk assessment)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$16,775	\$16,775
Postdoctoral fellow#3 (Activity #6And)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$30,330	\$30,330
Scientific Director (#1)	\$24,613	\$0	\$24,613	\$25,351	\$0	\$25,351	\$49,964	\$49,964	\$119,583	\$119,583
Administrative Director (Activity#1)	\$29,301	\$0	\$29,301	\$30,180	\$0	\$30,180	\$59,481	\$59,481	\$142,361	\$142,361
New Research Assistant Professor (Activity #8, Extension)	\$31,482	\$0	\$31,482	\$32,426	\$0	\$32,426	\$63,908	\$63,908	\$180,928	\$180,928
Graduate Student w/tuition (Activity #8)	\$16,986	\$0	\$16,986	\$17,097	\$0	\$17,097	\$34,083	\$34,083	\$105,870	\$105,870
Total salary and fringe	\$1,209,350	\$0	\$1,209,350	\$1,245,609	\$0	\$1,245,609	\$2,454,960	\$2,454,960	\$7,180,575	\$7,180,575
SUPPLIES:										
Metagenomics (Activity #2 w startup)	\$25,000	\$0	\$25,000	\$25,000	\$0	\$25,000	\$50,000	\$50,000	\$100,000	\$100,000
Fish Behavior/aggregation (Activity #3, radiotags, receiver, pheromones)	\$30,000	\$0	\$30,000	\$30,000	\$0	\$30,000	\$60,000	\$60,000	\$113,425	\$113,425
Fish ecology/IPM (Activity #4; field supplies, newts, gas)	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$30,000	\$30,000	\$100,000	\$100,000
Modelling (Activity #6V+6V, computers, software, risk and simulation)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$60,000	\$60,000
Invasive plants (Activity #2C gas, nets, bags,etc)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$20,000	\$20,000	\$60,000	\$60,000
Pathogens (Activity#7)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$380,000	\$380,000
Administration (computer and related supplies; Activity #1)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$25,000	\$25,000
Extension (Activity #8; field supplies)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$20,000	\$20,000	\$100,000	\$100,000
Total Supplies	\$100,000	\$0	\$100,000	\$100,000	\$0	\$100,000	\$200,000	\$200,000	\$938,425	\$938,425
TRAVEL										
Metagenomics (Activity #2 sampling, conferences)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$20,000	\$20,000
Fish Behavior, biochemistry (Activity #3, experiments for 2 conferences)	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$15,000	\$15,000	\$30,000	\$30,000
Fish Ecology (#4; sampling MN, then MI- house rent, van,air, food)	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$30,000	\$30,000	\$75,000	\$75,000
Modeling (Activity #6Ven+#6A)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$30,000	\$30,000
Invasive plants (#2C)	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$15,000	\$15,000	\$45,000	\$45,000
Pathogens (Activity#7)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$20,000	\$20,000
Administration (#1; meetings, expert advisors)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$25,000	\$25,000
Extension (travel, conferences, experiments; Activity #8)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$20,000	\$20,000	\$60,000	\$60,000
