

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Fish, Wildlife and Conservation

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
135	Aquatic and Terrestrial Wildlife	20%		45%	
136	Conservation of Biological Diversity	20%		50%	
903	Communication, Education, and Information Delivery	60%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	5.2	0.0	19.7	0.0
Actual Paid	14.3	0.0	18.7	0.0
Actual Volunteer	30.5	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
431199	0	196016	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1743360	0	1591140	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
551183	0	1180263	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAES supported research on into environmental sustainability, including wildlife and conservation, spans several academic departments. Minnesotans care deeply about protecting the state's natural resources, and U of M natural resource researchers provide the science to support the stewardship within the state. In 2014, research was focused environmental stewardship, maintaining diversity in the ecology of Minnesota, and in maintaining and improving the quality of wildlife habitats.

Research highlights for 2014 include:

- Researchers exploring the effects of invasive plant species completed their 11 year field study on Canadian thistle. Initial results found there were significant differences in invasion by Canadian thistle in the first three to five years, but, after eight years, Canadian thistle decreased to such an extent that it is now no longer deemed a threat.
- A study on garlic mustard determined MN populations are decreasing following successive years of excessive spring rainfall followed by late-summer droughts. Despite this observation garlic mustard remains an invasive pest in Minnesota, and will continue to be monitored.
- A study tracking tigers in Asia found female tiger home range size, and the number of female home ranges within a given population, are a better measurement for assessing the resilience of tiger populations than simple tiger numbers. Occupancy surveys for large carnivores are a critical tool for conservation efforts when dealing with small populations where inbreeding depression is a possibility.
- The University of Minnesota Insect Collection added 13,502 specimens in 2014. The collection's total holdings now number 3,863,368 specimens, representing 50,975 species, a net gain of 240 species from 2013.
- Digital satellite imagery revealed more detailed land cover and use classification of the seven county Twin Cities metro area. Five level one classes were identified with 93 percent accuracy, and 10, more specific, level two classes at 91 percent.
- Researchers continue to use polymerase chain reaction (PCR) tests on moose blood samples provided by the Minnesota Department of Natural Resources (MNDNR). They hope the tests will help uncover the cause of mortality in Minnesota moose populations.
- Researchers were able to acquire and disseminate metagenomic data on tick-borne pathogens (*Rickettsia* and *Anaplasma* species). Defining microbiomes of major vector ticks will assist in evaluating and monitoring these microbial communities.
- Work continues on a next generation sequencing data set for tigermoths, but an evolutionary analysis was completed with additional analysis of the evolution of moth's defenses, and mating behaviors underway.
- Researchers tracking waterbird species in the Great Lakes region reported 413,000 pairs of 14 species nesting at 310 sites. This represents an 11 percent increase in overall population numbers and a 24 percent decrease in number of sites since the 1990s. While 14 species were accounted for the waterbird population is largely dominated by three species: ring-billed gull, herring gull, and double-crested cormorant.
- Research on leeches revealed leech cocoon formation and shedding involve a behavioral sequence that researchers are working to characterize.
- A study on Chronic Wasting Disease (CWD), and other prion diseases, using an orally-and horizontally-infectable rodent model successfully confirmed PO-infection of transgenic mice. These mice developed clinical disease between 273 and 389 days post infection. Researchers are currently repeating this study to confirm their results.
- Analysis on a cost-estimator for grassland and wetland restoration was completed.
- A study began on the effects of hydrological change on vegetation dynamics of prairie wetlands.
- Samples were collected throughout Minnesota and screened for IncA/C plasmids to discover probable

sources of IncA/C plasmids, and how they spread in the environment. This data will be used to map the environmental locations of the plasmids relative to the geography of the state.

- Researchers using fecal samples to evaluate declining moose populations throughout the state obtained 74 additional samples through a partnership with the MNDNR.
- Researchers developed an integration population model for the spotted owl. The model unequivocally demonstrated a precipitous decline of the spotted owl population over the last 20 years.

Extension

Extension's 2014 programming in natural resources is reported under several Planned Programs in this report, including Forestry, Water Resources and Climate Change, with outcomes specific to those areas. A major Extension program reported under this Planned Program is the Master Naturalist program, which taps the power of volunteers to protect, sustain, and improve and Minnesota's natural resources.

In 2014, the Minnesota Master Naturalist program entered its tenth year, and has already exceeded its original goal to have 1,000 volunteers trained by 2015. There are now more than 1,577 Master Naturalists volunteering across the state, and the new goal is to have 1800 trained volunteers by the end of 2015.

A more focused outcome reported under this Planned Program is the long running White Earth Academy in Math and Science, which is the result of significant collaboration between Extension and White Earth Reservation elders. The program reached a milestone in 2014 in that the program reached its first second generation students. The Boys and Girls Clubs of the White Earth nation was a new partner for the program in 2014. The program reached 59 students, of which 56 were American Indians. Topics included climate change and its impact on frogs and the habitat of golden winged warblers. Students learned about the effects of invasive aquatic and terrestrial species on the natural resources of the White Earth Reservations.

