M.L. 2013 Project Abstract

For the Period Ending June 30, 2016

PROJECT TITLE: Zebra Mussel Control Research and Evaluation in Minnesota Waters
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FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: M.L. 2013, Chp. 52, Sec. 2, Subd. 06f
APPROPRIATION AMOUNT: $600,000

Overall Project Outcome and Results

Zebra mussels (*Dreissena polymorpha*) continue to rapidly expand their range within Minnesota's lakes and rivers disrupting aquatic food webs, threaten native species, and damage infrastructure. Zequanox®, which contains killed cells of *Pseudomonas fluorescens* as the active ingredient, is a potential tool for controlling dreissenid mussels (zebra and quagga mussels *D. rostriformis bugensis*. The project goals were to determine the safety and efficacy of Zequanox for controlling zebra mussels and to evaluate the use of molecular tools to inform control efforts. Project studies are summarized in supplemental attachments with the final report.

The Zequanox non-target animal impacts database was expanded by evaluating the exposure-related impacts on three life stages of fathead minnow (*Pimephales promelas*), and on the survival of adult scuds (*Gammarus lacustris*) and mayfly nymphs (*Hexagenia* sp.) after applications were conducted in outdoor 1,000-L mesocosm tanks. No significant treatment related impacts were observed in survival of invertebrates or fathead minnows or in hatchability and growth of fathead minnows.

Detailed maps were prepared for portions of Lake Le Homme Dieu and Maple Lake (Douglas County), which had different zebra mussel infestation levels. Maps of depth, substrate hardness, and submerged aquatic vegetation (SAV) depth and biovolume were generated using side-scanning sonar and parallel sonar data transects were collected and processed into component data categories. Processed sonar data and resulting maps are available on the vendor's cloud-based server network and could be combined with new or existing data to generate additional mapping products. Sonar data were used to generate a geospatial database of map characteristics in ArcGIS, and spatial analyses of the data were used to generate additional map products in ArcMap. Conversion to ArcGIS allowed for spatial analysis and sharing in GIS format. Zebra mussel populations were correlated with depth and substrate and submerged aquatic vegetation was found to be an important component of zebra mussel habitat in shallow areas in Lake Le Homme Dieu.

The use of environmental DNA to detect and identify application locations for Zequanox that might have the greatest impact on zebra mussel populations was also evaluated. The use of eDNA could assist management agencies to identify infestations, however, eDNA was found to not be effective for targeting control efforts.

Methods to apply Zequanox under the surface were first evaluated in controlled laboratory and pond-scaled mesocosm studies and further evaluated in 27-m^2 enclosures placed in Robinson's Bay (Lake Minnetonka, MN). Whole water column and subsurface applications were evaluated by comparing zebra mussel mortality and biomass reduction between treated and control groups. Approximately 73 and 56% of the zebra mussels in contained samples were killed in the highest whole water column and subsurface Zequanox applications, respectively, and the similarly the adhering zebra mussel biomass was reduced ~79 and 57%, respectively.

Overall, we found that Zequanox has the potential to be used as a management tool for zebra mussels in quiescent water environments, however, Zequanox is not likely to be effective for eradication of zebra mussels in an open water environment. Additionally, eDNA may have utility as a tool for the detection of zebra mussels in a waterbody but it is not an effective tool for determining the biomass of zebra mussels present or for prioritizing the location of zebra control efforts.

Project Results Use and Dissemination

Three oral presentations describing study methods and results were prepared and disseminated at professional scientific meetings including the Upper Midwest Invasive Species Conference and the Annual Conference of the International Association of Great Lake Research. One webinar entitled "The potential use of eDNA to guide site selection for zebra mussel control treatments" was presented during a USGS hosted Environmental DNA Webinar Series. One peer-reviewed manuscript entitled "Safety of the molluscicide Zequanox® to nontarget macroinvertebrates *Gammarus lacustris* (Amphipoda: Gammaridae) and *Hexagenia* spp. (Ephemeroptera: Ephemeridae)" was prepared and published online on June 23, 2016 in the Management of Biological Invasions and is included as a supplemental attachment to the project final report. Five peer-reviewed reports that summarize study methods and results were prepared and are supplemental attachments to the project final report.

A model was developed for selecting the proper concentration (w/v) of Zequanox to be used in stocks prepared for subsurface applications waters between 7 and 22°C. This prediction model is described in supplemental attachments with the final report .

Molecular markers for the detection of zebra mussels were found to be highly specific to zebra mussels. A water sampling protocol was also developed to improve the probability of detecting zebra mussels. The use of environmental DNA (eDNA) did correlate with zebra mussel biomass. Zebra mussel DNA did accumulate in depositional areas. This suggests that our zebra mussel eDNA assay could assist management agencies to identify infestations, but not inform control efforts. The molecular markers, sampling protocol and depositional areas are described in supplemental attachments with the final report.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2013 Work Plan Final Report

Date of Status Update Report: September 8, 2016

Date of Next Status Update Report: Final Report

Date of Work Plan Approval: June 25, 2013

Project Completion Date: June 30, 2016 **Is this an amendment request? No**

PROJECT TITLE: Detection and Monitoring of Asian Carp Populations and Movements

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Location: Mississippi, St. Croix, and Minnesota Rivers and their tributaries, other waterbodies if needed

Total ENRTF Project Budget:		
	ENRTF Appropriation:	**$540,000**
	Amount Spent:	**$539,797**
	Balance:	**$203**

Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 06b; and M.L. 2015, Chapter 76, Section 2, Subdivision 19

Appropriation Language:
$540,000 the first year is from the trust fund to the commissioner of natural resources to accelerate a search and monitoring program directly targeting Asian carp to be used in the development of potential control strategies. Carryforward; Extension: (a) The availability of the appropriations for the following projects are extended to June 30, 2016: (2) Laws 2013, chapter 52, section 2, subdivision 6, paragraph (b), Detecting and Monitoring Asian Carp Populations

I. PROJECT TITLE: Detection and Monitoring of Asian Carp Populations and Movements

II. PROJECT STATEMENT: Asian carp are a real and serious threat to Minnesota's aquatic ecosystems. Recently, adult bighead carp were caught by commercial fisherman in April of 2011 at the mouth of the St. Croix River and in November of 2012 in Lake Pepin. On March 2, 2012 an adult bighead and an adult silver carp were captured in Pool 6 of the Mississippi River near Winona. Catches of these and previous large adult fish could indicate the front of the invasion wave of Asian carp or the individual wanderings of rogue fish. An aggressive search and monitoring program will provide vital information on the status of these species and allow development of potential strategies for control.