Total Travel	\$55,000	\$0	\$55,000	\$55,000	\$0	\$55,000	\$110,000	\$110,000	\$305,000	\$305,000
OTHER DIRECT COSTS:										
Services (qPCR machine contract, sequencing, repairs) (Activity #2)	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$30,000	\$30,000	\$60,000	\$60,000
Radio-receivers, Services (Biochemistry) (Activity #3)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$30,000	\$30,000
Pond rental with fish and technician (USGS reimbursable; Activity #4)	\$50,000	\$0	\$50,000	\$0	\$0	\$0	\$50,000	\$50,000	\$150,000	\$150,000
Oxygen meter, GPS (Activity #4)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,000	\$6,000
Equipment repairs(All Activities; field and lab, divided by 7)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$10,000	\$10,000	\$30,000	\$30,000
Total Other Direct Costs	\$75,000	\$0	\$75,000	\$25,000	\$0	\$25,000	\$100,000	\$100,000	\$276,000	\$276,000
TOTAL DIRECT COSTS	\$1,439,350	\$0	\$1,439,350	\$1,425,609	\$0	\$1,425,609	\$2,864,960	\$2,864,960	\$8,700,000	\$8,700,000

Attachment A: Budget Detail for M.L. 2013 Environment and Natural Resources Trust Fund Projects

Project Title: An Aquatic Invasive Species Research Center

Legal Citation: MI 2013, Chp. xx, Sec. xx, Subd. xx

Project Manager: Peter Sorensen

M.L. 2013 ENRTF Appropriation: \$ 8,700,000

Project Length and Completion Date: 6 years, June 30, 2019

Date of Update:

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET (by Project Year)	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		TOTAL BUDGET ALL YEARS	TOTAL BALANCE ALL YEARS					
	2013-2014	Amount Spent	Balance	2014-2015	Amount Spent	Balance	2015-2016	Amount Spent	Balance	2016-2017	Amount Spent	Balance			2017-2018	Amount Spent	Balance	2018-2019	Amount Spent
BUDGET ITEM																			
Personnel:																			
Research Assistant Professor #1 - Metagenomics (Activity #2, fulltime)	\$0	\$0	\$0	\$0	\$0	\$0	\$85,000	\$0	\$85,000	\$87,550	\$0	\$87,550	\$90,177	\$0	\$90,177	\$92,882	\$0	\$92,882	
Graduate student#1 (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$20,550	\$0	\$20,550	\$21,167	\$0	\$21,167	\$21,801	\$0	\$21,801	\$22,456	\$0	\$22,456	
Michael Sadowsky (Activity #2, 1 week/yr)	\$0	\$0	\$0	\$0	\$0	\$0	\$8,742	\$0	\$8,742	\$9,004	\$0	\$9,004	\$9,274	\$0	\$9,274	\$9,553	\$0	\$9,553	
Peter Sorensen- Fish behavior/aggregation (Activity #3, 2 mo/yr)	\$0	\$0	\$0	\$0	\$0	\$0	\$29,916	\$0	\$29,916	\$30,813	\$0	\$30,813	\$31,738	\$0	\$31,738	\$32,690	\$0	\$32,690	
Postdoc#1- fish behavior/Judas fish (Activity# 3)	\$0	\$0	\$0	\$0	\$0	\$0	\$46,680	\$0	\$46,680	\$48,080	\$0	\$48,080	\$49,523	\$0	\$49,523	\$51,008	\$0	\$51,008	
Graduate Student#2 (Behavior; Activity #3)	\$0	\$0	\$0	\$0	\$0	\$0	\$20,550	\$0	\$20,550	\$21,167	\$0	\$21,167	\$21,801	\$0	\$21,801	\$22,456	\$0	\$22,456	