2. Brief description of the target audience

Fish, Wildlife and Conservation research and outreach programs focuses on working with concerned citizens and volunteers who are trained and have served in a variety of roles. Target audiences also include the Minnesota Department of Natural Resources, Soil and Water conservation districts, U S Fish and Wildlife Services, Health and Human Service Departments and Environmental Sciences, public schools, others involved in environmental science educator programs, and youth on the White Earth Reservation in Northwest Minnesota.

Other targeted audiences for **research** projects include: other researchers, students and scholars in natural resource issues. Specialists in urban ecosystems, sustainability managers, multi-functional agriculture, environmental agencies, rural planners, public land use managers, and social and natural scientists.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	833	718421	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2014
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	4	27	31

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Master Naturalists trained and supported in Minnesota.

Year	Actual
2014	1577

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Citizens will explore their natural environment, resulting in increased knowledge and meaningful discovery about Minnesota's environment and environmental issues. (Target expressed as percentage of program participants reporting new knowledge.)
2	Citizen stewards will commit time to exploring and conserving the environment, and teach others about the environment and stewardship. (Target expressed as number of hours reported by volunteers and others involved in programs.)
3	Citizens will, through exploration, conservation and education, influence environmental conditions on significant land acreage in Minnesota. (Target expressed as number of acres Master Naturalists report that they influence each year.)
4	Citizens and professionals will be more connected with others in regional communities of interest through exploration, teaching and conserving natural resources. (Target expressed as percentage of participants who report new network connections.)
5	Researchers will partner with and provide conservation agencies with management strategies to assist endangered species in the Great Lakes region.

Outcome #1

1. Outcome Measures

Citizens will explore their natural environment, resulting in increased knowledge and meaningful discovery about Minnesota's environment and environmental issues. (Target expressed as percentage of program participants reporting new knowledge.)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Citizen stewards will commit time to exploring and conserving the environment, and teach others about the environment and stewardship. (Target expressed as number of hours reported by volunteers and others involved in programs.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	63530

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Citizen stewards for conserving the environment are often the most efficient and effective actors. Across Minnesota, citizens have been especially effective in identifying and acting to eradicate invasive species, and to monitor environmental effects.

What has been done

Through collaborative relationships within Extension programs and with other agencies, Extension mobilized a corps of Master Naturalist volunteers to address current issues in need of citizen action.

Results

More than 60,000 hours of time was invested in citizen-driven environmental projects. As noted in outcome number two, a major effort for Master Naturalists in 2014 was the identification of invasive species along important river banks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
903	Communication, Education, and Information Delivery

Outcome #3

1. Outcome Measures

Citizens will, through exploration, conservation and education, influence environmental conditions on significant land acreage in Minnesota. (Target expressed as number of acres Master Naturalists report that they influence each year.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1790552

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The goal of the Master Naturalist program is to harness the power of volunteers to help protect Minnesota's natural resources. To be certified as a Master Naturalist, volunteers must initially complete 40 hours of training and 40 hours of volunteer service on a supervised project. To maintain certification, they must complete eight hours of advanced training and 40 hours of volunteer service annually. Master Naturalist's make up a network of skilled volunteers who engage in outreach and increase Minnesotans' understanding and appreciation of the natural world. Volunteers also make it possible to run low-cost programs and save taxpayer dollars.

What has been done

In 2014, Master Naturalist volunteers focused on the growing problems of invasive species along vulnerable river banks. Volunteers also worked at nature centers and science museums across the state. Another long-term project cleaned up and restored a historic area located between Minnehaha Falls Park and Fort Snelling. Workshops were offered to Master Naturalists to explore major natural areas of Minnesota: Prairies and Potholes, North woods and Great Lakes, and Big Woods and Big Rivers.

Results

More than 85 percent of participants in Master Naturalist training workshops reported achieving learning gains, and more than 70 percent reported changing behavior after training. Volunteers used that learning to create change in their communities, ultimately affecting 1,790,552 acres in 2014. Volunteer actions included seed collection, tree planting, and removal of invasive species such as buckthorn. Master Naturalist volunteers themselves find the experience life changing. One volunteer was a senior in high school when she took the Master Naturalist training and has gone on to pursue an environmental education careers. She writes, "When I became a Master Naturalist, I had no intention of making a career out of the environment. You've truly made a lasting difference for me."

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
903	Communication, Education, and Information Delivery

Outcome #4

1. Outcome Measures

Citizens and professionals will be more connected with others in regional communities of interest through exploration, teaching and conserving natural resources. (Target expressed as percentage of participants who report new network connections.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Those who maintain the environment must remain vigilant over time. Research has shown that connections with others who care make a difference by creating sustained efforts to protect the environment.