When Asian carp are present in low numbers, collection of live specimens is very difficult, especially in large river systems such as the Mississippi, Minnesota, and St. Croix Rivers. As such, a technique that identifies the presence of the DNA from Asian carp in the environment (eDNA) has been developed and used in other areas. Results of eDNA sampling conducted in 2011 were positive for silver carp in several locations in the three rivers, suggesting their presence. However, additional sampling in 2012, with a more rigorous analysis technique, found no positive samples. The eDNA technique still holds promise in the future, and collection of water samples for analysis and to archive is still merited, albeit at a reduced level.

However, to quickly and effectively respond to the threat posed by Asian carp, we need more detailed information regarding the actual fish themselves. Several important questions need to be answered. Which species, silver, bighead, or their hybrids are present? Are only adult fish present, or are juveniles also present? What specific rivers, reaches, and habitats are the Asian carp using at various times of the year? What other fish species are found in conjunction with Asian carp? What effects occur to native fish populations? In order to implement effective proactive measures to conserve our rivers and lakes from this threat, all these questions need to be addressed.

The Minnesota DNR Division of Fish and Wildlife, Section of Fisheries continues to do surveys and sampling of our major rivers. However, enhancing this effort to detect Asian carp is impossible at current staffing levels. Furthermore, scientific research indicates that Asian carp can be difficult to detect with standard fisheries assessments, particularly when they are in the early stages of invasion. Specialized sampling with targeted gears and varied habitats is more likely to find these fish if they are present. This project will determine the distribution and abundance of any Asian carp in Minnesota waters above Pool 4 of the Mississippi River and in the Minnesota River, and use this information to inform rapid response efforts. It will also delineate the leading edge of Asian carp reproductive success. Locating the areas and habitats these fish are using, when they appear to be in very low numbers and have not yet established spawning populations, is vital to targeting removal or other control efforts.

III. PROJECT STATUS UPDATES:

Project Status as of 12/31/2013: No bighead or silver carp were captured during this reporting period. However, the carcass of a silver carp was found in August at Lock and Dam 5, and a grass carp was caught by a commercial fisherman in Pool 2. Personnel collected water samples for eDNA analysis from three sites on the Mississippi River and one on the St. Croix River. The contracted commercial fisherman was deployed four times, and seven other commercial fishing efforts were monitored. Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 67 days during this reporting period on the Mississippi, St. Croix, and Minnesota Rivers. Gears used included gill, trammel, fyke, and hoop nets, electrofishing, and larval trawls. Personnel are analyzing acoustic telemetry data from other species to refine and better target likely habitats that Asian carp may prefer. This project was highlighted at an Asian carp forum put on by the Freshwater Society and the University of Minnesota.

Project Status as of 6/15/2014: No black, grass, bighead or silver carp were captured during this reporting period. Severe winter conditions limited commercial efforts under the ice, and flooding in May and June further limited potential effort. The contracted commercial fisherman was deployed five times, and four other commercial fishing efforts were monitored. Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 49 days during this reporting period on the Mississippi, St. Croix, and Minnesota Rivers. Gears used included gill, trammel, fyke, and hoop nets, electrofishing, and larval trawls and light traps. Personnel are collecting and analyzing acoustic telemetry data from other species to refine and better target likely habitats that Asian carp may prefer. Data has been presented at conferences including the Upper Mississippi River Conservation Committee and the Minnesota Chapter of the American Fisheries Society. Personnel have also provided numerous media interviews.

Project Status as of 12/31/2014: Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 94 days during this reporting period. These efforts are targeted toward juvenile fish or eggs, and fortunately no Asian carp were collected or sighted. However, contracted commercial fishing did catch two silver carp and two bighead carp, and one of each species was a mature female with eggs. This is the highest number of invasive carp caught in a year in Minnesota waters, and the catches in Pool 2 of the Mississippi River are the most upstream records to date. Whether this represents more invasive carp, or simply that our techniques for finding them are improving, is unknown. However, it does clearly demonstrate the importance of this project.

This is an Amendment request. The request is to extend the project into Fiscal Year 2016. We anticipate there will be approximately $80,000 remaining in the Appropriation on June 30, 2015. There are several reasons for this. First, we did not receive requests this fall to assist with eDNA collections (Activity 1). Second, brutal winter conditions in 2014 made commercial fishing through the ice virtually impossible, and extended high water in May and June of 2014 greatly limited our ability to deploy the contracted commercial fisherman (Activity 2). We have also spent less money on equipment, primarily nets, because we purchased nets before the appropriation became available with other funds. Finally, due to the unclassified nature of the positions, we have had employee turnover due to people accepting permanent positions. Since it takes time to refill positions, we have realized a total of about 5 months of vacancy in the specialist positions (Activity 2, 3). We feel it would be a good use of the appropriation to complete sampling in the field in July-October 2015. This would give us three full field seasons of information, which would greatly improve our ability to effectively target sample in the future and most efficiently use other limited funding sources (Game and Fish Fund, Invasive Species Account, Federal grants) after the ENRTF appropriation is over. **Amendment Approved: 05/29/2015**

Project Status as of 6/30/2015: Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 78 days during this reporting period. These efforts can be targeted toward adult fish, juvenile fish, or eggs. MN DNR personnel caught one mature female bighead carp at the Allen S. King Plant Discharge channel in Bayport, MN on the St. Croix River on May 28, 2015. An additional mature female caught by a shore angler on May 31, 2015 was donated to the DNR for inspection. Samples have been sent to USGS and we are currently awaiting the results. No eggs or juvenile invasive carp have been identified to date, but samples are still being processed and identified.

Three grass carp have been caught in 2015, one in Pool2, one in Pool 4, and one in Pool 6. On January 15, 2015 one 21 pound mature female grass carp was caught in a seine in Pool 6. On April 28, 2015 an 18 pound mature male grass carp was caught in Lower Grey Cloud Slough on Pool 2. An additional mature female grass carp weighing 25 pounds was caught by a non-contract commercial fisher in Pool 4 near Wabasha, MN.

Project Status as of 12/30/2015: This is an amendment request. We will not need the $9,000 remaining in Activity 1, for eDNA collection. We would like to spend that money on Activity 2, Targeted Commercial Fishing.

Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 28 days during this reporting period. Larval sampling was conducted on 11 days in Pools 2 and 3 of the Mississippi River and on the St. Croix River. Over 6 days of gill netting, 1200 feet were set, 3 days of non-standard electrofishing totaling 283 minutes of on-time, 1 day of standard electrofishing over 3 standard sites for 65 minutes of on-time, 3 days of trap netting for a total of 27 fishing nights, and 3 days of small seining setting 140 feet. Eighteen days were expended deploying, retrieving and downloading acoustic telemetry information.

