

2017 University of Minnesota Combined Research and Extension Plan of Work

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I. Plan Overview

1. Brief Summary about Plan Of Work

Structure of Report. This plan of work describes the goals of 12 planned programs for the University of Minnesota's Agricultural Experiment Station (MAES) and Extension. Eleven of these operate as structured program areas within Extension. Climate Change, however, is a NIFA priority that is the focus of research within MAES and a multi-disciplinary initiative within Extension.

Most programs share Extension and research interests with Minnesota Agricultural Experiment Station (MAES) research; however, youth development programs report only Extension programming. If funding has not been allocated to MAES for research, other research is tapped or conducted with Extension funding.

MAES funds research in five University colleges and, for purposes of this report, sorts those projects into the planned programs discussed here. This allows MAES and Extension to directly report research impact on outreach, and Extension's impact on research.

Planned programs involve researchers and educators in the design, development, delivery and evaluation of educational programs that are informed by research. As a multi-disciplinary initiative, the climate change initiative convenes educators, faculty and researchers from many fields to contribute to education and outreach on issues that influence many sectors. Program teams reach target audiences, examine stakeholder input, evaluate efforts and update program designs. Working alongside these teams are administrative structures that support programs, manage stakeholders and communicate the value of the land grant system to Minnesota and beyond.

Changes to the plan of work in 2017: To further focus our reporting efforts, two planned programs were removed from the 2017 POW. These are (#11) Forestry and Forest Products and (#13) Housing. Research projects and extension program efforts previously reported in Forestry and Forest Products will be reported under Climate Change, Natural Resource Management and Sustainable Energy as appropriate. Projects and programs reported under Housing will be divided among Community Vitality and Personal Finance, Building Strong, Healthy Families and Health and Nutrition as appropriate.

Other changes are minor and are described in the "update" described in the first paragraph of each Brief Summary.

Assumptions. Projections for this plan of work assume stable funding from county, state and federal resources; however, cuts in state allocations to the University of Minnesota may require the dean of Extension and the director of the Agricultural Experiment Station to decrease budgets. Key decisions will be made based on strategic planning to support the program goals described (described below). Extension and the Agricultural Experiment Station will work together in 2017-2021 to:

- Enhance the scholarship of programs and faculty;
- Increase the use of technology for teaching and learning;
- Strengthen connections between research, extension programming and communities' assessed needs;
- Analyze the outcomes and impacts of programming and research;

- Strengthen the diversity of programs and improve the cultural competence of staff;
- Increase the impact of both research and outreach through multidisciplinary research and collaborative learning partnerships;
- Collaborate with the University to achieve operational excellence.

Extension's Strategic Plan. As a result of Extension's consultation with stakeholder groups, faculty, and staff, Extension's Strategic Plan was developed in 2012. The goals and strategies of that plan are described below. Throughout this reporting period, progress toward these goals will affect activities, stakeholder relationships and program development.

GOAL #1: Extension delivers exemplary education based on University research and scholarship to fulfill its land grant mission. Strategies are to:

1. Provide education using most effective tools/method
2. Ensure that all programs are based on comprehensive program/education plans
3. Establish consistent standards for research, scholarship and education
4. Establish a consistent program model
5. Align research, scholarship and education with University, State and Federal priorities

GOAL #2: Extension research and education addresses significant issues by affecting behavior change to improve social, economic and environmental conditions. Strategies are to:

1. Establish consistent, measurable criteria for public value (relevance, outcomes, impact)
2. Use collaborative, multidisciplinary approaches to address significant issues
3. Engage stakeholders throughout the program (identification, development, delivery, evaluation, sun-setting) to ensure relevance and effectiveness
4. Build strong relationships with funders and key influencers
5. Establish program priorities that optimize stakeholder/audience needs and University assets

GOAL #3: Extension operates as an efficient, effective and integrated organization. Strategies are to:

1. Ensure sustainable funding through diversified and strategic resources
2. Streamline and align operations across all centers, administrative units and offices
3. Develop communications systems that enhance efficiency and support collaboration
4. Develop infrastructure/capacity to support consistent and effective use of technology
5. Establish consistent standards for program development, delivery and evaluation
6. Enable and promote collaboration among faculty and staff

GOAL #4: Extension fosters a workforce and environment that drives innovation and excellence and supports a culture of inclusion and collaboration. Strategies are to:

1. Create an organizational workforce that operates efficiently and effectively to successfully represent the traditional culture and the modern brand of Extension
2. Establish a work environment that balances employee needs with organizational mission and resources to promote innovation and collaboration
3. Recruit and retain a diverse workforce
4. Ensure that staff receive professional development grounded in research and scholarship
5. Refine performance review and promotion systems based on academic scholarship, professional excellence, and alignment with organizational priorities
6. Provide organizational support for all employees through the Extension career lifecycle

GOAL #5: Extension communicates and demonstrates the value of its educational solutions, research focus and knowledge expertise to its stakeholders and the public. Strategies are to:

1. Define and communicate Extension's value with stakeholders
 2. Implement consistent University and Extension brand identity across the organization
 3. Inspire and equip employees and volunteers to serve as brand ambassadors, ensuring a consistent brand experience for all audiences.
 4. Support and enhance Extension's brand and reputation across program marketing and communications activities
 5. Enhance the reputation of Extension by consistently delivering on our promise to stakeholders
- Extension will report on key initiatives that have resulted from this strategic plan as they are implemented.

MAES Research. New funding from central administration at the U of M to increase research impacts, and reassigned funding from faculty retirements has offered the opportunity to reassess research priorities. In 2014, University President Kaler unveiled a new strategic plan for the University that focuses on solving "grand challenges in a diverse and changing world." Within the broader plan is a research specific initiative that identifies three initial research grand challenges, they are:

1. Sustainable, Healthy, Secure Food
2. Advancing Industry While Conserving the Environment and Addressing Climate Change
3. Building Vibrant Communities that Enhance Human Potential and Collective Well-Being in a Diverse and Changing Society

This announcement led to a challenge for every department to establish their own strategic priorities for FY16. MAES identified the following department priorities:

1. **Support University research and researchers.**
2. **Support the research goals of National Institute of Food and Agriculture and the land-grant mission of the University:** Key research priority areas for the MAES research include: global food security, food safety and nutrition, climate change, sustainability and the environment, and building healthy families and communities.
3. **Strengthen relationships with federal and state partners:** Communicate the importance of Hatch, AFRI, Smith-Lever and McIntire-Stennis federal funds and the requirement for the states to match these funds along with the impact of Agriculture State Special funding. Stakeholder feedback is taken into consideration for several MAES funded programs including the Rapid Agricultural Response Fund and the Small Grains Initiative.

Over the years, MAES research has responded to the need to be smarter and more efficient in its research investments. Moving forward, it will continue to seek out new models of research effectiveness while focusing funding and reporting on the key research priority areas noted above and building on the understanding that strengthening the research partnerships between producers, private industry, and education is critical.

A few key research challenges identified were:

- To feed a growing population, researchers are prospecting hundreds of genebanks for crop traits that will allow tomorrow's crops to be more resilient and adaptive to ever changing pest, disease, and climate conditions.
- To satisfy needs for nutritious, appealing food, scientists are collaborating with plant breeders to use the plant genome to incorporate nutrition and flavor considerations in the wheat breeding process to develop wheat bread that maintains its quality and flavor with less salt and sugar.
- To address the effect of climate change on Minnesota plants, researchers are utilizing phenology and over 120 years of data to identify species that are vulnerable to climate change and develop mitigation strategies for the future.
- To understand changes in family dynamics, social scientists are using modern technology to evaluate information and engage with others in regard to changing to parental attitudes and behavior.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2017	267.7	0.0	329.5	0.0
2018	267.7	0.0	329.5	0.0
2019	267.7	0.0	329.5	0.0
2020	267.7	0.0	329.5	0.0
2021	267.7	0.0	329.5	0.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

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

2. Brief Explanation

The Minnesota Agricultural Experiment Station engages in scientific merit and peer review processes for all research projects. Peer review involves both internal and external reviewers. This takes place within each college that receives MAES funding and under the review and approval of the college department heads and associate deans for research. For example, in the College of Veterinary Medicine the associate dean for research gathers input from the steering committee leaders from the college's three Signature Programs for research (Emerging and Zoonotic Disease, Population Systems and Comparative Medicine.) The steering committee members are chosen through a group nomination and election by the Signature Program group members at open forums.

Each of the colleges that partner with MAES (and Extension) engages in a yearly strategic planning process to submit a "compact" that is negotiated with central administration and assures that the colleges' research and outreach goals and direction are connected with University priorities. In 2016, MAES submitted a compact including its own strategic plan that established research priorities in line with its partner colleges, the University, and NIFA research goals. This plan will be used to select and refine the research projects that receive MAES funding and those that are reported on in the future.

Extension will continue to manage continuous improvement of the merit-based promotion processes that began in 2009 and was extended to county educators in 2010. To implement a successful system, program leaders carefully select and support educators for success. Extension leaders will work together to manage opportunities for peer support among all who

are undergoing promotion review, and a fair and supportive critical review process will be established.

Seven criteria are reviewed in the promotion process: 1) program leadership, 2) extension teaching, 3) program management, 4) scholarship, 5) technical assistance, 6) engagement, and 7) service. These seven criteria are weighted differently for Extension educators with rank (regional educators) and Extension educators without rank (county educators.) Candidates choose which criteria will be the primary emphasis of their promotion dossier. The dossier is reviewed by peers in Minnesota and in other states.

Promotion is awarded to recognize the level of the academic professional's contributions to the missions of Extension and the University as well as to their professional field. Although tenure is not granted in University of Minnesota Extension, there are clear expectations that academic professionals will move forward in rank and will be recognized for attaining a higher academic rank. Responsibility for the Extension promotion decision rests with the Dean of Extension, based on recommendations from a promotion review committee, Center Associate Dean, and Extension's Senior Associate Dean. Promotion is neither automatic nor routine, and the decision is made without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Extension will report yearly on the number of Extension educators and specialists that achieve academic promotion.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

MAES research is continually informed, reviewed, and focused by the needs of stakeholders. Colleges receiving MAES funding have advisory groups who provide input into research goals and needs. In addition, individual departments convene stakeholder groups specific to their disciplines, and researchers connect with stakeholder groups in a variety of ways for continuing feedback on their research goals and objectives. Specific efforts to convene groups for new emerging research challenges, such as seeing input into invasive species research goals, will be undertaken.

Each **Extension** program team is responsible for a planned program, and many teams are engaged in multi-disciplinary initiatives. Teams review trends, conduct new research and interview key informants to assure that educational programs and field research are addressing issues of strategic importance. Program teams meet regularly to review the work in communities, as well as available research. Teams also monitor critical issues and needs. Their review culminates in program development and plans of work, as well as budget requests and business plans.

In the 2012 strategic planning process, Extension initiated a process to identify key issues affecting the quality of life in Minnesota and Extension's role in providing solutions to these issues. Through a process that engaged faculty, staff and citizen advisory committee members, Extension identified three priority issues: Community Food Systems, Bridging the Educational Achievement Gap and Promoting Sustainable Energy. These issues represents a complex challenge with multiple stakeholders and partners.

MAES is making investments in each of these areas. Because of the complexity and the need for research partners, these issues are ripe with opportunity for integrated activities.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

Extension. Program teams and assigned committees work intentionally to include and serve underserved and underrepresented audiences. Below are some examples of methods employed by UMN Extension to integrate underserved populations in programming.

- Co-design of curriculum and program offerings: Teams use collaborative design methods to bring educational design concepts to pilot focus groups, monitor feedback, and adjust approaches.
- Evaluated program pilots: Teams design programs and use pre- and post-evaluation techniques to determine whether the program is effective with specific groups.
- Outreach committees: The American Indian Task Force, for example, has convened a multi-disciplinary team to learn about and listen to Minnesota's Native American population. The process is developing relationships that result in more successful programming. Also, a Latino Community of Practice gathers educators working to reach Minnesota's immigrant Latino population. They are sharing information and are working together to engage stakeholders to learn of the communities' needs.
- Designated outreach staff: Several Extension positions are responsible for conducting programs in locations with new populations and communities of culture. By making successful outreach a measure of performance for specific job descriptions, deeper in-roads are made.

Each year, we will report program success in matching or exceeding Minnesota's percentage of residents who are persons of color. We will also report on targeted outreach that has affected outputs or outcomes regarding under-served and under-represented populations.

MAES. Research opportunities and needs in the areas of food science and nutrition and family and community development related to under-served populations have increased. MAES researchers will study food and health needs of new immigrant families, as well as food security and food accessibility issues of the poor, especially rural poor.

Family Social Science research will also examine the best ways for social agencies to support the needs of marginalized or underserved groups, such as handicapped children and refugees. Additionally, multiple research projects are exploring how Minnesota can best improve the achievement gap within our education system.

Each year, we will report on the number of research projects focusing on the needs of underserved and underrepresented populations within our state and do our best to highlight results in our impact pieces.

3. How will the planned programs describe the expected outcomes and impacts?

We have elected to present a joint report that organizes NIFA's planned programs around Extension's program areas and initiatives. Extension activities are implemented and monitored by program teams that work together to plan and enhance their program business plans yearly. This "straight line" between the MAES research and field work and our NIFA reporting system will assure field accountability to NIFA as a key stakeholder. Benchmarks will be monitored and changed based on yearly assessments and will be incorporated into the program plans as well as the NIFA Plan of work.

Whenever possible, Extension will report on behavior or condition impacts, demonstrating the public value of Extension in Minnesota and beyond Minnesota's borders.

4. How will the planned programs result in improved program effectiveness and/or

Programs and research are managed through program areas with designated staff, leadership and supervision that holds educators and specialists accountable to both scholarship and engagement. Extension has created structures for both managing programs and evaluating their effectiveness. Promotion processes underscore that accountability. Higher education has been operating for some time in an environment of increasing demand from our stakeholders and increasing complexity of research problems, while budget forces at the county, state and federal level require thoughtful choices. By selecting critical issues, focusing work and tightening links between areas of expertise in Extension and research, we can increase our effectiveness and benefit from a feedback system that tells us when to increase, decrease, or shift focus to maintain or increase efficiency.

IV. Stakeholder Input

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

- 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
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Other (One-on-one interactions)

Brief explanation.