Research Assistant Professor #2 - fish ecology/ IPM (Activity #4)	\$38,000	\$0	\$38,000	\$76,000	\$0	\$76,000	\$78,280	\$0	\$78,280	\$80,628	\$0	\$80,628	\$83,047	\$0	\$83,047	\$85,539	\$0	\$85,539	
Graduate Students #3,4 (Ecology; 1-6 yrs, 2 - 2 yrs; Activity #4)	\$19,570	\$0	\$19,570	\$20,157	\$0	\$20,157	\$41,524	\$0	\$41,524	\$42,769	\$0	\$42,769	\$22,026	\$0	\$22,026	\$22,687	\$0	\$22,687	
Paul Venturilli - Modeler (Activity #6Ven, 1 mo)	\$7,650	\$0	\$7,650	\$7,880	\$0	\$7,880	\$8,116	\$0	\$8,116	\$8,359	\$0	\$8,359	\$8,610	\$0	\$8,610	\$8,868	\$0	\$8,868	
Graduate Student#5 (Activity #6Ven)	\$19,750	\$0	\$19,750	\$20,343	\$0	\$20,343	\$20,953	\$0	\$20,953	\$21,581	\$0	\$21,581	\$22,229	\$0	\$22,229	\$22,896	\$0	\$22,896	
Ray Newman (1mo) (Activity #5, 1 mo)	\$10,872	\$0	\$10,872	\$11,198	\$0	\$11,198	\$11,534	\$0	\$11,534	\$11,880	\$0	\$11,880	\$12,237	\$0	\$12,237	\$12,604	\$0	\$12,604	
Postdoctoral fellow#2 (Activity #5 Newman)	\$45,000	\$0	\$45,000	\$46,350	\$0	\$46,350	\$47,741	\$0	\$47,741	\$49,173	\$0	\$49,173	\$50,648	\$0	\$50,648	\$52,167	\$0	\$52,167	
Undergraduates (Activity #5.4 fulltime summer, 2 haltime winter)	\$28,920	\$0	\$28,920	\$29,788	\$0	\$29,788	\$30,681	\$0	\$30,681	\$31,602	\$0	\$31,602	\$32,550	\$0	\$32,550	\$33,526	\$0	\$33,526	
2 Field and fish care technicians (ALL Field and lab activities)	\$105,000	\$0	\$105,000	\$108,150	\$0	\$108,150	\$127,000	\$0	\$127,000	\$130,810	\$0	\$130,810	\$134,734	\$0	\$134,734	\$138,776	\$0	\$138,776	
Research Assistant Professor#3 - Pathogens (Activity #7, Fulltime, 4yrs)	\$95,000	\$0	\$95,000	\$97,550	\$0	\$97,550	\$99,177	\$0	\$99,177	\$102,882	\$0	\$102,882	\$90,177	\$0	\$90,177	\$0	\$0	\$0	
Senior Lab technician (Activity #7)	\$32,000	\$0	\$32,000	\$32,960	\$0	\$32,960	\$33,949	\$0	\$33,949	\$34,967	\$0	\$34,967	\$0	\$0	\$0	\$0	\$0	\$0	
Graduate student#6 (Activity#7)	\$22,506	\$0	\$22,506	\$23,181	\$0	\$23,181	\$23,877	\$0	\$23,877	\$24,593	\$0	\$24,593	\$0	\$0	\$0	\$0	\$0	\$0	
David Andow (Activity#And, risk assessment, 2wks.yr)	\$12,000	\$0	\$12,000	\$12,360	\$0	\$12,360	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Postdoctoral fellow#3 (Activity #6And-)	\$45,000	\$0	\$45,000	\$45,000	\$0	\$45,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Scientific Director (Activity #1, 4.5 mo/yr, after year 2)	\$0	\$0	\$0	\$66,837	\$0	\$66,837	\$68,842	\$0	\$68,842	\$70,907	\$0	\$70,907	\$73,035	\$0	\$73,035	\$75,226	\$0	\$75,226	
Administrative Director (Activity #1, fulltime, after year2)	\$0	\$0	\$0	\$79,568	\$0	\$79,568	\$81,955	\$0	\$81,955	\$84,414	\$0	\$84,414	\$86,946	\$0	\$86,946	\$89,554	\$0	\$89,554	
New Research Assistant Proff#4 (Activity #8, Extension, fulltime)	\$83,000	\$0	\$83,000	\$85,490	\$0	\$85,490	\$88,055	\$0	\$88,055	\$90,696	\$0	\$90,696	\$93,417	\$0	\$93,417	\$96,220	\$0	\$96,220	
Graduate Student #7 (Activity #8)	\$19,750	\$0	\$19,750	\$20,343	\$0	\$20,343	\$20,953	\$0	\$20,953	\$21,581	\$0	\$21,581	\$22,229	\$0	\$22,229	\$22,896	\$0	\$22,896	
Fringe:																			