One grass carp was caught in a non-contracted commercial seine in the Minnesota River at New Ulm on December 10, 2015. The grass carp weighed 20 pounds and measured 37 inches total length. Ploidy analyses showed this fish to be diploid, but the sex and maturity could not be easily determined. Ageing structures, a genetics sample, and the gonads were sent to USGS for further analysis.

Amendment Request (5/5/2016)
This is an amendment request. We will not need the $9,000 remaining in Activity 1, for eDNA collection. The balances by budget items are $7,500 in Personnel, $600 in Equipment/Supplies, and $900 in Travel. We would like to spend that money on Activity 2, Targeted Commercial Fishing, and Activity 3, Accelerated Sampling with Traditional Methods. We propose to move $5,000 of the Personnel money to Activity 2, Professional Contracts to hire our commercial fisherman for additional seining or gill netting in June. We propose to move the remaining $2,500 of Personnel money to Personnel in Activity 2, Targeted Commercial Fishing ($1,500) and Personnel in Activity 3, Accelerated Sampling with Traditional Methods ($1,000) to pay student interns. The $600 in Equipment/Supplies and $900 in Travel would move to the same categories in Activity 3, Accelerated Sampling with Traditional Methods. June is an important sampling period because warming water temperatures initiate spawning movements in bigheaded carps. **Amendment Approved by LCCMR 5-17-2016.**

Project Status as of 6/30/2016: One mature male bighead carp was caught in a non-contracted commercial seine in the Minnesota River at New Ulm on February 18, 2016. The bighead carp weighed 25.8 pounds and measured 38.3 inches. This fish was processed by MN DNR staff and sent to USGS for analysis.

One bighead carp was caught in Pool 8 of the Mississippi River by a shore angler in Wisconsin waters near Onalaska, Wisconsin. The bighead carp weighed 33 pounds. The fish was not able to be inspected by DNR staff but was collected by U.S. Fish and Wildlife staff and sent to Dr. James Lamer of Western Illinois University for microchemistry analysis.

One bighead carp was caught in Pool 5A of the Mississippi River by a bow fisherman in a tournament in Wisconsin waters near Fountain City, Wisconsin on June 11, 2016. The bighead carp was submitted for a Wisconsin state record and was weighed at 27.5 pounds and measured 40 inches. The fish was taken to a taxidermist to be mounted and was not able to be inspected by DNR staff.

Overall Project Outcomes and Results
Invasive Carp, especially Bighead Carp and Silver Carp, pose an imminent and serious threat to Minnesota's aquatic ecosystems. From the 2013 appropriation, the MN DNR was able to appoint three non-classified positions to monitor and remove Invasive Carp from Minnesota waters, assist with environmental DNA collection, and collect groundbreaking native species biological data to determine the effects to native species if Invasive Carp become established. As a result, the MN DNR has established and developed the state's Invasive Carp management, monitoring, and detection program including all life stages. The program collected data from 255,750 feet of contracted commercial gill net, 18 commercial seines, 55,800 feet of gill net, 168 hours electrofishing, 422 larval samples, 622 hoop net and 223 fyke net sampling nights.

We would prefer to catch no Invasive Carp, however it is irresponsible not to be prepared. From the funding, the program caught 7 Invasive Carp via contract commercial fishing, 1 Bighead Carp from targeted sampling, and process an additional 5 Invasive Carp caught by other commercial fishermen and anglers. Sampling has also

allowed researchers to determine areas to target from an increased understanding of their biology, associations with native species, and catch records. Specifically, Lower Grey Cloud Slough and the King plant on the St. Croix River were identified as target areas after more than one fish was captured. The program has implemented processing protocols and gained the ability to work-up fish in-house including ageing, determining sex and maturity, and collect all structures necessary for microchemistry analysis. The results can be accessed from the MN DNR 2012 – 2015 Invasive Carp Sampling Reports.

The project furthers the LCCMR Six-Year Strategic Plan in multiple ways including: protecting important water resources, management of invasive species, supporting research of natural resources, and promoting public education and dissemination of information about natural resources.

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Enhanced eDNA sampling and verification
Description: The eDNA sampling conducted in 2011 suggested the presence of silver carp. However, additional sampling in 2012, with a more rigorous analysis technique, found no positive samples. The eDNA technique still holds promise in the future, and collection of water samples for analysis and to archive is still merited, albeit at a reduced level. The analysis of the samples will be paid for through the Aquatic Invasive Species Research Center. However, the enhanced knowledge of large river habitats and sampling expertise that will be possessed by the positions in this proposal is vital for locating precise and accurate sampling sites. We expect to collect approximately 300 samples for eDNA sampling each year of the project. Sample sites will include the Mississippi, St. Croix, and Minnesota Rivers, and tributaries if necessary. Sampling sites may also include lakes and rivers in Southwestern Minnesota, if Asian carp advance from the Iowa great lakes area.

Summary Budget Information for Activity 1:

ENRTF Budget: $ 6,000
Amount Spent: $ 6,000
Balance: $ 0

Activity Completion Date:

Outcome	Completion Date	Budget
1. *Annually collect approximately 300 water samples for eDNA analysis –note estimated amount per outcome, amounts may vary per task, but total Activity budget will stay at $18,000.*	June 30, 2016	$ 12,000
2. *Coordinate sampling with State and Federal agencies*	June 30, 2016	$ 3,000

Activity Status as of 12/31/2013: Personnel collected water samples for eDNA analysis on four occasions: one above Lock and Dam 1, one below Lock and Dam 1, one in Pool 6 near Winona, and one in the St. Croix River below Taylors Falls. A total of 200 samples were collected, transported, and filtered. Collection was completed in coordination with the University of Minnesota Aquatic Invasive Species Research Center and the National Park Service. All results were negative for bighead and sliver carp DNA.

Activity Status as of 6/15/2014: No activity in this reporting period. Spring conditions with high flows are not conducive to finding eDNA, and fish-eating birds migrating north create the possibility of false positives from fecal matter the result of eating fish further south.

Activity Status as of 12/31/2014: We received no requests for assistance in this reporting period.

Activity Status as of 6/30/2015: We received no requests for assistance in this reporting period.

Activity Status as of 12/30/2015: We received no requests for assistance in this reporting period.

Activity Status as of 6/30/2016: We received no requests for assistance in this reporting period.

Final Report Summary: eDNA was considered to a very promising form of early detection when this project was first proposed. However, due to a high degree of uncertainty in the science and how results are interpreted, eDNA has since become a lower priority in Minnesota waters. While MN DNR attempted to work with the University of Minnesota's Aquatic Invasive Species Research Center, eDNA has since been conducted almost exclusively by the U.S. Fish and Wildlife Service. The Fish and Wildlife Service has been developing more specific genetic markers for Bighead and Silver Carp and is still working to use this technology in management applications.