The University of Minnesota strives to maintain the confidence and trust of the people, organizations and communities it serves in all regions of Minnesota. Extension and MAES are firmly committed to building relationships that bring together the knowledge, skills and abilities necessary to strengthen capacity in individuals, geographic communities and communities of interest. Extension and MAES listen and are flexible and creative in program development, collaborating with a broad group of stakeholders across the state.

Formal structures currently in place will be maintained and will be influenced by key stakeholders, including county Extension committees, citizen committees of the Regional Sustainable Development Partnerships, the dean's Citizen Advisory Committee, and an ongoing advisory role established with the Association of Minnesota Counties. Programs and centers, to varying degrees, manage structured advisory committees and feedback processes. Targeted questions put to our currently structured committees will be featured yearly, as well as special initiatives that integrate input from persons and groups outside the committee structure.

2(A). A brief statement of the process that will be 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.

Extension

1. Regular review of program activities from participants and sponsors allow program teams and researchers to identify new individuals and groups that can help them achieve ultimate goals.
2. Members of a statewide Extension Citizen Advisory Committee are selected through outreach to local and state stakeholders who apply to be a delegate to the committee. Applicants are reviewed to consider the breadth of representation needed for program areas and geographic concerns.
3. Counties conduct yearly budget reviews, assess past performance of local Extension staff and programs, and consider current program relevance to county priorities. A committee convened by Extension and the Association of Minnesota Counties serves in an advisory capacity to Extension.
4. Typically, program participants provide feedback about program satisfaction through post-event surveys.
5. Targeted program audiences and constituents are identified by Extension educators.
6. Educators and researchers act as an internal focus group.
7. Regional Sustainable Development Partnerships leverage volunteer hours for governing boards, work groups and projects that tie community concerns for sustainable living. These are identified through connections and partnerships with organizations and jurisdictions at the local level.

MAES

1. MAES partner colleges have advisory committees.
2. Research and Outreach Centers have citizen advisory committees. Listening sessions are conducted to solicit input into research needs.
3. Individual researchers and research teams receiving MAES funding have stakeholder group input that they seek out to provide feedback and support to research programs.
4. Legislators and higher education committees are identified by University Relations and the MAES government relations specialists.

2(B). A brief statement of the process that will be 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 with the general public (open meeting advertised to all)
- 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
- Survey of selected individuals from the general public

Brief explanation.

Extension identifies advisors and stakeholders in counties, through program teams, through state contacts, through program advisory committees and Extension-wide advisory committees.

1. County-based committees and elected officials meet with regional directors as they make budget decisions. Often, these budget decisions respond to the quality and relevance of the service they receive from local Extension staff.

2. Formal evaluation and market surveys collect input. By deciding whether or not to partner with Extension, program audiences "vote" on the relevance and effectiveness of programs.

3. Current program participants provide feedback through post-event surveys.

4. Educators and researchers who are liaisons to stakeholders facilitate internal focus groups to share what they learn in program discussions and planning. Regular review of program activities and feedback from stakeholders about programs allow program teams to identify new individuals and groups that can help them achieve their goals.

5. Through personal meetings with legislators and higher education committees, Extension monitors whether the goals of the State of Minnesota and its voters are considered.

6. The Extension Citizen Advisory Committee is convened three times a year and receives conference calls and informational reports.

7. Regional Sustainable Development Partnerships (RSDP) partner with organizations and agencies that have complementary goals and project objectives. Through cooperation and collaboration, RSDP increases the visibility of meetings, events, projects and opportunities such as community forums.

8. The process of awarding MAES administered funding for the Rapid Agricultural Response Fund and Small Grains Initiative not only requires researchers requesting funding to include letters of support from stakeholders, but stakeholders are brought to the table to review the proposals and offer their evaluation on the importance of the project. This input is a necessary part of the decision-making process.

Colleges receiving **MAES** funding have advisory groups that provide input into research

goals and needs. In addition, individual departments convene stakeholder groups specific to their disciplines, and researchers connect with stakeholder groups in a variety of ways for continuing feedback on their research goals and objectives.

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.

Input from stakeholders guides program teams and administration as they design research programs, outreach plans and structures. Stakeholder input is considered when answering questions such as:

- Which audiences should educators work with?
- How should research-based education be delivered? (Long-term consultation, workshop format, on-line courses, assessment, one-on-one consultation, mass media, web site, etc.)
- What other resources do stakeholders turn to? Do these intermediaries need research-based information? What is our program niche?
- What do stakeholders know about our programs? How do they hear about them?
- Has past service and research been satisfactory? How might it be changed?
- What new research should shift how we deliver programs?
- What external factors have occurred which require us to change program strategies?
- Regional Sustainable Development Partnerships use feedback from volunteers and from the groups they connect with to identify university resources that can address the needs and priorities of stakeholders, including those of Extension and MAES, and to fund local and regional initiatives.

As Extension has established program specialization, regional centers, and purchase of service by counties, stakeholder input is deeply integrated into our systems and organizational decisions. The extent to which programs continue, grow and evolve relies upon satisfaction, positive feedback and investment from stakeholders as well as demonstration of positive educational impacts.

Each program plan and program area work plan integrates input from external scans, stakeholder input and secondary data that feed the strategic planning process. The strategic plan will directly influence the use of resources and the direction of research and outreach programs.

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Sustainable Energy
3	Climate Change
4	Health and Nutrition
5	Food Safety
6	Water Resources
7	Community Vitality and Public Finance
8	Building Healthy, Strong Families
9	Youth Development
10	Natural Resource Management
11	Horticulture
12	Agricultural Business Management

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

2. Brief summary about Planned Program

Update: New faculty hires have allowed MAES to increase efforts in some targeted research areas related to crop productivity and pest management. A newly hired crop physiologist will focus on identifying physiological mechanisms and traits that enhance crop productivity. Funding from the MN Legislature is also allowing for an increased focus on invasive pest management, including pests affecting our agricultural crops.

Changes to Extension outcomes for 2017-21 reflect an intention to report action and condition changes rather than learning outcomes. These are the only changes from the 2016-2020 Plan of Work.

Summary. The Food and Agricultural Organization of the United Nations recently reported that more than one billion people in the world 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 both use resources efficiently and reduce harmful environmental effects. Without significant increases in agricultural productivity, food will become more scarce and expensive.

To help meet the challenge of global food security and hunger, MAES invests 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. Extension connects farmers and communities with information that supports productivity and profitability. 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. Research and outreach supports new agricultural niche markets, responds to new consumer preferences and seizes the opportunity for local and organic foods. MAES and Extension are being strategic in looking at the entire food system and finding solutions that support Minnesota agriculture without sacrificing the environment.

MAES invests in both basic and applied research to support a productive agricultural industry and address the issue of global food security and hunger. A major emphasis of MAES supported basic research is in microbial and plant and animal genomic research. The University of Minnesota's St. Paul campus houses the Cargill Building for Microbial and Plant Genomics, the first building dedicated to microbial and plant genomics research at a public research university. MAES researchers also have available the resources of a Bio-Safety Level 2 (BSL-2) laboratory, and a Bio-Safety Level 3 (BSL-3), a maximum containment laboratory/glasshouse which is the only facility of its kind in the Midwest, and one of only three in the U.S.

Genomic research supported by MAES research will:

- Provide techniques to understand the genetic basis of traits found in agronomic crops such as corn and soybeans, peas and alfalfa that may be used to improve these and other crops.
- Study microbial and plant compounds that have potential as drugs.
- Sequence the genomes of bacteria that cause disease in livestock to identify potential targets for therapy.

- Study pathogenic microbes that cause livestock and plant disease.
- Develop technology for identifying useful biological agents and for analyzing the huge volume of data genomics produces.
- Use DNA molecular marker techniques to help speed the process of plant breeding for desirable traits.
- Support animal agriculture through understanding changes in gene expression associated with animal diseases.

Global Food Security and Hunger describes the work of two program areas. The first organizes outreach to commodity crop producers and their industry supports; the second organizes outreach to livestock producers and their industry supports.

Crop and livestock programs introduce new technology and practices, and support both the demand and supply side of industry markets. Content areas featured within the crops area include: agricultural drainage, climate and weather, commodity crops (corn, soybeans, small grains and sugar beets), forages, and pesticide safety. Livestock educators serve producers within Minnesota's beef, dairy, horse, meats, poultry, and swine industry. Both areas have small farms programs.

Extension's programming for Global Food Security and Hunger is delivered through three sources: 1) County educators address local concerns such as weather disasters and monitor local research; and, 2) Regional educators specialize in particular content areas (e.g., dairy). 3) Educators and specialists merge expertise to develop educational materials and content used in workshops, but also for online delivery and download.

Global Food Security and Hunger program staff is instrumental to Extension's efforts to address the interdisciplinary issue of Community Food Systems that was selected after stakeholder analysis in 2012.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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	5%		10%	
204	Plant Product Quality and Utility (Preharvest)	10%		10%	
205	Plant Management Systems	5%		5%	
206	Basic Plant Biology	5%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		5%	
212	Diseases and Nematodes Affecting Plants	5%		5%	
213	Weeds Affecting Plants	10%		5%	
216	Integrated Pest Management Systems	5%		5%	
301	Reproductive Performance of Animals	5%		5%	
302	Nutrient Utilization in Animals	8%		5%	
304	Animal Genome	2%		5%	
305	Animal Physiological Processes	5%		5%	
306	Environmental Stress in Animals	7%		5%	
307	Animal Management Systems	10%		10%	
311	Animal Diseases	5%		5%	
315	Animal Welfare/Well-Being and Protection	8%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Commodity crops addressed by this planned program produce approximately \$3 billion in cash receipts to Minnesota farmers, contributing economically to Minnesota's rural communities and to the state as a whole. The primary commodity crops produced in Minnesota are corn, small grains (spring wheat, barley and oats) and soybean. Another important commodity crop in Minnesota is sugar beets. Minnesota ranks first nationally in sugar beet production, raising 460,000 acres annually. The economic benefit from the beet sugar industry in Minnesota and North Dakota include \$1.1 billion in direct impacts plus another in secondary impacts.

Minnesota livestock producers are challenged to integrate knowledge from diverse disciplines into production practices suitable for individual operations. Research and education on animal production systems address the interactions between nutrition, genetics, reproduction, physiology, microbiology,

immunology, and molecular biology, and related effects on animal health, productivity, and impacts to the environment. In Minnesota, large amounts of land (including 2,000,000 acres of conservation reserve land) are suited for beef cow/calf operations, but the cost of production is high due to feed costs and inefficient use of available forage. Research is needed to develop grazing and forage systems that reduce feed costs and improve profitability. Minnesota is the nation's sixth largest milk-producing state and has the largest turkey industry in the nation.

Multi-disciplinary Extension initiatives are examining local food production opportunities is the development of sustainable, diverse and resilient food systems across scales.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

A balanced approach toward commodity, industry and regulatory partners is necessary to maintain programmatic funding and our competitive position. Research in best practices can be communicated to livestock and crop producers through Extension education and demonstration. The University of Minnesota can provide leadership in statewide and regional initiatives to support both supply and demand for Minnesota's agricultural products.

2. Ultimate goal(s) of this Program

The ultimate goal of Extension programs in crop and livestock production is to enhance the productivity and profitability of those who manage the millions of acres of productive Minnesota land, thus stimulating an efficient economy that produces the world's food. Another goal is environmental protection and management.

Research components seek to:

- Identify and overcome constraints to crop production.
- Focus on soil health, tillage systems, crop rotations, pest management and decision support systems that will accelerate the adoption of research results on farms by demonstrating the benefits of research in terms of the whole farm.
 - Enhance the health and safety of producers and pesticide applicators.
 - Develop efficient crop production and sustainable cropping systems.
 - Create discoveries in germplasm development, genetic transformation and the development and application of molecular markers -- crop improvement for the introduction of new genes to increase resistance to pests and diseases; and improvement of productivity and crop quality.
 - Develop new approaches for breeding and genetic improvement using molecular technologies.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	37.7	0.0	110.2	0.0
2018	37.7	0.0	110.2	0.0
2019	37.7	0.0	110.2	0.0
2020	37.7	0.0	110.2	0.0
2021	37.7	0.0	110.2	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research will be conducted to achieve the goals outlined under "Ultimate Goals." Note that KA 201 Plant Genome, Genetics and Genetic Mechanisms, and KA 206 Basic Plant Biology, will be used to report mainly MAES research activities and outcomes in this joint report, while other KAs will be used to discuss both Extension and Experiment Station results and impact. Within this planned program, both basic and applied research activities will focus on a broad range of efforts to support the viability and success of Minnesota's crop producers, including such emerging opportunities as biomass, alternative crops and response to new pests and pathogens.

Crop production and livestock **Extension** education will use educational forums, one-on-one consultation opportunities, industry collaboration and web-based information to deliver both proactive and reactive information to producers. Proactive education will disseminate new research that can improve the practices of crop and livestock producers; for example, creating better dairy cow health through improved cow care. Reactive education will help farmers cope with current economic trends, consumer trends and external threats such as bad weather. Multi-disciplinary efforts will combine the efforts of programming in community economics, youth, families and agriculture to address local, sustainable food systems across scales.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Distance Learning) 	<ul style="list-style-type: none"> ● Newsletters ● Web sites other than eXtension ● Other 1 (Publications)

3. Description of targeted audience

The primary audiences are producers of livestock, commodity crops and small farms. Additional audiences are industry representatives who can assist in dissemination of valuable information. Collaborative relationships with state departments, local government jurisdictions and regulating agencies support and inform those who influence crop and livestock producers.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of Extension publications and presentations.
- Number of Extension learning opportunities.
- Number of new crop germplasm released to the public.

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of Extension program participants that significantly change one or more practice as a result of attending classes and conference sessions intended to improve participant practices.
2	Number of changes in condition reported each year.
3	Number of acres affected by new livestock and crop production to increase production, efficiency, or conservation.
4	Research will support a more sustainable, diverse and resilient food system (Measure: number of new or improved innovations developed for food enterprises. Measure: number of new diagnostic systems analyzing plant and animal pests and diseases)
5	Development of new crop varieties will help Minnesota growers improve profitability
6	Research will provide information to support strategies to control animal diseases.