What has been done

The development of an advanced training program for Master Naturalists sustained the interest of volunteers over time as they learned new information and developed new regional connections across the state.

Results

Advanced training of existing Master Naturalist volunteers connected them to new resources and leaders, including Ely Field Naturalists, a regional group of professionals who bring nature training to the public, residential learning centers such as Wolf Ridge and Eagle bluff, and non profits that offer experiential learning such as the Boulder Lake Environment Learning Center and Tamarack Wildlife Center. Master Naturalists were also connected with the Minnesota Conservation Corp. In fact, a Corps member now works out of the U of M Cloquet Forestry Center.

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity
903	Communication, Education, and Information Delivery

Outcome #5

1. Outcome Measures

Researchers will partner with and provide conservation agencies with management strategies to assist endangered species in the Great Lakes region.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Great Lakes are a major region of importance for nesting waterbirds, but habitat destruction due to increased recreational, residential, and commercial use has put several waterbird species in danger of extinction. In 1985 piping plovers were placed on the U.S. endangered species list. Historically, piping plovers nested throughout the Great Lakes (estimated population 500-800 pairs), but declined to just 11-14 pairs, all within the state of Michigan, by the 1980s.

What has been done

University researchers began to study the piping plover in the early 1980s in collaboration with the Michigan Department of Natural Resources, the U.S. Fish and Wildlife Service, and other conservation agencies. A variety of management techniques have been utilized over the years including captive rearing, temporary artificial incubation, mini exclosures, and nest moving. Public reporting of piping plover sightings and a bird banding program run by University researchers became important tools to determine migration routes, wintering sites and critical data on breeding.

Results

Traditionally, only 25 percent of piping plovers manage to survive and return to breed at nesting locations. Research results show fledging success is highest during hot, dry summers and the first ten days after hatching are incredibly important to provide management strategies to exclude and discourage predators and disturbance. Piping plover nesting pairs increased from 60 in 2010 to 70 in 2014, representing an important shift toward recovery of this endangered species. Additionally, birds are beginning to return to former breeding areas in northern Michigan, Apostle Islands National Lakeshore in Wisconsin, and on Manitoulin Island in Ontario. Research findings have assisted state and federal agencies in the development of and refining of conserving plans for waterbird species throughout the Great Lake region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
903	Communication, Education, and Information Delivery

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (Changes in counting methodology)

Brief Explanation

The Master Naturalist program is changing its definition of "direct" and "indirect" contacts. This has caused a shift in the number of persons served under "direct" the number served decreased dramatically (from more than 200,000 in 2013 to 833 in 2014). This should be seen as creating more integrity in our output models.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In past years, we have reported on the success of the Master Naturalist program in creating successful volunteers who provide education to others. In fact, past evaluations have empirically shown that Master Naturalists are seen to be a quality provider of education by those who have benefited from their volunteerism.

However, not every person trained in the Master Naturalist program provides the 40

hours of training that is requested of those who are certified. In 2014, Extension continued its evaluation of the Master Naturalist program by asking those who had not delivered 40 hours of volunteer time for the reason they did not follow through. Information from this survey can be used to improve the program in the future if factors are ones that can be addressed by the structure of the program.

There are three main reasons that inactive Master Naturalists did not follow through. The first, named by 43 percent of respondents, was a major life changing event. Of these, a move out of the area, illness or family problems were prominent. The second (with 42 percent of responses) was "other." Among "other" reasons listed was that participants had, in fact, provided the hours but had not registered them online. Other reasons included generally being too busy, not liking the training well enough to act on it, not feeling confident enough to do the work, or not being well enough informed about opportunities to volunteer. The third reason, identified by 41 percent of the respondents, was that the 40 hour commitment was too much.

Program leaders can take the information from potential volunteers to improve systems or communications. Ultimately, the goal is to provide well-informed educators and volunteers to communities across Minnesota.

Key Items of Evaluation

In 2014, Extension asked those who had not delivered the required 40 hours of volunteerism why they had not followed through. Information from this survey can be used to improve the program in the future if the factors are ones that can be addressed by program leaders.

There are three main reasons inactive Master Naturalists did not follow through in providing 40 hours of volunteer work. The first, named by 43 percent of respondents, was a major life changing event. Of these, a move out of the area, illness, or family problems were prominent. The second (with 42 percent of the responses) was "other." Among "other" reasons listed was that participants had done volunteer work but had not registered them online. Other reasons included being too busy, not liking the training well enough to act on it, not feeling confident enough to do the work, or not being well enough informed about opportunities to volunteer. The third reason, identified by 41 percent of the respondents, was that the 40 hour commitment was too much.

Program leaders can take the information from potential volunteers to improve systems or communications. Ultimately, the goal is to provide well-informed educators and volunteers to communities across Minnesota.