ACTIVITY 2: Targeted commercial fishing

Description: All Asian carp caught to date in Minnesota waters have been collected in commercial fishing gear, especially seining. Commercial fishermen possess the necessary gear and have the local knowledge to deploy it in an effective manner. Contracting with commercial fishermen is a cost effective method of collecting adult Asian carp if they are present. An existing commercial fishing operation will be selected through a competitive bid process to provide approximately 50 days of gill net fishing and 12 days of seine fishing over the 2 year period. Seining is only feasible in certain locations within the rivers that are free of obstruction, while gill nets can be deployed in other locations. Commercial fishing is rare in the Minnesota River, thus it may prove difficult to spend much contracted effort there. Additionally, the personnel in this project will accompany and monitor the catch of other, non-contracted, commercial fishing operations to detect fishing patterns and catch that will greatly inform future Asian carp directed sampling efforts.

Summary Budget Information for Activity 2:

ENRTF Budget: $ 181,500
Amount Spent: $ 181,500
Balance: $ 0

Activity Completion Date:

Outcome	Completion Date	Budget
1. *Deploy and direct commercial fishermen in likely Asian carp habitats, approximately 50 gill net and 12 seining days–note estimated amount per outcome, amounts may vary per task, but total Activity budget will stay at $168,000.*	June 30, 2016	$ 142,000
2. *Observe and monitor other commercial fishing operations, analyze and collate data on catch and sites sampled to inform future fishing efforts*	June 30, 2016	$ 33,000

Activity Status as of 12/31/2013: The contracted commercial fisherman was deployed four times during this reporting period. One seine haul day was conducted near the confluence of the St. Croix and Mississippi River. Three days were spent gill netting. One day was in Pigs Eye Lake in Pool 2, one day was in Spring Lake in Pool 2, and one day was near Stillwater on the St. Croix River. Personnel attended and examined the catch. No Asian carp were captured. Personnel also examined commercial fishing catch by non-contracted fishermen on an additional seven days. One grass carp was captured by a fisherman when personnel were present. Samples from this fish were sent to the US Geological Survey and the Fish and Wildlife Service. The fish was a diploid female and was aged at twenty years old.

Activity Status as of 6/15/2014: Severe winter conditions limited commercial efforts under the ice, and flooding in May and June further limited potential effort. The contracted commercial fisherman was deployed five times. One seine haul was conducted in Pool 2, along with two days of gill netting. One day of gill netting was conducted in North Lake of Pool 3 and Polander Lake of Pool 5A. Five other commercial fishing efforts were monitored, one each in the lower St. Croix River, Pool 2, Pool 4, Pool 5A, and the Minnesota River.

Activity Status as of 12/31/2014: The contracted commercial fisherman was deployed 15 times in this reporting period with our personnel to monitor and examine the catch. Seining was conducted twice near the mouth of the St. Croix River at Point Douglas and once each in Pigs Eye and Baldwin lakes of Pool 2. Gill netting occurred on 11 days, one day each on Pools 1, 5, 6, and 7, two days in Pool 4, and five days in Pool 2. These efforts caught 4 invasive carp. On July 17, one adult silver carp and one adult bighead carp were caught in gill nets at the mouth of Grey Cloud Slough in Pool 2. Both were 6 year old mature females with large numbers of eggs. They exhibited no sign of previous spawning or mating. The silver carp was approximately 18 pounds while the bighead carp was 34 pounds. On October 1, gill netting at this same location captured a 19 pound mature female silver carp. We are awaiting further biological information from the US Geological Survey. These catches are notable in that they represent the furthest upstream recorded presence of invasive carp in the Mississippi River. Finally, on September 16 a 21 pound male bighead carp was caught in a seine haul at Point Douglas in the

St. Croix River. The fish was likely 4 years old. An additional bighead carp weighing 39 pounds was caught by a non-contract commercial fisher in Pool 4 near Frontenac. We are also awaiting further biological data from this fish.

Furthermore, personnel monitored 3 seine hauls in the Minnesota River conducted by a non-contract commercial fisherman. Commercial fishing in the Minnesota River is very difficult and limited to a very small area of the river due to logistics such as log snags. Since the commercial fisherman here will fish the area anyway, we have not pursued a contract with him.

Activity Status as of 6/30/2015: The contracted commercial fisherman was deployed 9 times in this reporting period with our personnel to monitor and examine the catch. Seining was conducted five times, four in four backwaters of Pool 2 of the Mississippi River (Pigs Eye, River Lake, Baldwin Lake, and Spring Lake) and once in Pool 6. Gill netting occurred on 4 days, including 3 days on Lower Grey Cloud Slough and one day in the St. Croix River. These efforts caught 1 invasive carp. On January 15, 2015 one 21 pound mature female grass carp was caught in a seine in Pool 6. On April 28, 2015 an 18 pound mature male grass carp was caught in Lower Grey Cloud Slough on Pool 2. In addition personnel monitored 3 commercial seines in Pool 7, Pool 4, and on the St. Croix River. An additional mature female grass carp weighing 25 pounds was caught by a non-contract commercial fisher in Pool 4 near Wabasha, MN. All grass carp were found to be diploid. We are awaiting further biological data from these fish.

Furthermore, personnel monitored seine hauls in the Minnesota River conducted by a non-contract commercial fisherman. Commercial fishing in the Minnesota River is very difficult and limited to a very small area of the river due to logistics such as log snags. Since the commercial fisherman here will fish the area anyway, we have not pursued a contract with him.

Activity Status as of 12/30/2015: The contracted commercial fisherman was deployed ten times in this reporting period with our personnel to monitor and examine the catch. Seining was conducted four times, one in a backwater of Pool 2 of the Mississippi River (Pigs Eye), twice in the St. Croix River, and once in Blackdog Lake off the Minnesota River. Gill netting occurred on six days, including 3 days on Lower Grey Cloud Slough and one day in Spring Lake on Pool 2 of the Mississippi River and two days in Blackdog Lake off the Minnesota River. No invasive carp were caught in these efforts.

Activity Status as of 6/30/2016: The contracted commercial fisherman was deployed 3 times in this reporting period with our personnel to monitor and examine the catch. Seining was conducted once in the St. Croix River and gill netting was conducted twice in Pool 2 of the Mississippi River. In addition 5 seines were monitored by non-contracted commercial fishermen, 2 in the St. Croix River, 2 in Pool 2, and one in Pool 4. No Invasive Carp were caught in these efforts.