Outcome # 1

1. Outcome Target

Percentage of Extension program participants that significantly change one or more practice as a result of attending classes and conference sessions intended to improve participant practices.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 204 - Plant Product Quality and Utility (Preharvest)
- 315 - Animal Welfare/Well-Being and Protection
- 306 - Environmental Stress in Animals
- 307 - Animal Management Systems
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 213 - Weeds Affecting Plants
- 216 - Integrated Pest Management Systems
- 311 - Animal Diseases
- 304 - Animal Genome
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 205 - Plant Management Systems
- 305 - Animal Physiological Processes
- 206 - Basic Plant Biology
- 212 - Diseases and Nematodes Affecting Plants

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Number of changes in condition reported each year.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 306 - Environmental Stress in Animals
- 212 - Diseases and Nematodes Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 216 - Integrated Pest Management Systems

- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 304 - Animal Genome
- 301 - Reproductive Performance of Animals
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 315 - Animal Welfare/Well-Being and Protection
- 302 - Nutrient Utilization in Animals
- 311 - Animal Diseases
- 206 - Basic Plant Biology
- 305 - Animal Physiological Processes
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Number of acres affected by new livestock and crop production to increase production, efficiency, or conservation.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals
- 204 - Plant Product Quality and Utility (Preharvest)
- 307 - Animal Management Systems
- 216 - Integrated Pest Management Systems
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 306 - Environmental Stress in Animals
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 305 - Animal Physiological Processes
- 311 - Animal Diseases
- 206 - Basic Plant Biology
- 212 - Diseases and Nematodes Affecting Plants
- 315 - Animal Welfare/Well-Being and Protection
- 301 - Reproductive Performance of Animals
- 304 - Animal Genome

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Research will support a more sustainable, diverse and resilient food system (Measure: number of new or improved innovations developed for food enterprises. Measure: number of new diagnostic systems analyzing plant and animal pests and diseases)

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 5

1. Outcome Target

Development of new crop varieties will help Minnesota growers improve profitability

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 206 - Basic Plant Biology

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

1. Outcome Target

Research will provide information to support strategies to control animal diseases.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 315 - Animal Welfare/Well-Being and Protection
- 311 - Animal Diseases
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Adjustments to both the research and outreach work of the program will be necessary in response to all of the external factors listed above. Some of these are more predictable than others in an increasingly large-scale and global environment. Crop and livestock production are affected by changes in government regulations, the economy and, as always, the weather.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

End of workshop surveys will be used to collect information about participant satisfaction, learning and plans to use the material. These will likely not be reported in deference to changes in action and condition. Crop and livestock production programs engage in in-depth evaluations for yearly events that have a broad impact and that will be repeated year to year. The goal of the evaluation is to measure whether the programs achieve their educational goals, and to determine whether programs can be improved in regard to marketing, target audience, logistics, content, teaching or structure.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

Update. The CERTs team adapted one outcome metric this year to accommodate realistic program evaluation processes, and selected new knowledge area codes to better describe their work. With the removal of the Forestry and Forest Products program from the 2017 POW, research related to bioenergy and biomass derived from Minnesota's native forests have been moved to this program.

Summary

Extension. The goal of Extension's Sustainable Energy Planned Program is to provide unbiased information needed to allow stakeholders and the public to make thoughtful decisions about energy futures in the state and region. Sustainable Energy programming is primarily carried out by the Clean Energy Resource Teams -- or CERTs. CERTs are a statewide program of the Regional Sustainable Development Partnerships. CERT's mission is to connect individuals and their communities to the resources they need to identify and implement community-based clean energy projects. CERTs partners are funded by a variety of sources, including Extension. In carrying out its mission, CERTs staff align their work with federal and state goals, and leverage dollars from a host of sources to bring initiatives, educational programs and seed grants to communities throughout the state of Minnesota.

MAES. The U.S. has a goal of producing 20 percent of its transportation fuels from renewable sources, including biomass, by 2030. This is the kind of challenge for which the Land Grant University system was first created. Sustainable energy efforts require a system-wide focus, looking at not only efficient processes, but balancing natural resources, and examining its impact on climate change, water quality, and quality of life. Joint positions of the Minnesota Agricultural Experiment Station research and University of Minnesota Extension outreach are focusing on the potential for biomass and other renewable energy sources, such as wind and hydrogen energy, within the context of Minnesota's agricultural and natural resources environment.

Emerging technologies and emerging public policy are driving key players to consider the use of biomass to create biofuels and biopower. However, a full-fledged sustainable energy economy has yet to be developed. In developing that economy, decision-makers need quality information that is not biased by either political positions or profiteering. Sustainable energy efforts at Extension will provide a source of unbiased research and education that will, ultimately, create a viable economy for sustainable energy. Its knowledge base, drawn from research of MAES and others, will glean information about current economic and policy forces, knowledge of emerging policies and technologies, and research by and about environmental impacts of biofuels and biomass, economic drivers and realities, and new technology and engineering.

MAES research is helping to develop 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 are also 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.

MAES will support research to investigate the potential of renewable energy resources. Many of the currently funded projects are focused on a range of opportunities related to biomass. However, research projects on other energy sources will be undertaken as opportunities arise. This research will help determine economic and policy issues related to renewable energy resources, and will conduct needed basic and applied research on processes, materials, and techniques. It will be designed to help agricultural producers participate in the renewable energy industry by adding value to their products while at the same time improving rural economic development.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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	0%		30%	
401	Structures, Facilities, and General Purpose Farm Supplies	0%		5%	
402	Engineering Systems and Equipment	5%		5%	
503	Quality Maintenance in Storing and Marketing Food Products	3%		0%	
511	New and Improved Non-Food Products and Processes	2%		0%	
601	Economics of Agricultural Production and Farm Management	0%		20%	
604	Marketing and Distribution Practices	10%		0%	
605	Natural Resource and Environmental Economics	5%		30%	
607	Consumer Economics	15%		0%	
608	Community Resource Planning and Development	15%		0%	
610	Domestic Policy Analysis	0%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	15%		0%	
805	Community Institutions and Social Services	10%		0%	
901	Program and Project Design, and Statistics	5%		0%	
903	Communication, Education, and Information Delivery	15%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Extension. Minnesota's energy supply is not as clean, efficient, reliable, and affordable as it could be. Minnesotans spent \$24 billion and consumed a total of 1.860 trillion BTUs of energy (electricity, natural gas, petroleum products, coal and biomass) in 2013 to supply energy needs. Energy use spreads across four main sectors: Transportation (24 percent total use for buses, automobiles), residential (23 percent total use), commercial (19 percent total use) and industrial (34 percent total use.)

One priority for the work of Sustainable Energy reflects a partnership with The Minnesota Department of Commerce, Division of Energy Resources Staff. Their goal is to oversee how utilities across the state are meeting their mandated energy savings goals, and also coordinate which technologies are "allowed" to claim deemed savings.

MAES. In the early 1980s, MAES funding helped build Minnesota's first ethanol research facility at one of its Research and Outreach Centers. At the same time, Experiment Station research and Extension outreach efforts focused on the economic potential of ethanol for rural communities and how they could take advantage of those opportunities. Today, there are broader opportunities for renewable energy, and an increasingly urgent need to explore them.

Research is needed to develop new methods to produce biofuels from waste biomass including forest and mill residues, agricultural crops and wastes, animal waste, livestock operation residues, aquatic plants, fast-growing trees and plants, and municipal and industrial wastes.

Other energy opportunities include studying other energy sources and ways to lower energy usage. For example, a current pilot project at the Research and Outreach Center at Morris, Minnesota, is working to create a "net-zero" dairy and swine farm by combining best practices and new technology to lower energy usage throughout the facilities.

2. Scope of the Program

- In-State Extension
- In-State Research
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Extension

Sustainable energy initiatives carried out by CERTs, program partners, educators and specialists assume that:

- The most sustainable form of energy is energy not used.
- Communities and their members can use education, incentive and encouragement to adopt energy conservation, energy efficiency and renewable energy technologies and practices in their homes, businesses and local institutions.

MAES

- Relationships and partnerships among key players affecting supply and demand must be nurtured and informed.
- As the U.S. seeks to reduce its dependence on petroleum products, demand for bio-based products will steadily increase.
- Unanswered questions about the impact of biofuels on greenhouse gas emissions, as well as the competition between food and fuel, will increase the need for unbiased information and public research. The role of research in helping to inform the public and policy debate is critical.
- Many potential alternative energy sources are in the beginning development stages or as yet unknown. It will be important to be flexible and entrepreneurial in order to take advantage of emerging research opportunities.
- The direction of the renewable energy industry will be driven by innovation.
- Renewable energy research requires a system-wide focus, looking at not only efficient processes, but balancing natural resources, and examining its impact on climate change, water quality, and quality of life.

2. Ultimate goal(s) of this Program

Extension

The overriding charge of CERTs is to help Minnesota meet its energy efficiency and renewable energy goals by connecting individuals and their communities to the resources they need to identify and implement energy efficiency and renewable energy projects. Its goals will be quantified through BTUs of energy saved, through dollars awarded in seed grants, and through the involvement of people in creating a more sustainable energy future.

MAES

The ultimate research goals are:

- To build a new bio-based economic sector on the existing foundation of agriculture, forestry and natural resources.
- To understand and evaluate the economic impacts of adoption of renewable energy sources.
- To enlarge the understanding of Minnesotans in the opportunities and trade-offs in renewal energy strategies.
- To develop real science answers to known and as yet unknown questions.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	8.1	0.0	49.8	0.0
2018	8.1	0.0	49.8	0.0
2019	8.1	0.0	49.8	0.0
2020	8.1	0.0	49.8	0.0
2021	8.1	0.0	49.8	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Extension. Sustainable Energy programming from U of M Extension is primarily carried out through the Clean Energy Resource Team project (CERTs). CERTs are a statewide partnership with a shared mission to connect individuals and their communities to the resources they need to identify and implement community-based clean energy projects. CERTs activities in Extension are carried out with the following partners: University of Minnesota Regional Sustainable Development Partnerships, The Great Plains Institute, Southwest Regional Development Commission, and the Minnesota Division of Energy Resources.

As an example of the kind of work CERTs will be doing, the team works with the Minnesota Department of Commerce, Division of Energy Resources along with Minnesota Electric Utilities to provide education and outreach on Community Solar Gardens. This option of centrally-locating solar photovoltaic (PV) systems that provide electricity to participating subscribers was written into Minnesota legislation in 2013 and the first projects are being installed in 2016. CERTs has been instrumental in providing consumer education through fact sheets, websites, and public presentations and in testing new implementation approaches (e.g., shared procurement strategies) as the market adjusts to this new mechanism to adopt clean energy.

2016, the marketplace will continue its rapid growth, and CERTs will continue to support effective consumer decision making in a significant way.

MAES. Researchers will engage in a wide range of research activities, including laboratory studies, experiments, field testing, prototype development, comparison studies, and economic analysis. Collaborative efforts will be necessary and will include cross-disciplinary studies and the involvement of private industries and other private and public stakeholders.

Some specific projects already known:

- Research on new uses for ethanol bioproducts, liquid fuels from biomass, and other energy crops for Minnesota.
- Research on ways to recover liquid fuel, gas, and other products from agricultural wastes.
- Research to develop farm scale prototypes for energy recovery and use.
- Research on altering lignin composition for bioprocessing of lignocellulosic feed stocks to biofuels and other products.
- Studies on the economic and environmental impacts of the emerging biofuels economy.

Researchers will:

- Publish the results of research in scientific journals and communicate research results in internal and external media.
- Present data at professional scientific regional, national and international conferences and symposia.
- Deliver science-based objective information to state, regional, national and international user groups.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • One-on-One Intervention • Demonstrations • Other 1 (seed grants) • Other 2 (campaigns) 	<ul style="list-style-type: none"> • Public Service Announcement • Newsletters • TV Media Programs • Web sites other than eXtension

3. Description of targeted audience

Extension programming through Clean Energy Resource Teams is delivered in seven regions spanning the entire state of Minnesota. CERTs empowers communities and their members to adopt energy conservation, energy efficiency and renewable energy technologies for their homes, businesses and local institutions. Types of communities that CERTs works with include, but are not limited to, businesses, civic organizations, economic developers, faith groups, farmers, local governments, residents and neighborhoods, schools, and utilities.

MAES research reaches agriculture and natural resources industry representatives, biotechnology company representatives, policymakers, state and federal agency representatives, private citizens, and entrepreneurs.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
 - Number of patents submitted
 - Number of peer reviewed publications
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Seed grant dollars will provide opportunity and support for clean energy projects to occur in Minnesota communities.
 - Workshops, tours and forums will provide unbiased information regarding energy efficiency and renewable energy to target audiences.
 - Subscribed members to the CERTs list serve will receive regular communication and education about clean energy resources in Minnesota.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Research will investigate and help develop novel sources of bioenergy.
2	Number of participants who report they are likely to take action in their homes, businesses and communities for energy efficiency and renewable energy
3	Number of BTUs (in billions) saved as the result of annual energy savings, either through energy efficiency or by offsetting current energy sources with renewable energy

Outcome # 1

1. Outcome Target

Research will investigate and help develop novel sources of bioenergy.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 610 - Domestic Policy Analysis
- 601 - Economics of Agricultural Production and Farm Management
- 131 - Alternative Uses of Land
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Number of participants who report they are likely to take action in their homes, businesses and communities for energy efficiency and renewable energy

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics
- 402 - Engineering Systems and Equipment
- 608 - Community Resource Planning and Development
- 604 - Marketing and Distribution Practices
- 805 - Community Institutions and Social Services
- 901 - Program and Project Design, and Statistics
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Number of BTUs (in billions) saved as the result of annual energy savings, either through energy efficiency or by offsetting current energy sources with renewable energy

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 805 - Community Institutions and Social Services
- 607 - Consumer Economics
- 511 - New and Improved Non-Food Products and Processes
- 605 - Natural Resource and Environmental Economics
- 608 - Community Resource Planning and Development
- 604 - Marketing and Distribution Practices
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 402 - Engineering Systems and Equipment

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

The potential for biomass and other renewable energy sources will be developed within the context of Minnesota's agricultural and natural resources environment. It will also be developed within the larger, global world of increasing demand for energy from developing countries and competing demands for food.

