2009 University of Minnesota Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

This report highlights accomplishments of the University of Minnesota's Agricultural Experiment Station (MAES) and Extension for 2009. The report is organized under nineteen program areas that develop, deliver and evaluate research based programs in Minnesota. These programs are re-constructed for this report in order to integrate NIFA priorities.

MAES Summary of Activities

MAES research efforts in 2009 confronted the same challenges that faced all land grant universities, namely working within an environment of economic stress requiring flexibility and creativity while facing increasingly complex research problems. For example, due to University budget constraints our largest collegiate partner, the College of Food, Agricultural and Natural Resource Sciences (CFANS) has lost 23 faculty positions in the last 5 years. That has meant fewer MAES researchers to tackle more complicated problems. On the other hand, investments in technical laboratory equipment, in part supported by the one-time increase in Hatch funding, has helped to leverage an increase in competitive grant research funding. CFANS has increased those research funds from $38 million to $51 million. The increased research capability made possible by the MAES level 3 biocontainment plant pathology facility has resulted in progress on tackling invasive pest and disease problems facing Minnesota small grains producers and soybean producers. Newly developed genetics techniques have increased the rate of progress in food quality and safety research, new variety development and biofuels research.
Inter-disciplinary and regional research is also increasing. Impacts resulting from MAES research in 2009 are reported under Planned Programs.

UMN Extension: Summary of 2009 Activities

Service Levels

There was an increase in demand for Extension resources in 2009. As a result:

UMN Extension program teams reported service to over 707,000 Minnesotans this year. This includes federal and state funded programs, nutrition education (EFNP and FSNP) programs and Farmer Lender Mediation.

The University of Minnesota Extension Web Site received more than 19.5 million visits in 2009. This is a 14% increase over 2008. Google's criterion places UMN Extension's web site right after NIFA with a search for "Extension Service".

Outreach to Underserved Populations:

The Minnesota State Demographer's Office estimates Minnesota's non-white population to be 14% (2007 estimate). However, minorities were at or greater than 14% of program participants for seven of our planned programs. (Note: This is two more than in 2008.) They are:

1) Family Resource Management (36%)

2) 4 H (24%) (66% of urban program participants are persons of color)

3) Nutrition Education (24%)

4) Family Relations (17%)

5) Environmental Science Education (17%)

6) Food Safety Education (16%)

7) Youth Work Institute (14%);

Multi-State Engagement

All of UMN Extension's planned programs are engaged in formal or informal involvement with other states. Many of these initiatives are described in the program reports.

The UMN Extension's Distribution Center delivered 189,249 educational materials to all 50 states, 3 territories and 7 foreign countries.

A contract with Iowa State Extension provides cost effective phone service to Minnesotans. In 2009, Iowa provided Extension information to 5,811 Minnesotans.

Other performance measures, including integrated service:

These 19 programs provide integration and performance measures in a number of ways:

All demonstrate a research connection in teams and through program business plans.

138 highly specialized Extension educators are at work, along with 39 specialized educators and 228 program coordinators and assistants who staff county offices.

An academic promotion process is now in place to monitor and reward educator performance. In 2009, 3 advanced their faculty status through rigorous peer review of their scholarship, Extension teaching and program leadership. In 2009, 12 educators started the process for 2010 promotion.

Partnerships with 4 colleges fund 21 faculty (11.5 FTE) in academic departments.

The percentage of field educators with Masters or Ph.D.s increased from 51% in 2000 to 83% in 2009. This is a 2% increase over 2008.

Despite extremely difficult budget cuts in counties, county investments in Extension remained strong in 2009. County investment was reduced by only 4.98%. Most counties (84%) reduced non-personnel costs rather than Extension educator staff. Two counties actually increased educator time.

Grants to Extension increased by 12.35% in 2009. Income decreased 7%. Grants and income are now 19% of UMN Extension's budget.

Extension programs mobilized over 34,500 volunteers to leverage1,380,331 hours of service in 2009. The total value of this service, including 4 H contributions of personal travel and per diem, is over $28,144,000.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	367.0	0.0	456.6	0.0
Actual	329.8	0.0	518.9	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- Combined External and Internal University Panel
- Expert Peer Review

2. Brief Explanation

For MAES, the merit review process of researchers is managed through the five collegiate partners that receive MAES funding. These are the Colleges of Food, Agricultural and Natural Resource Sciences, Veterinary Medicine, Biological Sciences, Education and Human Development, and Design. The deans and associate deans for research of these colleges are members of the MAES Executive Council. The merit review process is governed by University of Minnesota standards for all faculty. Within those standards, MAES partner colleges establish their own research peer review process managed by department heads and reviewed for approval by the associate deans for research of each of the colleges.

In 2009, UMN Extension continued to engage its new academic promotion processes. Three faculty members advanced in rank after a rigorous peer review process. Twelve started the process for 2010 review. To facilitate a successful system moving forward, program leaders led the charge to provide training and peer support to educators as they begin the promotion process. The goal is to assure that educators have a full understanding of what is expected, and where they can go for help.

Promotion of UMN Extension faculty is neither automatic nor routine, and the decision is made without regard to race, color, creed, national origin, sex, age, marital status, disability, public assistance status, veteran status or sexual orientation. The process does not result in tenure. Every Extension Assistant Professor is expected to apply for and receive promotion to the rank of Associate Extension Professor within six years of employment.

Promotion in academic rank is based on six criteria. The criteria are consistent with the following organizational values.

1) Program Leadership: Extension educators will help to envision, organize and lead educational programs that address priority interests of citizens.
2) Extension Teaching: Extension teaching will bring relevant content to a current issue.
3) Scholarship: Creative intellectual work will contribute to knowledge in the discipline, have impact, be communicated and valued, and is reviewed by peers.
4) Engagement: Extension staff will connect with communities and stakeholders to better understand their needs, use their resources and build their capacity.
5) Program Management: Extension programs will be "done right" through planning, organization, staffing, implementation and evaluation.
6) Service: The University and the profession will benefit from staff contributions.

External and internal input during this process is provided by:

1) Internal peers or near peers in UMN Extension who comment upon the candidate's performance;
2) External peers or near peers within Extension or the educator's field of interest who comment upon the candidate's promotion portfolio in writing;
3) Promotion Committee members from within the organization who are recommended by the candidate and are ultimately chosen by the associate dean. The Promotion Committee makes a recommendation to an Associate Dean, who makes a recommendation to the Dean. The Dean ultimately decides upon the candidate's promotion.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals

Brief explanation.

In our 2008 Federal Accomplishment Report, we described the statewide stakeholder input process to develop a new strategic plan for agricultural research and Extension. That process, now completed, highlighted several

areas of interest and concern, which will be discussed in later sections. This comprehensive effort, which took two years to complete, both informed and was informed by the established systems for gathering stakeholder input. It was guided by the members of the MAES Executive Council and included collegiate citizen advisory groups as well as departmental, Center, and program advisory groups.

MAES also takes the lead in managing governmental relations for Extension and research. University of Minnesota Research and Outreach Centers, with both Extension and research missions, identify local citizens and groups to gather input into their outreach and research work.

All program areas in Extension encourage stakeholder participation by creating avenues for listening to stakeholder concerns. These concerns are reflected in program business plans when they are updated. In 2009, focused encouragement of stakeholder participation happened in four ways:

1) Through maintenance of Extension's advisory committees at the county, regional and state level, as well as advisory committees convened within specific program areas.

2) Through in-depth efforts within the Youth Development Program Area to generate stakeholder feedback about programming and communications.

3) Through the ongoing work of the American Indian Task Force, which has proactively engaged tribal communities in Extension programming. This task force, established by the Dean, is comprised of 11 Extension professionals who are charged to improve the climate, environment and programming for Minnesota's native populations.(Note: An article about the work and success of this committee will be published in the Journal of Extension in 2010 or 2011.)

4) Through dissemination and discussion of the results of the 2008 Extension network study. These results were described in last year's report. Findings of that study were presented to key stakeholder groups. The purpose was to create further reflection on the relationship between Extension and its target audiences.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Experiment Station:

Besides the formal processes to identify stakeholders and gather input, there are other processes in place to elicit this input for research decisions, such as requirements for stakeholder input into each proposal for Rapid Agricultural Research project funding and Small Grains Initiative research project funding. Other research-related committees bring stakeholders to the table for input and decision-making, such as the Agronomic and Horticultural Variety Review Committees and the Plant Licensing Task Force.

Extension:

1) Local advisory committees are convened, as mandated by state statute, in each county. Regional directors maintain relationships with county Extension committees as well as locally-elected County Commissioners, and address priorities. The dean, associate deans and government relations staff scan statewide stakeholders to consider representation of key liaisons on statewide advisory committees. A dean's designee serves on the University of Minnesota's Public Engagement initiative in order to better engage Extension as a vehicle for University outreach to communities. (www.extension.umn.edu/About/citizens.html)

2) The Youth Development Program Area conducted rigorous stakeholder analysis in 2009. Staff of 4-H programs conducted two surveys to collect feedback about Minnesota's 4-H program from traditional and nontraditional stakeholder groups. The first was an online retention survey that involved youth who were members of clubs during the 2007-2008 program year, yet did not re-enroll. The purpose was to understand why they did not re-enroll; 221 youth responded. The second effort reached out to all parents of children registered for clubs for the first time in 2008-2009. The purpose was to understand satisfaction levels and experiences; 731 parents and 143 youth provided input through the survey. The Youth Work Institute administered interviews to understand how programming delivered over the past five years was perceived by the youth development field. Both areas of youth development programming engaged key informants in a rigorous review of web site content and structure.

Personas of key web users were developed in order to keep the intentions of those users in mind during the development stage. Then, usability testing in the University of Minnesota Usability Lab provided feedback about how the content and navigation of the site was perceived by actual users. (www.extension.umn.edu/youth)

3) Liaisons to reservations and tribal colleges have helped the American Indian Task Force bring education about tribes to the University, and bring University staff to reservations for learning and listening.

4) Evaluators who conducted the Extension Network Study brought data about Extension's relationships with its audiences to program teams, county leaders and other stakeholders who could assess strengths and gaps.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

Brief explanation.

1) Local Extension advisory committees are engaged in group and one-on-one discussions to provide information and request input.

2) The Extension Youth Development Program Area used surveys, development of web-user "personas" and usability testing strategies to collect data about responses to programming and to integrate user perspectives into web communications.

3) Tours, discussion groups, and community visioning processes were all utilized to understand how Extension could better serve Minnesota's Native American population. Tribal members are engaged with the task force in an advisory capacity.

4) Facilitated meetings responding to the 2008 Extension Network Survey generated responses from target groups that will inform program teams and administrators who continue to nurture relationships with local and statewide networks.

Listening sessions, advisory committee input and meetings, surveys and individual contact are some of the means by which MAES identifies individuals and groups of stakeholders to collect input. For example, the Plant Licensing Task Force, formed to study MAES plant germplasm and variety release policies, was constituted by soliciting membership through individual contact by the MAES Director to: the Minnesota Apple Growers Association, Minnesota Association of Wheat Growers, Minnesota Barley Growers Association, Minnesota Crop Improvement Association, Minnesota Department of Agriculture, Minnesota Farm Bureau and Farmers Union, Minnesota Fruit and Vegetable Growers Association and Nursery Landscape Association, the Minnesota Soybean Growers Association and the Northern Minnesota Grass Seed Growers Association.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

Research

1) One clear message received from Minnesota stakeholders providing input into the Strategic Plan for

Minnesota Agriculture was that the development of research programs can be done most effectively in collaboration with those stakeholders. This already occurs routinely through several informal channels, including efforts by individual researchers to monitor and build their research agenda around developments reported in scientific and trade publications or discussed at public meetings. However, stakeholders wanted more direct and proactive approaches. As one response, the results of the strategic planning process were brought back to stakeholders, generating discussion in presentations and public forums such as a panel presentation at Farm Fest, as well as providing further details on the MAES website.

2) One of the stakeholder issues identified was concern for the future of Minnesota agriculture and a desire that the University focus on increasing awareness of agricultural career opportunities among prospective students, as well as increasing the emphasis on the highly-technical, science-based nature of most agricultural programs for both undergraduate and graduate students. In response, MAES funded 14 research fellowships in research areas including sustainable energy, livestock production, agronomic crops, and alternative and organic agriculture.

Extension

1) In 2009, advisory committees were utilized to understand the priorities and concerns of key stakeholder groups as budget cuts were made and considered for the future. For example, conversations with counties resulted in flat fees for contracts in 2009.

2) Data from the survey of youth development stakeholders are being shared with program teams so that they examine critical issues and concerns that surfaced. Strengths and areas for improvement will be analyzed. Input from web site users was directly used to guide the design, wording and content of youth development program sites.Strategies to address shortcomings that were discovered are being developed and included in future program planning and resource allocation decisions.

3) The American Indian Task Force identified emerging issues and redirected Extension programs as a result of new relationships with tribes. Targeted programs and staff to assist tribes were the result. Hiring practices were re-designed to better recruit tribal applicants. Four new grant-funded positions were hired to serve Native Americans. They are focused on youth development, natural resources, and financial literacy.

4) Stakeholders reviewing the results of the network survey came to better understand the various roles and functions played by different parts of Extension. For example, the Association of Minnesota Counties Extension committee became better able to articulate the differing contributions of local educators and regional educators to their constituents. Program leaders were able to draw differences in relationships to target audiences from one program area to the next, and considered how varying relationships could be leveraged for more impact.

Brief Explanation of what you learned from your Stakeholders

1. From county advisory committees, we learned the priorities of county stakeholders and received input in contracting for provision of Extension programming. We saw that Extension is valuable enough to maintain programming despite local government cutbacks.

2. The 4-H stakeholder study revealed that, overall, first year youth and parents were satisfied with their experience with 4-H. However, first-time 4-H parents said they experienced difficulty in finding answers to questions they had about the program. Youth sixth grade and older and parents of younger youth reported high levels of feeling welcomed into the club/group and high levels of youth learning new things as a result of participation. Areas for improvement are indicated by less than half of parents reporting that the activities were an "excellent" match with their child's interests and less than three-quarters of parents reporting that most or all of their questions were answered. Of the parent respondents, nearly half (45%) are completely new to 4-H and are likely to have significant needs for clear information about the program. The Youth Work Institute's study demonstrated that stakeholders value the quality of professional development offered. They view the Institute as a reliable resource for the latest research, community responsiveness, and strong leadership for the field. A clear theme emerged around the Institute's need to improve its marketing and communications. While the Institute is recognized for its trainings and staff, it is less understood as an organization. Stakeholders asked for a more user-friendly website, and encouraged the Institute to cast a wider net as they reach teachers and untapped youth workers. In addition, stakeholders are calling upon the Institute to explore opportunities for professional development and organizational learning through ongoing coaching and through coalitions where colleagues can come together to learn and form networks.

3. The Native American Task Force learned that reservations were strongly concerned about health disparities that could be addressed by local foods initiatives, Master Gardener programs, nutrition health and youth programs.

4. When the network study was disseminated to key stakeholders, we learned that these careful studies were greatly appreciated. Additional questions are being used for development of future network studies.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
8404773	0	5473227	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	8475384	0	3952944	0
Actual Matching	27987845	0	38900214	0
Actual All Other	24402882	0	37689728	0
Total Actual Expended	60866111	0	80542886	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from				
Carryover	0	0	0	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		20%	
204	Plant Product Quality and Utility (Preharvest)	20%		20%	
205	Plant Management Systems	30%		20%	
206	Basic Plant Biology	10%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		10%	
212	Pathogens and Nematodes Affecting Plants	10%		10%	
213	Weeds Affecting Plants	10%		5%	
216	Integrated Pest Management Systems	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	11.9	0.0	149.9	0.0
Actual	10.9	0.0	121.1	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**
537151	0	912317	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1611146	0	9742072	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
375420	0	12063959	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Food and Agricultural Organization of the United Nations recently reported that more than one billion people in the world now suffer malnutrition. This sobering statistic highlights the challenge to the world and the U.S food production system. Minnesota, as the sixth largest agricultural producer in the U.S, plays a key role within that system. Fifty-three percent of Minnesota's total land area is farm land, and farm income provides close to $15 billion to the Minnesota economy. Maintaining and building that productivity requires both long term vision and short term results as world food needs grow, because the food production system is not static. To be profitable and meet societal expectations, farms must use resources more efficiently while reducing harmful environmental affects. Without significant increases in agricultural productivity, food will become more scarce and expensive.

In 2009 MAES invested in research to: develop disease resistance in crops and improve the nutrient quality of food; reduce animal diseases and develop better livestock production practices; improve agricultural marketing and enhance rural development. Many promising research avenues, such as precision agriculture, production strategies to reduce erosion and pollution, and new crop varieties that reduce water and fertilizer demand have international implications. Both research and outreach has supported new agricultural niche markets, response to new consumer preferences and opportunities for local and organic foods. Here are examples of results:

Integrated pest management research and Extension education has resulted in new recommendations for methods to manage soybean aphid infestations. The pest control tactics could save U.S. soybean growers $1.3 billion over the next 15 years.

UMN is the only land-grant university with an insect quarantine facility and a plant pathogen quarantine facility. With these tools, researchers are finding beneficial insects to control soybean aphids, buckthorn, and garlic mustard, and monitoring threats such as Ug99 wheat stem rust, Asian soybean rust and sudden oak death.

MAES funded the development of many crop varieties over the years, most recently new cultivars of wheat and barley with improved disease resistance, and new soybean varieties that have made Minnesota number one in organic soybean production, with 20 percent of the market.

Extension provides both responsive and proactive research-based education to Minnesota's commodity crops growers, ultimately achieving outcomes that increase the globe's food supply while protecting the environment for future generations of growers. In 2009, weather provided many challenges to Minnesota's crop producers. Wet conditions in northwest Minnesota delayed planting, and then cool and dry conditions slowed crop growth and development across the state. Later, cool and wet conditions delayed harvest and produced crop production and grain storage challenges. Extension responded with several disaster-response web sites devoted to flooding and late harvest, and State Specialists and Extension Educators contributed research-based materials to help Minnesota crop producers make strategic management decisions.

Educational programming about current and key best management practices in crop production and pest management are conducted on an annual basis. They range from classroom presentations in the winter for regional Forage Days, Ag Professional Update workshops and a number of more locally-based program to in-field, hands-on, clinics for alfalfa stand assessment on winter-killed fields, as well as an intensive two-day field school where agriculture professionals can hone their in-field diagnostic skills.

The development of a Crop News Blog in 2009 (http://blog.lib.umn.edu/efans/cropnews/) demonstrates the Crop Team's commitment to utilize technology to provide timely responses to crop management issues.

2. Brief description of the target audience

Research:

A wide variety of audiences use the results of MAES research including local, regional, national and international agricultural producers, industry, governments and policy makers. Another major sector of the target audience for MAES research includes other researchers, including crop breeders, plant geneticists, entomologists, ecologists, economists, plant pathologists, soil specialists and others. Another important target audience includes agricultural professionals, Extension educators and consumers.

Extension:

Private businesses, county governments, and trade associations are the primary users of Extension programming. Audiences are targeted depending on their utilization of available research on our primary program areas: agricultural drainage, climate and weather, commodity crops (corn, small grains, soybeans, and sugarbeets), forages, honey bees, pesticide safety and more.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	48000	20000	3000	0
Actual	17900	70440	2100	0

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

Patent Applications Submitted

Year: 2009
Plan: 2
Actual: 1

Patents listed
New wheat variety--Sabin--medium-maturity hard red spring wheat with above average yields

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	10	120	
Actual	1	111	112

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Conduct regional and local events to provide producers with latest applied research for improved crop management. (Target expressed as number of events)

Year	Target	Actual
2009	690	250

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants of the Crops program workshops/classes and conferences will achieve significant learning gains regarding research-based crops knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Crops program workshops/classes and conferences.)
2	Participants of Crops workshops/classes and conference sessions intended to improve participant crops practices will significantly improve their crops practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their crops practices as a result of attending workshops/classes and conference sessions intended to improve participant crop practices.)
3	Development of new crop varieties will help improve Minnesota farmers profitability
4	Research in best practices for sugarbeet production will give growers needed information to protect their crops and save money.
5	Genomic research will help tackle a major threat to small grains.
6	Gene sequencing will develop necessary basic information for crop improvement.
7	Research will provide growers with decision tools they can use to prevent losses due to insect pests.

Outcome #1

1. Outcome Measures

Participants of the Crops program workshops/classes and conferences will achieve significant learning gains regarding research-based crops knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Crops program workshops/classes and conferences.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	62

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #2

1. Outcome Measures

Participants of Crops workshops/classes and conference sessions intended to improve participant crops practices will significantly improve their crops practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their crops practices as a result of attending workshops/classes and conference sessions intended to improve participant crop practices.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The quantitative number above is an aggregate of scores of a number of program offerings; however, a particularly successful program initiative developed over the past three years addressed the issue of pesticide safety. Responsible management of pests and pesticides is essential to public health, safety and environmental protection and has emerged as a priority for national security.