Final Report Summary: The work the MN DNR has been able to do with contracted commercial fishermen has been instrumental in the success of the DNR's Invasive Carp Monitoring Program. From the ENRTF funding, the program was able to catch 7 Invasive Carp via contract commercial fishing and collected data from 255,750 feet of contracted commercial gill net and 18 commercial seines. Working with commercial fishermen has also allowed managers to determine areas to target from an increased understanding of their biology, associations with native species, and catch records. This work has been very significant to the state of Minnesota to learn more about these species, remove additional Invasive Carp that may have otherwise reproduced or reached un-infested areas, and gain additional insights into how this mode of monitoring can be used in the future in Minnesota.

ACTIVITY 3: Accelerated sampling with traditional fisheries techniques.

Description: Experiences in Minnesota waters and other states indicate that commercial fishing gears are an effective means of capturing adult Asian carp. However, it is absolutely critical that we determine if, and if so, where, Asian carp are spawning in Minnesota waters. Research continues in other states as to what gears and habitats are most likely to confirm the presence of viable eggs or juveniles. These gears include electrofishing, trap nets, gill nets, trammel nets, trawls, drift nets, hoop nets, and acoustic telemetry, all traditional fisheries sampling techniques. These methods can also capture Asian carp in habitats not accessible to commercial gears, which also requires non-prop motors. This effort would be above and beyond our normal fisheries management efforts. To effectively monitor Asian carp potential in the Minnesota River, a separate set of sampling gears is necessary and prudent. The Minnesota River is not infested with zebra mussels, and personnel time is more effective actively searching and sampling rather than drying and decontaminating nets. Our normal efforts are effective in monitoring population trends of our native sportfish and panfish species. However, detection of Asian carp requires specialized, targeted sampling gears deployed in different manners at intense levels in all habitat types. Reports will be prepared summarizing sampling sites, effort expended with various gears, relative catch and effort in various habitats, and native fish presence in gears and habitats relative to the presence or absence of Asian carp.

Summary Budget Information for Activity 3:

ENRTF Budget: $ 352,500
Amount Spent: $ 352,297
Balance: $ 203

Activity Completion Date:

Outcome	Completion Date	Budget
1. *Deploy gears in appropriate habitats to target juvenile Asian carp for approximately 180 field days each year–note estimated amount per outcome, amounts may vary per task, but total Activity budget will stay at $349,000.*	June 30, 2015	$ 178,000
2. *Incorporate new methods and techniques as appropriate, approximately 45 field days each year*	June 30, 2015	$ 96,000
3. *Collate and analyze field data to determine most productive sampling methods and determine patterns in Asian carp distribution; prepare maps and reports and disseminate data for all three rivers*	June 30, 2015	$ 76,000

Activity Status as of 12/31/2013: Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 67 days during this reporting period. Fortunately, no Asian carp were collected or sighted. Boat electrofishing was conducted on eight days in the Mississippi River, five days on the St. Croix River, and 21 days on the Minnesota River. Total electrofishing effort was 2,133 minutes of on time. Hoop nets were set on four days in Mississippi River, one day on the St. Croix River, and 15 days on the Minnesota River for a total of 281 net nights. Trawling for eggs and larval fish was conducted on six days in the Mississippi River, two days on the St. Croix River, and eight days on the Minnesota River. Gill and trammel nets were set on two days in the Mississippi River and two days on the St. Croix River. Total effort was 2,850 feet of net. Fyke nets were set on eight days in the Mississippi River and one day on the St. Croix River for a total of 73 net nights.

Although no Asian carp were caught, thousands of native fish of numerous species were sampled. Personnel took structures for aging from important commercial and forage species including bigmouth and smallmouth buffalo, freshwater drum, and gizzard shad. Very little is currently known about the age structure and growth rates of these species in the upper Mississippi basin. In areas with severe Asian carp infestations, such as the Illinois and Missouri Rivers, the growth of these important native species has been greatly reduced. Knowledge of growth rates in Minnesota now, prior to infestation, will provide vital data to assess ecological and economic impacts of an invasion in Minnesota waters.

Personnel also spent 14 days retrieving acoustic telemetry receivers from the Mississippi and St. Croix Rivers. The telemetry gear was purchased with a combination of DNR Fisheries and Lessard-Sams Outdoor Heritage funds. However, the data it provides is vital to informing Asian carp personnel on habitat use by fish in the river. This information will allow most efficient deployment of accelerated sampling and directing contracted commercial fishing effort. Also, there are bighead and silver carp with acoustic transmitters that have been tagged in the Mississippi River below Pool 16, as well as in the Illinois and Missouri Rivers. In the unlikely event that one of these fish would swim upstream into Minnesota waters, this would provide extremely valuable information.

Activity Status as of 6/15/2014: Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 49 days during this reporting period. Fortunately, no Asian carp were collected or sighted. Boat electrofishing was conducted on ten days in the Mississippi River, one day on the St. Croix River, and nine days on the Minnesota River. Total electrofishing effort was 3501 minutes of on time. Hoop nets were set on one day in Mississippi River and five days on the Minnesota River for a total of 49 net nights. Trawling and light traps for eggs and larval fish was conducted on five days in the Mississippi River, one day on the St. Croix River, and six days on the Minnesota River. Gill nets were set on one day on the Minnesota River, but effort was only 200 feet of net. Fyke nets were set on one day in the Mississippi River and one day on the St. Croix River for a total of 73 net nights. Water conditions, including flooding and turbidity, have hampered sampling effort. Small mesh seining in backwaters has been tested in the Minnesota River. This technique has been recommended due to new information regarding habitat use of very young bighead and silver carp. While very promising, this method has been nearly impossible due to high water levels.

Although no Asian carp were caught, thousands of native fish of numerous species were sampled. Analysis of aging structures from important commercial and forage species including bigmouth and smallmouth buffalo, freshwater drum, and gizzard shad continues. Very little is currently known about the age structure and growth rates of these species in the upper Mississippi basin. In areas with severe Asian carp infestations, such as the Illinois and Missouri Rivers, the growth of these important native species has been greatly reduced. New information obtained on pre-invasion conditions in the Missouri River is proving valuable. Certain species, including several shiner species and others such as orangespotted sunfish, were formerly abundant in certain backwaters that are now overrun with young bighead and silver carp. Identifying backwaters in Minnesota where those species currently reside will greatly inform our search efforts for the carp species. Further new information suggests that native predators including bowfin, northern pike, and flathead catfish would be most likely to be effective predators. Current habitat use of those species will be documented to further inform our search efforts and determine habitat improvement possibilities to favor those native predators.