Public policy decisions will have an impact on incentives to conserve energy or use renewable energy sources.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

The metrics of effectiveness employed by the CERTs team considers the efficacy of Extension's educational outreach, as well as the efficacy of programs to meet energy efficiency and renewable goals. Surveys and observations examine whether program participants are likely to take action to change their energy sources or decrease their energy use. Using technical information and participation rates, the team has established a way to quantify the annual energy savings in BTUs.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Climate Change

2. Brief summary about Planned Program

Update: A new hire in 2015 that specializes in silviculture will increase our research efforts in this area. Additionally, the removal of the Forestry and Forest Products planned program will lead to more research efforts in our Northern forests being reported here. Additional funding given to the Forever Green Initiative in 2016 will increase research conducted on alternative crop species that may adapt well as our climate changes. Extension has slightly modified its outcome goal.

Summary. Climate change is a long-term environmental issue. In Minnesota, as elsewhere, climate change is already happening. For example, over the past twenty years, the growing season in the Great Lakes region has increased by 8-to-16 days, and overall plant growth has increased by 10 percent. For Minnesota, climate change will mean more hot extremes and more heavy precipitation events. Climate change will increase stress on our natural resources, require adaptations in our agricultural practices, and create economic and public policy challenges.

The complex issue of climate change requires multi-disciplinary perspectives. U of M faculty and specialists in forestry, water quality, environmental sciences, agricultural researchers and economists, along with climate and soil specialists will work together to develop the needed information. Master Naturalist volunteers will monitor species that are particularly influenced by climate change. Researchers will develop conservation strategies, risk management strategies and practical information on best responses to climate change. Extension will provide outreach to provide Minnesotans information for responding to change.

Extension programs that achieve climate change outcomes are disbursed throughout other planned programs. This Planned Program describes the effort when these staff work together as a multi-disciplinary team to address the NIFA priority of Climate Change. The multi-disciplinary team hosts yearly events that help public and private interests consider the effects of climate change and adapt.

Minnesota Agricultural Experiment Station researchers and Extension will provide key information and support:

- 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.
- Giving advice to farmers and communities on how to respond to fluctuations and stresses created by climate change.
- Advising stakeholders and policy makers based on analysis of alternative climate change remediation policies.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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%		15%	
104	Protect Soil from Harmful Effects of Natural Elements	50%		20%	
123	Management and Sustainability of Forest Resources	0%		20%	
125	Agroforestry	0%		5%	
131	Alternative Uses of Land	0%		5%	
132	Weather and Climate	25%		20%	
605	Natural Resource and Environmental Economics	25%		15%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

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. As changes are monitored, land grant systems are well-situated to recommend adaptive practices. Research and education will inform decision-makers in homes, farms, businesses, communities and regional and state policy settings so that Minnesota is better able to mitigate the effects of climate change. Master Naturalist volunteers will be deployed to monitor climate change through vulnerable species, and to educate people where they live, work and play.

2. Scope of the Program

- In-State Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

1. Climate change may affect a myriad of conditions in agricultural production, environmental control, family and community life. Responding to these needs must involve many disciplines.

2. Baseline research and needs assessment must be examined in order to chart future programming.
3. Climate change is a contentious issue. Neutrality regarding cause and blame must undergird the program, while proactive thinking engages stakeholders in addressing the effects of climate change.

2. Ultimate goal(s) of this Program

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, environmental control agents, and public leaders to adapt to climate change by seizing the opportunities of new crops and new management practices.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	27.2	0.0
2018	0.0	0.0	27.2	0.0
2019	0.0	0.0	27.2	0.0
2020	0.0	0.0	27.2	0.0
2021	0.0	0.0	27.2	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

The Climate Change initiative is a multi-disciplinary program mobilizing available and relevant Extension programming and research in areas such as forestry, environmental science education, water, crops, horticulture and more. Extension FTEs are not formally aligned with the Climate Change planned program area. Outcomes and outputs are likely to be described in other program areas. Volunteer hours will be monitored and reported.

Priorities are to conduct and synthesize adaptation research, develop resources and pathways to increase climate literacy in target audiences, and train decision-makers in new practices to ensure communities are prepared. As climate change affects conditions in planned programs across Extension, including Forestry, Agriculture, Horticulture and more, research from MAES and other sources will be consulted in order to determine a response.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
-----------------------	-------------------------

<ul style="list-style-type: none">● Education Class● Workshop● Group Discussion● One-on-One Intervention● Demonstrations● Other 1 (Adaptation of program modules)	<ul style="list-style-type: none">● Web sites other than eXtension
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3. Description of targeted audience

As 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. Many will be those audiences targeted by other program areas, as described in those plans of work. Primarily, we will choose audiences whose decisions will be influenced by climate change, as well as those who consult or influence the decisions of these growers and producers, including volunteers. Other audiences include decision-makers and leaders responsible for preparing communities for change, including preparing infrastructures to manage extreme weather. 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(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Research projects will be conducted to develop information on climate change effects on northern forests.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Research will develop new knowledge and technologies related to climate change. (Measure: number of new crop varieties and genotypes with climate adaptive traits; number of new assessment and management tools developed, including models and measurements; number of new climate relevant databases, monitoring systems and inventories managed or under development)
2	Percentage of participants who self-report changes in decisions and behavior after educational events.

Outcome # 1

1. Outcome Target

Research will develop new knowledge and technologies related to climate change. (Measure: number of new crop varieties and genotypes with climate adaptive traits; number of new assessment and management tools developed, including models and measurements; number of new climate relevant databases, monitoring systems and inventories managed or under development)

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics
- 132 - Weather and Climate
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 123 - Management and Sustainability of Forest Resources

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Percentage of participants who self-report changes in decisions and behavior after educational events.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 132 - Weather and Climate
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 605 - Natural Resource and Environmental Economics
- 102 - Soil, Plant, Water, Nutrient Relationships
- 123 - Management and Sustainability of Forest Resources

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Other (Degree of climate change)

Description

The multi-disciplinary team will monitor the degree to which the public is able and willing to address climate change, as well as the degree to which climate change affects communities, economies and individuals.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Evaluation strategies will be developed as part of program development in other disciplines. As grant proposals are developed and submitted, evaluation plans will be integrated into the funding of projects. When content and outcomes are integrated into existing programming, evaluation strategies for those programs will be tapped to measure the effectiveness for the climate change initiative.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Health and Nutrition

2. Brief summary about Planned Program

Update: A new researcher hired in the Department of Animal Science in late 2015 will focus on genomics and epigenetics. His future research with mouse models could impact human health and nutrition studies. No changes were made to Extension priorities or outcomes.

Summary. In February of 2014, the New York Times reported that childhood obesity rates in children aged 2-5 had plummeted by 45 percent in the past decade, noting that "the first broad decline in an epidemic that often leads to lifelong struggles with weight and higher risks for cancer, heart disease and stroke." However, rates are still high among older children. Health and nutrition programs at the University of Minnesota reach children of all ages and, more importantly, will be turning a greater portion of its attention to making systemic changes that promote the health and well-being of all community residents.

Minnesota Agricultural Experiment Station research and Extension outreach will focus on the issue of childhood obesity with a broad community and family systems focus. The goal is to generate research and to provide both reliable information and practical outreach to families and communities, as well as to the food industry and public policymakers.

In 2016, changes are made in order to: 1) correctly describe evaluation outcomes as they are presented in the evaluation methodology, identifying statistically significant change rather than just percentage of participants who showed change; and, 2) to address a new programmatic priority to create the policy, system and environmental changes.

Extension. The Extension Nutrition Education Program (NEP) provides nutrition education to audiences of low-income persons and professionals who serve low-income persons. NEP includes the Supplemental Nutrition Assistance (SNAP-Ed) Program, the Expanded Food and Nutrition Education Program (EFNEP), an Extension-funded program, and project grants from other sources.

In January 2014, University of Minnesota Extension restructured its Health and Nutrition Programs, including the federally funded SNAP-Ed program for low-income audiences. The regional model for SNAP-Ed allows for expansion and contraction based on the actual funding available.

The new regional SNAP-Ed program uses the University of Minnesota Extension's regional delivery model. SNAP-Ed Regional Educators cover multiple-county areas, based on income-eligible populations, schools with high numbers of students eligible for free- and reduced-price meals, levels of nutrition-related health disparities, and other factors. Regional educators work with local community partners to determine educational programs and complementary policy, systems, and environmental approaches based on income-eligible participants in the counties.

Under these conditions, we anticipate significantly reduced numbers of participants in relation to other years.

The integration of direct education and policy, system and environment programming is designed to create greater impacts. A Regional Educator who teaches nutrition education to 25 fourth graders reaches 25 fourth graders, (and, to a certain degree, their parents). However, if a Regional Educator reaches the parents of 25 fourth graders and their siblings, provides technical assistance to a school interested in establishing a Farm-to-School program, trains community volunteers to deliver nutrition education, and promotes changes through participation on a wellness committee, that same educator will make a

difference for many more than 25 children because they are working within the policy, system and environmental changes. Ultimately, the team's goal is to create communities that "make the healthy choice the easy choice."

MAES. Minnesota Agricultural Experiment Station research focuses on issues of food consumption for optimal health, food chemicals in processing and storage, and product characteristics of foods grown in the Midwest. Research on more general human issues includes projects on insects and diseases that can affect humans are also included in this program area.

Dietary research focuses on the relationship between vivolipid oxidation and its protection against heart disease, diabetes and cancer, on measuring the physiological effects of dietary fiber, investigating foods that help in the treatment for diabetes, the potential of phyto-estrogens as cancer preventatives, developing new sources of dietary antioxidants and fibers, understanding the link between fat, salt and hypertension, and the dietary influences of colon cancer.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds :Yes

6. Expending other than formula funds or state-matching funds : Yes

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	5%		5%	
701	Nutrient Composition of Food	25%		15%	
703	Nutrition Education and Behavior	60%		20%	
704	Nutrition and Hunger in the Population	10%		30%	
721	Insects and Other Pests Affecting Humans	0%		5%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		5%	
724	Healthy Lifestyle	0%		20%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Nutrition and optimal food intake is a fundamental physical building block important to the wellbeing of Minnesotans. Research has established the link between adequate nutrition in the early years and adult productivity, between adequate nutrition and risks of disease and disability, and between adequate nutrition education and nutritional intake.

In the U.S., \$92.6 billion in annual cost is related directly to obesity-related health concerns. One-half of these costs are covered directly by tax dollars via Medicare and Medicaid. More than half of all Minnesotans are considered to be obese or overweight (61%), putting them at risk for heart disease, stroke, certain cancers and type two diabetes, all of which are among the leading causes of death. A comprehensive approach addresses not only individual behavior change, but environmental and systemic change as well. According to the Centers for Disease Control, during the past twenty years, obesity among adults and children has risen significantly, resulting in a host of poor health conditions. In 2004, in excess of 260,000 Minnesotans are certified as eligible for Food Stamps. Assuming 61% have weight problems, over 150,000 Food Stamp participants need information and community systems that support healthy choices.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Healthful eating habits in childhood play a role in the prevention of chronic under-nutrition and acute nutrition problems throughout their lives. The development of healthful eating habits as a child can serve as a basis for adult dietary behaviors. Consumers will increase their healthful behaviors through adequate information, tools and motivation. Individuals benefit from an environment that reinforces changes to more healthful food selections and more nutritious food choices. Choices about health and nutrition are affected by the community institutions and policies around them. Affecting those institutions and policies at the local, regional and statewide level will ultimately affect child health.

2. Ultimate goal(s) of this Program

Through a comprehensive approach to change individual level decisions and the nutritional environment, Minnesotans will make decisions that will enhance their health and well-being.

Research goals to support these decisions include:

- Determining optimal food consumption for health of the colon, reducing cardiovascular disease, cancer and diabetes.
- Determining the physiological effects of various dietary fibers.
- Analyzing the loss of food chemicals in processing and storage.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
		1862	1890	1862

2017	9.6	0.0	32.0	0.0
2018	9.6	0.0	32.0	0.0
2019	9.6	0.0	32.0	0.0
2020	9.6	0.0	32.0	0.0
2021	9.6	0.0	32.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Besides its core educational programs, nutrition programs at Extension are engaging in multi-disciplinary initiatives that may affect outcomes and impacts. Efforts will:

- Develop food systems and community support systems that support healthy eating in children and families;
- Evaluate the effectiveness of nutrition education programs;
- Research the impact of nutrition education on children and the impact of access of food on families; and,
- Research the impact of healthy eating, increased physical activity, and food shopping behavior of low-income families.
- Develop networks and partnerships with local organizations and systems that can build systemic change will also be a primary activity.

MAES research will be conducted to develop a better understanding of the nutritional content and health benefits of various foods, as well as developing methods to help the food processing industry provide healthy food that customers desire.

Where possible, research efforts will focus children and underserved populations in the state.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • One-on-One Intervention • Demonstrations • Other 1 (work through community networks) 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension • Other 1 (social media)

3. Description of targeted audience

For maximum impact, we plan to focus direct education on:

- parents and other caregivers of low-income children
- situations where more than one organization collaborates to bring SNAP-Ed classes to eligible audiences in the community

- communities that present opportunities for impacting systems, environments, and policies so that SNAP-Ed participants have every opportunity to put into practice what they learn in classes.

MAES research target audiences also include:

- Food industry.
- Health professionals including dietitians, nurses, and physicians.
- Researchers concerned with the diet, nutrition, and human health fields.
- The public.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
 - Number of patents submitted
 - Number of peer reviewed publications
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of workshops/classes or educational presentations taught.
 - Number of organizations represented in community networks.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of participants who report knowledge change related to human nutrition knowledge.
2	Number of changes made by professionals, organizations and policy makers related to practices, <u>organizational culture and policies that promote food literacy, active living and healthy food access.</u>
3	Percentage of program participants who use research-based information from Extension to improve <u>their intake of healthful foods and engagement in physical activity.</u>
4	Research will support families, children and youth understanding of healthy food choices.