What has been done
Local, regional and state Extension Educators developed, in concert with the Minnesota Department of Agriculture, a winter workshop option for Private Pesticide Applicator Certification. This program has been responsive and appreciated by clientele. In 2009, over one-third of the people in need of re-certification chose this method. This program model has created an avenue for research-based content to reach an audience not necessarily connected to other programming efforts.

Results
Interactive technology was used to survey participants about program satisfaction and effectiveness:
* 83% of participants rated the workshop as high or very high value;
* Approximately 80% of attendees changed at least one pesticide-related practice based on the last time they re-certified; and,
* 88% planned on changing at least one practice based on what they learned.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Development of new crop varieties will help improve Minnesota farmers profitability

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Developing new improved malting and feed barley varieties for the Midwest improves farmers' profitability. The mission of the UMN malting barley breeding research is to provide the malting and brewing beer industry with a stable and high quality grain supply.

What has been done
Over the years, the malting barley breeding program has developed several varieties. A new variety, planned to be officially released in 2010 should provide growers with an option to help reduce the risk of DON contamination resulting from Fusarium Head Blight. In 2009 the program evaluated 1,457 lines for FHB resistance.

Results
The malting variety Lacey, released by MAES in 2000 was planted on 56% of the acres in Minnesota in 2009, and 16% of the acres in North Dakota. Minnesota varieties in total occupied over 300,000 acres in Minnesota and North Dakota in 2009. The most recent release, Rasmusson, is a higher yielding malting variety that has received favorable response from the brewing industry, and use of this variety is expected to increase.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)
212	Pathogens and Nematodes Affecting Plants

Outcome #4

1. Outcome Measures

Research in best practices for sugarbeet production will give growers needed information to protect their crops and save money.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is great interest and concern about over-fertilizing crops, which wastes money and produces run-off of unused nutrients that can pollute local streams and groundwater.

What has been done
Field studies investigated adjustment to sugarbeet nitrogen (N) guidelines for organic matter.

Results
In 2009, researchers used the information gained from this project to revise the nutrient guidelines for sugarbeets grown in southern Minnesota. This revision reduces N guidelines and will affect 120,000 acres. This will result in a reduction of approximately $1,440,000 in expenses for nitrogen fertilizer, and will reduce the potential for nitrogen runoff.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #5

1. Outcome Measures

Genomic research will help tackle a major threat to small grains.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Stem rust, called the polio of agriculture, caused a plague that was brought under control nearly half a century ago as part of the Green Revolution. Scientists managed to breed wheat that contained genes capable of resisting the fungus that caused stem rust. Unfortunately, that resistance is threatened by a new race of the fungus, named Ug99. (The name represents Uganda, the country of origin, and the year the new race was found.) It is moving east, working its way through Africa and the Middle East and threatening India and China. More than a billion lives are at stake, because 90% of the world's wheat has little or no protection against Ug99.

What has been done
Researchers around the world, including UMN small grains researchers, are scrambling to halt the pathogen. They are trying to create genetic barriers that Ug99 cannot overcome.

Results
The UMN Level 3 Plant Pathology Biocontainment facility is the only facility that has been authorized to do work on Ug99 in the U.S. U of M research has identified one wheat line to be one of the best sources of resistance to Ug99, and is now focusing on which of the genes are required for conferring resistance.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #6

1. Outcome Measures

Gene sequencing will develop necessary basic information for crop improvement.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Legumes rank as the third largest family of flowering plants. Peanuts and lentils, as well as crops in Africa and India such as the common bean, belong to the family. The family has evolved a knack for corralling microbes into nodules that turn atmospheric nitrogen into a form that can be used by the plant. Basic research on the comparative genomics of legumes will develop improved germplasm that improves crops.

What has been done
UMN researchers are characterizing the genomes of soybean and Medicago truncatula, a model legume, through a combination of DNA sequencing and bioinformatic data-mining.

Results

Researchers have genome sequenced the legume Medicago truncatula, and the results are now available in an early form. The inventory of Medicago resistance genes is aiding the discovery and use of genes for disease resistance in alfalfa. Researchers are now extending resequencing to hundreds of different Medicago lines, providing a framework for controlling agriculturally important traits such as nodulation and nitrogen fixation. To communicate the outputs of the research to the broader research community, researchers maintain a web site that receives more than 15,000 hits per month. This is one of the highest number of regular visits for any plant genomics web sites in the U.S., according to a recent National Science Foundation survey.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #7

1. Outcome Measures

Research will provide growers with decision tools they can use to prevent losses due to insect pests.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Soybean aphid feeding damage can cause up to a 40% loss in yield if left uncontrolled. The Upper Midwest represents about 85% of the soybean production in the U.S.

What has been done
A UMN entomologist serves as the project manager of the North Central regional research project that focuses on feeding damage caused by the soybean aphid. They have developed an economic threshold and economic injury level of the soybean aphid. They found the economic threshold is 250 aphids per plant. At that point in the population growth of soybean aphids, growers need to chemically manage the populations within five to seven days. Equally important for the growers has been the team's development of a simple method to sample soybean aphids, named Speed Scouting, that has accelerated adoption of IPM for soybean aphid.

Results
A recent economic analysis evaluated the level of adoption of the team's recommendations. The analysis estimated that as a result of the Soybean Aphid IPM Team's work, soybean growers will prevent losses of an estimated $1.3 billion in increased input costs (insecticides) and yield loss over 15 years.

The team was given the 2009 Integrated Pest Management Team Award by the Entomological Foundation. These pest-control tactics can save U.S. soybean growers $1.3 billion over the next 15 years, according to an independent analysis by Michigan State University.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (Varying evaluation strategies)

Brief Explanation

The percentage of Extension direct contacts reporting a learning behavior was lower than behavior changes. This is due to varying evaluation techniques across the large program area, which caused a greater number of educators to measure learning gains than measured behavior gains.

The reported number of adults served in this program area was lower than targeted. This reflects different reporting procedures that did not capture the work of campus specialists in 2009.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security and Hunger - Livestock

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	5%		10%	
304	Animal Genome	0%		5%	
305	Animal Physiological Processes	5%		10%	
306	Environmental Stress in Animals	20%		5%	
307	Animal Management Systems	30%		30%	
311	Animal Diseases	20%		25%	
315	Animal Welfare/Well-Being and Protection	10%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	10.2	0.0	49.5	0.0
Actual	10.2	0.0	58.4	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**
536347	0	957694	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1659909	0	8111305	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
315441	0	4828971	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Minnesota's livestock industry plays a significant role in the nation's response to global food security. Minnesota is first in production of turkey, third in hogs, fifth in cheese, sixth in dairy and red meat, eighth in total livestock production and tenth in

cattle and calves.

Few livestock farmers would disagree that 2009 has been among their toughest years ever. Milk prices dropped considerably, and hog prices were so bad it was as though, as one educator described it, "the farmer taped a $50 bill to each hog as it went out the driveway." Credit tightened, and some farmers were concerned about not only 2009 loan repayment, but also financing the 2010 inputs. Besides its usual efforts to bring research and new technology to livestock producers, the livestock team worked hard in 2009 to respond to the financial crisis faced by many Minnesota farmers. The team worked with other Extension educators and professionals to connect its audiences to resources to manage family stress, financial management and other relevant issues. They also participated in a collaborative pulled together by the Minnesota Department of Agriculture to address needs through the development of The Minnesota Farm Assistance Network. This network is a confidential system through which farm families can call a toll-free number any time of the day or night to explain their concerns and request help. If the concern is related to the business, business advisors are put in touch with the farm. If the need is food, health care or other personal welfare, or legal guidance, the volunteers knows who in the network can provide assistance to the family.

Also in 2009, Extension's Beef Team continued to play a strong role in addressing Bovine TB. Last year, we reported that they effectively helped Minnesota achieve split state status. This year, the team developed a network newsletter that updates all necessary audiences on research targeted at risk assessment and production practices that reduce TB transmission risk.

MAES research continued to support Minnesota's livestock producers with research on animal genomics, animal health and disease prevention, improved feed and nutrition, animal welfare and environmental issues related to animal production systems. MAES livestock research is conducted with strong regional collaboration, and local partnerships between the U of M and animal producers and agricultural industry. Some examples of 2009 efforts:

Research showed that using a new management system called Statistical Process Control for early detection of mastitis in dairy cows proved to be more sensitive and give fewer false-positive alerts than the disease detection system currently used on the farm.

Almost 900 dairy heifer calves from three commercial dairy farms were custom raised at the UMN Southern Research and Outreach Center. Information on their growth and health was added to a data base of over 4,500 calves, which was developed over the past five and a half years to provide farmers with information about the relationships between lactation performance, nutrition management, growth and health from birth to six months.

A collaborative project to sequence the turkey genome which originally involved U of M, Virginia Tech and Michigan State University animal geneticists was expanded by joining forces with researchers at the USDA's ARS and the University of Maryland. As a result the genome is now 90% sequenced at several-fold higher coverage than anticipated.

There is increasing interest by consumers and producers in the potential of organic animal production, and well as increasing concern about animal welfare issues. Several MAES research projects focused on these topics in 2009, a few of which are highlighted in the Outcomes section of this report.

2. Brief description of the target audience

The Livestock team at University of Minnesota Extension serves Minnesota dairy producers, pork producers, poultry producers, beef producers, veterinarians, consumers, and the Minnesota feed industry. MAES research is used by the same audiences. MAES target audiences also includes other animal research scientists, other scientists in genetics, public health, medicine and agriculture in Minnesota, the U.S. and internationally, public policy makers at the state and local levels, Extension Educators, and industry professionals including private consultants.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	37900	3800	0	0
Actual	40261	6866	1498	0

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

Year: 2009

Plan: 1
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	10	80	
Actual	39	65	104

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Through demonstration projects, provide ideas and solutions to producers on such topics as milk house waste, manure rate application on fields, and on-farm demonstrations of forage topics such as alfalfa brown root rot variety screening, and alfalfa fall cutting. (Target expressed as number of demonstration projects.)
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Provide workshops, training sessions, schools, and other processor specific events. (Target expressed as number of events.)

Year	Target	Actual
2009	350	316

Output #3

Output Measure

- The Quality Count$ initiative will sustain its cooperative partnerships with regulatory, association and production groups that assist in addressing the issue of somatic cell count. (Target expressed as the minimum number of groups involved.)
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Through the Quality Count$ program, the average bulk tank somatic cell count in Minnesota dairy operations will be maintained at a low level, and move downward over time through changed attitudes and improved consistency of dairy producers. (Target expressed as the somatic cell count under which Minnesota's dairy industry will stay.)
2	Participants of the Livestock program workshops/classes and conferences will achieve significant learning gains regarding research-based livestock knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Livestock program workshops/classes and conferences.)
3	Participants of the Livestock program workshops/classes and conference sessions intended to improve participant livestock practices will significantly improve their livestock practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their livestock practices as a result of attending workshops/classes and conference sessions intended to improve participant livestock practices.)
4	Research will provide information to support Minnesota dairy producers transition to new systems.
5	Economic analysis research will provide information to animal producers and public policy makers on the impact of animal disease control strategies.
6	Research will provide information on management systems to control livestock odor and manure management
7	Research on animal welfare will provide animal producers, public policy makers and consumers information for decision-making.

Outcome #1

1. Outcome Measures

Through the Quality Count$ program, the average bulk tank somatic cell count in Minnesota dairy operations will be maintained at a low level, and move downward over time through changed attitudes and improved consistency of dairy producers. (Target expressed as the somatic cell count under which Minnesota's dairy industry will stay.)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	280000	297188

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 2005, the dairy industry began to collaborate to address spiking somatic cell counts. The industry high was 400-500,000 in 2002. These counts reflect upon cow health and affect the quality of dairy products.

What has been done
Research, education, and collaboration among all who influence dairy herds was utilized to improve somatic cell counts. New best practices are being introduced to dairy farmers, and somatic cell counts are tracked monthly.

Results
In 2009, somatic cell counts in Minnesota continued to decrease. The average for 2009 was 297,188. This is a 7% reduction from the average count of 321,010 in 2008. It is an 18% reduction over baseline counts in 2004. Moreover, monthly average counts were lower than monthly averages in eleven of the twelve months of 2009. In 2008, we reported that milk quality was the best ever recorded in Minnesota. This trend continued in 2009.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #2

1. Outcome Measures

Participants of the Livestock program workshops/classes and conferences will achieve significant learning gains regarding research-based livestock knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Livestock program workshops/classes and conferences.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	74	92

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Methods of care for livestock make a difference regarding product quality and productivity of livestock operations.

What has been done
Workshops and consultations pass along existing and newly available information about livestock care to producers of hogs, cattle (dairy and meat), turkeys, horses and other livestock.

Results
Post-educational reports from participants indicated that 92% achieved learning gains.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #3

1. Outcome Measures

Participants of the Livestock program workshops/classes and conference sessions intended to improve participant livestock practices will significantly improve their livestock practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their livestock practices as a result of attending workshops/classes and conference sessions intended to improve participant livestock practices.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	65	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The outcome quantified here was assessed by the University of Minnesota Horse Team regarding their 2009 fall regional horse owner conference. The objective of these programs was to increase the knowledge of horse owners and improve the quality of care for horses and their habitat.

What has been done
Topics presented at the 2009 Fall Regional Horse Owner Programs included: lameness evaluation, equine genetics, equine metabolic syndrome, how to get involved with UMN research, managing carbohydrates in feed, research updates, winter care, equine dentistry, manure management, poisonous plants, vitamin and mineral nutrition and truck and trailer safety. Thirty-nine percent of participants had attended a Regional Horse Owner Program in the past. Evaluation was conducted on that group to learn about the effectiveness of the program.

Results
100% of participants indicated a change in behavior based on information learned at previous programs. The top changed behaviors included: 1) using rotational graze pastures; 2) buying or growing better horse hay; 3) improved first aid kits; 4) improved vaccination and deworming; 5) nutritional changes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #4

1. Outcome Measures

Research will provide information to support Minnesota dairy producers transition to new systems.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Organic milk is the fastest growing and one of the most profitable products in the dairy industry. With increasing interest in more sustainable dairy systems, farmers are seeing the potential of organic dairying, but need more information on how to make the transition from conventional to organic farming practices.

What has been done
At the UMN West Central Research and Outreach Center, half of its dairy research herd, or 70 cows, was converted to organic production. Cows that have been raised conventionally need a year of transition into organic management. New heifers during transition must be under organic management for the last trimester of their mother's gestation. By the end of 2009 the whole herd met organic standards.

Results
The Center is now one of only three organic dairy research facilities in the nation and the only one in the Midwest. The actual transition process became part of the research, that informed dairy producers about transition requirements. And the organic research herd will be part of further research into the broader impact of organic agriculture.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
306	Environmental Stress in Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #5

1. Outcome Measures

Economic analysis research will provide information to animal producers and public policy makers on the impact of animal disease control strategies.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Recent outbreaks of bovine tuberculosis in Minnesota beef cattle herds has resulted in the downgrading of Minnesota's TB status to Modified Accredited. This has caused hardship to Minnesota producers, but the total impact was not understood.

What has been done
UMN applied economics research has demonstrated that losses to the beef cattle sector if Bovine TV is not eradicated would total about $40 million per year. Additional losses to the dairy industry and wildlife and recreation were not included in the analysis and would raise this total. The analysis showed that it will take approximately six years for Minnesota to become bovine TB-free, so that the total expected costs of bovine TB, assuming no additional infected herds are found and split state status is maintained, will be about $60 million. Failure to maintain split state status could cause that number to dramatically increase to a minimum of $300 million assuming a statewide modified accredited status is declared and only lasts six years.

Results
This research has the potential to directly impact indemnity payments to producers and to help identify the costs of alternative eradication and containment policies. The economic impacts are also providing input into decisions about alternative marketing and testing policies based on risks of additional transmission or contamination. The results of this research have been provided to the Minnesota Board of Animal Health and USDA, Animal Plant Health Inspection Service to help determine policies regarding eradication of the disease as well as the state's status.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #6

1. Outcome Measures

Research will provide information on management systems to control livestock odor and manure management

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Odor emissions from animal production buildings and from manure lagoons have been a critical local issue for several years. Although federal and some state agencies do not regulate odors, controlling the emission of odorous compounds remains a high priority for animal producers and for neighbors living near livestock and poultry operations. However, there has been limited data available about odor emission factors. Also, characterizing and quantifying livestock odorants is one of the most challenging analytical tasks because odor-causing chemicals are very reactive and are often present at very low concentration in a complex matrix of less important or irrelevant gases.

What has been done
Research has developed a new analytical method to characterize livestock odorants and used this analysis to identify the key odorants responsible for livestock odor. Field air samples from swine and dairy operations confirmed the results of the research. At the same time, other research developed and tested strategies to use surface aeration to control odor from manure storage lagoons.

Results
The first study has generated a large database of sensory odor and chemical concentration. This will be useful for producers and regulators in assessing odor impacts and in finding strategies and technologies to mitigate these odors emitted from dairy and swine buildings. Odors associated with anaerobic lagoons have been an uncontrolled nuisance due to lack of cost effective technologies. The outcome of the second research presents an affordable, advanced surface aeration system than can reduce odor generation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #7

1. Outcome Measures

Research on animal welfare will provide animal producers, public policy makers and consumers information for decision-making.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Interest in animal welfare issues related to swine production systems is growing. However, to be sustainable, alternative swine production systems need to be efficient and profitable. In open pen group farrowing systems, animal welfare is enhanced by providing a large area and bedding to swine. However piglet mortality is as high as 20-30%, diminishing the margin of profit and causing welfare concerns about crushed piglets. Group housing of gestating sows improves sow welfare by providing freedom of movement but also induces aggression among the sows.

What has been done
Research showed that young sows should be separated from mature sows to improve the welfare of younger sows in group housing systems. Research also showed that piglet mortality in group-farrowing systems can be reduced by farrowing more younger than older sows, and by alleviating heat stress. Another study showed that least fearful sows weaned more piglets than fearful sows.

Results
Research on controlling aggression among group-housed gestating sows and reducing piglet mortality has been presented to farmers. This research, as well as the results of swine fear studies, have the potential to impact the welfare of millions of pigs in production. Protocols for conducting fear tests and evaluating their results in multiple livestock species are being created by the North Central Regional committee. These protocols can be incorporated into welfare assessment used by commodity or certifications groups. For example, the National Pork board could incorporate a fear test into its Pork Quality Assurance Plus program to provide consumers with another assurance that the animals produced under the system have good welfare.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
315	Animal Welfare/Well-Being and Protection

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other ()

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
131	Alternative Uses of Land	30%		30%	
601	Economics of Agricultural Production and Farm Management	30%		30%	
605	Natural Resource and Environmental Economics	30%		30%	
610	Domestic Policy Analysis	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	23.5	0.0
Actual	1.0	0.0	43.1	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**
263905	0	195322	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1170808	0	2215452	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
307513	0	3288556	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Emerging technologies and emerging public policy have driven the potential use of bio-mass to create biofuels and bio-power; however, a full-fledged sustainable energy economy has yet to be fully developed. In order to further develop that economy, decision-makers need quality information that is not biased by either political positions or profiteering. Sustainable energy efforts at the University of Minnesota Experiment Station and Extension exist to create unbiased research and education that will, ultimately, create a viable economy for sustainable energy.

In 2009, Minnesota Agricultural Experiment Station research and University of Minnesota Extension outreach focused on the potential for biomass and other renewable energy sources within the context of Minnesota's agricultural and natural resources environment. That work has informed public policy makers deciding how the potential of renewable energy sources will be developed. Many potential alternative energy sources are in the beginning development stages or as yet unknown. MAES research has focused on developing new methods to produce biofuels from many different sources, including forest and mill residues, agricultural crops and wastes, animal waste and livestock operation residues, algae, fast-growing trees and plants, and municipal and industrial wastes. Researchers have been looking at new uses for ethanol bioproducts; research to develop farm scale prototypes for energy recovery and use; and studies on the economic and environmental impacts of the emerging biofuels industry. At the same time, Extension outreach is bringing that new information to farm and forest landowners making decisions about their operations, and to local communities making decisions about their energy future.

Some examples:

Wind turbines are just one of an array of renewable energy options Minnesota's communities are exploring. Extension has hired new faculty focused on the economics of bio-based fuels to help communities determine their options.

Corn with high oil content holds potential as a source of raw material for biofuels. Researchers have identified genes responsible for high oil content and are now working to breed a high-oil variety that's also economically competitive.

Research assessing the physical, environmental, social and economic factors involved in developing a sustainable forest biomass industry has given Extension Educators the information to teach Minnesota landowners how to raise the trees that will someday help power Minnesota's energy needs.