Personnel also spent 12 days retrieving acoustic telemetry receivers from the Mississippi and St. Croix Rivers. The telemetry gear was purchased with a combination of DNR Fisheries and Lessard-Sams Outdoor Heritage funds. However, the data it provides is vital to informing Asian carp personnel on habitat use by fish in the river. For example, River Lake in Pool 2 had numerous instances of buffalo use, and the extreme lower Minnesota River was important winter habitat for common carp. Our Minnesota receiver array is being augmented with Federal government receivers in Pools 4-9. Also, there are bighead and silver carp with acoustic transmitters that have been tagged in the Mississippi River below Pool 16, as well as in the Illinois and Missouri Rivers. In the unlikely event that one of these fish would swim upstream into Minnesota waters, this would provide extremely valuable information.

Activity Status as of 12/31/2014: Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 94 days during this reporting period. Fortunately, no Asian carp were collected or sighted. Boat electrofishing was conducted on 12 days in the Mississippi River, 12 days on the St. Croix River, and 24 days on the Minnesota River. Total electrofishing effort was 3,093 minutes of on time. Hoop nets were set on three days in the Mississippi River and 16 days on the Minnesota River for a total of 124 net nights. Trawling and light traps for eggs and larval fish was conducted on six days in the Mississippi River, nine days on

the St. Croix River, and 12 days on the Minnesota River. Gill nets were set on one day on the Minnesota River, six days on the St. Croix River, and four days on the Mississippi River with total net length of 3.3 miles. Fyke nets were set on four days in the Mississippi River and two days on the Minnesota River for a total of 46 net nights. Small mesh seining and cast netting have also been tested in backwaters in the Minnesota River. This technique has been recommended due to new information regarding habitat use of very young bighead and silver carp. Seventeen days were expended deploying, retrieving and downloading acoustic telemetry information.

The value of this accelerated sampling can be directly demonstrated. Sampling indicated high use of bigmouth buffalo and the presence of a paddlefish in lower Grey Cloud Slough. Since these two native species have feeding habits similar to bighead and silver carp, we decided to deploy the commercial fisherman there. The direct result of that was the capture of the two invasive carp on July 17 and the silver carp on October 1 (see Activity 2 Status).

Personnel also spent seven days surveying streams and Illinois Lake in the Windom area. This was in response to a reported sighting, and was needed due to the potential for a "backdoor" invasion from the Missouri River basin, where invasive carp are well established and reproducing. No evidence was found.

Personnel continue to refine techniques for determining age and growth of important commercial and forage species including bigmouth and smallmouth buffalo, freshwater drum, and gizzard shad. Buffalo are the most valuable commercial fish species in Minnesota, and gizzard shad are the most important food item for sport fishes in the Mississippi River.

Activity Status as of 6/30/2015: Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 78 days during this reporting period. One 24 pound mature female bighead carp was caught by MN DNR personnel on the St. Croix River at the Allen S. King Plant Discharge near Bayport, MN. Boat electrofishing was conducted on 4 days in the Mississippi River, 2 days on the St. Croix River, and 6 days on the Minnesota River. Total electrofishing effort was 1,152 minutes of on time. Hoop nets were set on two days in the St. Croix River and 5 days on the Minnesota River for a total of 148 net nights. Trawling and light traps for eggs and larval fish was conducted on 18 days in the Mississippi River, nine days on the St. Croix River, and eight days on the Minnesota River. An additional 10 days were conducted on Pool 4 of the Mississippi River by the Lake City staff. Gill nets were set on one day on the Minnesota River, six days on the St. Croix River, and four days on the Mississippi River with total net length of 3,300 feet. Small-mesh seining has also been tested in backwaters on the St. Croix and Minnesota Rivers. This technique has been recommended due to new information regarding habitat use of very young bighead and silver carp. Five days were expended deploying, retrieving and downloading acoustic telemetry information.

The value of this accelerated sampling can be directly demonstrated. Sampling indicated high use of invasive carp in lower Grey Cloud Slough. As a result, we have increased contracted commercial fishing there. The direct result of that was the capture of an invasive carp on April 28 (see Activity 2 Status).

Personnel have refined techniques for determining age and growth of important commercial and forage species including bigmouth and smallmouth buffalo, freshwater drum, and gizzard shad. Buffalo are the most valuable commercial fish species in Minnesota, and gizzard shad are the most important food item for sport fishes in the Mississippi River. Personnel have completed analyses of smallmouth and bigmouth buffalo ageing and are compiling the data for publication and will being compiling all age and growth data to better understand the population dynamics of these four "rough fish" species to better understand the impacts of commercial fishing.

MN DNR personnel caught one mature female bighead carp at the Allen S. King Plant Discharge channel in Bayport, MN on the St. Croix River on May 28, 2015. An additional mature female bighead carp was caught on May 31, 2015 by a shore angler that was subsequently given to the MN DNR for analysis. The 31 pound fish was sampled and sent to USGS for further analysis. Social media reports indicated there were other bighead carp

caught there around the same time, but we were unable to obtain those fish. A concerted effort for outreach has been initiated in the area and the Division of Enforcement has offered increased patrols.

Activity Status as of 12/30/2015: Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 28 days during this reporting period. Larval sampling was conducted on 11 days in Pools 2 and 3 of the Mississippi River and on the St. Croix River. Over 6 days of gill netting, 1200 feet were set, 3 days of non-standard electrofishing totaling 283 minutes of on-time, 1 day of standard electrofishing over 3 standard sites for 65 minutes of on-time, 3 days of trap netting for a total of 27 fishing nights, and 3 days of small seining setting 140 feet. Eighteen days were expended deploying, retrieving and downloading acoustic telemetry information.

After a total of six confirmed bighead carp were caught on the St. Croix River at the King Plant in the previous reporting period, extensive sampling was conducted in the area during this reporting period as well as both upstream and downstream of the location to monitor and ensure no other individuals could be found. One grass carp was caught during this sampling period in Minnesota River from a non-contracted commercial seine haul.

Activity Status as of 6/30/2016: Accelerated sampling efforts with traditional fisheries techniques were conducted on a total of 18 days. Larval sampling was conducted on 3 days in Pools 2, 3, and 4 of the Mississippi River. Over 6 days of gill netting, 4,900 feet were set, 8 days of non-standard electrofishing totaling 555 minutes of on-time, and 1 day of trap netting for a total of 8 fishing nights. Six days were expended deploying, retrieving and downloading acoustic telemetry information.

Final Report Summary: From the ENRTF funding, the Minnesota Department of Natural Resources has been able to form and develop one of the most extensive Invasive Carp monitoring programs in the country. Funding has allowed managers to expand monitoring to all life stages from adults to larvae and eggs and provided an in-depth understanding of the habits and biology of fish in this area of low abundance. Many other states did not have a monitoring program in place before Invasive Carp establishment and Minnesota has been very fortunate to have the funding of ENRTF to develop and implement the Invasive Carp program in place today. The sampling from this project has allowed Minnesota managers to better understand the state's native species including ageing Smallmouth and Bigmouth Buffalo, Freshwater Drum, and Gizzard Shad. These are extremely important commercial and game fish forage species, and Minnesota is now in the forefront of understanding their biology. Finally, this project has been vital to determining the gears and locations best suited to capture and remove Invasive Carp from Minnesota waters.