Outcome # 1

1. Outcome Target

Percentage of participants who report knowledge change related to human nutrition knowledge.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Number of changes made by professionals, organizations and policy makers related to practices, organizational culture and policies that promote food literacy, active living and healthy food access.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 704 - Nutrition and Hunger in the Population
- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Percentage of program participants who use research-based information from Extension to improve their intake of healthful foods and engagement in physical activity.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Research will support families, children and youth understanding of healthy food choices.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 704 - Nutrition and Hunger in the Population
- 703 - Nutrition Education and Behavior
- 501 - New and Improved Food Processing Technologies
- 701 - Nutrient Composition of Food

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Changes in the economic status of families and institutions, such as schools, can positively or negatively affect how much an individual or institution can invest in behavior change. Greater or lesser emphasis on health and nutrition can enhance or decrease the effectiveness of our approach. Changes in population can affect who is targeted by the program and whether cultural adaptations may be needed.

As new multi-disciplinary initiatives come together to address the issues of aging populations, immigrant families and healthy families, the outcomes and impacts of Childhood Obesity programs may be affected.

Federal decisions could significantly affect the type of outreach and education these programs engage in from 2014 - 2019. As yet, those decisions are not known.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

A new evaluation model is being developed to align with the Health and Nutrition programmatic framework. The framework is based on the Spectrum of Prevention, a model for developing holistic interventions developed by the Prevention Institute (www.preventioninstitute.org).

The evaluation model will include assessments for program monitoring, as well as outcomes and impacts. The spectrum of prevention levels include: 1) Strengthening individual knowledge and skills; 2) Promoting community education; 3) Educating providers; 4) Fostering coalitions and networks; 5) Changing organizational practices; and, 6) Influencing policy.

For each level, data will be collected using the RE-AIM model: Reach, Effectiveness (outcomes), Adoption, Implementation, and Maintenance (sustainability). This comprehensive evaluation model is designed to meet evaluation needs across Health and Nutrition programs. Some examples of ways it will be useful are: developing new initiatives, assessing program quality, examining gap analysis, and measuring the impact of existing initiatives. The framework utilizes a Developmental and Ecological approach, which recognizes adaptation are necessary to be relevant, and that initiatives must be implemented at multiple levels to achieve the greatest collective impact.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food Safety

2. Brief summary about Planned Program

Update. The 2017 - 2021 Plan of Work goals for Food Safety are modified to emphasize action and behavior change over knowledge change. Increasing interest in the consumption of local foods and increasing interest in diversity of food options by consumers provide a need for more research in small and local food industries and methods to maintain food safety and food quality.

While the food supply in the U.S. is one of the safest in the world, each year about 76 million illnesses occur, more than 300,000 persons are hospitalized, and 5,000 die from the food borne illness. Keeping food free of contaminants, bacteria or pathogens, as well as fresh and wholesome through production, processing and the distribution chain requires a high level of quality control. Food preparation is another critical element of food safety, whether in the kitchen of a restaurant, home or institution. Minnesotans' changing food preferences add new demands. The local food movement, for example, raises new quality issues, and concerns among consumers about food allergies challenge the food supply.

Minnesota Agricultural Experiment Station research and University of Minnesota Extension education will combine to bring food safety processes and practices into the 21st century. Research will focus 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. Extension programs will focus on food safety certification programs for food services, food safety training for food handlers, food safety education to consumers, and food safety consultation to retail distributors.

The mission of Food Safety education is to provide research-based food safety education to Minnesota food service establishments, non-profit community events, schools, processing facilities, care facilities, homes and home-based businesses and to increase the safety of food products grown, caught, prepared or preserved in Minnesota. This is being accomplished through: 1) Food Safety Certification programs for Food Services; 2) Food Safety Training for food handlers; and, 3) Food Safety Education through distributed materials to the general public.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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	40%		40%	
503	Quality Maintenance in Storing and Marketing Food Products	30%		30%	
504	Home and Commercial Food Service	30%		30%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

An average of 39 foodborne outbreaks occur every year in Minnesota, involving more than 600 persons. Fifty percent of the food dollar is spent on meals prepared by the food service industry. The majority of foodborne outbreaks in Minnesota is related to improper handling in these food service retail situations. Emerging trends to which the food service industry must adapt include food allergies, food irradiation and foodborne illness. In entrepreneurial food markets and community-based care settings, similar concerns arise with less professional resources available for trainings and standards for food preparation.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Interventions in public food service settings will control the conditions under which foodborne illnesses occur. For-profit and non-profit food service settings benefit from becoming trained in food handling because the reputations of their institutions and industry will be strengthened. Emerging food markets need to be safe in order to maintain the integrity of their new industry. The general public seeks information about food safety from timely, responsive mediums rather than workshop or certification settings.

2. Ultimate goal(s) of this Program

The ultimate goal is to prevent foodborne illnesses and assure the safety of food preparation in food service settings.

Research goals include to:

- Create the basic knowledge to permit the food industry to develop safe and flavorful food products;
- Reduce incidence of pathogens by incorporating natural antimicrobials in ready-to-consume foods;
- Reduce food spoilage by using naturally occurring chemicals from edible plants;
- Optimize product quality by evaluating food component interactions;
- Increase understanding of the structural characteristics that proteins bring to food products;
- Develop a polymer science approach to study lipid replacement in cereal-based systems;
- Evaluate the farm to table movement of food and determine where contamination may occur.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	7.0	0.0	11.1	0.0
2018	7.0	0.0	11.1	0.0
2019	7.0	0.0	11.1	0.0
2020	7.0	0.0	11.1	0.0
2021	7.0	0.0	11.1	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research will be conducted to meet the applied and basic research goals outlined under "Ultimate Goals." Research into the development of new products, processes and storage conditions is included under this program.

Extension. The Extension Food Safety Program's (FSP) programs will focus on five priority areas.

Food Safety for Food Service Managers and Employees: Food Manager Certification and recertification programming, in both face to face and on-line formats, will be delivered resulting in certification of food service managers. Food Service Employee Training is offered at establishments or conferences upon request and is also scheduled several times a year for open enrollment.

Volunteer Organizations and Care Givers: Cooking Safely for a Crowd is offered face to face and online for those who occasionally cook in large volumes. Curriculum is available for care givers, day care providers and others who work with at risk populations.

Food Safety for Consumers: Food safety educational outreach to the public takes several forms. The team maintains a webpage that is frequently updated with new information. Collaborating with Iowa, UMN Extension maintains the Answer Line for food safety questions. Press releases, news articles, fact sheets and radio and television interviews are also used to inform the public. The team also reaches out using social media.

Food Preservation Food Safety for Entrepreneurs and Home Growers: The Extension Food Safety team will deliver in person training and website information for those interested in food preservation at home. For those interested in making products (jams and pickles type) for market, "Peddling Your Pickles" and "Jam and Jelly" workshops are given for entrepreneurs

Farm to School/Market: The team will help small to medium-sized producers by bringing together a team of extension and community business professionals to assist them in food production, food safety, business planning and market development.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● One-on-One Intervention ● Demonstrations ● Other 1 (Train-the-trainer) 	<ul style="list-style-type: none"> ● Newsletters ● Web sites other than eXtension ● Other 1 (answering lines) ● Other 2 (CDDVDs)

3. Description of targeted audience

Research supports the food development industry and food processing industry, while the direct audiences of the outreach efforts are food service workers through relationships with the National Restaurant Association, food handlers in community locations, entrepreneurs who market foods through farmers markets and other local channels, fishermen, and high-risk audiences through the organizations they trust.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of workshops or other educational events conducted.

- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Research will increase number of viable technologies to improve food safety.
2	Research will increase understanding of threats to food safety from microbial and chemical sources.
3	Percentage of participants that significantly changed one or more food safety practice as a result of attending classes intended to improve food safety practices.
4	Percentage of pass rates among those who participate in food safety education programs to become certified food managers. (The Minnesota Department of Health reports a decrease in critical inspection violations in establishments that employ a Certified Food Manager.)

Outcome # 1

1. Outcome Target

Research will increase number of viable technologies to improve food safety.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 504 - Home and Commercial Food Service
- 501 - New and Improved Food Processing Technologies
- 503 - Quality Maintenance in Storing and Marketing Food Products

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Research will increase understanding of threats to food safety from microbial and chemical sources.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 503 - Quality Maintenance in Storing and Marketing Food Products

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Percentage of participants that significantly changed one or more food safety practice as a result of attending classes intended to improve food safety practices.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 504 - Home and Commercial Food Service
- 503 - Quality Maintenance in Storing and Marketing Food Products

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Percentage of pass rates among those who participate in food safety education programs to become certified food managers. (The Minnesota Department of Health reports a decrease in critical inspection violations in establishments that employ a Certified Food Manager.)

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 504 - Home and Commercial Food Service
- 503 - Quality Maintenance in Storing and Marketing Food Products

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Government Regulations
- Populations changes (immigration, new cultural groupings, etc.)

Description

If regulations become lax for food service establishments, incentive to engage in certification may decrease. As population demographic change occurs, the "where and how" of public food service situations may need adjustment in program planning. As local foods face public scrutiny, more training for food safety may be required.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Evaluation uses data collection after courses and also at 3-6 month intervals after trainings. The post-program surveys consider which behaviors have been adopted in order to prevent foodborne illness outbreaks. Besides data collection, we plan to study program adaptations for new audiences to determine the cultural appropriateness of our program adaptations. Once program interventions are considered effective because of post-program evaluation, their outcomes will be measured through means similar to data collection for other programs.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Water Resources

2. Brief summary about Planned Program

Update: In the 2015 POW we removed Water Resources as a program, with plans to shift Water Resources projects into our Climate Change, Forestry and Forest Products and Natural Resource Management programs. We have since decided to keep Water Resources as a separate program for two key reasons: (1) The new NIFA strategic plan highlights water as a "sixth" key area in the coming years, and (2) In 2014, funding was granted to upgrade the Aquatic Invasive Species Research Center facilities. As the land of 10,000 lakes, we see ourselves in a position to provide research and outreach on water issues that will impact not only the state but the country as a whole. The 2017 POW reflects this shift. Outcomes were adjusted to emphasize change in action and condition rather than just a change in knowledge.

MAES research focuses on a number of key issues in regard to water quality in our state. In particular, our research is designed to develop a systematic, comprehensive and scientific approach to addressing agricultural profitability and non-point source pollution reduction in the Minnesota River Basin. Other research to support Minnesota water quality statewide will consider the urban/suburban/agricultural interface and competing demands for water resources. Research will study Minnesota lakes, streams and groundwater, and strategies to maintain their health and protect aquatic species.

Extension's Water Resources programs deliver science-based land use and water education programs and information for natural resource professionals, agency staff, local decision makers, citizen leaders and volunteers in order to inform decisions, adopt best practices, and increase water stewardship in communities. Specifically, the Stormwater Education Program assists local government in protecting and improving water resources by strengthening urban land use decision-making, improving stormwater practices, and educating local leaders and water resource professionals.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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	10%		15%	
112	Watershed Protection and Management	60%		25%	
133	Pollution Prevention and Mitigation	20%		30%	
135	Aquatic and Terrestrial Wildlife	0%		10%	
403	Waste Disposal, Recycling, and Reuse	0%		10%	
605	Natural Resource and Environmental Economics	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

In this land of (more than) 10,000 lakes, and many additional streams, rivers and other waterways, 4,114 were inventoried as impaired in 2014. This includes 515 newly inventoried waterways since 2012. Pollution from controllable human-made sources are an obstacle to keeping Minnesota's waters fishable and swimmable. The pressure on water resources is growing because the number of homes on Minnesota lakes has grown. The State of Minnesota has responded with requirements that, for example, local units of government reduce stormwater pollution and control how sewage treatment is done and maintained. However important this legislation is, it is the decisions that homeowners, landowners and small communities make that will improve the quality of water.

Minnesota's water resources are critical to the state's identity and economy. The Water Resources Program team members are "go to" resources who guide communities and residents in identifying issues and creating solutions for stormwater and shoreland issues. The Water Resources Program has the capacity to bring University research when communities are solving local and statewide water problems. Members are skilled at helping communities gather the right people and engage in community wide problem-solving about controversial issues. Communities and individuals can use this education and outreach to make decisions that protect our water resources.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

1. Pollution prevention requires an educational process in which those who manage land learn new methods and approaches.
2. Property owners care about the quality of the water around them and want to maintain a pollution free community.
3. Changing the norms, rules and behavior of community members will have an effect on pollution control.
4. Local government decision-makers need quality, updated information in order to form plans to protect the water resources in their jurisdictions.
5. High quality lakes, rivers, wetlands, and agriculture are valued in Minnesota, which can cause conflict in making decisions about public problems.

2. Ultimate goal(s) of this Program

The goal of water resource programs and research at the University of Minnesota is to work collaboratively in the University and in communities to maintain and improve the quality of Minnesota's waters and the health of Minnesota residents. Extension is making research based tools available to improve decision-making on water related issues among citizens, policy makers and environmental managers.

Research goals:

- Develop a framework for describing and taking inventory of characteristics of the Minnesota River Basin that affect non-point source pollution, agricultural management practices and their potential for reducing non-point source pollution.
- Develop an inventory for research on the risk associated with adopting crop management practices that can reduce non-point source pollution.
 - Identify and assess tools for stormwater practices.
 - Identify and assess shoreland management practices.
 - Identify and reduce aquatic invasive species.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	9.3	0.0	22.9	0.0
2018	9.3	0.0	22.9	0.0
2019	9.3	0.0	22.9	0.0
2020	9.3	0.0	22.9	0.0
2021	9.3	0.0	22.9	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

MAES. Research will be conducted and best practices developed in order to be able to:

- Provide land management / water quality education, stormwater management practice training, and local government stormwater education and support.
- Provide education, practical experience and resources about how to protect and improve the shoreland, environment, lake/stream water quality and protect native aquatic species.

Extension. Educational programming will provide education and consultation to citizens and government entities in watersheds so that they can plan to protect their waters.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • One-on-One Intervention • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension • Other 1 (Publications)

3. Description of targeted audience

Water Resource Programs will be available to communities across the entire state. We will reach those communities through local government and elected and appointed officials and their staff. Local government engineers and planners, consulting engineers, planners, and architects are also targeted as they help communities make decisions that impact Minnesota's waters. Natural resource and horticulture professionals will be engaged as partners, learners, and agents of change. Homeowners and community members are another key audience, because their use of water and management of waste can positively and negatively affect water supply.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of products developed to provide useful information about shoreland, storm water and septic system management in web links, printed products and media.
 - Number of educational events conducted about water quality, stormwater issues and shoreland management, revegetation and use of plants to maintain shoreland structures.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of water resource professionals who are applying skills and resources learned while participating in programs that address specific water management responsibilities and to achieve water management goals.
2	Number of Aquatic Invasive Species detected by volunteer detectors using information about early detection taught by Extension.
3	Research on aquatic invasive species and/or water quality will improve the overall health of Minnesota Lakes and Rivers.