Both MAES original research and Extension outreach has increased the use of ethanol byproducts by livestock producers for use in feed rations.

MAES and Extension applied economists have analyzed the feasibility of shifting Minnesota pasture and cropland from current land uses to energy crops in a set of enterprise budgets, and tracked corn price impacts on pork and milk prices at the farm gate and at retail.

Extension's efforts and dollars regarding sustainable energy were not tracked in 2009 as a program area. While Extension efforts are discussed here, outputs and funding are accounted for in other program areas. Future plans of work will address Sustainable Energy outputs as a planned program.

2. Brief description of the target audience

For MAES research, the target audiences are Minnesota agriculture and natural resource industries, biotechnology companies, policymakers, state and federal agency representatives, private citizens and entrepreneurs. Since the knowledge, ideas and solutions developed through MAES supported research on this topic could have broad implications, the target audiences also include regional and U.S. and international representatives of these groups.

Primary audiences for outreach and education are producers of biomass feed stocks, as well as processors of biomass fuels and bio-products. Secondary audiences are policy makers at the local and state level, as well as users who influence public policy and demand for bio-fuel products.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Year: 2009

Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	25	0	
Actual	0	38	38

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Graduate student research assistants

Year	Target	Actual
2009	10	15

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Research will provide information on new uses for ethanol byproducts.
2	Research will provide information on technologies for use of on-farm energy sources.
3	Research will provide better understanding of the economic impact and environmental trade-offs of renewable energy sources.
4	Education and Extension resources increased utilization of biomass resources.
5	Research will provide new approaches in the use of waste products as biofuels.

Outcome #1

1. Outcome Measures

Research will provide information on new uses for ethanol byproducts.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Using the byproducts of ethanol production can provide added-value and revenue. The use of one byproduct--distillers dried grain with soluble (DDGS)-- in animal feed has been widely studied and is being used for feeding poultry and swine. When UMN researchers began their studies on DDGS 10 years ago, only 4% of corn co-products from Minnesota ethanol plants were fed to pigs and poultry. Today that figure has climbed to 25% as the research has helped farmers and nutritionists understand and use co-products in cost-effective rations. However, new methods of ethanol production produce new byproducts needing research before they can be successfully introduced into animal feed.

What has been done
Applied nutrition research focused on ways to help dairy calf and heifer raisers create cost-effective feeding programs. A significant need for this type of information exists because raising replacement heifers continues to be one of the top three expenses on dairy farms. One part of the research focused on evaluating the impact of adding glycerol, a by-product of ethanol production, to milk replacer as a partial replacement for lactose, on calf performance and health. Other research focused on corn germ and high protein distiller grains, other ethanol production byproducts. Studies of the use of these products in turkey feed has provided information on the best combinations and percentage of these byproducts to increase feed efficiency. The studies also revealed that the wrong combination can reduce gain and showed there is an upper limit to the amount of corn protein that can be tolerated.

Results
The calf and heifer study showed that glycerol is an acceptable energy source for calves and heifers. The knowledge generated by the research is important to dairy nutritionists, commercial poultry nutritionists and poultry producers that formulate and mix feed on-farm. The information is also important to ethanol processors which produce the byproducts and want to provide technical information to buyers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Research will provide information on technologies for use of on-farm energy sources.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Research will provide better understanding of the economic impact and environmental trade-offs of renewable energy sources.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agricultural producers, forest managers, policy makers, government agencies and the public all need more information to make sustainable energy choices.

What has been done
A wide range of MAES research in 2009 focused on aspects of this issue, helping to provide real-world information on options and trade-offs for bio-fuels and sustainable energy production. They ranged from a comparison of energy crops including switchgrass, hybrid poplar, willow and corn stover, to an analysis of the economic and environmental impacts of biofuel feedstock production. The comparison of energy crops showed that corn stover was the lowest-cost of the potential energy crops at $45/dry ton. The analysis of the environmental impacts, however, showed environmental costs--effluent levels increase sharply as stover supply increases. When restriction are imposed on effluent levels, feedstock supply prices increase.

Results
Minnesota's biofuel economy is evolving in a complex economic and environmental policy environment. The economic analysis of biofuel production address questions important to environmental and energy policymakers, producers and processors and consumer. The results of the research are being incorporated in the research economic model to explore how alternative cropping systems might be used to improve water quality while providing biofuel feedstock value.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land

601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #4

1. Outcome Measures

Education and Extension resources increased utilization of biomass resources.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wood ash has shown to be an excellent substitute for agriculture lime. Wood ash comes from the burning of chipped forest biomass material (trees). Using this biomass for land application has positive effects on yields and is an economical use of natural resources.

What has been done
A local Extension educator facilitates and manages a land application plan using wood ash material as an alternative lime to neutralize acid soils for crops in two counties. Besides managing the program, the educator also tests field soil, determines application rates in tons per acre, conducts inorganic lab analysis, tests the liming ability of the wood ash, schedules trucks, and educates farmers about best management practices, crop varieties and rotations to benefit from the applied wood ash, as well as set-backs for streams, ditches, and wells.

Results
Yields of legumes have more than doubled, and soil fertility from the wood ash offsets fertilizer inputs for at least two years. Farmers value the wood ash at approximately $100 per acre. The biggest criticism is not getting enough wood ash to the field in a timely manner when they reseed or for spring field work. Other public good has come from the project. Utilization of biomass saves space in the Virginia, MN landfill - approximately 4000 yards of space is saved for other items and increases useful life of land fill by an equal amount. Local business is benefiting. The biomass plants save a landfill tipping fee of $32.76 per yard, for an annual savings of approximately $131,040.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Research will provide new approaches in the use of waste products as biofuels.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Through the process of photosynthesis, algae is able to use sunlight to absorb carbon dioxide and provide an end product--oil or feedstock. Unlike agricultural crops grown for fuel, algae does not need good quality agricultural land. Algae can be grown anywhere and do not require as much water or even clean water, as other crops.

What has been done
UMN researchers have been investigating using waste water from sewage plants for mass cultivation of microalgae for biofuel production. The potential benefits are two-fold as municipal waste treatment plants often burn the waste sludge and, left alone, it will also emit carbon dioxide. Researchers screened more than 50 algae strains obtained from the field and commercial sources, selected several high potential strains and tested them on a pilot scale production facility. They developed a new harvest technique which uses processes and equipment mostly available in any waste water treatment plant. After harvesting, the algae was dried and their oil extracted to make biodiesel fuel and the remaining biomass was used to make bio-oil.

Results
Results of the research has shown that algae can not only remove pollutants but also make significant quantities of oil that can be turned into fuel. Encouraging results from this research have led scientists to predict commercial scale production within five years.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Other (Misplacement of publications count.)

Brief Explanation

Previous plans of work did not plan for any Extension direct Sustainable Energy programs. Therefore, the prediction of 25 peer reviewed publications should have been placed under research rather than Extension.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		20%	
104	Protect Soil from Harmful Effects of Natural Elements	50%		20%	
123	Management and Sustainability of Forest Resources	0%		20%	
132	Weather and Climate	25%		20%	
605	Natural Resource and Environmental Economics	25%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	44.2	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**
0	0	321133	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	2333616	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	3662079	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research:

The complex issue of climate change requires multi-disciplinary perspectives. MAES supported the work of U of M faculty and specialists in forestry, water quality and the environment, agricultural researchers and economists, along with climate and soil specialists. In 2009, researchers focused on several areas of work related to climate change, including developing

conservation strategies, risk management strategies and practical information on best responses to climate change.

Some specific areas of focus of work in 2009:

Investigating forest responses to warming and wildlife responses to changing habitats.
Developing plant diversity and production strategies to reduce crop vulnerability
Identifying potential changes in soil microbes and threats from invasive pests.
Developing conservation strategies in agricultural inputs to slow or lessen the impact of climate change.
Monitoring climate and using tools such as remote sensing to map and monitor Minnesota resources.
Analyzing carbon sequestration and biomass.
Advising stakeholders and policy makers based on analysis of alternative climate change remediation policies.

Extension:

Climate change has created a divisive political environment because of issues of causality and blame. No matter the cause, changes in Minnesota's climate are affecting Minnesotans. In 2007, changes in the hardiness zone stimulated discussion about potential changes in plant selection among growers. As such changes are monitored, land grant systems are well-situated to recommend adaptive practices. In 2009, University of Minnesota Extension began coordinating efforts to address climate change. Because efforts are just beginning, the program logic model is not developed. It will be developed in the coming years as educators are convened, research is assessed, and effective education and outreach are planned. The directive of this coordinated effort is to: 1) Discover the actual and potential implications of climate change on crop and ecological systems, economies and other sectors. 2) Enhance the public's engagement and receptivity to implications of climate change regardless of causality, and 3) Transfer knowledge that allows producers and environmental control agents to adapt to climate change by seizing the opportunities of new crops, new varieties and new management practices that maintain the viability of production economics and infrastructures while minimizing damage from invasive pests, diseases and changes in the hydrologic regime.

In 2009, progress was made in coordinating this program area: 1) A key liaison was hired to coordinate Extension's response. 2) Thirty-five Extension faculty were engaged in discussions of the influence of climate change on Extension programming. 3) Relationships with key research and management resources within and external to the University were established, and literature was reviewed. Primary research resources currently include the Minnesota Agricultural Experiment Station (MAES), the UMN Natural Resources Research Institute, Departments of Horticulture and Forest Resources, the Water Resources Center and non-University partners.

2. Brief description of the target audience

There is a wide range of target audiences for MAES research related to climate change. These include other scientists, state and federal policy makers and policy analysts who work in the area of natural resources, community development and agriculture, water resources managers, climatologists, land managers and the public.

As Extension programming is developed, audiences will be targeted. Targeted audiences must be those with whom we can make a difference, and who can benefit from research-based information. Primarily, we will choose audiences whose production systems will be influenced by climate change, as well as those who consult or influence the decision-makers of these growers and producers. Secondary audiences to be considered will be decision-makers and leaders responsible for preparing communities for change. This includes local government jurisdictions, state and local elected officials, producers and environmental groups, human health services, FEMA, and Extension educators working in food and nutrition, family and community life issues.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2009

Plan:

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan			
Actual	0	42	42

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A multi-disciplinary group of Extension faculty will consider the influence of climate change on the content and delivery of their educational programming. (Target expressed as number of faculty involved.)

Year	Target	Actual
2009	{No Data Entered}	35

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Research will develop new knowledge to inform public policy makers and forest land owners about the capacity of forest carbon sequestration.
2	Studies of forest responses to warming and wildlife responses to changing habitats will increase knowledge for climate change responses
3	Research will develop information to develop tracking of climate change and early warning systems in the environment.
4	Research on plant biology will provide information to sustain the environment under changing conditions.

Outcome #1

1. Outcome Measures

Research will develop new knowledge to inform public policy makers and forest land owners about the capacity of forest carbon sequestration.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As concern about the rising carbon dioxide levels in the atmosphere increase, there has been a search for natural solutions. One of those is the carbon sequestration potential of forest land. But actual information to support this theory is lacking.

What has been done
UMN forest biology and ecology research analyzed North American forest plots and found a highly limited capacity for carbon sequestration.

Results
This research has many indirect economic impacts. The analyses of the limits to carbon sequestration potential is helping to alert government agencies to the danger of attempting to build state greenhouse emissions reduction strategies on the back of forest sequestration. Instead, the research indicates that more economically beneficial and realistic means of conserving fossil fuels and of developing alternative energy sources should be targeted.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
132	Weather and Climate
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Studies of forest responses to warming and wildlife responses to changing habitats will increase knowledge for climate change responses

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
To respond to climate change, public policy makers and natural resource managers must have reliable, unbiased information on actual conditions and change over time.

What has been done
At the UMN Cloquet Forestry Center researchers are looking at tree physiological response to warming at the boreal-temperate forest meeting point. The database of almost 100 years of climatology data, over 50 years of timber harvesting records, and 40 years of reforestation records in digital form is providing information on responding to changing forest needs. In other studies, MAES researchers have amassed a 12-year record of ecosystem/atmospheric carbon and water exchange at a series of sites in northern forests and wetlands.

Results
The research is producing a rich record to track the impacts and magnitude of climate change in forest ecosystems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
123	Management and Sustainability of Forest Resources
132	Weather and Climate
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Research will develop information to develop tracking of climate change and early warning systems in the environment.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Growing evidence suggests that the climate of the Great Lakes region is already changing: winters are getting shorter; annual average temperatures are growing warmer; the duration of lake ice cover is decreasing as air and water temperatures rise.

What has been done
Studying fish species tolerance to water temperatures and dissolved oxygen concentration has developed information to help predict the potential consequences of increasing temperatures due to changing climate. Researchers developed a Species Sensitivity Distribution Model based on fish species tolerance levels.

Results
The model has been adopted and used by the Minnesota Pollution Control Agency when developing a Total Maximum Daily Load level for dissolved oxygen and thermal pollution in Minnesota streams and waters.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Research on plant biology will provide information to sustain the environment under changing conditions.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
One of the challenges of global climate change is it has highlighted how much we still don't know about global plant ecology. However, developing that basic information is critical to finding ways to respond to environmental change in ways that sustains the environment.

What has been done
UMN forest research has discovered universal rules of leaf design and the scaling of plant physiology from seedling to tree, from cell to ecosystem, and from the stand to the globe.

Results
The research radically improves the understanding of and ability to predict land ecosystem responses to global environmental changes. This includes responses of forests and grasslands to biodiversity loss, carbon dioxide emissions and climate change.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
123	Management and Sustainability of Forest Resources
132	Weather and Climate

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities

Brief Explanation

The external factors that have and are related to this the Climate Change Planned Program have mainly served to increase the importance and visibility of the program and its research. Minnesota is experiencing a more volatile climate, with wider temperature swings, flooding events across the state and especially in northwestern Minnesota, and increased number of freeze/thaw cycles. This is focusing public attention on climate change. At the same time, increasing emphasis and interest in biofuels development is highlighting the potential climate change impacts on that field, as well as the environmental trade-offs of biofuel development and use. And, as a basic constraint that all the UMN research and Extension Planned Programs are facing, economic stresses limit the range and depth of those programs just as their importance increases.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	0%		20%	
701	Nutrient Composition of Food	0%		50%	
703	Nutrition Education and Behavior	90%		20%	
704	Nutrition and Hunger in the Population	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	17.5	0.0	15.6	0.0
Actual	14.9	0.0	28.8	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**
200521	0	311084	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1207625	0	1811718	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
7685302	0	2247717	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Minnesota Agricultural Experiment Station research and Extension outreach combined is providing both reliable information and practical outreach to families and communities. MAES supports research to develop better understanding of the nutritional content and health benefits of foods, as well as to develop methods to help the food processing industry provide healthy food. Extension's nutrition education programs help people with limited income discover how to make healthy food choices while stretching food dollars. These programs are complemented by outreach to families, schools and communities for a more systemic approach to disease and obesity prevention. Some examples of program impact in 2009:

An Extension nutrition program targeted Latino immigrants with community-based events which had a significant effect on participants' knowledge and increased intake of fruits and vegetables.

Nutrition researchers worked with local school districts looking at whether kids will eat whole grains and other healthy foods, and how school nutrition directors can make meals healthier. They found that a gradual approach to improving children's diets can be successful both at school and home.

Minnesota is home to the largest Somali immigrant population in the U.S. Extension nutrition education assistants have been teaching them how to create nutritious meals on a tight budget and help families work through new challenges such as children who embrace American fast food, and issues such as dealing with Muslim dietary restrictions in a foreign land.

Researchers studied barriers to providing good food on the school lunch tray, how to overcome those barriers and how to duplicate school nutrition program successes on a larger scale. Other research looked at whether funding for school lunch programs is adequate to meet nutritional guidelines. It showed that even though healthier meals have higher labor costs, the actual ingredients may cost less.

Researchers are developing knowledge on food choices to support human health, such as the impact of soy products on cardiovascular health and whole grains on diabetes. Extension outreach brings that information to producers, communities and families. For example, research on the cancer-fighting nutrients in fruits and vegetables grown in Minnesota may lead to a new market concept of a branded product line of produce certified to be high in disease-preventing compounds.

As children's health is supported within the context of a healthy family, MAES continued to support research into the nutritional benefits of foods on human health. Examples of research results in 2009:

The completion of an animal study examining the effect of consumption of whole grain flours on diabetes control confirmed that eating whole grain food led to improved glucose control and insulin sensitivity early in the course of the development of diabetes. This emphasizes the importance of consuming whole grain products to help prevent the development of type 2 diabetes.

Other research with implications for diabetes control looked at the metabolism of dietary fatty acids and determined that they are metabolized differently based on their chemical structures. The information gained from this research gives nutritionists better information to tailor dietary recommendations to support health.

An analysis on changes in satiety and related hormones after gastric bypass surgery has produced information that has been included in education for dietitians, and could lead to a change in clinical practice in the dietary management of patients undergoing gastric bypass surgery.

A study of the effects of the consumption of soy and seaweed on hormones in post menopausal breast cancer survivors showed that both had beneficial effects.

MAES research had previously established the benefits of cruciferous vegetables on inhibiting colon cancer. Current research building on those results has improved a method for quantification of total glucosinolates in cruciferous vegetables, increasing the understanding of functional foods.

A study of cancer health disparity in the Asian American immigrant community in Minnesota revealed a low level of cancer literacy and understanding of cancer prevention strategies. The results are being used to help customize messages and strategies on cancer prevention and screening to the most vulnerable subgroups of Asian American immigrants and refugees in Minnesota.

In 2009, two new evidence-based programs were developed to enrich Extension's outcomes related to childhood obesity. One effort, *Go Wild with Fruits & Veggies!,* is engaging youth in a school-based learning experience that positions fruits and vegetables as healthy, appealing and fun. An evaluation study described here gives evidence that the program does change eating habits, and so the team will begin replicating the program statewide in 2010. The curriculum is delivered by those teaching SNAP-ed or EFNEP in elementary schools with 50% free or reduced lunch participation. Additionally, schools will be offered training for parent volunteers or teachers to use the curriculum in schools that are not SNAP-ED eligible. Beyond face-to-face education, the program uses social marketing to promote healthy eating through posters, classroom activities and newsletters. The program contains activities for school food service personnel and family members, as well. These activities stimulate new predispositions toward fruits and vegetables within environments where children learn, play and eat.

Another effort, *Operation Frontline*, is engaging low-income communities in hands-on learning experiences with volunteer chefs who demonstrate that low-cost food can be delicious and healthy. Volunteer and sponsor development led to a kick-off in the Twin Cities in November of 2009. The program is already growing in popularity, and so replication around the state is happening sooner than expected.

2. Brief description of the target audience

MAES research in childhood obesity and human health is addressed to human health and nutrition professionals, the food industry, students and faculty in health and nutrition, applied economics, and family development, state and local policy makers and governments, directors of school lunch programs, the food and food service industries, and consumers.

Childhood Obesity is addressed at Extension through its Nutrition Education programs. These programs reach out to people on limited incomes with nutrition and food budgeting challenges. In order to reach children where they learn, play and eat, nutrition education provides information to parents, schools and communities. By making these institutions more aware of nutrition, children are provided models of healthy lifetime habits.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	22330	1456600	29500	69700
Actual	37912	0	55889	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	27	
Actual	7	33	40

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes will be provided in individual and group settings that teach about diet quality, food safety, food resource management and food security. (Target expressed as number of workshops/classes taught.)

Year	Target	Actual
2009	3075	4034

Output #2

Output Measure

- School Food Service Institutes will be held for school food service workers and managers so that they implement healthy food service programs for Minnesota's public schools. (Target expressed as number of institutes held each year.)

Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	An increased number of individuals will use research-based information from Extension to improve their intake of healthful foods. (Target expressed as percentage of participants who self-report change.)
2	Food service personnel will use research-based information from Extension to improve students' healthy eating. (Target expressed as percentage of workshop participants reporting use of materials.)
3	Program participants will increase human nutrition knowledge. (Target expressed as percentage of participants who report knowledge change.)
4	Program participants will increase their skills in selecting and buying food that satisfies nutritional needs, managing food budgets and preparing affordable foods within the food groups. (Target expressed as percentage of participants who reported learning these skills.)
5	Research will provide information to improve the nutrition of school lunch programs.

Outcome #1

1. Outcome Measures

An increased number of individuals will use research-based information from Extension to improve their intake of healthful foods. (Target expressed as percentage of participants who self-report change.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	79

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Childhood obesity and its negative effects threaten low-income families disproportionately because of the cost structures of food, the availability of healthy foods, and poor choices that happen because of lack of information.

What has been done
Classes, workshops and hands-on demonstrations are offered to people on limited incomes with nutrition and food budgeting challenges.