V. DISSEMINATION:

Description: Information regarding sites sampled, Asian carp caught, and native species associated with sampling sites will be compiled. This information will also be shared with other state and federal agencies including the University of Minnesota, US Fish and Wildlife Service, National Park Service, US Geological Survey, US Army Corps of Engineers, Upper Mississippi River Conservation Committee, and others. Results will be presented at appropriate conferences, and, if appropriate, compiled and written for publication in peer reviewed journals.

Activity Status as of 12/31/2013: Personnel have compiled sampling data and information and provided it to the US Fish and Wildlife Service as they initiate sampling for Asian carp in waters to the south of Minnesota. Media outlets, including the Star Tribune, Pioneer Press, and Outdoor News, have written stories about the project. The project manager participated in an Asian carp informational forum presented by the Freshwater Society and the University of Minnesota. He detailed the efforts of this project and thanked the LCCMR for their support and funding.

Activity Status as of 6/15/2014: Personnel have compiled sampling data and information and provided it to the US Fish and Wildlife Service as they initiate sampling for Asian carp in waters to the south of Minnesota. Media outlets, including the Star Tribune, Pioneer Press, and Outdoor News, have written stories about the project. Personnel gave scientific presentations at meetings including the Upper Mississippi River Conservation Committee and the Minnesota Chapter of the American Fisheries Society, and coordinated on river activities with the US Fish and Wildlife Service, US Geological Survey, and Wisconsin DNR.

Activity Status as of 12/31/2014: Personnel have compiled sampling data and information and coordinated on river activities with the US Fish and Wildlife Service, US Geological Survey, and Wisconsin DNR. Media outlets continue to contact us about the project. Personnel continue to analyze data and prepare professional presentations and publications, and providing information to the general public.

Activity Status as of 6/30/2015: Personnel have compiled sampling data and information and provided it to the US Fish and Wildlife Service and US Geological Survey as they initiate sampling for Asian carp in waters to the south of Minnesota, as well as Wisconsin DNR. Media outlets, including the Star Tribune, Pioneer Press, and Outdoor News, have written stories about the project. Personnel gave scientific presentations at meetings including the Midwest Fish and Wildlife Conference and the Minnesota Chapter of the American Fisheries Society, and coordinated on river activities with the US Fish and Wildlife Service, US Geological Survey, and Wisconsin DNR.

Activity Status as of 12/30/2015: Personnel have compiled sampling data and information and provided it to the US Fish and Wildlife Service and US Geological Survey, as well as Wisconsin DNR. Media outlets, including the Star Tribune, Pioneer Press, and Outdoor News, have written stories about the project. Personnel participated in meetings within the Minnesota DNR and with the Wisconsin DNR and federal agencies to disseminate this year's findings and discuss past and future efforts.

Final Report Summary 6/30/2016: Personnel have compiled sampling data and information and provided it to the US Fish and Wildlife Service and US Geological Survey, as well as Wisconsin DNR. Media outlets, including the Star Tribune, Pioneer Press, and Outdoor News have written stories about the project. Personnel participated in meetings within the Minnesota DNR and with the Wisconsin DNR and federal agencies to disseminate this year's findings and discuss past and future efforts.

Over the course of this project, annual MN DNR reports and work plans have been created and disseminated to a wide variety of audiences, as well as discussing this project with the media, discussing the monitoring project and research findings in scientific presentations, and sharing data with other state and federal management agencies.

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget:

Budget Category	$ Amount	Explanation
Personnel:	$ 319,000	Three (3) NR Specialist-Fisheries (new, unclassified, 24 months, 77% salary 23% fringe); student interns (2-4 positions for 3 months annually, 85% salary 15% fringe) to conduct at least 200 field sampling days annually, oversee commercial fishing operations, and compile, analyze, and report findings.
Professional/Technical/Service Contracts:	$ 105,000	One or two commercial fishing operations to utilize seines and large mesh gill nets and trammel nets to follow up on eDNA results or sample likely backwater/oxbow or other likely habitats, approximately 40 days of gill net and 10 days of seine fishing over 2 years.
Direct and Necessary Services:*	$ 39,398	Amount for direct support services, which are DNR's direct and necessary business services required to support this proposal.
Equipment/Tools/Supplies:	$ 50,602	Specialized nets including large mesh gill nets (20@$300 = $6,000), hoop nets (12@$450 = $5,400), trammel nets (12@$400 = $4,800), mini-fyke nets (12@$600 = $7,200), and larval drift nets (2@$950 = 1,900) necessary to capture Asian carp at various life stages and in various habitats; associated supplies to deploy nets such as rope, anchors, floats ($2,500); non-prop motors (2@$6,000 = $12,000); preservative and disinfecting chemicals ($1,000); eDNA water sample bottles ($2,200); miscellaneous supplies such as personal protective equipment, repairs, replacements, etc. ($4,600). Separate sets of equipment are necessary for the Minnesota River as it is not currently infested with zebra mussels.
Travel Expenses in MN:	$ 26,000	Fleet charges for approximately 18,000 miles per year and in-state travel expenses for crew lodging and meals for distant and overnight status, approximately 25 nights per year; base of operation will be Warner Road, St. Paul, fisheries office, for the Mississippi and St. Croix Rivers and Hutchinson for the Minnesota River and southwest Minnesota.
TOTAL ENRTF BUDGET:	**$ 540,000**	

Explanation of Use of Classified Staff: No classified staff paid with this appropriation

Explanation of Capital Expenditures Greater Than $3,500: Two (2) non-prop propulsion outboard motors, approximately 25 hp, $6,000 each for a total of $12,000. These motors propel the boat with a jet of water rather than a propeller, allowing access to very shallow backwater habitats and preventing damage and

improving safety in areas of all rivers that have obstructions and potential low water clarity, such as the Minnesota River.

Number of Full-time Equivalent (FTE) funded with this ENRTF appropriation: 3 for 2 years, 6 FTE

Number of Full-time Equivalent (FTE) estimated to be funded through contracts with this ENRTF appropriation: Approximately 1.2

* Direct and Necessary expenses include both Department Support Services (Human Resources, IT, Financial Management, Communications, Procurement, and Facilities) and Division Support Services. Department Support Services are described in agency Service Level Agreements, and billed internally to divisions based on indices that have been developed for each area of service. Department leadership (Commissioner's Office and Regional Directors) are not assessed. Division Support Services include costs associated with Division business offices, and clerical support. Those elements of individual projects that put little or no demand on support services such as large single-source contracts, large land acquisitions, and funds that are passed-thru to other entities are not assessed Direct and Necessary costs for those activities.