Research Assistant Professor#1 (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$28,645	\$0	\$28,645	\$29,504	\$0	\$29,504	\$30,389	\$0	\$30,389	\$31,301	\$0	\$31,301	
Graduate student #1 w/ tuition (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$16,704	\$0	\$16,704	\$16,808	\$0	\$16,808	\$16,914	\$0	\$16,914	\$17,024	\$0	\$17,024	
Michael Sadowsky (Activity #2)	\$0	\$0	\$0	\$0	\$0	\$0	\$2,946	\$0	\$2,946	\$3,034	\$0	\$3,034	\$3,125	\$0	\$3,125	\$3,219	\$0	\$3,219	
Peter Sorensen- Fish behavior/aggregation(Activity #3)	\$0	\$0	\$0	\$0	\$0	\$0	\$10,082	\$0	\$10,082	\$10,384	\$0	\$10,384	\$10,696	\$0	\$10,696	\$11,017	\$0	\$11,017	
Postdoc (Activity#3)	\$0	\$0	\$0	\$0	\$0	\$0	\$15,731	\$0	\$15,731	\$16,203	\$0	\$16,203	\$16,689	\$0	\$16,689	\$17,190	\$0	\$17,190	
Grad Student (Activity #3)	\$0	\$0	\$0	\$0	\$0	\$0	\$16,704	\$0	\$16,704	\$16,808	\$0	\$16,808	\$16,914	\$0	\$16,914	\$17,024	\$0	\$17,024	
Research Assistant Professor #2 (fish ecology IPM, Activity #4)	\$13,690	\$0	\$13,690	\$27,380	\$0	\$27,380	\$29,390	\$0	\$29,390	\$31,472	\$0	\$31,472	\$33,627	\$0	\$33,627	\$35,854	\$0	\$35,854	
Graduate Students w/ tuition (Activity #2)	\$16,540	\$0	\$16,540	\$16,638	\$0	\$16,638	\$33,479	\$0	\$33,479	\$33,688	\$0	\$33,688	\$16,952	\$0	\$16,952	\$17,062	\$0	\$17,062	
Paul Venturilli (Activity #6V)	\$2,578	\$0	\$2,578	\$2,655	\$0	\$2,655	\$2,735	\$0	\$2,735	\$2,817	\$0	\$2,817	\$2,902	\$0	\$2,902	\$2,989	\$0	\$2,989	
Graduate student, w/ tuition (Activity #6V)	\$16,570	\$0	\$16,570	\$16,669	\$0	\$16,669	\$16,772	\$0	\$16,772	\$16,877	\$0	\$16,877	\$16,986	\$0	\$16,986	\$17,097	\$0	\$17,097	
Ray Newman (Activity #5)	\$3,664	\$0	\$3,664	\$3,774	\$0	\$3,774	\$3,887	\$0	\$3,887	\$4,004	\$0	\$4,004	\$4,124	\$0	\$4,124	\$4,247	\$0	\$4,247	
Postdoctoral fellow#2 (Activity #5)	\$15,165	\$0	\$15,165	\$15,620	\$0	\$15,620	\$16,089	\$0	\$16,089	\$16,571	\$0	\$16,571	\$17,068	\$0	\$17,068	\$17,580	\$0	\$17,580	
Undergraduates (Activity #5)	\$4,049	\$0	\$4,049	\$4,170	\$0	\$4,170	\$4,295	\$0	\$4,295	\$4,424	\$0	\$4,424	\$4,557	\$0	\$4,557	\$4,694	\$0	\$4,694	
2 field and fish care technicians (ALL ACTIVITIES) frq @ 41.3%	\$43,365	\$0	\$43,365	\$44,666	\$0	\$44,666	\$52,451	\$0	\$52,451	\$54,025	\$0	\$54,025	\$55,645	\$0	\$55,645	\$57,315	\$0	\$57,315	
Research Assistant Professor (Activity #7)	\$28,645	\$0	\$28,645	\$29,504	\$0	\$29,504	\$30,389	\$0	\$30,389	\$31,301	\$0	\$31,301	\$0	\$0	\$0	\$0	\$0	\$0	
Senior Lab technician (#7) frq@41.3	\$13,216	\$0	\$13,216	\$13,612	\$0	\$13,612	\$14,021	\$0	\$14,021	\$14,441	\$0	\$14,441	\$0	\$0	\$0	\$0	\$0	\$0	
Graduate Student (#7)	\$17,032	\$0	\$17,032	\$17,145	\$0	\$17,145	\$17,262	\$0	\$17,262	\$17,382	\$0	\$17,382	\$0	\$0	\$0	\$0	\$0	\$0	
David Andow (#6And, risk assessment)	\$4,044	\$0	\$4,044	\$12,731	\$0	\$12,731	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Postdoctoral fellow#3 (Activity #6And)	\$15,165	\$0	\$15,165	\$15,165	\$0	\$15,165	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Scientific Director (#1)	\$0	\$0	\$0	\$22,524	\$0	\$22,524	\$23,200	\$0	\$23,200	\$23,896	\$0	\$23,896	\$24,613	\$0	\$24,613	\$25,351	\$0	\$25,351	