Outcome # 1

1. Outcome Target

Percentage of water resource professionals who are applying skills and resources learned while participating in programs that address specific water management responsibilities and to achieve water management goals.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics
- 111 - Conservation and Efficient Use of Water
- 135 - Aquatic and Terrestrial Wildlife
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Number of Aquatic Invasive Species detected by volunteer detectors using information about early detection taught by Extension.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 112 - Watershed Protection and Management
- 135 - Aquatic and Terrestrial Wildlife
- 111 - Conservation and Efficient Use of Water

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Research on aquatic invasive species and/or water quality will improve the overall health of Minnesota

Lakes and Rivers.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 112 - Watershed Protection and Management
- 111 - Conservation and Efficient Use of Water
- 605 - Natural Resource and Environmental Economics
- 135 - Aquatic and Terrestrial Wildlife

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

If regulations that mandate planning and education for stormwater runoff and on-site treatment change, communities will no longer have an incentive to engage in this programming. As population changes happen in communities, the types of education delivered requires cultural and language relevance. Weather extremes may change the program priorities when they influence lakes and streams.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Evaluation is at two levels: awareness surveys are sent to participants to see if program goals were met, and direct interviews with local government staff will determine if the water resource programs provided are useful and helpful to local planning.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Community Vitality and Public Finance

2. Brief summary about Planned Program

Update. The only change in this plan of work from relates to Outcome Goals. The evaluation methods used to gather action step fulfillment was not successful. We have designed a community leader interview protocol to discern community actions that were strongly influenced by Extension's applied research or programs. The new wording reflects that change. Language used to report collective impacts is consistent with data collected for the North Central Regional Center for Rural Development.

Summary

Extension. This federal program will provide outcomes and impacts related to Extension's Center for Community Vitality, where more than 20 educators deliver programming related to leadership and civic engagement, economic development, and tourism development to community leaders and residents.

In 2016, we are combining two planned programs -- Leadership and Civic Engagement and Community Economics -- in order to report on outcomes common to all of these programs; for example, providing yearly tallies with regard to community plans affected and implemented.

Community Vitality programs at Extension help communities choose their future by:

- Informing the decisions they make;
- Improving the processes they use when they make decisions;
- Enhancing the skills, ability and confidence of those who lead and decide; and,
- Increasing the number of people who step up to lead and decide.

MAES. Research addresses taxation, the relationship of supply and demand for housing in rural communities, understanding family businesses as a vehicle for economic development, and improving the management skills of small business owners relative to business structures, product development and market evaluation

Research related to community development and vitality is limited but focuses on issues related to youth community engagement, personal protective gear for workers, restorative justice and international research for social scientists working in developing countries.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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	10%		10%	
608	Community Resource Planning and Development	45%		20%	
611	Foreign Policy and Programs	0%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	45%		30%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		30%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

MAES. Economic opportunities and challenges in non-urban areas affect the health of existing businesses, the availability of affordable housing, and financing for local government services. To remain healthy and viable, businesses in Greater Minnesota communities increasingly need information about local labor markets and employment trends, and assistance in market evaluation, new product development, and improved small business decision-making.

Communities and local leaders also need information on how to engage and provide assistance to underserved populations and increase youth involvement in community development.

Extension. Community development programs are largely focused on the needs of communities in Greater Minnesota. New demographic research reinforces the need to prepare local leaders in rural areas. According to study author Ben Winchester, Extension research fellow, organizations in the most rural counties of Minnesota requires an average of one in 34 residents to serve in leadership positions, compared with one leader required for ever 143 residents of major metropolitan areas. So, the demand for leadership is up to five times more in rural counties than urban areas, while the supply of leaders is diminishing. In light of this, many people should be asked to lead, but the 2010 Rural Plus Survey conducted by Minnesota's Blandin Foundation shows that is not always the case. When asked, "Have you ever been invited to serve in a leadership role in your community," 41 percent said no. Older residents, those with high incomes and business owners were most likely to say they had not been asked to lead.

Economic opportunities and challenges in non-urban areas affect the health of existing businesses, the availability of affordable housing and local government services. To remain healthy and viable, community leaders in Greater Minnesota need information about how local economics work, their current economic strengths, the needs of businesses in their area, and the potential markets and marketing opportunities that could bring more business vitality to their community. Communities also need to examine their competitiveness and their particular role in the economy of their region and Minnesota. All communities must address the quality of life for businesses and for the workforce during demographic shifts.

How can communities address these challenges? Case study examinations show that communities succeed when they realize that, "ultimately, we have to do it ourselves." While support from state government and other outside sources can affect the lives and outcomes of community life, the primary

ingredient for success is a communities' ability to make decisions and act together. This requires that community leaders and residents be informed and engaged in creating their future.

2. Scope of the Program

- In-State Extension
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

A Theory of Change developed and adopted for the Extension Center for Community Vitality in 2010 shapes interventions. The theory of change is based on best experiences in practice, as well as research in community development. The theory of change delineates our assumptions:

- We assess context to understand the local culture, economy, resources, demographics, motivation and leadership capacity and how they affect the issue(s) at hand.
- We build relationships, because trust is essential to collaborative action. We consult and coach to ensure that multiple points of view are included. We nurture both formal and informal leaders who can support and champion local action. In communities and beyond, we build partnerships with organizations and institutions that affect community change.
- We facilitate learning, combining research-informed knowledge with local expertise. We strive to make knowledge meaningful to multiple types of learners and audiences.
- We design and deliver relevant programs that flexibly allow for multiple points of entry and levels of engagement.

2. Ultimate goal(s) of this Program

We are successful when a community...

1. recognizes and understands its current situation;
2. has greater confidence that it can manage change;
3. acts to move toward a desired vision;
4. is better able to respond to social, civic, environmental, cultural and economic opportunities and challenges;
5. works through limitations, differences, interests and other barriers to resolve problems; and,
6. considers the impact of its actions on the greater community.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	29.7	0.0	5.4	0.0
2018	29.7	0.0	5.4	0.0

2019	29.7	0.0	5.4	0.0
2020	29.7	0.0	5.4	0.0
2021	29.7	0.0	5.4	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Extension. Community Vitality programs will use multiple interventions that help communities choose their future and strengthen local leadership: 1) workshops (face-to-face and online), 2) consultation for public participation strategies in community decisions, 3) long-term cohort groups, 4) applied research, and 5) community assessments. Because long-term leadership and civic engagement cohorts are proven to strengthen program outcomes, outreach efforts will encourage their implementation throughout the state. Community economics and tourism development programs use applied research and education to inform economic development decisions.

MAES research to support the understanding of public finance focuses on public policy, state and local taxation impacts and the state of Minnesota’s economy and the challenges facing local communities and local governments.

Research related to community vitality, while limited, includes research projects related to community leadership and safety, restorative justice and social work research in encouraging youth participation in community leadership.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • Other 1 (Community Coaching) • Other 2 (Applied research) 	<ul style="list-style-type: none"> • Web sites other than eXtension • Other 1 (Publications) • Other 2 (Materials dissemination)

3. Description of targeted audience

Community Vitality and Public Finance programs reach out to ten primary audiences:

- Local government agencies, employees and leaders
- Nonprofit organizations through their collaborative associations
- Foundations and their grantees
- The natural resources sector
- The agricultural sector
- The tourism sector
- The public health sector
- Chambers of Commerce
- Economic Development Associations
- Alumni of leadership cohort programs from previous years

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of community cohort groups convened to develop leadership skills, create civic connections, or strengthen the local economy.
 - Number of workshops and other structured gatherings that provided communities with increased skills, knowledge and behaviors related to community leadership, civic engagement, economic development or tourism.
 - Number of community-based applied research studies regarding (for example) retail trade, business retention and expansion, economic impact, tourism development or social capital.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of participants who increased their leadership intensity or involvement in at least one role.
2	Percentage of program alumni who report in follow-up surveys that the program helped make public meetings, planning sessions, or committees more effective.
3	Number of community or economic development decisions that were influenced by applied research or education.
4	Number of positive effects on "capitals" that are essential to the vitality of communities (including human, social, civic, financial, built, health, cultural, and natural) that were stimulated by applied research or education in communities.

Outcome # 1

1. Outcome Target

Number of participants who increased their leadership intensity or involvement in at least one role.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Percentage of program alumni who report in follow-up surveys that the program helped make public meetings, planning sessions, or committees more effective.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 608 - Community Resource Planning and Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Number of community or economic development decisions that were influenced by applied research or education.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 608 - Community Resource Planning and Development
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

- 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number of positive effects on "capitals" that are essential to the vitality of communities (including human, social, civic, financial, built, health, cultural, and natural) that were stimulated by applied research or education in communities.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 608 - Community Resource Planning and Development
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Greater emphasis on local control and required public participation tied to government funding positively impacts demand for this programming. More or less programming is demanded based on current priorities of local government or economies. When Extension and community leaders more effectively engage diverse members of the community, outcomes may take more time, but simultaneously report that communities are taking on the hard work of engaging underserved communities.

Economies shift with a myriad of external forces, including economic shifts that challenge or support local businesses, government regulations that affect tax bases, or support one industry over another.

Population changes drain communities of their population base or create influxes. All of these changes require communities to act on new information and challenge research and Extension to respond.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Evaluation of Leadership and Civic Engagement programs is monitored systematically and yearly. Using the Theory of Change adopted by Community Vitality programs in 2010, a yearly impact survey will be done each year to determine if programs are helping leaders and communities achieve goals. Retrospective pre and post surveys are conducted for every leadership and civic engagement cohort. Ripple effect mapping is used to examine the impacts of programs on community capitals. The team will further investigate how those outcomes help to achieve public value for Extension.

To monitor the success of our applied research programs, we will continue to conduct retrospective post-program evaluations that learn about community progress. Progress will be monitored through phone calls, online surveys, focus groups or one-on-one check-ins.

In shaping the study of outcomes in communities, two scholarly models will be considered. The first is the community capitals framework. Shaped by Cornelia and Jan Flora from the University of Iowa, the capitals framework recognizes the essential capitals that can be leveraged to create healthy communities. The second is public value. Articulated by Laura Kalambokidis of the University of Minnesota Extension and the Department of Applied Economics, public value frameworks challenge programs funded by public sources to articulate the good that educational programming brings to the broader public. Current evaluation methods include the use of Ripple Effect Mapping to help communities identify shifts that happened in community interaction, planning and decisions as a result of intervention.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Building Healthy, Strong Families

2. Brief summary about Planned Program

Update: There are no changes to this Planned Program for 2017-2022.

Summary. The focus of this program is the empowerment of people, through research-based information to address the challenges facing their families.

MAES research examines characteristics of family systems to identify and describe the impact of environment and decision-making on quality of marriage and family life. Specific research addresses positive family development and effective services that aim at security for the individual and family units as well as addressing the needs of underserved groups including minorities and children with disabilities.

Update: Minnesota continues to have one of the worst achievement gaps in the country despite years of effort. Several new research projects are exploring this issue and one new economist will be studying education in rural Africa.

Extension's regional educators and specialists work with families and the organizations that serve them to enhance the fiscal, emotional and developmental health of families and children. Each of these programs design, pilot and evaluate effective educational programming and tap community partnerships that reach low-income and minority families as well as other families in critical periods of transition.

Family Resource Management programs focus on subjects such as managing budgets, credit and debt, family businesses, preparation for retirement, culture and money, and teaching children about money. Family Relations programming uses education to build families through better family communication, nurturing and respectful discipline practices, strong parent and child relationships and authoritative parenting skills.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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	45%		20%	
802	Human Development and Family Well-Being	45%		30%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		10%	
805	Community Institutions and Social Services	0%		20%	
806	Youth Development	10%		20%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Cost-benefit analysis conducted at the University of Minnesota and elsewhere has demonstrated that enhancing the outcomes of parenting decreases the cost of dealing with the consequences of poor youth development. Therefore, money invested in family development programs have a long-term financial benefit to society.

Families face critical periods of transition when parenting decisions can support, enhance or impede child development. Research available from many sources, including the University of Minnesota, describes how parent behaviors regarding discipline, communication, co-parenting, relationships and household management can best support children. Extension delivers this information in a variety of ways, depending on learning styles, the support systems parents trust in communities and their tendency to seek help. Finding a variety of conduits for disseminating information increases access to this information.

Similarly, investment in helping parents manage resources effectively can reduce the costs of poverty to the rest of society. As economic changes occur, the need for assistance becomes more important. According to the National Council on Economic Education, "...Our nation's workforce and citizenry is expected to take on increasing responsibility for their own financial future...Financial security begins with building skills and developing practices that foster decision-making to create financial security and stability. There is evidence that the population needs more education to make its financial decisions." The new generation of heads-of-households are living in a time when budgeting skills were not taught. In the 2006 JumpStart survey of high school seniors, the average knowledge of personal finance reported a dismal 52.4 percent correct. More than 50 percent of working Americans have never even tried to determine how much money they need to save for retirement.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research

- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

1. Partnerships with local nonprofits, educational organizations, social service programs and financial institutions can expand the outcomes of family development programming by bringing good ideas to scale.
2. Family development programs must be translated for language and culture so that immigrant and non-English speaking residents can take advantage of them.
3. The family is the first intimate setting for the child, and the family's role is to equip children with skills and ways of understanding themselves and the world. We can reasonably expect that preparing parents to guide children, manage households and model positive behaviors will influence positive developmental outcomes in children.
4. Individuals in families influence each other over time. Influence runs from parent to child and child to parent.
5. The context in which children develop in addition to family (neighborhoods, faith organizations, historical and social events, culture, race, ethnicity, and more) is critical to the assumptions and behaviors that are brought to parenting and family life.
6. Healthy children and families leads to positive outcomes for the larger community.