B. Other Funds:

Source of Funds	$ Amount Proposed	$ Amount Spent	Use of Other Funds
Non-state	NA	NA	
State	$50,000	$10,000 (approximate)	The Aquatic Invasive Species Research Center at the University of Minnesota is providing the funding to analyze the eDNA water samples collected in this project.
	$120,000	$120,000 (approximate)	Additional DNR staff and equipment (including boats, motors, trucks, and monitoring equipment) will be used to support and assist implementing this Asian carp monitoring program, with resources provided by the Game and Fish Fund.
TOTAL OTHER FUNDS:	**$170,000**	**$90,000**	

VII. PROJECT STRATEGY:

A. Project Partners: DNR Division of Fish and Wildlife Section of Fisheries – Program administration, Fisheries technical and field support, data management, and equipment. University of Minnesota and the Invasive Species Research Center will provide the analysis of eDNA water samples collected. Several federal agencies, including the National Park Service, US Fish and Wildlife Service, US Geological Survey, US Army Corps of Engineers will provide assistance including research findings, access to sampling areas, promotion and logistical support.

B. Project Impact and Long-term Strategy:

Asian carp are a real and serious threat to Minnesota's aquatic ecosystems. There is a huge amount of time, money, and effort going into learning more about these fish in systems like the Illinois and Missouri Rivers. This project can take this knowledge and transfer the applicable lessons to Minnesota waters, especially the Mississippi, St. Croix, and Minnesota Rivers.

The Minnesota DNR Division of Fish and Wildlife, Section of Fisheries continues to do surveys and sampling of our major rivers. However, enhancing this effort to detect Asian carp is impossible at current staffing levels.

Furthermore Asian carp appear to be surprisingly hard to catch when they are at low numbers, apparently caused by better gear avoidance than many of our native fishes. This means that our traditional fisheries management and research activities on the rivers, although they are many, varied, and very effective for monitoring our native fish populations, are likely insufficient to understand what stage in the invasion we are. This project will determine the distribution and abundance of any Asian carp in Minnesota waters and use this information to inform rapid response efforts. It will also delineate the leading edge of Asian carp reproductive success. Locating the areas and habitats these fish are using, when they appear to be in very low numbers and have not yet established spawning populations, is vital to targeting removal or other control efforts.

C. Spending History: *NA*

VIII. ACQUISITION/RESTORATION LIST: NA

IX. MAP(S): NA

X. RESEARCH ADDENDUM: NA

XI. REPORTING REQUIREMENTS: Periodic work plan status update reports will be submitted not later than 12/31/2013, 6/15/2014, 12/31/2014, 6/30/2015, and 12/31/2015. A final report and associated products will be submitted between June 30 and August 15, 2016 as requested by the LCCMR.

Detection and Monitoring of Asian Carp Populations and Movements

M.L. 2013, Chp. 52, Sec. 2, Subd. 06b; and M.L. 2015, Chapter 76, Section 2, Subdivision 19

Funding supported:

1st Invasive Carp Caught by MN DNR Targeted Sampling,

7 Invasive Carp Caught by Contract Commerical Fishing,

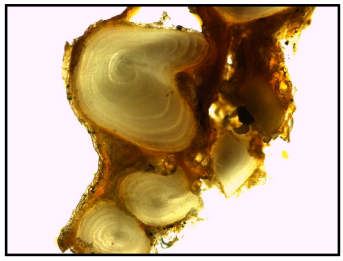
5 Processed Invasive Carp Caught by Outside Sources,

Ability to Process Invasive Carp In-house,

Development of an Extensive Monitoring Program,

Monitoring of all Invasive Carp Life Stages,

Increase Understanding of Native Species Age and Growth,



and 200 Environmental DNA (eDNA) Samples Collected.

MNDNR

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

FINAL. ATTACHMENT A.: Budget Detail for M.L. 2014 Environement and Natural Resources Trust Fund Projects.

FINAL ATTACHMENT A : BUDGET DETAIL FOR
Environment and Natural Resources Trust Fund

M.L. 2014 Project Budget
Project Title:Cattail management for wetland wildlife and bioenergy potential.
Legal Citation: M.L. 2014, Chp. 226, Sec. 2, Subd. 06i
Project Manager: Dan Svedarsky
Organization: Northwest Research and Outreach Center, U of MN
M.L. 2014 ENRTF Appropriation: $ 74,000

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Act 1 Budget	Amount Spent	Act 1 Balance	Act 2 Budget	Amount Spent	Act 2 Balance	Act 3 Budget	Amount Spent	Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	***Cattail Management and***			***Biological Monitoring***			***Outreach Publication***				
Personnel (Wages and Benefits)				$38,000	$38,000	$0				$38,000	$0
Josh Bruggman, Research coordinator: $ 23,000 (66.4%											
Field technician. 20% FTE for 2 1/2 years. $ 15,000 (63.2											
Professional/Technical/Service Contracts											
Mattracks Inc. Contract to harvest 50 acres of a wetland with track equipped bi-directional tractor. Rent set of tracks to equip baler of large round bales.	$7,600	$7,600	$0							$7,600	$0
Rental of swather, front end loader, and round baler from undetermined implement dealer	$5,000	$5,000	$0							$5,000	$0
Equipment fabrication and modification. A swather will be adapted to be attached to the rented tractor and may required some welding and modification. Tracks will be attached to a rented round baler.	$6,000	$0	$6,000							$6,000	$6,000
Equipment moving costs. Move Mattracks equipment from Karlstad to flood control impoundment harvest sites. Removal of bales from wetland. Move rented baler and swather to project site and to a machine shop where modifications can be completed.	$4,000	$200	$3,800							$4,000	$3,800
Equipment/Tools/Supplies Field supplies; notebooks, flagging, stakes, waders, miscellaneous tools.				$400	$400	$0				$400	$0
Printing (Production setup and formatting, printing of 300 hard copies)							$5,000	$5,000	$0	$5,000	$0
Travel expenses in Minnesota Mileage, lodging, meals to and from study sites, conferences, and coordinating visits with equipment providers.				$8,000	$6,761	$1,239				$8,000	$1,239
COLUMN TOTAL	**$22,600**	**$12,800**	**$9,800**	**$46,400**	**$45,161**	**$1,239**	**$5,000**	**$5,000**	**$3,000**	**$74,000**	**$11,039**