Results
Retrospective pre-post end-of-session evaluations, as well as 24-hour diet recall tests at the beginning and end of multiple session courses, demonstrated that 79% of individuals had improved their intake of healthful foods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Food service personnel will use research-based information from Extension to improve students' healthy eating. (Target expressed as percentage of workshop participants reporting use of materials.)

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Program participants will increase human nutrition knowledge. (Target expressed as percentage of participants who report knowledge change.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	75	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Childhood obesity and its negative effects threaten low-income families disproportionately because of the cost structures of food, the availability of healthy foods, and poor choices that happen because of lack of information.

What has been done
Classes, workshops and hands-on demonstrations are offered to people on limited incomes with nutrition and food budgeting challenges.

Results
Restrospective pre-then post evaluations demonstrated that 80% of participants had increased their knowledge about human nutrition.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #4

1. Outcome Measures

Program participants will increase their skills in selecting and buying food that satisfies nutritional needs, managing food budgets and preparing affordable foods within the food groups. (Target expressed as percentage of participants who reported learning these skills.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	73

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Household budget managers can make a significant difference in their household's diet by selecting and buying food that satisfies nutritional needs. This is difficult with tight budgets, limited food availability, and histories of poor diet choices.

What has been done
Nutrition education programs blended nutrition education and family resource management education to help household food buyers manage their food-buying budgets.

Results
Among participants who attended a minimum of six nutrition education sessions, 73% reported they had learned important skills in food budget management in a post-series evaluation report.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #5

1. Outcome Measures

Research will provide information to improve the nutrition of school lunch programs.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

MAES research in childhood obesity and human health is addressed to human health and nutrition professionals, the food industry, students and faculty in health and nutrition, applied economics, and family development, state and local policy makers and governments, directors of school lunch programs, the food and food service industries, and consumers.

What has been done
A study of the economics of school lunch program showed that even though healthier meals have higher labor costs--because more preparation is involved than with convenience foods--the actual ingredients may cost less. Researchers looked at the rates paid to schools and whether they should be adjusted. At the same time UMN food science researchers have worked with local school districts to track students' acceptance of healthier foods on the school lunch tray, including whole grains. Those studies have shown that gradual introduction of healthier food choices can be successful.

Results
School food research is bringing scientists from many disciplines, the food industry and government working cooperatively to help people eat healthy, affordable, appealing food. The school lunch research has influenced the 2009 National Academies of Sciences, Institute of Medicine report on School Meals: Building Blocks for Healthy Children. The economic analysis is informing policy makers at a particularly important time since Congress will reauthorize the Child Nutrition Act in 2010, which will include revisions affecting the school lunch program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
703	Nutrition Education and Behavior

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy
- Appropriations changes
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

This year, economic hard times for low-income families increased demand for the program.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants

Evaluation Results

A nutrition education curriculum was designed to use engaging cartoon animal characters to teach children (third through sixth grades) about the importance of eating fruits and vegetables, especially highlighting local foods. The curriculum was piloted in three schools in an urban school district. A quasi-experimental pre/post design included two intervention schools and a control school. The percentage of minority enrollment in the schools ranged from 63% to 82% and the percentage of children eligible for free or reduced-price school meals ranged from 65% to 87%.

Two Nutrition Education Assistants implemented the program in classrooms as part of physical

education classes or as an enrichment to regular classes on a weekly basis for seven weeks. A pre-post questionnaire was used to evaluate change in students' like of fruits and vegetables, willingness to try new fruits and vegetables, frequency of preparing vegetables for meals and snacks, and knowledge gains. Change in intake of fruits and vegetables was measured using 24-hour dietary recalls obtained before and after the lessons were implemented. Physical activity was also assessed.

Pre and post responses were completed by 132 children in 7 classrooms in the 2 intervention schools and by 121 children in 6 classrooms in the control school. Results indicated that vegetable intake increased in the intervention group, but decreased in the control group. Fiber and fat intake improved for the intervention group but not in the control group ($p<.05$), based on pre-post 24-hour dietary recall. There was no significant difference between intervention and control in terms of fruit intake or physical activity levels. The study indicated there were slight increases in physical activity and decrease in sedentary activities for the intervention group, but the differences were not statistically significant.

Key Items of Evaluation

A school-based curriculum nutrition education effort that used cartoon animal characters to teach children about eating fruits and vegetables demonstrated success in changing diets among children. Results indicated that vegetable intake increased in the intervention group but decreased in the control group; fiber and fat intake improved for the intervention group but not in the control group ($p<.05$).

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	10%		60%	
503	Quality Maintenance in Storing and Marketing Food Products	45%		40%	
504	Home and Commercial Food Service	45%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	9.2	0.0	11.6	0.0
Actual	10.3	0.0	19.0	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**
495318	0	3617	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1531438	0	1206337	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
480651	0	1421196	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research

UMN food safety research has focused on designing new techniques for detecting contaminants and pathogens in foods during production, processing and storage, and evaluating the farm to table movement of food to determine where contamination may occur. Some examples of research results in 2009 include:

Research on non-thermal pasteurization of liquid foods using concentrated high intensity electric field process showed that the process was very effective in reducing bacteria in liquid foods such as juice and milk. It is also low cost and energy efficient. The researchers developed a small continuous prototype that can be used for tests and demonstration. Several major food companies are very interested in the invention.

Researchers continued to evaluate sanitizers that can be used in organic food production. Last year's Accomplishment Report described the promising results of research on the use of electrochemically activated water as a sanitizers. The researchers are continuing their work and the findings were presented at the 2009 annual meeting of the International Association for Food Protection.

Researchers have determined the mechanisms by which E Coli survives desiccation conditions. The understanding of the mechanisms of desiccation tolerance can be applied to safe food packaging.

Researchers identified and tested antimicrobial combinations that proved to be an effective mixture in inhibiting Listeria microbes in fresh cheese and deli meats and may also extend shelf life of the food without noticeable changes in product flavor.

Extension

In 2009, the Food Safety team maintained their program outreach to retail food service businesses around the state, and continued to work with the processing industry to make processes safer. A growing initiative this year is reaching those who consume and sell local foods. Education about safe canning for individuals' use has increased, and local farmers' markets continue to grow in popularity. Food safety education must reach those who preserve and sell these local foods. This work has benefits beyond food safety, because assuring that foodborne illness outbreaks do not occur helps local entrepreneurial activity succeed.

2. Brief description of the target audience

Research in food safety is important to the food safety industry, clinical laboratories, microbial engineers, organic farm producers and other agricultural producers, food processors including the dairy and meat industries, companies engaged in the storage,transportation, selling and serving of foods, and consumers.

Extension food safety programs reach food service managers, food service providers, food processors, food preservers in the home, and local food-preserving entrepreneurs.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	1600	7400	0	0
Actual	4152	17000	24	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	0	
Actual	0	15	15

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- On-line and face-to-face classes will be delivered for food service workers in English. (Target expressed as number of courses offered.)

Year	Target	Actual
2009	67	138

Output #2

Output Measure

- Content for food service professionals will be translated into Spanish and other languages and adapted for the cultural orientations for related participants. (Target indicates number of courses available in languages other than English.)
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants of the Food Safety program classes will achieve significant learning gains regarding research-based food safety knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Food Safety classes.)
2	Participants of the Food Safety program classes intended to improve participant horticulture practices will significantly improve their food safety practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their food safety practices as a result of attending classes intended to improve food safety practices.)
3	The MN Dept. of Health reports an 18-20% decrease in inspection critical violations in establishments that employ a Certified Food Manager. Food Safety Education programs will certify food managers. (Target expressed as % of pass rates.)
4	Those who preserve food at home and in local foods markets are practicing methods that keep food safe.

Outcome #1

1. Outcome Measures

Participants of the Food Safety program classes will achieve significant learning gains regarding research-based food safety knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Food Safety classes.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	70	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Minnesota Food Code adopted by the Minnesota Department of Health and the Minnesota Department of Agriculture requires that food service establishments employ a Certified Food Manager. The food service industry employs 9% of all workers, and turnover is 300-900% annually. This indicates an ongoing need for high-quality certification resources. Extension is focused on providing this certification in smaller cities and towns so that workers do not have to drive to the metro area.

What has been done
In January through December 2009, 577 ServSafe exams were given by the University of Minnesota Extension after program delivery to first-time class members, re-test participants, and online course participants.

Results
As measured by the Life Skills Evaluation System completed by 466 participants, the program improved knowledge and behavior in problem-solving, keeping accurate and useful records, decision-making, communication, food safety regulations and trying new techniques in food safety. Over 90% of participants made positive gains from pre-program to post-program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service

Outcome #2

1. Outcome Measures

Participants of the Food Safety program classes intended to improve participant horticulture practices will significantly improve their food safety practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their food safety practices as a result of attending classes intended to improve food safety practices.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	65	72

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
(Note: The outcome measure above incorrectly includes the word "horticulture" to describe the practices taught.) The Minnesota Department of Health requires Certified Food Managers to renew their certification every three years. These courses make eating out safer, and build job skills among low-income and working class employees.

What has been done
340 Certified Food Managers attended renewal courses through 20 separate sessions. Most of these courses served greater Minnesota areas so that employees do not have to drive to the Twin Cities to get the necessary certification.

Results
To determine whether knowledge changes resulted in new workplace practices, an on-line survey was conducted one month after the class. There was a 24% response rate. Of responders, 67.4% reported an increase in hand-washing; 52.3% reported an increase in thoroughly cleaning food contact surfaces; 50% reported increase in use of glove, tongs or deli tissue; 47.7% reported increased use of test strips; and 47% increased their use of thermometers to assure temperatures.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service

Outcome #3

1. Outcome Measures

The MN Dept. of Health reports an 18-20% decrease in inspection critical violations in establishments that employ a Certified Food Manager. Food Safety Education programs will certify food managers. (Target expressed as % of pass rates.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	95	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Education, testing and certification of food service managers is known to reduce critical violations.

What has been done
Extension trains and certifies food service managers, with a special emphasis on serving non-metro areas.

Results
Ninety percent of those tested for certification passed the test.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service

Outcome #4

1. Outcome Measures

Those who preserve food at home and in local foods markets are practicing methods that keep food safe.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is an increase in interest in preserving food at home, and entrepreneurs are selling more local foods through local food markets throughout the state. Home-preserved foods can become unsafe if mishandled. It is essential that consumers follow USDA and research-based food preservation recommendations to reduce the risk of food borne illness.

What has been done
U of MN Extension programs help maintain a safe food supply through educational programs and resources that provide information, improve decision making and increase skills related to food preservation. The educational program aims to help participants:
*learn the sources of credible, research-based food preservation information;
*employ specific skills that will improve their ability to preserve foods safely; and,
*adopt or change food preservation practices.

Results
A follow-up survey via e-mail was conducted. Response rate was 35%. Respondents indicated they had made these and other changes after attending the workshops:
*79% used up-to-date food preservation information.
*62% sanitized food contact surfaces before preserving.
*55% did not take short cuts.
*52% processed canned foods for the recommended length of time.
*52% blanched and cooled vegetables for the recommended length of time for freezing.
*45% used only tested recipes for canning salsa.
*45% froze more foods than other food preservation methods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy

Brief Explanation

A growing entrepreneurial economy for local foods created service demands in 2009.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

4-H Programs in Minnesota

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
805	Community Institutions, Health, and Social Services	20%		0%	
806	Youth Development	80%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	44.1	0.0	0.0	0.0
Actual	55.7	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**
1293504	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3017968	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
8088072	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension
In past reports to CSREES, we described evaluations that proved that 4-H club membership positively affects youth development and life choices. With this knowledge, the team is focused on growing club membership so that efforts are put toward activities known to make a difference. In 2009, there was marked progress in club participation in 4-H. 4-H club membership for 2009 was 35,899, an increase of 9.2% from 2008 and a 38.1% increase over the 2004 statewide baseline data of 26,000.

There were two major developments in Minnesota's 4-H programs in 2009:
1) A program theory for Minnesota 4-H programs was developed. This program theory will guide and measure a promise to children and youth for a quality 4-H learning experience. The program theory outlines two primary outcomes -- self-directed learning and leadership through active citizenship expected for children and youth who have sustained participation in program

offerings.
2) Two partnerships were engaged to address current issues through youth development. One was a multi-state partnership to implement the *Power of Wind* Curriculum. This pilot project built from the new curriculum funded by the 3M Foundation. State 4-H organizations involved in the project include Texas, South Dakota, Wisconsin, Iowa, Missouri and Minnesota. Operation Military Kids is a multi-state initiative to create a supportive network for youth with a parent deployed in military service. This successful project engages partnerships with the National Guard, Family Assistance Centers, the American Legion, Boys and Girls Clubs, the Minnesota Department of Education, the Army Reserves and the Minnesota Child Care Resource and Referral Network.

Research
No Agricultural Experiment Station dollars are invested in 4-H. Still, 4-H is based on solid research about child development available at the University of Minnesota and from other scholarly resources.

2. Brief description of the target audience

The target market for 4-H clubs is youth. In the coming five years, strategic recruitment as well as training for local club leaders, has been designed to increase 4-H club membership. Training and resources for support staff and volunteers help them create quality learning environments in clubs that are inviting, accessible and welcoming to a broader range of Minnesota youth. The Urban Youth Learn audience engages adults working with schools, agencies and organizations and volunteers interested in building sustainable youth programs. (Sixty-six percent of urban club members are youth of color.) Youth leadership programs target young learners who are working in the context of their neighborhood or community to make a difference.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	13500	6500	113000	0
Actual	12270	30426	237822	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	0	
Actual	2	0	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Well-trained adult volunteers will work with Minnesota's young people. (Target expressed as percentage of volunteers trained in effective practices for working with 4-H youth.)

Year	Target	Actual
2009	85	83

Output #2

Output Measure

- Learning settings (or point of service) in 4-H will meet the essential elements that promote positive youth development. (Target expressed as scores out of 20 items on the 4-H Youth Program Survey.)
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- The number of underserved youth participating in 4-H program activities will increase yearly. (Target expressed as a percentage of youth involved in programs from groups targeted as "underserved".)

Year	Target	Actual
2009	{No Data Entered}	24

Output #4

Output Measure

- Participants will be satisfied with the out-of-school activities delivered through the 4-H program. (Target expressed as percentage of those who are satisfied.)

Year	Target	Actual
2009	{No Data Entered}	84

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Youth involved in 4-H programs will demonstrate skills and knowledge on target with their youth development. (Target expressed as a percentage of 4-H youth showing appropriate skills.)
2	Youth participating in 4-H programs will demonstrate more civic engagement and volunteerism in their communities than a statewide comparison group. (Target expressed as a percentage of difference between the two groups.)
3	Youth participating in 4-H programs will be less likely to engage in risk behaviors (e.g., smoking, drinking, riding in cars with people drinking) than a comparison group of Minnesota youth. (Target expressed as an average of difference among five targeted behaviors.)

Outcome #1

1. Outcome Measures

Youth involved in 4-H programs will demonstrate skills and knowledge on target with their youth development. (Target expressed as a percentage of 4-H youth showing appropriate skills.)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Youth participating in 4-H programs will demonstrate more civic engagement and volunteerism in their communities than a statewide comparison group. (Target expressed as a percentage of difference between the two groups.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	21	13

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
One example of a civic engagement activity in 2009 was a statewide project for analog-to-digital conversion. The analog-to-digital conversion presented an opportunity for 4-H youth and adults to provide community service through DTV teams. Many community members lacked technical understanding of how to make the conversion. This issue was critical in Greater Minnesota communities where television is often the main source of information about weather or national emergency updates.

What has been done
DTV Teams educated and assisted community members as they converted televisions to the new signal. Thirty-one county 4-H teams formed and 142 youth served an estimated 189 hours (1.3 hours / person) and 72 adults teamed with youth to serve an estimated 180 hours.

Results
As a result, 1,541 individuals were reached through community groups. Over 700 individual households were reached. Almost 700 were provided information at county fairs, and 827 individuals were reached through community events. An additional 82 received phone calls by team members.

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #3

1. Outcome Measures

Youth participating in 4-H programs will be less likely to engage in risk behaviors (e.g., smoking, drinking, riding in cars with people drinking) than a comparison group of Minnesota youth. (Target expressed as an average of difference among five targeted behaviors.)

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (Evaluation report readiness)

Brief Explanation

4-H continues to be engaged in national evaluation strategies that are generating new information about program impact on various measures of positive youth development outcomes. (National 4-H Study of Positive Youth Development, Tufts University) These were available in 2007 and 2008. New data are being reviewed that will be available in 2010; however, no new information was analyzed in 2009.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Youth Work Institute

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
805	Community Institutions, Health, and Social Services	50%		80%	
806	Youth Development	50%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	12.8	0.0	0.0	0.0
Actual	11.6	0.0	0.9	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**
354010	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1492054	0	76452	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
988824	0	12644	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Youth Work Institute programs achieve goals to: 1) conduct educational training that links research and practice; 2) conduct community forums and public seminars; 3) organize partnerships and collaborations; 4) develop publications and educational products, and 5) conduct applied research and evaluation. All Institute activities bridge university research and community practice to promote an asset-based youth development framework and to promote accountability and quality in program practice.

In 2009, the Youth Work Institute engaged in extensive stakeholder analysis to inform future decisions. To inform the building of new web navigation and content, the Institute developed "user personas" which tested new content against the interests of target audiences. The process incorporated stakeholder testing at multiple points to validate proposed improvements and address issues that were identified. It also included testing by eight key users in the University of Minnesota's Usability Lab.

Current users of Youth Work Institute programs were asked for input about future directions and priorities. Recommendations fell into three categories:

• **Continue**. Stakeholders value the quality of the Institute's professional development offerings and its professional staff. They view the Institute as a reliable resource for the latest research, community responsiveness, and strong leadership for the field. These critical contributions need to be sustained. Minnesota's youth work community would be left without assistance that the Institute provides.

• **Improve**. A clear theme emerged around the Institute's need to improve its marketing and communications. Stakeholders interviewed recommend that the Institute improve its online presence, through both increased distance education and a more user-friendly web site.

• **Innovate**. The stakeholders encouraged the Institute to explore ways to reach more teachers and other untapped youth workers. In addition, stakeholders are calling upon the Institute to explore possibilities for relationship-based opportunities for professional development and organizational learning through coaching and broader coalitions where colleagues can come together to learn and network.

2. Brief description of the target audience

The Youth Work Institute serves individuals, organizations and systems working with and on behalf of youth. This includes those who interact with youth through community-based programming as well as decision-makers who can improve the quality and quantity of opportunities for youth to be involved in out-of-school-time activities. Examples include: youth program directors, youth workers, volunteers, teachers, coaches, parents and elected officials, as well as community collaborative, state agencies, funders and policy makers.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	4200	7500	0	0
Actual	4469	8185	0	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	2	0	
Actual	3	0	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Educational events will be delivered through public offerings and contracts with youth-serving organizations. (Target expressed as the number of events, classes, workshops, etc. offered.)

Year	Target	Actual
2009	120	128

Output #2

Output Measure

- The number of organizations participating in capacity building consultation and technical assistance will increase. (Target expressed as number of participating organizations.)

Year	Target	Actual
2009	80	55

Output #3

Output Measure

- Individuals representing diverse organizations will participate in networks and collaboratives supported by Youth Work Institute Staff. (Target expressed as number of organizations involved.)
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Educational offerings will be delivered through distance education. (Target expressed as the number of online offerings.)

Year	Target	Actual
2009	{No Data Entered}	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants at public educational offerings will report that they increased their knowledge of current research and effective program practices. (Target expressed as a percentage of participants.)
2	Youth Development organizations participating in consultation and technical assistance will report that their participation increased their ability to effectively serve youth. (Target expressed as percentage of those in agreement.)
3	Youth development professionals will report that they used Youth Work Institute products and publications to strengthen their youth programs. (Targets expressed as percentage of practitioners utilizing them.)

Outcome #1

1. Outcome Measures

Participants at public educational offerings will report that they increased their knowledge of current research and effective program practices. (Target expressed as a percentage of participants.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	85	92

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research is the backbone of effective youth development programs. It is critical that practitioners understand the latest youth development research and related best practices.

What has been done
The Youth Work Institute's offerings are based in the latest research, and link that research with practical ways to apply it to daily practice.

Results
Evaluation summaries for all Youth Work Institute classes in 2009 demonstrated that 92% of respondents agreed that their understanding of the research related to the session topic was enhanced.

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #2

1. Outcome Measures

Youth Development organizations participating in consultation and technical assistance will report that their participation increased their ability to effectively serve youth. (Target expressed as percentage of those in agreement.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	82

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research shows that programs that demonstrate high quality features show positive effects on youth outcomes, whereas programs absent these quality features showed no effect. Quality at the point of service--the specific practices, processes and interactions among adult staff and youth in program settings--are best measured through observation.