2. Ultimate goal(s) of this Program

Extension will work in networks and communities to address parenting and family management practices. The ultimate goal of Financial Literacy programming is that families and individuals increase their wealth and financial security by making sound decisions about consumption, debt, retirement and daily finances. The ultimate goal of family relations programs is to see children of parents grow to the optimum developmental outcomes. In order to reach these goals, we aspire to create health, human service and educational systems where professionals are prepared to work successfully with parents and families.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	26.2	0.0	9.0	0.0
2018	26.2	0.0	9.0	0.0
2019	26.2	0.0	9.0	0.0
2020	26.2	0.0	9.0	0.0
2021	26.2	0.0	9.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

MAES. Research will examine the characteristics of family systems to identify the impact of environment and decision-making on quality of marriage and family life. Specific research will address positive family development and effective services that aim at security for the individual and family unit. Research efforts include study of processes and patterns of community adaptation, acceptance of youth and frail elders and various minority groups in Minnesota; i.e., Latino, Hmong, Vietnamese, Native American and Somalian. Research will be conducted to support the economic stability of families and on improving education in the state, especially as it relates to the achievement gap.

Extension. Activities will include:

- practitioner workshops held with partnering organizations who deliver education to their communities;
- workshops and trainings held in community-based settings;
- development of publications for the web and in print to support programming;
- media used to disseminate research and information;
- curriculum developed and adapted for culture and use;
- pilot programming and subsequent evaluation and research to determine which program methodologies should go to scale.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • Other 1 (training of trainers) • Other 2 (webcast and other multimedia) 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension • Other 1 (publications)

3. Description of targeted audience

Building Strong, Healthy Families programs serve professionals in collaborating agencies such as mental health professionals, parent educators, schools, courts, family service agencies, health care settings, organizations and businesses. Youth and money programs reach adolescents moving into independent living directly or through their educational resources. Family development programs are highly effective in attracting low-income, minority and immigrant families through partnerships with trusted community organizations.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of professionals trained to educate and support families.
 - Number of workshops and classes held -- face-to-face or online.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Professionals who work with parents and families will improve their skills. (Outcome expressed as a percentage of participants who report improving skills, or the significance level showing meaningful change in skills, depending on the evaluations methods used.)
2	Parents will improve their parenting practices. (Outcome is the significance level at which parents demonstrated they made meaningful change in behavior.)
3	Divorcing or unmarried parents will improve their co-parenting relationships in ways that are known to be effective in supporting positive child outcomes. (Outcomes expressed as percentage of participants who report improved communication, planning or resource sharing.)
4	Individuals, families and employees who participate in Resource Management programming will report they have used the knowledge and materials provided by the program to change behaviors related to targeted financial management goals. (Outcome is the significance level demonstrating that parents are making meaningful change in financial condition.)
5	Research will provide information and guidance to educators and school administrators that will help lower the achievement gap in the state.

Outcome # 1

1. Outcome Target

Professionals who work with parents and families will improve their skills. (Outcome expressed as a percentage of participants who report improving skills, or the significance level showing meaningful change in skills, depending on the evaluations methods used.)

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being
- 806 - Youth Development
- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Parents will improve their parenting practices. (Outcome is the significance level at which parents demonstrated they made meaningful change in behavior.)

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Divorcing or unmarried parents will improve their co-parenting relationships in ways that are known to be effective in supporting positive child outcomes. (Outcomes expressed as percentage of participants who report improved communication, planning or resource sharing.)

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development
- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Individuals, families and employees who participate in Resource Management programming will report they have used the knowledge and materials provided by the program to change behaviors related to targeted financial management goals. (Outcome is the significance level demonstrating that parents are making meaningful change in financial condition.)

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Research will provide information and guidance to educators and school administrators that will help lower the achievement gap in the state.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions and Social Services
- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

1. Currently, a Minnesota statute exists that makes divorce education mandatory for parents in conflict who are divorcing. If that policy changes, there would be less demand for Extension's divorce education program (Parents Forever).

2. Because family development programs work with a host of public and nonprofit organizations, government regulations, public policy and public priorities will create shifts in those partnerships.

3. Economic challenges create more challenge for financial literacy programs, and new public policy (for example, health care legislation) will affect the content and nature of programming.

4. As immigrant populations arrive in Minnesota or face new conditions during their evolution as American residents, their needs will change for both parent education and financial literacy.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

The Building Strong, Healthy Families team uses randomized control trial studies, pre-post and follow-up evaluation designs to examine the effects of the program on parents and families. These evaluation results have been leveraged to draw more funding to help the studies and the program go to a larger scale in Minnesota. The studies will demonstrate outcomes, will rigorously examine program effectiveness, and will determine when key interventions are ready to go to scale.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Youth Development

2. Brief summary about Planned Program

Update: No significant changes were made to this planned programs. Activities and goals are congruent with common measure adopted by National 4-H programs.

Summary. The Extension Center for Youth Development operates youth development programs in 87 Minnesota counties, and trains institutions, organizations and systems across Minnesota on topics of youth development research. With this statewide presence and scope of work, it is the only youth development organization of its kind in Minnesota. In 2013, the Center for Youth Development established science, technology, engineering, math and the science of agriculture as its strongest program investments.

The Extension Center for Youth Development fosters vibrant, sustainable and resilient communities by building a force of engaged young people who are able to learn and lead in a global society and by building a receptive social environment that challenges and supports youth in communities across Minnesota. Our vision is to be the leading Minnesota resource ensuring community opportunities for youth to learn, lead and contribute.

The fundamental values of the Extension Center for Youth Development represent what is desirable for the organization, the program, the youth workers (both paid and volunteer), the participants and communities.

- **Spirit of Youth** -- Extension Youth Development fosters a spirit of youth as change agents, mobilizers and global citizens.
- **Robust Regional Systems** -- Extension Youth Development staff contribute expertise and experience to locally responsive programming for both youth and adults.
- **Focused on Relevant Issues** -- Life in the 21st Century depends upon a population that is healthy, technologically competent and actively engaged in leadership and service in their communities.
- **Demonstrated Commitment to Diversity** -- As a public organization, Extension Youth Development welcomes and actively seeks employees, partners, volunteers and program participants that reflect a broad interpretation of diversity.
- **Recognized as Experts** -- As a learning organization, Extension Youth Development staff have a high proficiency in youth development principles, practice and strategies, and use this knowledge to engage and provide expertise to youth workers in communities.
- **Programs as Laboratories of Learning** -- Based on this broader concept of applied research, Extension Youth Development utilizes programs as laboratories for creating sharable solutions that address key issues facing youth.
- **Collective Impact** -- Given our desire to impact communities, Extension Youth Development embeds work in 4-H and adult learning with scholarship, research and evaluation as a way to move toward and actualize the public value of Extension Youth Development.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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 and Social Services	20%		0%	
806	Youth Development	80%		0%	
	Total	100%		0%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Research has documented that organized, high-quality out-of-school activities benefit young people academically, socially and emotionally. These activities have an impact on academic achievement, foster a sense of community, provide safety and belonging and provide youth with opportunities to explore interests and interact with caring adults. For some youth, these types of community learning opportunities provide a positive alternative to unsupervised time that could put them at risk. And so, community-based youth programs are no longer just nice, they are necessary to promoting the healthy growth and development of young people. (Lochner, Allen and Blyth, 2009)

To address current issues of concern for youth development in Minnesota, the Center for Youth Development has prioritized the following six organizational strategies:

1. Extension is responsible for quality programming from border-to-border in Minnesota. To uphold Extension's reputation and meet the needs of youth and communities, the Center will apply the Extension education model across the state, using a program design and development process, applying monitoring and evaluation methods, utilizing a research base, and demonstrating value to stakeholders.

2. Today's youth are tomorrow's workforce in Minnesota. Extension will create greater programmatic impact by strengthening connection to higher education, building adult capabilities to positively impact youth outcomes, and bolstering learning environments for youth to gain 21st century learning skills.

3. Minnesota is becoming more diverse. Extension will reach, retain, and positively impact new audiences by significantly increasing the number of diverse underserved youth and adults engaged in our long-term educational programs.

4. Extension is a high-profile employer of youth development professionals. The Center for Youth Development will increase the satisfaction of its workforce by fostering an organization of professionalism, collegiality, inclusion and high standards.

5. Extension is responsible to its public funding sources. The Center for Youth Development will streamline its operations to build an efficient, effective and integrated organization.

6. Program sustainability must make youth development programming available for the long haul. The Center for Youth Development will establish revenue generation targets and resource development plans to create a diverse financial portfolio that builds organizational sustainability.

2. Scope of the Program

- In-State Extension
- Multistate Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

1. Youth are more likely to experience positive youth outcomes when the interactions and non-formal learning environments offered to them reflect indicators of youth program quality:

- They provide a safe environment.
- They provide a supportive environment.
- They create high levels of interaction.
- They stimulate high levels of engagement.

2. Given vibrant non-formal learning environments and the use of experiential learning processes, youth can master a topic of interest and develop passion for learning by applying methods of inquiry in small group learning and individual projects in real world contexts.

3. Given the opportunity to engage in programs, youth will lead through active citizenship by sharing new knowledge, carrying out service learning, and facilitating dialogue for positive change.

4. Given effective research-based training and support systems, adults working with and on behalf of young people will create high quality, culturally responsive learning environments.

2. Ultimate goal(s) of this Program

The goal of youth development programming at Extension is to build a strong youth development field in Minnesota by supporting the development of competent youth work professionals and volunteers, and to build and sustain high-quality programs.

The Center for Youth Development is aspiring to and committed to measuring progress towards the following targets, and expects to reach these targets by September of 2019.

- 80 percent of youth participating in 4-H Youth Development as high school seniors will go on to higher education.
- Program participants in long-term programming will reflect the racial, ethnic and socioeconomic diversity of the statewide community served by 4-H Youth Development.
- 80 percent of youth participating in 4-H Youth Development will be prepared with 21st century learning skills that help them excel in their education and in the workplace -- communicating effectively, building connections, making positive choices, and making contributions.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
	1862	1890	1862	1890

2017	42.6	0.0	0.0	0.0
2018	42.6	0.0	0.0	0.0
2019	42.6	0.0	0.0	0.0
2020	42.6	0.0	0.0	0.0
2021	42.6	0.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

4-H programs at Extension will, in the coming years, continue to manage programs statewide with special attention to engaging quality youth workers and volunteers. In the coming years, these out-of-school activities will be directed at three national mission mandates. Each provides a structure to support and guide program delivery throughout the state. Funding from state appropriations and USDA will leverage other dollars to design, implement and evaluate programming. They are:

1. Science, Technology, Engineering and Math, including the science of agriculture
2. Citizen and Leadership
3. Animal Science

Adult learning efforts will continue to train the youth development field in Minnesota. Research will continue to investigate the components of quality youth programming, and will evaluate how to best integrate those components into youth development experiences. 4-H programs will engage in the community of practice that designs, delivers and tests these practices. More organizations, networks and professionals will be engaged with the Center throughout this five year plan.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Online Learning for Adults) 	<ul style="list-style-type: none"> ● Newsletters ● eXtension web sites ● Web sites other than eXtension ● Other 1 (materials sales)

3. Description of targeted audience

The target market for 4-H clubs is youth. Training and resources to support staff and volunteers assure that they create quality learning environments that are inviting, accessible and welcoming to a broad range of Minnesota youth. The Urban Youth audience includes adults working with schools, agencies and organizations and volunteers interested in building sustainable youth programs. Youth leadership programs target young learners who are working in the context of their neighborhood or community to make a difference.

Through adult learning efforts, we serve individuals, organizations and systems that work with and on behalf of youth. This includes volunteers who work in 4-H programs, as well as volunteers and staff of other community-based programming. At the institutional level, the Center will work with youth development leaders who can integrate and ensure quality assessment throughout youth development programs.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
 - Number of patents submitted
 - Number of peer reviewed publications
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of educational offerings delivered for youth-serving organizations through both face-to-face and on-line offerings.
 - Percentage of parents of youth participants who report being satisfied with their first year of participating in 4-H programming, thus making long-term engagement more feasible.
 - Number of lead adult volunteers in 4-H clubs will be trained to work with Minnesota's young people who participate in 4-H program activities.
 - Number of 4-H program clubs that use a validated assessment tool to guide quality improvement efforts.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Youth participating in 4-H Youth Development who go on to higher education.
2	Youth participating in 4-H Youth Development who are prepared with 21st century learning skills; e.g., communicating effectively, building connections, making positive choices, and making contributions to their community.)
3	Adult participants in educational offerings who report that they increased their understanding and knowledge of a given youth development topic.

Outcome # 1

1. Outcome Target

Youth participating in 4-H Youth Development who go on to higher education.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Youth participating in 4-H Youth Development who are prepared with 21st century learning skills; e.g., communicating effectively, building connections, making positive choices, and making contributions to their community.)

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Adult participants in educational offerings who report that they increased their understanding and knowledge of a given youth development topic.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development
- 805 - Community Institutions and Social Services

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Youth program availability and investment is vulnerable to public policy allocations and appropriations, and both negative and positive changes can result. As new research and management practices are integrated, the investment in particular goals may be affected. As we grow our response to new populations, new research and insight might change program direction.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

4-H and Youth Work Institute programs are both evaluated rigorously. These evaluations measure the effects of individual workshops and activities, but also examine the flow of research into program and training strategies. Ultimately, the assessment of program quality and the effects of youth programs on youth are the condition change we seek.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Natural Resource Management

2. Brief summary about Planned Program

Update: For the 2017 POW we have removed the Forestry and Forest Products Program. Many of the projects reported under that program in the past will move to this section as we feel protecting Minnesota's forests goes hand-in-hand with protecting our natural resources and animals that make those forests their home. Outcomes have been decreased and changed to focus on action and condition changes rather than knowledge changes.

MAES. Minnesotans value natural resources. In many ways, it is the heart of our state. Research related to natural resource management provides the science behind the strong stewardship of our citizens. Research conducted is both applied and basic, and covers a range of work, from the ecology of prairie restoration, to management of Minnesota's forests and ecosystem, to supporting wildlife resources. Increasingly, this research is interconnected with research assessing and responding to climate change impacts. In years when the results of this research are of particular relevance to that issue, results will be reported under the program area of Climate Change. Another trend in research is the growing importance of ecology and "whole systems" study of Minnesota's natural resources and land management issues.