Administrative Director (Activity#1)	\$0	\$0	\$0	\$26,814	\$0	\$26,814	\$27,619	\$0	\$27,619	\$28,447	\$0	\$28,447	\$29,301	\$0	\$29,301	\$30,180	\$0	\$30,180	
New Research Assistant Professor (Activity #8, Extension)	\$27,971	\$0	\$27,971	\$28,810	\$0	\$28,810	\$29,674	\$0	\$29,674	\$30,565	\$0	\$30,565	\$31,482	\$0	\$31,482	\$32,426	\$0	\$32,426	
Graduate Student w/ tuition (Activity #8)	\$16,570	\$0	\$16,570	\$16,669	\$0	\$16,669	\$16,770	\$0	\$16,770	\$16,877	\$0	\$16,877	\$16,985	\$0	\$16,985	\$17,097	\$0	\$17,097	
Total salary and fringe	\$812,272	\$0	\$812,272	\$1,087,682	\$0	\$1,087,682	\$1,395,809	\$0	\$1,395,809	\$1,429,853	\$0	\$1,429,853	\$1,209,350	\$0	\$1,209,350	\$1,245,609	\$0	\$1,245,609	
SUPPLIES:																			
Metagenomics (Activity #2 startup)	\$0	\$0	\$0	\$0	\$0	\$0	\$25,000	\$0	\$25,000	\$25,000	\$0	\$25,000	\$25,000	\$0	\$25,000	\$25,000	\$0	\$25,000	
Fish Behavior/aggregation (Activity #3, radiotags, receiver, pheromones)	\$0	\$0	\$0	\$0	\$0	\$0	\$23,425	\$0	\$23,425	\$30,000	\$0	\$30,000	\$30,000	\$0	\$30,000	\$30,000	\$0	\$30,000	
Fish ecology/IPM (Activity #4; field supplies, news, gas)	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$20,000	\$0	\$20,000	\$20,000	\$0	\$20,000	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	
Modeling (Activity #6V+6V, computers, software, risk and simulation)	\$20,000	\$0	\$20,000	\$20,000	\$0	\$20,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	
Invasive plants (Activity #2C gas, nets, bags etc)	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	
Pathogens (Activity#7)	\$95,000	\$0	\$95,000	\$95,000	\$0	\$95,000	\$95,000	\$0	\$95,000	\$95,000	\$0	\$95,000	\$0	\$0	\$0	\$0	\$0	\$0	
Administration (computer and related supplies; Activity #1)	\$0	\$0	\$0	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	
Extension (Activity #8; field supplies)	\$50,000	\$0	\$50,000	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	\$10,000	\$0	\$10,000	
Total Supplies	\$190,000	\$0	\$190,000	\$155,000	\$0	\$155,000	\$193,425	\$0	\$193,425	\$200,000	\$0	\$200,000	\$100,000	\$0	\$100,000	\$100,000	\$0	\$100,000	
TRAVEL																			
Metagenomics (Activity #2 sampling, conferences)	\$0	\$0	\$0	\$0	\$0	\$0	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	
Fish Behavior, biochemistry (Activity #3, experiments for 2 conferences)	\$0	\$0	\$0	\$0	\$0	\$0	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	
Fish Ecology (#4; sampling MN, then MI- house rent, van, air, food)	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	\$15,000	\$0	\$15,000	
Modeling (Activity #6Ven+6A)	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	\$5,000	\$0	\$5,000	
Invasive plants (#2C)	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$7,500	\$0	\$7,500	\$7						