What has been done
The Youth Program Quality Intervention (YPQI) was a two-year, multi-state, randomized controlled study funded by the W.T. Grant Foundation. It explored links between program quality and staff performance at point of service and sought insights into the following questions: 1) Can the YPQI change staff performance at the point of service? 2) Can accountability tools empower managers and staff to improve point-of-service quality? Minnesota, led by the YWI, contributed 54 programs to the study.

Results
Preliminary findings indicate that the YPQI has a positive effect on youth program quality at the point of service both nationally and in Minnesota. In addition, programs with more robust implementation of quality improvement interventions generally exhibited greater overall affects on program quality. The study results have immediate implications for program staff, managers, and policymakers who hope to have an impact on youth development in an environment of shrinking resources. 82% of the 33 Quality Matters sites improved in one or more dimension of quality (e.g., safe environment, supportive environment, interaction, engagement).

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #3

1. Outcome Measures

Youth development professionals will report that they used Youth Work Institute products and publications to strengthen their youth programs. (Targets expressed as percentage of practitioners utilizing them.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	97

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Professional development opportunities need to go beyond increasing knowledge and skill-building. Participants need to be able to transfer or apply new knowledge and skills into their practice. This requires sufficient time, support and resources to master and integrate new content and skills.

What has been done
The Youth Work Institute provides professional opportunities to apply research to daily practice. From toolkits to learning circles, workshops to dialogues, the Youth Work Institute provides useful information and resources to those who work with and on behalf of youth.

Results
Evaluation summaries for all Youth Work Institute classes in 2009 demonstrated that 97% of respondents agreed that they will be able to apply what they learned to their work. A retrospective pretest of one program, Youth Work Matters, was administered to 12 participants. Participants were asked to rate themselves (1 being "not at all" to 5 being "to a great extent") on 18 items before and after the training. Results were statistically significant for each of the 18 items that addressed objectives from eight program sessions. Participants reported the greatest change in their level of understanding and ability to articulate long and short term outcomes for youth, recognize that adultism creates barriers to positive youth development, and consider basic youth needs in my daily practice.

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other ()

Brief Explanation

We did not report against our state defined output, "Individuals representing diverse organizations will participate in networks and collaboratives supported by Youth Work Institute Staff." The Youth Work Institute has tried several approaches to stay connected to practicing youth workers. We began supporting the Twin Cities YouthWork Coalition with networking and convening events to help build the field. In mid-2008 we focused on getting youth workers into existing Institute workshops and events; this approach has proven as successful as special TCYC events.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- Case Study

Evaluation Results

Minneapolis Foundation Evaluation. The Minneapolis Foundation contracted with the Extension Center for Youth Development to evaluate its efforts to prevent youth violence through both grant making and community leadership efforts. By aligning its grant making and community leadership efforts, The Foundation's multifaceted approach contributed to a decline in violent crime. The Foundation created momentum, convened meetings, forged partnerships, lent credibility, leveraged support and worked to maintain focus on the issue of youth violence. Working collaboratively, and with the participation and leadership of The Minneapolis Foundation, city and community leaders recognized that sustained reduction in violent crime among young people required more than aggressive law enforcement; this was more than a public safety issue. The public health framework that has been adopted in the city of Minneapolis and the state of Minnesota recognizes youth violence as a preventable epidemic that requires a sustained, proactive approach in much the same way as The Minneapolis Foundation has for the past five years.

Key Items of Evaluation

The Youth Work Institute has become a respected source of research to youth workers and to institutions supporting youth development in Minnesota. Its research about its own programs, and about initiatives with which they are a part, conclude that the Youth Work Institute is shifting attitudes about quality program delivery in Minnesota.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Leadership and Civic Engagement

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	60%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	40%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	11.1	0.0	0.0	0.0
Actual	11.0	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**
529643	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1958810	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
627610	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

There continues to be great demand for Leadership and Civic Engagement programs from the University of Minnesota Extension. In 2009, new partnerships resulted in the development of additional cohort programs that are known to make a difference in communities. New evaluation studies were conducted to assess the influence of leadership education on community capitals. In addition, social capital assessment research continued as developers sought to validate a tool developed by Extension last year to assess bonding, bridging and linking social capital in communities.

Members of the leadership team also created an award-winning resource guide in 2009 that articulates key management principles that Minnesota has found most effective in creating leadership education programs. This Building Leadership

Programs Management Guide can help communities and Extension educators nationwide develop leadership programs that make communities more vital.

No Agricultural Experiment Station funds are invested in this program area; however, research for the program is tapped from the University of Minnesota's Humphrey Institute of Public Affairs.

2. Brief description of the target audience

Leadership and Civic Engagement programs reach out to five primary audiences: local government agencies, employees and leaders, nonprofit organizations and collaborative associations, foundations and their grantees, the natural resources sector, and the agricultural sector. In 2009, cohort leadership and civic engagement groups were successfully developed for:

- sixteen small towns with high rates of poverty;
- emerging leaders in two counties;
- law enforcement officers in one county;
- Latino immigrants in one county;
- agriculture and rural leaders statewide and in the northwest region of the state;
- county government leaders in three areas of the state;
- environmental leaders statewide, public health staff statewide;
- chamber of commerce leaders in one county;
- Extension leaders across the state; and,
- community gardeners in Metro Minneapolis.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	8000	5000	500	0
Actual	5366	10883	304	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	1	0	
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Community cohort groups will meet to develop leadership skills and create civic connections. (Target expressed as number of cohort groups convened.)

Year	Target	Actual
2009	20	30

Output #2

Output Measure

- Community assessments and research projects will help communities understand their strengths related to civic leadership and social capital. (Target expressed as number of local assessments conducted.)
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Workshops and other structured gatherings will provide communities with increased skills, knowledge and behaviors related to leadership and civic engagement. (Target expressed as number of events.)

Year	Target	Actual
2009	200	171

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Community leadership cohort members will increase the intensity of their leadership. (Target expressed as the percentage increase in the number of leadership roles held by members of U-Lead cohort groups.)
2	U-Lead cohort members will increase leadership skills and knowledge. (Target expressed as percentage of U-Lead participants reporting pre-to-post improvement in civic engagement, community commitment, community knowledge, personal growth and self-efficacy and shared future and purpose.)
3	Structured community gatherings are more productive. (Target expressed as percentage of participants who report in follow-up surveys that participation in LCE programming led to improvements in the process and product of structured community gatherings.)
4	Findings generated from community-based social capital assessments guide communities to informed action. (Target expressed as percentage of participants who report in follow-up surveys that social capital assessment led to actions designed to strengthen trust, networks or civic engagement.)
5	Community decision-makers improve the quality and quantity of engagement with those who have a stake in public decisions. (Target expressed as percentage of participants who report in follow-up surveys that collective decision-making has effectively engaged relevant stakeholders.)

Outcome #1

1. Outcome Measures

Community leadership cohort members will increase the intensity of their leadership. (Target expressed as the percentage increase in the number of leadership roles held by members of U-Lead cohort groups.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	42	22

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research shows that healthy communities cultivate leadership and have many willing candidates available to accept leadership positions.

What has been done
The U-Lead program helps communities (of place, interest and identity) nurture local leadership. Cohort-based leadership education programs help individuals consider their future leadership, and puts their leadership in a context that benefits communities. These programs are offered across the state and are rigorously evaluated both from the perspective of individual growth and eventual community contribution.

Results
During 2009, leadership role change data were collected with 190 participants in ten community leadership cohort programs. Of the participants, 58% increased their level of involvement in at least one of their organizational roles (either a new role, an increase from "inactive" to "active" or "leader" roles, or an increase from "active" to "leader" roles). Another way to understand the data is by examining changes in all organizational roles held by cohort members. Cohort program participants reported a total of 1001 organizational roles held during the program. At baseline, 22.9% of the organizational roles held were leadership roles. At program end, 27.9% of roles were leadership roles. This is an overall increase in active leadership roles of 22%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #2

1. Outcome Measures

U-Lead cohort members will increase leadership skills and knowledge. (Target expressed as percentage of U-Lead participants reporting pre-to-post improvement in civic engagement, community commitment, community knowledge, personal growth and self-efficacy and shared future and purpose.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	85	92

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research has found that successful communities use the skills, knowledge and ability of local people, mobilizing them and using their leadership skills. (Flora, C., North Central Regional Center for Rural Development, 1999)

What has been done
Cohort groups provide education that stimulates development of skills related to community development. The groups are sponsored by communities and are tailored to the leadership needs of that community. Overall, the educational content of these cohort groups build civic engagement, community commitment, knowledge of the community, personal growth and self-efficacy and shared future and purpose.

Results
During 2009, four Community Leadership cohort programs completed engagement in programs that met for a period of at least six months. Most program participants reported improvement in all five domains of community leadership, as measured by the Community Leadership Survey, a valid survey of community leadership skills. The strongest domain of leadership was civic engagement, with 95.6% of participants reporting improved skills. Scores were also high for civic engagement (95.6%), community commitment (94.1%), personal growth and self-efficacy (92.6%), community knowledge (89.7%), and shared future and purpose (86.8%).

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #3

1. Outcome Measures

Structured community gatherings are more productive. (Target expressed as percentage of participants who report in follow-up surveys that participation in LCE programming led to improvements in the process and product of structured community gatherings.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	85	86

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local leaders grapple with more complex public issues in current times because of economic and demographic shifts, as well as government devolution. Decisions that affect the public good are more sound when the process used to come to the decisions is thorough and fair, and when necessary information is gathered and reviewed before decisions are made.

What has been done
Extension's Leadership and Civic Engagement (LCE) staff offers community decision-makers services in facilitation that utilize the best strategies in facilitation and public participation. As decision-making processes are facilitated, educators teach communities best practices in group management so that they can be used in the future.

Results
LCE conducted an electronic survey with community organizations that received facilitation technical assistance during 2009. Of seven respondents, 100% responded that the meetings facilitated by LCE educators were successful in terms of anticipated goals. Eighty-six percent of respondents felt the meetings facilitated by LCE educators resulted in successful formulation of action plans to address community/organizational goals, and 71% of those surveyed reported that their organizations had been successful in following through on these action plans.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #4

1. Outcome Measures

Findings generated from community-based social capital assessments guide communities to informed action. (Target expressed as percentage of participants who report in follow-up surveys that social capital assessment led to actions designed to strengthen trust, networks or civic engagement.)

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Community decision-makers improve the quality and quantity of engagement with those who have a stake in public decisions. (Target expressed as percentage of participants who report in follow-up surveys that collective decision-making has effectively engaged relevant stakeholders.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	38	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Public participation strategies help decision-makers gather needed information from a large array of stakeholders before decisions are made. This affects the quality of decisions that are made, and also enhances the trust that community members have in the organizations that address public issues.

What has been done
Leadership and civic engagement (LCE) educators use public participation research from the Humphrey Institute to guide local governments and other decision-making bodies through the process of engaging stakeholder input.

Results
LCE conducted an electronic survey of community organizations that received public participation technical assistance in 2009. Three of the seven respondents who received facilitation services also responded that their process did require engagement of a wide range of stakeholders. Of these three respondents, all responded that they were effective in engaging relevant stakeholders.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges
- Other (Cultural Adaptation)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Case Study

Evaluation Results

Existing research suggests that leadership education produces high levels of "bonding" social capital (strong ties among people with common backgrounds), but also tends to reinforce "old boy" networks and exclude new or non-traditional leaders (Zacharakis and Flora, 2005). The Network Brown County program was explicitly designed to engage new or young residents from diverse backgrounds and communities across a Southern Minnesota county in community leadership development activities. A 2009 study was part of a growing practice to use the Community Capitals Framework (Flora, Flora and Fey, 2004; Emery and Flora, 2006) to measure and describe the impacts of leadership development. The Framework is based on the idea that every community has resources. When these resources are invested to create new resources, they become capital (Flora, Flora and Fey, 2004: 9).

For purposes of our impact study, we asked program alumni and community stakeholders to gauge the degree to which the Network Brown County program had an impact on social capital, as well as cultural, human, political, financial, built, and natural capitals. A research assistant interviewed randomly-selected Network Brown County alumni from four cohort groups (n=20), and also interviewed community stakeholders identified by the alumni as people who had knowledge of the program (n=19). This qualitative data was supplemented with a scale (1-6) to rate the respondent's perceived degree of change.

Private Value Outcomes: Fifty five percent of alumni interviewed believed the program changed their perception of themselves as leaders. Fifty percent of alumni interviewed believed the program changed the perceptions others hold about them as leaders.

Public Value Impacts: Community Stakeholders who had observed the Network Brown County program reported that they had seen the program bring greater social capital to the community (stronger bonds, bridges among groups and links to outside resources.) They also said they had witnessed more tangible capitals development as a result of the program. They solidly agreed that the program had strengthened the vitality of the community through stronger political capital, more cultural experiences, preservation of the natural environment and (to a lesser degree) economic and financial capital.

Key Items of Evaluation

In a study of a leadership education program that has been operating for a decade, we found that alumni and community members agreed that the program helped to create ties and linkages among community members. They also had seen the program leverage new capital for their community that enhanced the health, political capacity, cultural and natural environments.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Community Economics

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
602	Business Management, Finance, and Taxation	40%		70%	
608	Community Resource Planning and Development	60%		30%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	0.0	9.3	0.0
Actual	11.4	0.0	7.3	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**
404903	0	65268	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2171785	0	817709	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
955346	0	546516	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In 2009, Community Economics educators were engaged in applied research throughout the state -- with the retail industry, with economic developers and with local and regional planners. Strong partnerships have been formed with state agencies and local leaders so that Extension is developing a solid reputation as a provider of applied research to community economic development decisions and action. Last year, a new applied research program, based on IMPLAN software, was developed to help communities understand the economic impact of potential initiatives (e.g., building a health care facility) or external events (e.g., natural disasters). In its first year, this new program was utilized by two counties, two cities, a regional rail authority, a Scenic Byway collaborative and a coalition of Minnesota's airports.

Research to support the health and vitality of Minnesota communities focused on several sectors of the economy, including the rural retail environment, housing policy, state tax financing issues, changing rural labor markets and tourism. Especially in this

time of economic stress, knowledge of public sector impacts on state economic growth, as well as new local and regional economic opportunities is essential. Some specific results of community economics research in 2009:

- Results from a study of the volatility of the Minnesota tax system were incorporated into final reports of the Minnesota Long Term Budget Stability Commission and the Governors' 21st Century Tax System Commission. Results from an earlier study projecting Minnesota tax revenue growth through 2033 were also used in the final report of the Long Term Budget Stability Commission.
- A study on the impacts of commuting in rural labor markets showed that standard methods of determining commuting zones understate the important linkages between some non-metropolitan counties. The results show the importance of accounting for economic ties between counties when formulating economic development policy.
- The results of a study of the causal effect of two year college attendance on education for rural youth are being used to update the estimates of labor market consequences of attending two year colleges. This work has documented a beneficial role of community colleges that is an important contribution to the current state of knowledge as the mandate, funding and overall roll of community colleges, especially those in rural areas is an active area of policy debate.

2. Brief description of the target audience

Primary audiences for community economics programs include chambers of commerce, the tourism industry, economic development officers, local governments, and nonprofits that can, in turn, support local economic development efforts in 32 communities.

Additional audiences for research knowledge and results are rural social scientists and economists, Extension educators, and state and federal as well as local policy makers

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	10000	34000	0	0
Actual	13590	63000	0	0

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

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	1	16	
Actual	12	15	27

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Educational workshops will be provided (face-to-face and on-line). (Target expressed as numbers of workshops.)

Year	Target	Actual
2009	240	260

Output #2

Output Measure

- Community-based applied research will be conducted regarding retail trade, business retention and expansion and tourism development. (Target expressed as numbers of communities engaged.)

Year	Target	Actual
2009	10	32

Output #3

Output Measure

- Community-based trainers will be trained to continue providing education in communities through business retention and expansion programming, customer service training and internet literacy programs. (Target expressed as the numbers of trainers trained.)

Year	Target	Actual
2009	90	200

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants in Community Economics programs will increase their knowledge of relevant community economic development topics. (Target expressed as the percentage of participants reporting increased knowledge.)
2	Participants in long-term programs (Business Retention and Expansion, Tourism Development, Connecting Rural Communities) will contribute to new plans for local economic development. (Target expressed as a percentage of participants in long-term programs initiated in prior three years who report that participation in Community Economics programming led to creation of new plans.)
3	Communities engaged in long-term programs (Business Retention and Expansion, Tourism Development, Connecting Rural Communities) will report that plans developed as a result of Community Economics programming were implemented to the betterment of their local economies. (Target expressed as a percentage of communities in long-term programs initiated in prior three years who report that participation in Community Economics programming led to creation of new plans). Note: Communities could be those of place (geographic) or those of interest (industry or sector-based.)
4	Research on preserving rural homeownership will inform public policymakers.

Outcome #1

1. Outcome Measures

Participants in Community Economics programs will increase their knowledge of relevant community economic development topics. (Target expressed as the percentage of participants reporting increased knowledge.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	87

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Information, applied market research and technology are tools that businesses use to maintain their competitiveness. While major corporations typically have resources to tap these on their own, small community-based businesses often do not. Community Economics programs seek to develop more competitive economies by providing fairer access to technology utilization and applied research. Structured programs convene businesses to consider research-based information together so that they can strengthen the local business and industry climate.

What has been done
Community economics educators delivered education and conducted applied research. Program content focused on E-Commerce opportunities, customer service, business retention and expansion, economic impact analysis, festival and event management, analysis of customers in local market areas, public value of public programs, and site location on global positioning system maps.

Results
Knowledge outcome data were collected after 44 Community Economics workshops during the 2009 calendar year. A total of 570 participants completed evaluations of these workshops. Eighty-seven percent of these 570 participants reported learning gains, as measured by the comparison of their average retrospective pre-test scores to their average post-test scores across all session learning objectives.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Participants in long-term programs (Business Retention and Expansion, Tourism Development, Connecting Rural Communities) will contribute to new plans for local economic development. (Target expressed as a percentage of participants in long-term programs initiated in prior three years who report that participation in Community Economics programming led to creation of new plans.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	95

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Tourism businesses must act together to make their individual businesses profitable because they are marketing their regions and communities along with their product or service. Knowledge of their tourism markets and collaborative decision-making are key to success in the tourism industry.

What has been done
The University of Minnesota Extension's Community Tourism programs offer research studies and facilitation to enhance community collaboration. Businesses, community leaders and regions are convened to take advantage of these programs. A study of the effectiveness of the community tourism programs was conducted in 2009. The study gathered retrospective information from those engaged in the program, as well as other stakeholders in the community.

Results
Fifty-eight of 61 respondents (95%) reported success in formulating plans based on Extension tourism research or facilitation efforts. Both program participants and stakeholders agreed quite strongly (5.4 and 5.5 on a 6 point Likert) that community tourism research and facilitation had allowed them to accomplish their goals and implement a plan for community tourism. Those interviewed reported that community tourism programming had strengthened social capital by bringing tourism entities together and linking them to outside resources. They also reported stronger political strength for tourism in the region, resulting in favorable public policy decisions for the industry, as well as grant applications to protect the environment or build local infrastructure.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

Communities engaged in long-term programs (Business Retention and Expansion, Tourism Development, Connecting Rural Communities) will report that plans developed as a result of Community Economics programming were implemented to the betterment of their local economies. (Target expressed as a percentage of communities in long-term programs initiated in prior three years who report that participation in Community Economics programming led to creation of new plans). Note: Communities could be those of place (geographic) or those of interest (industry or sector-based.)

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Research on preserving rural homeownership will inform public policymakers.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As the housing foreclosure crisis deepened, Minnesota's home foreclosure rate increased, further destabilizing the economy, especially in rural communities.

What has been done
Researchers analyzed the spatial distribution of sub-prime home mortgage loans in Minnesota and the relationship between sub-prime lending and affordable housing in urban and rural Minnesota.

Results
Findings from this research have helped to formulate state policy in Minnesota. In particular, methods used to compile foreclosure data were used in developing new foreclosure data regulations. Findings have also been used to develop federal policies, as the lead researcher provided expert guidance to federal officials at the Federal Reserve Bank of Philadelphia.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- Case Study

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Family Relations

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
802	Human Development and Family Well-Being	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	9.2	0.0	8.6	0.0
Actual	8.1	0.0	7.6	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**
709742	0	137195	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
928936	0	604842	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
674018	0	61974	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research

In 2009 MAES family development research investigated positive family development and effective services that support families. Some specific research results this year:

Analysis of data on youth risk-taking and experimentation was incorporated into an online course for parents of college students to help them develop a realistic understanding of student development, and to help them talk with their student about challenging topics.

Results from UMN research on cultural diversity and end of life care were presented to an audience of 120,000 in a national teleconference put on by the Hospice Foundation of America.

Research was conducted to adapt a prevention intervention strategy to the cultural characteristics of at-risk Latino/a families. One of the largest agencies in Minnesota providing services to Latinos/as has asked the lead researcher to replicate the

model in their agency, and the intervention strategy is now being replicated in Monterrey, Mexico with a child maltreatment population.

Extension

In 2009, family relations programs responded to current economic conditions in Minnesota and across the nation with education and outreach related to family stress. (http://www.extension.umn.edu/toughtimes/) Most information was made available on-line for easy access. Another major program development project in 2009 was the Parenting for School Success program and evaluation study. This program is testing how to help Latino immigrant parents nurture their child's development and enhance their school success. Outcomes of this program are described here.

2. Brief description of the target audience

The program serves professionals in collaborating agencies such as mental health agencies, parent educators, schools, courts, family service agencies, health care settings and others. The program ultimately reaches parents who are divorcing, parents of adolescents and parents of pre-school and school-aged children.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	3000	45000	0	0
Actual	4582	15126	0	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	2	22	
Actual	2	23	25

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Publications will be distributed.

Year	Target	Actual

2009	13000	13550

Output #2

Output Measure

- Professionals will be trained.

Year	Target	Actual
2009	500	1361

Output #3

Output Measure

- Parents will participate in Extension trainings.

Year	Target	Actual
2009	4500	3221

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Professionals who work with parents and families will increase their knowledge regarding up-to-date research on parenting practices, positive child development and family functioning and well-being. (Target expressed as a percentage of participants who report knowledge gain.)
2	Parents will increase their knowledge regarding up-to-date research on parenting practices, positive child development and family functioning and well-being. (Target expressed as a percentage of participants who reported knowledge gain.)
3	Professionals who work with parents and families will improve their skills in working with parents and families (e.g., utilizing best practices for improving parenting skills). (Target expressed as a percentage of participants who report improving skills.)
4	Parents will improve their parenting skills. (Target expressed as percentage reporting improvement.)
5	Parents who are mandated to participate in Parents Forever because of contentious divorce situations will reduce conflict in front of their children following divorce. (Target expressed as percentage of parents who report reducing conflict.)
6	Parents mandated to participate in Parents Forever because of contentious divorce situations will increase their children's access to both parents following divorce. (The lower percentage reflects that these cases often occur where having access to both parents is not in the best interest of the children.)
7	Research on the effects of child exposure to domestic violence will inform the work of helping professional working with children and youth.

Outcome #1

1. Outcome Measures

Professionals who work with parents and families will increase their knowledge regarding up-to-date research on parenting practices, positive child development and family functioning and well-being. (Target expressed as a percentage of participants who report knowledge gain.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	96

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Minnesota has a great number of nonprofit and public sector organizations whose staff work with parents. The availability of research-based family development information can improve these professionals' ability to work effectively with parents and families.

What has been done
Train-the-trainer workshops were delivered across the state, and listserves are supporting professionals who interact with parents.

Results
According to pre-post evaluation and follow-up surveys six weeks after program participation, 96% of professionals reported that they gained knowledge regarding research relevant to their work.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #2

1. Outcome Measures

Parents will increase their knowledge regarding up-to-date research on parenting practices, positive child development and family functioning and well-being. (Target expressed as a percentage of participants who reported knowledge gain.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	89

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Parents who make informed decisions can better support the health and welfare of their children.

What has been done
Parenting classes were provided to parents from a variety of populations in collaboration with community sponsors. Learning changes were measured using valid scales. These scales measured positive discipline, positive communication, reduction of conflict, positive involvement and parental acceptance. Scales are provided in both Spanish and English.

Results
Eighty-nine percent of parents demonstrated knowledge gains.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #3

1. Outcome Measures

Professionals who work with parents and families will improve their skills in working with parents and families (e.g., utilizing best practices for improving parenting skills). (Target expressed as a percentage of participants who report improving skills.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Minnesota has a great number of nonprofit and public sector organizations whose staff work with parents. The availability of research-based family development information can improve the ability of these professionals to work effectively with parents and families.

What has been done
Train-the-trainer workshops were delivered across the state, and listserves are supporting professionals who interact with parents.

Results
On-line surveys six weeks after program participation discovered that 100% of participants reporting said that the program had improved their skills in working with parents and families.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #4

1. Outcome Measures

Parents will improve their parenting skills. (Target expressed as percentage reporting improvement.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	82

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Parents who make informed decisions can better support the health and welfare of their children.

What has been done
Parenting classes were provided to groups from a variety of populations in collaboration with community sponsors. Learning changes were measured using valid scales. These scales measured positive discipline, positive communication, reduction of conflict, positive involvement and parental acceptance. Scales are provided in both Spanish and English.

Results
Eighty-two percent of parents demonstrated knowledge gains.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #5

1. Outcome Measures

Parents who are mandated to participate in Parents Forever because of contentious divorce situations will reduce conflict in front of their children following divorce. (Target expressed as percentage of parents who report reducing conflict.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	75	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research on children of divorced households has determined that sustained conflict following divorce can produce negative eventual outcomes for children.

What has been done
Parents Forever is delivered in collaboration with Minnesota's family courts to affect the behavior of parents after divorce. Parents are educated about the negative effects of conflict and are guided through a plan for co-parenting.

Results
Directly after program delivery, 85% of parents reported reduced conflict with the other parent. In a follow up survey six to twelve months after program delivery, that percentage decreased to 75%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #6

1. Outcome Measures

Parents mandated to participate in Parents Forever because of contentious divorce situations will increase their children's access to both parents following divorce. (The lower percentage reflects that these cases often occur where having access to both parents is not in the best interest of the children.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	35	31

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Following divorce, access to both parents is attributed to positive results for children, except in cases where access to a parent is not in the best interest of the child. To make a difference in the long-term outcomes for children, it helps to maintain access to both parents, and to develop positive ways of communicating, solving problems, and reducing the amount of conflict.

What has been done
Parents Forever is mandated for divorce situations that are contentious in the Minnesota Court system.

Results
Directly after the program, 77% of participants reported they would increase their child's access to both parents. Six - twelve months after program delivery, that percentage was reduced to 31%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #7

1. Outcome Measures

Research on the effects of child exposure to domestic violence will inform the work of helping professional working with children and youth.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Domestic violence affects children, but professionals working with children and youth need tools to help them identify and measure those effects so they can better support the children's needs,

What has been done
UMN family social science researchers have developed and published a Child Exposure to Domestic Violence (CEDV) Scale. It is the first measure to be published that focuses on the direct assessment of child exposure to and involvement in adult domestic violence incidents. Researchers are now using the scale in a study of how child exposure to and involvement in adult domestic violence incidents affects child attitudes toward both the abused parent and the abusive parent in the home.

Results
The CEDV Scale is being widely adopted in Minnesota and around the world. The 55-page user manual is available on a CEDV website. Correspondence from the Chicago Public Schools indicates that the CEDV is being used widely as an assessment tool among its students. It is being adopted in social service and youth serving programs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Other ()

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Other (Cost-benefit study)

Evaluation Results

Partnering for School Success: Latino Parents

In Minnesota, Latino students have the lowest high school graduation rates of all ethnic/race groups. Depending on how organizations count graduation rates, only 37% to 42% of Latino students are graduating from High School. This is far below the state average of 78% among all populations. Family Development educators have been collaborating with Latino agencies and public schools to develop and test a Latino parent education curriculum to improve parenting practices connected to school success, to improve parent-school communication and relationships, and to increase parent involvement in schools.

A total of 40 parents of middle school youth participated in the pilot in Spring and Fall of 09. Parents were recent immigrants from Mexico, El Salvador, Bolivia Ecuador and Nicaragua. Seventy-five percent (75%) of parents had been in the United States for fewer than ten years. Parents participated in two three-hour sessions weekly for eight weeks. The school principal provided space, meals and staff time for daycare to

facilitate the classes. Pre-post surveys measured parenting practices, parenting efficacy (in terms of their confidence to support to their children's school success) parent involvement in school, and improved parent-school communication. Examination of pre-post change scores indicated that 85% of parents improved their parenting practices related to school success; 65% improved their sense of parental educational support efficacy; 73% improved their involvement in school, and 78% improved their communication with the school personnel.

Key Items of Evaluation

The Partnering for School Success Program engages immigrant parents in practices that support child development and learning. The program demonstrated strong success in improving parent practices and their sense of involvement related to their child learning.

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Family Resource Management

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
801	Individual and Family Resource Management	90%		90%	
806	Youth Development	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	12.1	0.0	3.1	0.0
Actual	14.4	0.0	10.1	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**
476699	0	80262	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1555911	0	755279	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
843556	0	344676	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research

MAES family resource management research has informed social science professionals, education and policy makers on constraints and challenges to family financial management in these times of economic difficulty. This has included studies on financial strategies for later life, the economic well being of families in transition, and understanding family resource decisions through multi-cultural lenses. Some specific examples of results from 2009 work:

Studies on the income disparity between single mothers and single fathers showed that single mothers' earnings decrease with each additional child, however this did not hold true for single fathers' earnings.

Continuing studies of the intermittent employment patterns of low income mothers and the importance of family system support. This data added depth to a teaching curriculum for low-income families.

Extension

Because of recent economic events, Minnesotans began to examine their credit health in 2009. They grew more risk averse with money, and experienced genuine distress in times of unemployment. And so, demand for family resource management education grew. The Extension Family Resource Management team responded with increased programming (practitioner workshops, trainings, publications, media outreach and curricula). They worked with colleagues in other teams to develop a multi-disciplinary, content-rich Web site that users could turn to for education and support about dealing with tough times. (www.extension.umn.edu/ResourceManagement/toughtimes.html) The team also convened key state agencies for a conference to explore ways to better support families through partnerships that more efficiently and effectively serve families.

In 2009, Minnesota's financial literacy program (Dollar Works) was adopted as a primary financial literacy curriculum in California and Oregon. To take advantage of this multi-state opportunity to evaluation the program, a data base was created for collection of data from all three states delivering the curriculum. As data is collected, it can be analyzed to discover the impact of the program on various groups and geographies.

2. Brief description of the target audience

The target audeinces of family resource research includes family professionals, policy makers and educators, and the legislative and judicial branches of state and federal governments

Extension audiences include the following:

For youth and money:adolescents moving into independent living, teachers k-12, professional staff-credit union representatives, college staff and faculty, college students and youth.

For financial security in later life: some community non-profit groups and individuals who utilize on-line website resources and self-study modules.

For resource management for daily life programs: the general public; individuals and families who seek knowledge and skills by choice or mandate; professionals seeking to enhance knowledge; public and private agencies, organizations and businesses seeking training to enhance their delivery of resource management programs.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	6000	12000	7000	0
Actual	9084	10057	6257	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	2	15	
Actual	10	12	22

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Community-based workshops will be held for individuals and families. (Target expressed as the number of events delivered.)

Year	Target	Actual
2009	300	426

Output #2

Output Measure

- Curricula and guides will be distributed.

Year	Target	Actual
2009	3000	10057

Output #3

Output Measure

- Training will be held for trainers in other organizations so that they can deliver education to their constituents. (Expressed as number of events.)

Year	Target	Actual
2009	100	33

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Individuals, families and employees who participate in Resource Management programming will report they have increased knowledge related to the targeted financial management goals. (Target expressed as a percentage of participants who report increasing knowledge.)
2	Individuals, families and employees who participate in Resource Management programming will report they have increased confidence (increased efficacy) in financial management, decision-making and planning for later life. (Target expressed as a percentage of participants who report increasing efficacy.)
3	Individuals, families and employees who participate in Resource Management programming will report they have used the knowledge/materials gained from the program to change behaviors related to targeted financial management goals. (Target expressed as a percentage of participants who reported making behavior change.)
4	Research on child support guidelines will inform Minnesota justice system.
5	Research on later life financial security will information family decision making.

Outcome #1

1. Outcome Measures

Individuals, families and employees who participate in Resource Management programming will report they have increased knowledge related to the targeted financial management goals. (Target expressed as a percentage of participants who report increasing knowledge.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Management of resources can lead families to spend and save effectively.

What has been done
Classes provide practical knowledge about resource management to targeted groups.

Results
In pre-post retrospective evaluations immediately after training, 90% of participants reported increased knowledge through the educational offering.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development

Outcome #2

1. Outcome Measures

Individuals, families and employees who participate in Resource Management programming will report they have increased confidence (increased efficacy) in financial management, decision-making and planning for later life. (Target expressed as a percentage of participants who report increasing efficacy.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	93

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Financial management is a high-stress household task. Its complexity and high consequences can deplete confidence.

What has been done
Education on resource management is designed to increase practical efficacy of household decision-makers, thus increasing confidence.

Results
In a pre-post retrospective evaluation, 93% of participants reported increased efficacy. "Efficacy" is a measure beyond skills and knowledge, because research identifies self-efficacy as a readiness and ability to make change.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development

Outcome #3

1. Outcome Measures

Individuals, families and employees who participate in Resource Management programming will report they have used the knowledge/materials gained from the program to change behaviors related to targeted financial management goals. (Target expressed as a percentage of participants who reported making behavior change.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	87

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Practical tools and knowledge can be used by financial managers to change their family resource behaviors.

What has been done
Financial management tools are provided, along with educational guidance, at workshop offerings by Resource Management Educators.

Results
In surveys six weeks following educational offerings, 87% reported they had made a behavior change related to resource management using the tools provided in training.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development

Outcome #4

1. Outcome Measures

Research on child support guidelines will inform Minnesota justice system.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The effects of divorce on the financial security of children is a matter of social and public policy concern. For several years, UMN family financial resource management researchers have studied the problem. The information gained from this research led the Minnesota court system to change child support guidelines. But further research has been needed to answer practical questions during the judicial, legal and personal financial deliberations in the processes of divorce. These questions would help determine that the levels of living of the parents are equal and thus provide the children of divorce with a reasonable level of living.

What has been done
Researchers developed income equivalence worksheets to generate the information needed in divorce proceedings. They also changed the financial variables to 2009 real dollars by using the Consumer Price Index formula.

Results

More realistic and complete information on the financial situation of divorcing parents help the courts make better decisions on providing for the financial well-being of children.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development

Outcome #5

1. Outcome Measures

Research on later life financial security will information family decision making.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The financial security of Minnesota's families, as well as the fiscal security of the state's economy, will be hurt if Minnesotans are not adequately prepared to make informed decisions about financing long-term care.

What has been done
Research on the financial literacy of employees faced with opportunities to enroll in long term care insurance showed that employees who were younger, had lower incomes, and without prior long term care experience were more vulnerable to lower financial literary. Lower financial literacy puts consumers at risk to make poor or uninformed decisions about managing the risk of long term care.

Results
Information from this research was used to develop decision-making tools for a website focused on long term care decision making. Findings have contributed to UMN Extension programming designed to reach employees at the work site with financial security in later life education workshops, including content on financing long term care.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy

Brief Explanation

The effects of the recession in 2009 increased demand for family resource management programs. Great effort was needed to meet demand and to create more effective systems of support for families.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- Time series (multiple points before and after program)

Evaluation Results

Collaborative Action for Employment (CAfE) Conference:

In 2009, the Family Resource Management team responded to the current global economic recession by exploring ways to better support families during these difficult times. The team was engaged as a partner in pulling together a learning conference for major support agency staff.

The goals of the conference were to:

Create, retain and sustain employment opportunities for low-income individuals;

Create new and strengthen existing partnerships across systems to address long-term community workforce needs to ensure economic success of the State;

Ensure that there is a seamless referral system in place so that low-wage, low-income people can access support service needs for employment; sustaining impacts of ARRA (Recovery Act) investments.

Partners for CAfE conference included:

Minnesota Community Action Partnership;
Minnesota Department of Human Services/Office of Economic Opportunity & Transition to Economic Stability;
Minnesota Department of Employment and Economic Development;
Minnesota WorkForce Council Association;
University of Minnesota Extension;
ISEEK;
Minnesota State Colleges and Universities

A total of 148 individuals from key agencies across the state of Minnesota attended the conference. Agency staff reported critical learning gains from their participation. Evaluation results indicated the following: 92% increased knowledge of what other agencies/counties have to offer in terms of resources for their clients; 100% reported they will use the knowledge gained to improve their organization's collaboration with other local agencies; 75% reported they will be contacting another agency staff who attended the conference to further discuss ways to work together to support low income families in their area.

Agency staff reported many key learning. Staff said:

- "other organizations have already started some of the things that we are looking into daily, and we don't need to reinvent the wheel."
- "service integration is required at ALL levels from policy-organization-frontline. We can't expect front-line staff to partner if the policies that govern their work are barriers."
- "In terms of job resources and nutrition, I never knew about the stress of going food shopping."
- "The most important thing I learned was that there are many opportunities to connect my

organization's work with others!"

Key Items of Evaluation

Extension played a leadership role in coordinating a Minnesota response for families during the global economic crisis. Examination of the first conference to form the collaboration demonstrated changed attitudes and perceptions among key state agencies who could benefit families by working together.

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Environmental Science Education

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%		0%	
136	Conservation of Biological Diversity	20%		0%	
903	Communication, Education, and Information Delivery	60%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	4.4	0.0	0.0	0.0
Actual	5.4	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**
310698	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1440608	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
405888	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension's environmental science education programs train teachers and field day leaders, train volunteers as Master Naturalists to use environmental science to improve their communities, and train Native American Youth through culturally-adapted summer programs. In 2009, the Master Naturalist program completed its fourth year of program development and assessment. As the program has progressed, participants report greater satisfaction, knowledge and behavior gains. To enhance the reach of the program, the team is deepening its partnerships in the field. The Team is training instructors who work with other environmental programs around the state. The program can now reach more Minnesotans with fewer Extension-driven events.

2. Brief description of the target audience

Environmental Science Education programs reach: 1) Concerned citizens and volunteers who are willing to be trained and serve in a variety of roles as citizen teachers and scientists. 2) Minnesota professionals from within Extension, the Minnesota Department of Natural Resources, Soil and Water Conservation Districts, U.S. Fish and Wildlife Services, Health and Human Services Departments, Environmental Sciences, the public schools and others involved in environmental science education programs. 3) Youth on the White Earth Reservation in Northwest Minnesota, when funding allows.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	600	4300	220	0
Actual	913	7817	521	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	0	
Actual	3	0	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Through training and other communications, volunteers, educators and natural resource professionals will be prepared to deliver research-based environmental science education programs. (Measure expressed as number of Minnesota Master Naturalist volunteers trained and supported.)

Year	Target	Actual
2009	300	120

Output #2

Output Measure

- White Earth Reservation youth will graduate from a four week summer program that includes environmental science education. (Target expressed as a percentage of students graduating.)

Year	Target	Actual
2009	75	81

Output #3

Output Measure

- Recruitment strategies for Environmental Science Education programs for adults will reach under-represented audiences. (Target expressed as a percentage of total audiences served.)

Year	Target	Actual
2009	10	17

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Within a year of environmental science education instructor training (i.e., Master Naturalist and Best Practices for Field Day Trainings), educators and community-based instructors will use the research-based educational methods in environmental science education delivery. (Target expressed as a percentage of participants.)
2	Minnesotans will have increased opportunities to participate in natural history learning activities. (Target measure reflects increases in number of events available.)
3	Master Naturalists will become more knowledgeable about natural history. (Measure expressed as a percentage of knowledge gain.)
4	Native American youth will increase their academic performance on standardized achievement tests following the four week ESE program. (Target expressed as a percentage of increase.)

Outcome #1

1. Outcome Measures

Within a year of environmental science education instructor training (i.e., Master Naturalist and Best Practices for Field Day Trainings), educators and community-based instructors will use the research-based educational methods in environmental science education delivery. (Target expressed as a percentage of participants.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	100	89

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Environmental education programs serve tens of thousands of youth in Minnesota in school and community settings. Maximizing the effectiveness of these programs makes better use of public resources.

What has been done
Best Practices for Field Day (BPFD) programs provide workshops, manuals and online resources to pass along educational methods and paradigms to those who organize and teach environmental field day experiences. These methods are known to create events that students recall in detail years later. This year, we conducted a study that supports another critical assumption of the BPFD program -- that these practices can be transferred to other settings through training.

Results
The study co-related student perceptions of presentations at the Minnesota Metro Children's Water Festival with an external observer who assessed whether BPFD practices were being utilized. Student/observer ratings corelated well with key constructs. This study adds validity to training content and delivery, and proves that train-the-trainer methods are working.

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 #2

1. Outcome Measures

Minnesotans will have increased opportunities to participate in natural history learning activities. (Target measure reflects increases in number of events available.)

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Master Naturalists will become more knowledgeable about natural history. (Measure expressed as a percentage of knowledge gain.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	20	22

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Residents of communities are in the best position to preserve and protect their natural environment -- their woods, forests, prairies and lakes. Master Naturalists receive training about their natural environment that they can use to care for it and share their knowledge with others.

What has been done
The Master Naturalist program has been developed over the past four years. Process evaluation has been conducted throughout those years to determine to assure informed program development.

Results
Minnesota Master Naturalist participants take a 20 question multiple-choice knowledge assessment to assess changes in knowledge. The Prairie and Pothole course reported a statistically significant increase from initial assessment scores to final scores ($t=9.83$, $df=42$, $p = 0.005$). The average pre-course score was 11 (55% correct); this increased on the post-course assessment to 16 (80%). The North Woods, Great Lakes course reported a statistically significant increase from initial assessment scores to final scores ($t= 3.69$, $df=,18$ $p = 0.002$). The average pre-course score was 12 (60% correct); this increased on the post-course assessment (75%). The Big Woods, Big Rivers courses reported that scores increased from a pre-course mean of 11 (55% correct) to a post course mean of 16 (80%)($t= 26.79$, $df=300$, $p < 0.001$).

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

Native American youth will increase their academic performance on standardized achievement tests following the four week ESE program. (Target expressed as a percentage of increase.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	5	14

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The White Earth Reservation recognized back in the 1990's that their students were not going on to higher education because they lack skills and knowledge of science and math.

What has been done
The White Earth Summer Academy was established in 1998 and has been conducted for the last 11 summers. Also, through a grant from NSF ITEST through the College of Education and Human Development, the Reach for the Sky (RFTS) program targets an after school and summer time programs for the reservation. The overall goal has been to engage students on the reservation with hands-on science and math activities that build skills and motivate students for advanced education.

Results
The program has been a success for schools, families and students. Students who participated in the program showed achievement over the previous year using the Terra Nova test. Student achievements went up in math (+14.1%) and science (2.2%). Enjoyment of science went up 67.5%. Moreover, there was a decrease in thinking that math was difficult by 51.7%. Students also reported a 20% increase in enjoyment of using computers. Students began to learn new skills by themselves (an increase of 51%) and taught others new skills (68% of participants). New skill sets included a 50% increase in word processing skills, 33% increase in skills using spreadsheets and 42% with graphs, CAD software.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Programmatic Challenges

Brief Explanation

The environmental science education team is reporting on higher numbers of people served but fewer trainings. This is the result of new attention being paid to training trainers rather than delivering service directly to volunteers.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 14

1. Name of the Planned Program

Water Resource Management and Policy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	35%		20%	
133	Pollution Prevention and Mitigation	45%		50%	
403	Waste Disposal, Recycling, and Reuse	10%		10%	
605	Natural Resource and Environmental Economics	10%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	9.7	0.0	27.0	0.0
Actual	9.6	0.0	33.1	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**
465433	0	126261	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1538246	0	2407578	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
445112	0	2781073	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research

MAES research reported this year has informed water resource management and policy makers on ways to improve the quality of Minnesota's lakes, rivers and streams. This research includes work on the agricultural impacts on water quality, as well as the problems of invasive fish and aquatic plant species on water quality. Some specific examples of research results in 2009:

Researchers acquired hyperspectral imagery to study, along with 400 field observations, to assess the potential of remote sensing to monitor and map wetland quality. Previous research had shown the remote sensing can be used effectively to

map lake quality and clarity.

Researchers collected data on the effects of whole lake herbicide treatments on invasive aquatic plants and how those treatments affected native plants in the lakes. Conclusions were that native plant communities are not harmed by the herbicide treatments, but it appears that four or more years of treatment is needed before the invasive species are controlled.

Research has developed information for better pesticide management decisions for the northern Corn Belt. Results will be used to improve models to predict pesticide transport in hilly landscapes, cropped soils, and soils that are frozen for significant periods.

Progress was made in improving models used to address the impaired waters program from agricultural feedlots and runoff from urban areas.

Twenty-five years ago, the piping plover's future appeared grim. Only about a dozen pairs of the tiny Great Lakes shorebird remained, when it was listed as an endangered species. Now, thanks in large part of UMN research, the plover is slowly returning with about 70 pairs now being tracked.

Research focused on understanding how the management of natural resources like water impact economic performance and growth. This work on water resource economics is being used, among others, by the Japanese Ministry of Agriculture to help understand and measure the national and regional impact of their rice policies on Japan's agriculture and rural development.

Extension

In 2009, the water resource management team continued to provide educational presentations that support water resource in public policy and community settings. The team worked to create unique opportunities for interactive land and water based workshops. They assisted in the coordination of the Minnesota Conference on Green Infrastructure for Clean Water in September. They also increased their capacity to provide training to local watershed and natural resource educators about effective workshop and program delivery. Finally, the team launched a new web site especially for elected officials. (www.nortlandnemo.org)

2. Brief description of the target audience

Research

Target audiences for the results of MAES research include the aquatic ecology scientific community, state and local natural resource managers, state conservation district managers, scientists, decision makers and policy makers dealing with water quality, wildlife and water management, conservation groups, Minnesotans who care about the state's water resources, individuals and groups across the nation and across the world who are invested in creating sustainable water management systems and policies.

Extension

Communities likely to use the storm water education program are those within the Twin Cities' third tier of urban development, communities in Minnesota's lake districts and the western Lake Superior Basin. We reach those communities through local government and elected and appointed officials and their staffs. Local government engineers and planners, consulting engineers, planners and architects are also targeted as they help communities make decisions that impact Minnesota's waters. Homeowners are a key audience -- whether they be shoreland property owners, lake association members, the horticulture industry, volunteer groups, or owners of on-site septic systems. Professionals are also a key audience as their professions interface with the water resources. These include natural resource professionals, real estate professionals, the hospitality industry or professionals who have access to homes and communities with on-site sewage treatment programs.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	12000	15000	650	0
Actual	6301	12000	65	0

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

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	69	
Actual	5	58	63

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Provide useful information about shoreland, storm water and septic system management into web links, printed products and media. (Target expressed as numbers of products created per year.)

Year	Target	Actual
2009	20	26

Output #2

Output Measure

- Workshops, seminars, and presentations will educate community members and professionals about strategies that provide wastewater treatment for their community at a reasonable cost in a way that is consistent with community values. (Target expressed as number of events.)

Year	Target	Actual
2009	85	79

Output #3

Output Measure

- Provide workshops on water quality, stormwater issues and shoreland management, revegetation and use of plants to maintain shoreland structures. (Target expressed as number of events.)

Year	Target	Actual
2009	30	18

Output #4

Output Measure

- Coordinate shoreline demonstration projects that provide hands-on learning opportunities and add to educational goals.

Year	Target	Actual
2009	3	3

Output #5

Output Measure

- Research on control of invasive fish species will provide scientists and professionals with better information and managment strategies for control.

Year	Target	Actual
2009	{No Data Entered}	0

Output #6

Output Measure

- Research will provide natural resource managers and scientists with information about sedimentation rates in Minnesota Lakes and Rivers

Year	Target	Actual
2009	{No Data Entered}	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Local decision-makers will know: 1) Where stormwater goes; 2) Major stormwater pollutants and their impact and 3) Three things they can personally do to prevent pollution. (Measure expressed as percentage of residents in targeted communities.)
2	Workshop participants will use information from shoreland education programming to provide education to 25 additional people, creating a multiplier effect. (Target expressed as a percentage of workshop participants.)
3	Shoreland education workshop participants will practice one or more of five lake/river friendly landscaping behaviors. (Target expressed as a percentage of workshop participants.)
4	Homeowners will modify or change their habits regarding home water and product use to better protect their on-site septic systems. (Measure expressed as a percentage of those evaluated.)
5	Small communities will develop a viable plan for onsite sewage treatment--plans that are affordable and address onsite sewage treatment. (Target expressed as number of communities per year.)
6	Research will provide natural resource managers with information about sedimentation rates in Minnesota Lakes and Rivers
7	Research will provide policy makers with information to manage the natural capital of Minnestoa's surface and ground water resources.

Outcome #1

1. Outcome Measures

Local decision-makers will know: 1) Where stormwater goes; 2) Major stormwater pollutants and their impact and 3) Three things they can personally do to prevent pollution. (Measure expressed as percentage of residents in targeted communities.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	88

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local public policy decisions influence water quality. Elected leaders need science-based information to inform their decisions.

What has been done
Workshops and field trips describing forces that have an effect on water quality. The goal was to help elected leaders acquire water science information that influences their public policy.

Results
Eighty-eight percent of the elected officials at workshops agreed that they had gained knowledge about natural resources that was important to their public policy decisions. Further, they said that they would take this information back as they: 1) decide how to distribute grant dollars, 2) engage in land use discussions, 3) develop comprehensive watershed plans, 4) engage with other jurisdictions and engage in other local planning forums.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

Workshop participants will use information from shoreland education programming to provide education to 25 additional people, creating a multiplier effect. (Target expressed as a percentage of workshop participants.)

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Shoreland education workshop participants will practice one or more of five lake/river friendly landscaping behaviors. (Target expressed as a percentage of workshop participants.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The long-term health of Minnesota's lake and river environments is compromised by anthropogenic activities, both directly (e.g., native plant removal, pollutants in the water, etc.) and indirectly (e.g., introduction of invasive plant and animal species, land development, etc.).

What has been done
The Aquatic Plant Identification Curriculum is designed for shoreland owners, lake associations, natural resource professionals. It provides participants with knowledge and experience to play a vital role in maintaining the health of the local lakes and rivers. The curriculum is offered state-wide through workshops where participants are introduced to relevant information, followed by a full day of hands-on experience during which participants sample, identify and press aquatic plants for future use in maintaining the health of lakes and rivers in their area.

Results
Participants have used education to write the aquatic plant management portion of their lake management plans. Minnesota Waters has adopted Extension's aquatic plant key for plant identification workshops. Notable participant behavior changes include the creation of formal and informal "aquatic plant committees" that actively monitor lakes for illegal native aquatic plant removal and early detection of AIS species. Some participants have discontinued previous aquatic plant removal practice and encourage other shoreline property owners to do the same. Early identification of AIS has increased the chance of effective AIS control. For example, trained lake association members on two Minnesota lakes discovered three new occurrences of AIS species, reported them to DNR and continue to monitor them.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation

Outcome #4

1. Outcome Measures

Homeowners will modify or change their habits regarding home water and product use to better protect their on-site septic systems. (Measure expressed as a percentage of those evaluated.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	46

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Homeowner behaviors can positively and negatively affect water quality and septic systems.

What has been done
Education is delivered through workshops and community consultation.

Results
After program delivery, 46% of participants reported behavior changes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Small communities will develop a viable plan for onsite sewage treatment--plans that are affordable and address onsite sewage treatment. (Target expressed as number of communities per year.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	3	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics

Outcome #6

1. Outcome Measures

Research will provide natural resource managers with information about sedimentation rates in Minnesota Lakes and Rivers

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Excessive sediment and nutrient loading of surface waters is a major problem in many watersheds. Agricultural practices have been implicated, but other factors may also affect the problem. Two problems associated with excessive sediment and nutrient concentrations in the Minnesota River are the eutrophication of Lake Pepin, and the development of hypoxic zone in the Gulf of Mexico.

What has been done
Researchers conducted a trend analysis of flow in the Minnesota River. Results showed that total suspended solid concentrations have decreased in the Minnesota River while rates of sedimentation have increased in Lake Pepin. This appears to be due to increased precipitation due to more and larger storms in the area.

Results
Considering that total suspended solid concentration have decreased in spite of the fact that the area under tile drainage in the Minnesota River Basin is continuously increasing suggests that farm fields may not be the main source of sediment in the Minnesota River.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #7

1. Outcome Measures

Research will provide policy makers with information to manage the natural capital of Minnestoa's surface and ground water resources.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Minnesota is the land of 10,000 lakes, but even such a large resource can be depleted. Human use of surface and subsurface sources of freshwater must protect the supply. Sustainability can only be maintained when the rate of water use does not exceed the renewal rate.

What has been done
Researchers derived estimates of the spatial distribution of the renewable water supply within Minnesota. Based on the results of the analyses a database was developed for a fresh water sustainability quantitative information system. The database contains all recharge estimates, as well as historical and current permitted water use on a per square mile basis. The database can be used to determine the renewable supply of freshwater over any area and compare that to past, present, or future planned use of water.

Results
The information was used by the Minnesota Environmental Quality Board to provide information on what is the renewable water supply on a county-by-country basis.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Case Study

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 15

1. Name of the Planned Program

Forestry

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
123	Management and Sustainability of Forest Resources	40%		50%	
124	Urban Forestry	25%		10%	
125	Agroforestry	25%		30%	
133	Pollution Prevention and Mitigation	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	7.1	0.0	91.2	0.0
Actual	7.3	0.0	31.9	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**
439975	0	100330	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1393254	0	2485596	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
449503	0	2017511	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research

MAES research in forestry includes forestry management studies and forest product development. Tree disease research has provided information to the support the health of Minnesota's urban forests. Long-term research into forest genetics and best management practices, field and laboratory studies and computer modeling support Minnesota's forest ecosystem. Much of UMN's forestry research produced knowledge that informed the issues of climate change and sustainable energy, and that research is reported under those programs in this year's Accomplishment Report. Some of the other results from forestry

research in 2009 include:

Several superior American elms have been identified growing free of disease in area where Dutch Elm disease has ravaged native elm population. These elms have been propagated and screened for resistance.

Studies examining the growth dynamics of mixed aspen-white spruce stands in northern Minnesota showed the potential for increasing productivity in pure aspen production through white spruce under planting.

Research on measurement, modeling and information system tools for forest ecosystem management has developed several tools, including MapServer software, and international conferences have been hosted on forest growth model evaluation and MapServer. This web-application development system has now been successfully migrated to a Foundation for support and further development and is in use by tens of thousands of individuals and organizations around the world.

A study that evaluated Minnesota family forest owner trespass practices was conducted in response to diminishing access to private forest land in the U.S. Results shared and the information is being considered by the state natural resources department and policy makers.

Seeds from more than 175 ash trees were collected this year. As the researchers become recognized as the seed collection experts in Minnesota other collection groups seek their expertise on forecasting ash species seed crops, and likely locations for individual species. This research is part of work to use natural genetic variation to enhance forest productivity and long term survival of forest tree species.

Extension

Two major efforts were dominant in forestry education this year. First, the team proactively addressed the Emerald Ash Borer and its invasion into Minnesota's ash trees. (An impact of that initiative is described in the outcomes section of the report.) Also, the team reached out to the Fond du Lac Band of Ojibway to provide education on ecology and management of natural resources important to their culture. This initiative was done after an educational needs assessment conducted with the reservation. The outreach has included five newspaper articles and three workshops especially for residents of the reservation. The educational content focused on birch bark harvest, wild strawberries, prescribed burning, seasonal preparedness, wild rice, moose hunting and management, and treaties.

2. Brief description of the target audience

Target audiences for MAES forest research public and private forest land managers, state natural resources agencies, state and federal policymakers, other forestry researchers, Extension educators, Minnesota Tree Improvement Cooperative, Native American nations.

Forestry courses reach those who work, live and own Minnesota's woodland acres.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	1750	12000	1000	0
Actual	3665	28000	295	0

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

Patent Applications Submitted

Year: 2009

Plan: 1

Actual: 1

Patents listed

2162 Cultivated Agarwood

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	4	70	
Actual	1	51	52

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Workshops, tours, and demonstration projects will increase awareness of landowners, volunteers, loggers, natural resource professionals and businesses involved in forestry, agroforestry, urban forestry and forest products. (Target expressed as the number of events.)

Year	Target	Actual
2009	190	163

Output #2

Output Measure

- Print and digital publications will provide answers to questions about sustainable management of Minnesota's natural resources. (Target expressed as number of publications distributed.)

Year	Target	Actual
2009	10000	2611

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Landowners will implement new forestry, agroforestry and urban forestry management practices. (Target expressed as number of acres on which new land management was improved.)
2	Landowners that implement new management practices will improve management of a significant number of acres. (Target expressed as number of acres on which management was improved.)
3	Natural resource-based businesses will become more profitable. (Target expressed as dollars earned or saved by natural resources enterprises.)
4	The Emerald Ash Borer (EAB) was identified and quarantined just three years after introduction.

Outcome #1

1. Outcome Measures

Landowners will implement new forestry, agroforestry and urban forestry management practices. (Target expressed as number of acres on which new land management was improved.)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Landowners that implement new management practices will improve management of a significant number of acres. (Target expressed as number of acres on which management was improved.)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	18000	99900

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Minnesota's forest owners care deeply about maintaining their land, and need science-based information about practices that will best secure the health and well-being of the forests they own.

What has been done
Education and outreach cover a wide range of topics including forest ecology, siviculture, invasive species, timber harvesting, timber and non-timber forest products, wildlife management, recreation, urban forestry and tax changes.

Results
Landowner participants report that their new practices are affecting, in total, almost 100,000 acres of Minnesota's forest lands. The size and scope of this program and its outreach has expanded considerably over the past five years.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
124	Urban Forestry
133	Pollution Prevention and Mitigation

Outcome #3

1. Outcome Measures

Natural resource-based businesses will become more profitable. (Target expressed as dollars earned or saved by natural resources enterprises.)

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

The Emerald Ash Borer (EAB) was identified and quarantined just three years after introduction.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Emerald Ash Borer (EAB) (Agrilus planipennis) is a serious forest pest in the United States. Once established, it attacks and kills virtually all ash (Fraxinus spp.) trees greater than one inch in diameter native to North America. Minnesota has the third largest ash tree population in the United States. Minnesota's wetland hardwood forests are more than 50% ash. Some Minnesota communities have a street tree inventory as high as 50% ash. Detecting its presence early in an infestation will allow forest managers more management options.

What has been done
Extension partnered with Minnesota's Departments of Agriculture and Natural Resources, as well as the U.S. Department of Agriculture, and the National Plant Diagnostic Network, to develop the EAB First Detectors Program to identify the first incidence of EAB in Minnesota. In 2008, 180 volunteers were trained to identify EAB and the signs and symptoms of an EAB infestation. In 2009 the program was broadened to include three additional forest pests: gypsy moth, Asian longhorned beetle, and Sirex wood wasp and 233 individuals were trained.

Results
The first confirmed infestation of EAB in Minnesota was discovered on May 13, 2009 in St. Paul by a tree service company that participated in Extension trainings. The detectors took all established steps to report the finding, and as a result the USDA confirmed the EAB detection within just 24 hours. This attests to the benefits of the established collaboration and its communication protocols. Both federal and state quarantines were established immediately. This was one of the earliest EAB detections in the country. Most happen 5 - 6 years after introduction; Minnesota's was at year 3. Other states have contacted Minnesota with interest in replicating its trainings and procedures.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
124	Urban Forestry

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Government Regulations
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 16

1. Name of the Planned Program

Housing Technology

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	1.3	0.0	2.6	0.0
Actual	2.2	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**
294129	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1245649	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
307871	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In 2009, in the wake of dramatic shifts in the the real estate market, Extension's housing technology programs adjusted their content and delivery to better respond to needs. This changed the primary education and consultation delivered by the team to help those remodeling existing homes, rather than new construction. Builders, remodelers and homeowners have demonstrated great need and desire for educational materials and consultation.

The University of Minnesota is now affecting the mitigation of radon internationally. Its housing specialist, Bill Angel, is chairing the World Health Organization's International Radon Project Working Group. Finally, the team was fully engaged in rapid response for severe flooding that occurred in the spring in both Northeast and Southwest Minnesota.

2. Brief description of the target audience

The overall target audience for this information is builders, remodelers, contractors, mitigaters and others involved with avoiding and resolving problems in homes.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	600	2500	0	0
Actual	1891	5593	0	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	1	0	
Actual	4	0	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Educational courses will be delivered to the target audiences.

Year	Target	Actual
2009	65	58

Output #2

Output Measure

- New research will result in the development of new and revised educational materials. (Target expressed as the number of new or revised curriculum materials.)
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improve the durability of new homes by working with builders. (Target expressed as the number of builders trained.)
2	Improve the availability of healthy and affordable housing through the mitigation of indoor environmental risks. (Target expressed as number of homes affected.)

Outcome #1

1. Outcome Measures

Improve the durability of new homes by working with builders. (Target expressed as the number of builders trained.)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Improve the availability of healthy and affordable housing through the mitigation of indoor environmental risks. (Target expressed as number of homes affected.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	1000	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Indoor radon is the leading cause of lung cancer among never smokers; the second leading cause among ever smokers, and is responsible for one of every seven U.S. lung cancer deaths. Radon has been described as a radioactive dirty bomb in our homes. Today, 13 million American homes have indoor radon concentrations above the level recommended by the World Health Organization. The proportion of homes with elevated radon is greatest in colder climates. In Minnesota, about 60 percent of homes have indoor radon concentrations above the WHO's recommended level.

What has been done
In the North Central Region of the U.S., the Midwest Universities Radon Consortium (MURC) of the University of Minnesota Extension's Housing Technology Program has delivered training in more than half of the states and Canadian provinces. The Consortium trains and certifies the radon measurement and mitigation professionals who identify and remediate elevated radon in homes and reduce the risk of lung cancer. Nationally, MURC has trained about 50% of the radon professionals who in turn remediate about half the homes that are mitigated.

Results
Using a U.S. Environmental Protection Agency (EPA) metric, it is possible to estimate that 1 life is saved annually for every 1,542 homes with elevated radon that is mitigated. In 2009, MURC-trained radon professionals reduced indoor radon concentrations in 35,000 homes. Since its founding in 1989, MURC trained professionals installed radon remediation systems in 400,000 homes. In 2009, using the EPA metric, the cumulative effect of MURC's 21 years of training was 270 radon related lung cancer deaths were prevented. Since its inception, UME's MURC has saved 2,300 individuals from this environmental toxicant.

4. Associated Knowledge Areas

KA Code	Knowledge Area
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 17

1. Name of the Planned Program

Agricultural Business Management

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	10%		20%	
602	Business Management, Finance, and Taxation	40%		20%	
603	Market Economics	10%		30%	
604	Marketing and Distribution Practices	40%		20%	
610	Domestic Policy Analysis	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	8.9	0.0	25.8	0.0
Actual	8.1	0.0	3.3	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**
452102	0	183528	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1456593	0	191594	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
404878	0	171433	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research

Given the tough economic times and increasing need for economic data to guide agricultural business decisions, it is not surprising that UMN applied economics research results were in demand in 2009. Policymakers also used the results of research on agricultural and rural finance markets in transition and ways to enhance the financial and environmental sustainability of

Minnesota farms. Examples of 2009 research include:

Research on credit risk helped lenders measure risk and identify appropriate levels of capital to meet regulatory and market requirements.

Generated benchmark farm business management reports for organic farms.

Analysis of the cost benefit of targeted insecticide applications revealed they provided effective control in seed potato fields while lowering application costs.

Other agricultural business research directly related to the topics of Climate Change and Sustainable Energy is reported under those programs.

Extension

In 2009, the economic climate created caution and risk-aversion among the farm businesses served. Farm businesses came to Extension concerned about potential volatility of agricultural prices, even though profits were good in past years. Hard times were real for Minnesota's dairy and hog farmers because of price drops. (Fortunately, these prices are expected to improve in 2010.) Research-based education provided the opportunity for agricultural business managers to make decisions based on solid information, rather than emotion, in stressful times.

2. Brief description of the target audience

Our survey and anecdotal data has shown that Extension and Experiment Station research has a greater impact on agriculture when it directly reaches those who disseminate key information. Therefore, our target audiences for Ag Business Management programs include:

- Minnesota's farmers
- Farm business management associations
- Agricultural leaders
- Other agricultural professionals (e.g., crop consultants)
- Farm business management educators
- State and federal policy makers

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	9000	4000	0	0
Actual	3167	7605	0	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	1	15	
Actual	3	12	15

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Educational events will deliver agricultural business management content. (Target expressed as the number of events.)

Year	Target	Actual
2009	180	73

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	In post-program surveys, farm owners will report increased net in farm income as a result of actions taken. (Target expressed as an average net income increase for outcomes of any program intervention.)
2	Participants of the Agriculture Business Management (ABM) program workshops/classes and conferences will achieve significant learning gains regarding research-based agriculture business management knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending ABM program workshops/classes and conferences.)
3	Participants of Agriculture Business Management (ABM) workshops/classes and conference sessions intended to improve participant agriculture business management practices will significantly improve their management practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their agriculture business management practices as a result of attending workshops/classes and conference sessions intended to improve participant management practices.)

Outcome #1

1. Outcome Measures

In post-program surveys, farm owners will report increased net in farm income as a result of actions taken. (Target expressed as an average net income increase for outcomes of any program intervention.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	6700	88430

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Successful marketing of grains ensure a farm's future. Significant income to farm establishments help the rural economy with business and personal spending.

What has been done
The Agricultural Business Management Group facilitates Marketing Groups across Minnesota. Each group conducts monthly meetings and actively markets the crops similar in size to the average of the group. Each group determines gross revenue needed to cover all crop expenses and family living costs.

Results
The success and impact of these marketing groups can be measured by the successful marketing of crops such that they generate the revenue in surplus of necessary gross income needed to meet expenses and cover the costs of family living by an average of $88,430 per farm. With 48 farm operations involved in these groups, the total positive revenue stream would be $4,244,640.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices

Outcome #2

1. Outcome Measures

Participants of the Agriculture Business Management (ABM) program workshops/classes and conferences will achieve significant learning gains regarding research-based agriculture business management knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending ABM program workshops/classes and conferences.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

Participants of Agriculture Business Management (ABM) workshops/classes and conference sessions intended to improve participant agriculture business management practices will significantly improve their management practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their agriculture business management practices as a result of attending workshops/classes and conference sessions intended to improve participant management practices.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	75	57

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farm and ranch families face complicated issues as they engage in succession planning, farm transition and estate planning. The difficulty causes farmers to avoid planning. Two studies conducted by Iowa State University faculty found more than 50% of Iowa farmers had no estate plan and 70% had not named a farm business successor (Duffy, Baker, and Lamberti, 2000) and (Baker, 2006). A Successful Farming magazine survey found that 30% of farmers nationwide had not discussed transfer of their farm business with their family (Tevis, 2003). Collectively these findings are the impetus for this educational program effort.

What has been done
Farm Transition and Estate Planning: Build Your Exit Strategy is an Extension program that assists farm and ranch families with business succession and personal estate planning. Workshops and workbooks were provided to a total of 388 individuals representing 157 farm business units. Topics include establishing personal, family and business goals to begin the transfer process; transfer strategies; financial considerations for transfer; tax considerations; treatment of heirs; estate planning issues and strategies; developing a written transfer plan; and establishing a transfer and estate planning team.

Results
Of farm families responding to follow-up evaluation, 67.2% had started a farm transition plan and 10 farm units had implemented their plan. 70.2% of families had begun personal estate plans and 11 had implemented their plan. According to FINBIN studies (2008), the average farm business owner has farm assets of $1,723,537 and non-farm assets of $177,904. Therefore, the 10 farm units that had completed their farm transition plan created planned farm transfers of $17,235,370 or $257,244.32 per farm family. The 11 families that completed personal estate plans created an orderly plan for $1,956,944 of assets, or $29,208.11 per Minnesota farm family. Total outcome results of the program were $19,192,314 million or $286,452.44 per family for the 67 families responding to the post-meeting follow-up evaluation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
610	Domestic Policy Analysis

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Time series (multiple points before and after program)

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 18

1. Name of the Planned Program

Consumer Horticulture

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	20%		50%	
132	Weather and Climate	20%		0%	
205	Plant Management Systems	20%		30%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		10%	
213	Weeds Affecting Plants	20%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	2.1	0.0	0.7	0.0
Actual	2.0	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**
263905	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1170483	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
680279	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research

MAES research activities that benefit consumers also benefit our commercial horticultural industry. Activities conducted include development of hardy plants for the northern gardener as well as development of techniques and technologies to support gardening in Minnesota. As the effort of MAES research in horticulture has initial impact on commercial horticulture, that effort is reported under the planned program "Commercial Horticulture."

Extension

Consumer horticulture experts managed new and complex collaborations in 2009, positioning the program for greater influence in the future. In urban Hennepin and Ramsey Counties, partnerships with urban nonprofit, youth, and business institutions are providing access to urban residents who want to create valuable greenspace in the city. As a result, Extension has played a role in community-driven recycling projects, urban garden development, Habitat for Humanity landscaping projects, and school projects. A new partnership has made Extension consumer horticulture educators a primary resource to the Minnesota Landscape Arboretum -- a Twin Cities cornerstone for featuring Minnesota horticulture and teaching horticulture topics. (www.arboretum.umn.edu/) This mission of the Arboretum Education Department is to connect people with the importance of plants in their lives. Approximately 60,000 people, pre-school through senior citizens, are served each year.

2. Brief description of the target audience

From the large group of horticultural information consumers, two distinct audiences have been selected be reached with specially designed programs. Audience #1 is people who need horticultural information where time is a factor. This portion of our audience seeks answers to questions and want a timely response. For this audience, we will provide problem-specific information with as little "friction" as possible. Audience #2 is people who want to build, or whom we seek to build, basic knowledge in horticulture and environmental stewardship.For these audiences, there are opportunities for in-depth classes and/or longer-term educational experiences.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	124000	51000	5000	0
Actual	126988	61000	67802	0

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	1	4	
Actual	0	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Master Gardeners trained by Extension will deliver hours of educational service to the residents of

Minnesota. (Target expressed as the number of volunteer hours committed by Master Gardeners.)

Year	Target	Actual
2009	103000	226125

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants of the Consumer Horticulture program clinics/classes will achieve significant learning gains regarding research-based horticulture knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Consumer Horticulture program clinics/classes.)
2	Participants of the Consumer Horticulture program clinics/classes and conference sessions intended to improve participant horticulture practices will significantly improve their horticulture practices as a result of attending the clinics/classes. (Target expressed as a percentage of participants that significantly changed one or more of their horticulture practices as a result of attending clinics/classes intended to improve horticulture practices.)

Outcome #1

1. Outcome Measures

Participants of the Consumer Horticulture program clinics/classes will achieve significant learning gains regarding research-based horticulture knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Consumer Horticulture program clinics/classes.)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Participants of the Consumer Horticulture program clinics/classes and conference sessions intended to improve participant horticulture practices will significantly improve their horticulture practices as a result of attending the clinics/classes. (Target expressed as a percentage of participants that significantly changed one or more of their horticulture practices as a result of attending clinics/classes intended to improve horticulture practices.)

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Case Study

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 19

1. Name of the Planned Program

Commercial Horticulture

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		20%	
204	Plant Product Quality and Utility (Preharvest)	40%		30%	
205	Plant Management Systems	40%		40%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	8.1	0.0	39.8	0.0
Actual	7.0	0.0	51.3	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**
447399	0	558933	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1436622	0	6140664	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
367598	0	4241423	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research

In 2009 MAES research continued to make progress in providing new cold hardy woody plants, fruits and flowers to support Minnesota's commercial horticultural industry. Research also progressed on Minnesota's major horticultural crops, including potatoes, sweet corn and other vegetables. Some examples of results of research this reporting year:

Genomics research on the wild potato demonstrated that genome reorganization predated the evolutionary divergence of potato species from tomato species. Wild potato species are most like cultivated potato in terms of genome structure, but important structural differences exist. This has important implications for comparative genomics approaches to gene mapping and cloning.

Other research on potato germplasm has determined that by making cultivated potato by wild potato hybrids followed by recurrent selection breeding procedures researchers can capture the tuberization and long-day adaptation traits from cultivated potato, and resistance to biotic and abiotic stress from the wild potato.

Turf grass research results indicate that collecting native germplasm in areas close to Minnesota could result in cultivars with higher seed yields, which would benefit both seed producers and end users.

Turf grass management studies showed more turf grass managers are using nitrogen only programs and maintaining function and quality: offsite runoff of nutrients is reduced, and researchers have identified methods to mitigate pesticide and nutrient runoff from golf course fairway turf. The primary outcome of this work is reduced fertilizer input and protection of surface waters.

Thanks to UMN wine grape breeders, the Minnesota wine industry is now more than a $35 million industry in the state. This year, wine grape breeders made three new grape selections. One was a white wine selection; one for red wine production and one was for rose' production. These became available for planting in 2009.

Sales of three previous rose cultivar releases, Northern Accents, Lena, Ole, and Sven have increased in each of the last two years, far outstripping estimates. The newest rose release is expected to generate a similar consumer response with limited retail sales expected to begin in 2011.

A cooperative high tunnel red raspberry experiment has allowed comparison of traditional field production with high tunnel technology.

Extension

In 2009, the University of Minnesota Horticultural team continued to partner with growers to improve their outcome through technology that increases productivity, protects the environment and thwarts risk to crops. The University of Minnesota is the industry's "go-to" credible source for research-based information that helps the industry be more profitable and friendly to the environment. We've reported on three project outcomes this year, including growing success coming from our introduction of high tunnels to Minnesota's fruit and vegetable industry. This important innovation is lengthening the growing season, producing valuable economic opportunity.

MAES research will be conducted that will achieve the goals outlined under "Ultimate Goals," including discovery and development research.

2. Brief description of the target audience

Research audiences include plant biologists, geneticists and pathologists, state and regional fruit and flower growers, vegetable processors, potato growers, the local, regional and national wine industry, nurseries, beekeepers, and consumers.

Extension audiences are fresh market producers including growers of fruits and vegetables for processing, the processing industry, associated agribusinesses turf professionals, nurseries and garden centers, and landscape professionals. Several of these groups have high representations of new immigrants.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	19000	18500	175	0
Actual	8958	11538	80	0

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

Patent Applications Submitted

Year: 2009

Plan: 2

Actual: 5

Patents listed
1. PP19,771 Chrysanthemum Plant Named "00-100-216"
2. PP19,831 Chrysanthemum Plant Named "00-100-382"
3. PP19,795 Chrysanthemum Plant Named "01-127-1"
4. Superior (MN5451) new blueberry cultivar licensed to Bailey's Nurseries
5. UMN Rosa 262, new rose variety licensed to Bailey's Nurseries

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	32	
Actual	13	35	48

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Deliver workshops, classes and seminars and other events to provide information to targeted audiences.

Year	Target	Actual
2009	130	92

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants of the Commercial Horticulture program workshops/classes and conferences will achieve significant learning gains regarding research-based horticulture knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Commercial Horticulture program workshops/classes and conferences.)
2	Participants of the Commercial Horticulture program workshops/classes and conference sessions intended to improve participant horticulture practices will significantly improve their horticulture practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their horticulture practices as a result of attending workshops/classes and conference sessions intended to improve horticulture practices.)
3	Adoption of new integrated pest management strategies reduce inputs without compromising quality, stimulating economic benefits for the industry.
4	Growers will adopt high-tunnel technologies that enhance profits by lengthening the growing season for fruits and vegetables. (Target expressed as number of growers who have used the practice.)
5	Research will provide information to develop sustainable solutions for problems affecting honey bee health.
6	Fruit breeding research will support the economic health of the Minnesota fruit industry

Outcome #1

1. Outcome Measures

Participants of the Commercial Horticulture program workshops/classes and conferences will achieve significant learning gains regarding research-based horticulture knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Commercial Horticulture program workshops/classes and conferences.)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Participants of the Commercial Horticulture program workshops/classes and conference sessions intended to improve participant horticulture practices will significantly improve their horticulture practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their horticulture practices as a result of attending workshops/classes and conference sessions intended to improve horticulture practices.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	55	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
This year saw an explosion in the Twin Cities of a new turfgrass insect pest known as cottony grass scale. This was the second year of its observation in this area.

What has been done
Extension Entomologists provided leadership in the discovery, study and education about this insect. They found evidence of non-reoccurrence on properties. Good monitoring this spring and summer should indicate whether further treatment is needed. If treatments are needed, the industry can now apply the least amount of insecticide during the most effective application period. It is uncertain whether pesticide treatments will be necessary when symptoms appear. This pest does not appear to be causing permanent damage to affected lawn areas.

Results
Extension equipped industry personnel with good insect monitoring information and appropriate management strategies for this pest. Because Extension disseminated information about the pest through conversations and industry conferences, members of the green industry have not been applying insecticides indiscriminately to the affected turfgrass areas. This has a positive economic benefit to the business, and potentially helps to protect some of the known predatory insects of this pest from being destroyed through excessive insecticide use. Rather, they have adopted a suggested more wait-and-see approach to managing this pest.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #3

1. Outcome Measures

Adoption of new integrated pest management strategies reduce inputs without compromising quality, stimulating economic benefits for the industry.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As research into processing crops continues, industry professionals have a need to connect with researchers to learn and understand the latest developments. Face-to-face meetings and lectures are essential to address critical industry topics, especially since Minnesota ranks first in producing and processing peas.

What has been done
The fruit and vegetable team helped develop and deliver a tri-state (Wisconsin, Minnesota, Illinois) conference sponsored by the Midwest Food Processors Association. Content focused on primary crops grown for processing in the region-corn, peas, beets, carrots, potatoes. Topics included production efficiency, environmental sustainability, and emerging issues. Over 100 representatives of the industry participated. A field day for the Midwest Food Processors Association was held in June; 30 members of the Raw Products Committee of MWFPA attended.

Results
The industry has adopted new integrated pest management strategies and reduced inputs without compromising quality. The processing industry has reduced by half insecticide use on sweet corn, with estimated cost savings of $1.6 M per year. According to the current President of the MWFPA, university research trials "have helped processors avoid purchasing ..."snake oil" materials. Processors estimate that this research alone saves them $10/acre on 5,000 acres per year. The university/industry partnership has enhanced the stability of a very significant and diversified enterprise within the agricultural landscape in southern Minnesota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

211 Insects, Mites, and Other Arthropods Affecting Plants

Outcome #4

1. Outcome Measures

Growers will adopt high-tunnel technologies that enhance profits by lengthening the growing season for fruits and vegetables. (Target expressed as number of growers who have used the practice.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Over the last three years, interest in growing fruits and vegetables in high tunnels has grown. High tunnels provide the potential for higher returns for growers when they use tunnel structures that lengthen the growing season. This is a relatively new production practice in Minnesota, meaning that growers and other interested individuals have not had access to much information on how to implement such practices.

What has been done
The Fruit and Vegetable Team team created a workshop to discuss high tunnel production methods, educate growers about how to get started with high tunnel production, and provide new information as it is discovered. The team maintains a web site (hightunnels.cfans.umn.edu), a list serve, and has created videos where growers and researchers describe production techniques. Working with the USDA Natural Resource Conservation Service, the team is teaching about cost sharing through the EQUIP program, which make high tunnels economically feasible.

Results
Grower enthusiasm continues to grow for this innovative and adaptable production practice. Sustaining this program will help keep growers informed of new developments, and is likely to expand as interest in this production practice continues to grow. As a result of our efforts, the number of high tunnels in Minnesota has grown in the past two years from less than 100 to over 250. Growers in northern Minnesota are now selling high tunnel-produced tomatoes and obtain increased annual income from vegetable production.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #5

1. Outcome Measures

Research will provide information to develop sustainable solutions for problems affecting honey bee health.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is less news coverage of bee health issues, but bees are not faring better. All bees--honeybees and native bees--are still in decline, and it is a serious issue. Over 30 percent of U.S. honeybee colonies die every year, from colony collapse disorder or other causes. Beekeepers are treading water, replacing as many colonies as economically feasible for their operations.

What has been done
UMN honeybee research (UMN has one of the few remaining bee research labs in the country) is providing information and strategies for honeybee health. A standardized sampling plan for the parasitic mite, Varroa destructor has been developed which helps beekeepers determine the level of mites in their colonies. Based on this information, beekeepers can make informed treatment decisions, which will help reduce in-hive pesticide use to control the mites. Also, through a unique technology transfer effort, researchers are assisting honeybee breeders in Minnesota and California select honeybee colonies for traits that help bees defend themselves against pathogens and parasites. These producers are the source of most of the genetics (queen bees) for the beekeeping industry in the U.S.

Results
The sampling device researchers developed will allow beekeepers to collect a sample of 300 adult bees per colony and use powdered sugar to dislodge the mites from the bees to calculate mite load. This device will be marketed by a commercial beekeeping company in 2010. Three queen producers in Minnesota have effectively fixed the hygienic trait developed by UMN research in their breeding line so they do not need inseminated breeder stock from UMN anymore. Through technology transfer, researchers are making measurable gains in helping U.S. queen bee breeders incorporate traits that help honeybees resist pathogens and parasitic mites in commercially available stocks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #6

1. Outcome Measures

Fruit breeding research will support the economic health of the Minnesota fruit industry

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Apple-growing is about a $18 million business in Minnesota, not counting the impact of community festivals and tourism built on the apple. In 1991, UMN apple breeders boosted that industry considerably with the release of the Honeycrisp apple, which became an enormous success. It has been called the iPod of apples. In 2006, the Honeycrisp apple was ranked as one of the top 25 academic or research innovations that changed the world, and soon after was named Minnesota's state fruit. However, Honeycrisp must be planted in a cold climate to produce the best-tasting fruit.

What has been done
UMN apple breeder's newest apple, SweeTango, was developed from a cross between Honeycrisp and Zestar, another UMN variety, made in 1988. The University began its fruit breeding program in 1908 and is now one of the three university apple-breeding programs left in the U.S. The managed release of SweeTango began in 2009, and the breeders hope that control of the brand will control the quality of the apples produced and sold.

Results
SweeTango--which has its own Facebook page--made its appearance in grocery stores and markets in the fall of 2009 in the Twin Cities, Seattle, and Rochester, New York. Initial reaction has been overwhelmingly positive.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}