Update: In 2014 the University received \$4.8 million in state funding to create the University of Minnesota Invasive Terrestrial Plants and Pests Center. In 2015, four initial projects were funded including projects on controlling buckthorn and oak wilt.

Extension's Fish, Wildlife and Conservation team taps the resources of the University of Minnesota to protect and enhance Minnesota's natural resources and environment through improved environmental education. This team manages Minnesota's Master Naturalist Program, which supports a corps of well-informed citizens dedicated to education and service for conservation within their communities. Workshops help natural resource professionals and educators improve the quality of their environmental science offerings through research-based resources and teaching methods. In addition, educational programming for youth on the White Earth Reservation brings environmental science education directly to Native American youth who can commit their future endeavors to vocational and/or avocational stewardship of the environment.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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	0%		20%	
124	Urban Forestry	0%		5%	
125	Agroforestry	0%		5%	
133	Pollution Prevention and Mitigation	0%		10%	
134	Outdoor Recreation	0%		10%	
136	Conservation of Biological Diversity	25%		30%	
605	Natural Resource and Environmental Economics	25%		15%	
903	Communication, Education, and Information Delivery	50%		5%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

The State Plan for Environmental Education (Lederman 2000) outlines legislated goals of environmental science education, stating that citizens should: 1) understand ecological systems; 2) understand cause and effect relationships between human attitudes and behavior and the environment; 3) be able to evaluate alternative responses to environmental issues before deciding on courses of action; and, 4) understand the effects of multiple uses of the environment (Minn. Statute 115.073, 1998). To assess citizens' level of knowledge in these areas, the Minnesota Office of Environmental Assistance conducted a survey of adult environmental knowledge, attitudes and behavior (Murphy 2002, 2005). The major findings were that 65 percent of Minnesotans believe they are knowledgeable about the environment but 46 percent have less than average knowledge, compared to a national pool. The task of education that connects research-based information to citizens can happen in schools, in communities and in professional settings.

Minnesota's 15 million forested acres provide timber, wildlife, recreation, wilderness, watershed protection, and biological diversity to the state. Through forest products and tourism industries, those forests contribute substantially to the state's economy. About one-half of the commercial forest land is privately owned. Policy makers, forest landowners, loggers, natural resource managers, farmers and urban dwellers make decisions every day that directly affect the use, management and protection of Minnesota's trees and forests. Accurate, authoritative, scientific and technical information should be the basis for their decisions. Emerging priorities include: sustainable forest management on family forest lands, expanding agroforestry opportunities, production of biofuels, control of exotic invasive pests, wildfire damage reduction, tree planting and maintenance on urban lands and farmsteads for energy conservation and environmental benefits, and extending the useful life of wood products in service.

2. Scope of the Program

- In-State Extension

- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

MAES natural resource management research and **Extension's** Fish, Wildlife and Conservation education programs work from the assumptions that:

- The environment is protected by those who explore it, conserve it, and teach others to explore and conserve.
- The quality of knowledge about fish, wildlife and conservation can be improved through connections between research-based information and key audiences.
- The quantity of education available can be increased by expanding the number of ambassadors for the environment.
- Engaging professionals, land owners, citizens and youth in environmental science education will lead to greater care and maintenance of Minnesota's ecosystems.
- Broad adoption of innovative, research-based strategies is necessary to address the priority issues related to forest management.

2. Ultimate goal(s) of this Program

Extension education will employ University of Minnesota resources to protect and enhance Minnesota's natural environment by enabling and engaging decision-makers, professionals and citizens to explore, understand, conserve and teach natural resources and conservation. Extension is making research-based tools available to improve decision-making on natural resources issues among citizens, policymakers, and environmental managers.

MAES goals:

- Develop an in-depth understanding of the biology and ecology of key invasive plant and pest species affecting Minnesota's prairies, forests, and native wildlife and to determine if there are weaknesses that can be targeted for control and eradication.
- Develop an inventory for research on the risk associated with adopting crop management practices that can reduce non-point source pollution.
- Develop agroforestry practices that mitigate non-point pollution problems.
- Strengthen social science models and practices for influencing individual and community decision-making.
- To improve understanding of factors affecting forest composition, diversity and function.
- To improve understanding of northern Minnesota forest ecosystems and develop improved management techniques.
- To investigate the biology and control of forest microbes and determine their importance to forest health and sustainable ecosystem functioning.
- To better understand the decisions that affect the integrity and biological diversity of the ecosystem, and linkages between biosphere, microclimate and global climate.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	12.4	0.0	12.9	0.0
2018	12.4	0.0	12.9	0.0
2019	12.4	0.0	12.9	0.0
2020	12.4	0.0	12.9	0.0
2021	12.4	0.0	12.9	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

MAES research in environmental science will investigate the natural resources of Minnesota and its ecosystems, including inter-relationship between land, water, wildlife and people. Research will also be conducted to improve northern forest species for growth, disease resistance, and wood quality. Studies will be done to preserve the genetic diversity of urban and northern forest species. Research will be conducted to support both forest landowners and public forest land managers in management decisions. Results of research will inform public policy makers on the best use of Minnesota's natural resources.

Extension will increase the number of, and improve the abilities of, natural resource professionals, education professionals, land owners, interested citizens and youth to explore, conserve and teach for the preservation of Minnesota's natural resources. This will be accomplished by the following activities: 1) providing curriculum and sponsored workshops for educators and natural resource professionals in best practices for design and delivery of environmental science programs; 2) training and supporting interested citizens (Master Naturalists) to participate in citizen science, stewardship and environmental science education in community settings; and, 3) training Native American Youth through culturally-adapted summer programs, and 4) creating online resources..

As managers of the Master Naturalist program, the Fish, Wildlife and Conservation team serves an important function in bringing citizen scientists to issues being addressed across all of Extension. Master Naturalists contribute local assessment, education or physical labor to projects in the Forestry, Water, Climate Change and Youth Development programs, to name just a few. In order to achieve these outcomes, the process of recruiting, training and project management must have strong integrity. The integrity of this process is the responsibility of the Fish, Wildlife and Conservation team.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods

<ul style="list-style-type: none">● Education Class● Workshop● One-on-One Intervention● Demonstrations● Other 1 (Train the trainer)	<ul style="list-style-type: none">● Newsletters● Web sites other than eXtension● Other 1 (electronic newsletter)● Other 2 (events / conferences)
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3. Description of targeted audience

MAES research and Extension 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, US Fish and Wildlife Services, Health and Human Services Departments and Environmental Sciences; 3) the public schools and others involved in environmental science education programs; and, 4) Youth on the White Earth Reservation in Northwest Minnesota, when funding allows.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of Master Naturalists trained and supported in Minnesota.

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of hours that volunteers and others involved in programs commit to exploring and conserving the environment, and to teaching others about the environment and environmental stewardship.
2	Number of acres influenced each year by citizens who, through exploration, conservation and education, influence environmental conditions.

Outcome # 1

1. Outcome Target

Number of hours that volunteers and others involved in programs commit to exploring and conserving the environment, and to teaching others about the environment and environmental stewardship.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 903 - Communication, Education, and Information Delivery
- 134 - Outdoor Recreation
- 605 - Natural Resource and Environmental Economics
- 123 - Management and Sustainability of Forest Resources
- 124 - Urban Forestry
- 136 - Conservation of Biological Diversity
- 125 - Agroforestry
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Number of acres influenced each year by citizens who, through exploration, conservation and education, influence environmental conditions.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Funds are being raised to sustain and grow natural resource education. Some program strategies are contingent on such funding, and additional evaluation and curriculum can be done (and has already been done) with that funding. Economic hard times can reduce the amount of volunteerism available. A change in public policy and educational priorities may challenge Extension to find partners and volunteers. Demographic shifts may change where we target our participant marketing and whether we adapt the program to reach new cultures.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Program evaluations will guide the direction of the projects and assess effectiveness in meeting objectives. Front-end evaluations helped to define audience and partners. Formative evaluation carried out during the development and early implementation phases of the programs informed and refined programs that can now be sustained by Extension. The dominant features of our evaluations are:

1. assessing participants' achievements, including potential to impact large numbers of people through volunteer and professional activities;
2. assessing knowledge impact on volunteers and professionals;
3. assessing how involvement in programming resulted in acres of land monitored and improved;
4. assessing the quality of social connections which are known, through research, to improve environmental outcomes.

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Horticulture

2. Brief summary about Planned Program

Update: The 2017-2021 state defined outcomes were rewritten to focus on action and condition change rather than knowledge changes.

In 2014, Extension's Master Gardener program partnered with the University of Minnesota Landscape Arboretum. With this partnership, the two organizations are becoming better able to seize the opportunity to strengthen volunteer training and management and to raise the profile of both of these prestigious Minnesota organizations.

In 2015, a new Pollinator Research Center was approved for the Saint Paul campus. It will officially open in 2016 and will house both research and extension efforts related to honeybees, native bees, and butterflies. A new faculty member was also hired to focus on native bee research.

2015 also saw the development of a new position focusing on coordinating organics research and outreach and the hiring of a new grape breeder who has a joint research and extension appointment.

MAES Research and Extension come together to provide answers and new technology to those who grow Minnesota's fruits and vegetables, as well as those who grow and maintain Minnesota's public and private green spaces. This program area conducts and supplies research to support Minnesota's vegetable crops, and will develop new varieties of such horticultural crops as potatoes, flowers including woody plants, and fruits including apples, berries and cold hardy grapes. It will also mobilize community volunteers who help others develop green space in yards, gardens and community spaces.

Commercial Horticulture: Horticultural research is disseminated to commercial fruit and vegetable growers, landscape services, nurseries/greenhouses and florists. Within the nursery sector, there are three basic activities -- production of plant materials, wholesale distribution and retail distribution of nursery products. Research to develop new varieties and new growing methods for both organic and traditional systems range from basic to applied. Extension engages growers and businesses to integrate new production systems, employ organic growing methods, and integrated crop management strategies. Another program in this area connects the nationally recognized and leading apiculture research at the University with commercial and hobby beekeepers.

Consumer Horticulture: The Master Gardener program at Extension mobilizes and educates thousands of volunteers who share horticulture information in their communities. The program also provides informational materials in writing and on the Internet to assure that gardeners have answers to questions at their fingertips. The University of Minnesota is seen as a premier source for homeowner horticulture and environmental information, with a strong community-based presence as well as presence in the media. Faculty research is closely tied to this effort.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

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	5%		15%	
132	Weather and Climate	5%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	5%		20%	
204	Plant Product Quality and Utility (Preharvest)	20%		10%	
205	Plant Management Systems	50%		25%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		20%	
213	Weeds Affecting Plants	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Commercial horticulture and the green industry are some of the fastest growing segments of Minnesota's agricultural economy. Commercial growers and turf and nursery professionals continue to seek new research information and educational opportunities to refine their production practices, to increase profitability, reduce inputs and protect natural resources. Minnesota's cold climate makes conditions for growth of horticultural products challenging. Research and education will continue to reach the industry with new products and management practices that nurture success.

The National Gardening Survey suggests more than half of Minnesotans are involved in some form of activity that is horticultural. This means that some 2.5 million people are creating and maintaining gardens that are affecting Minnesota's landscapes. Each of these Minnesotans ask questions that can be answered with university-based horticulture information. Technological resources are enhancing the ways that we can deliver this information, as well as the way we can use Master Gardeners to disseminate information.

For Minnesota's horticulture industry and Minnesota's gardeners, research and education will: 1) answer questions; 2) learn about and disseminate best practices in horticulture and plant health care for Minnesota's cold climate; 3) support issues and practices that protect Minnesota's climates; and 4) engage Minnesotans on behalf of horticulture research and dissemination.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension

- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

1) Minnesota's unique and difficult climate makes it essential that we undertake horticultural research specific to our geographic conditions. 2) Most consumers of horticultural information need timely answers to questions. 3) Within the horticultural industry and with consumers, there are conduits available to support the dissemination of information. 4) There will be continued growth in the number of small-scale commercial growers, due to the "buy local" movement and environmental concerns. 5) There are opportunities for increased impact from the results of MAES horticultural research, as solutions for Minnesota's green industries may be applicable in other northern states and areas of the world.

2. Ultimate goal(s) of this Program

Extension. The goals of horticulture programs at Extension are:

- To enhance the profitability of commercial growers, while maintaining food security, increasing the potential of locally-grown resources and adding value to the sustainability of the vegetable and fruit crops in Minnesota.
- To make Minnesota a place where those who create and maintain lawns, gardens and community green spaces have research-based information and local support available.

MAES. Research goals are:

- To develop products that enhance the ethical and economic progress of the industry.
- To improve the products and techniques available to Minnesota growers.
- To develop new technologies and strategies that increase profitability, grower satisfaction, and decrease environmental impact of plant maintenance.
 - To develop new turf grass varieties and management practices.
 - To research cultivars/rootstocks and cultural systems that improve production efficiency and promote sustainability.
 - To research post-harvest handling practices that improve crop use and product safety.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	14.4	0.0	37.5	0.0
2018	14.4	0.0	37.5	0.0
2019	14.4	0.0	37.5	0.0
2020	14.4	0.0	37.5	0.0
2021	14.4	0.0	37.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research will be conducted to achieve the goals outlined under "ultimate goals", including discovery and development research.

Extension will organize, coordinate and participate in events that create and update research-based education for those who grow plants, fruit, vegetables and landscapes in Minnesota. As a result of Extension outreach and education, workshops and conferences will reach Master Gardeners, potato growers, beginning growers, farmers' markets distributors, high tunnel users, apple growers, small fruit and vegetables growers and more.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● One-on-One Intervention ● Demonstrations ● Other 1 (on-line classes) 	<ul style="list-style-type: none"> ● Newsletters ● Web sites other than eXtension ● Other 1 (Publications)

3. Description of targeted audience

The audiences are:

1. Fresh market producers, including growers of fruits and vegetables for processing, the processing industry, associated agribusiness turf professionals, nurseries and garden centers, and landscape professionals. Several of these groups have high representations of new immigrants.
2. Consumers of horticultural information for yards, gardens and landscapes. These include audiences where information is needed in a timely fashion and those who want to build basic knowledge about horticulture and environmental stewardship over time. Community-based initiatives mobilize schools, neighborhoods and non-profit organizations to create and maintain green spaces.
3. Community volunteers who can educate and act to keep yards, gardens and green spaces healthy.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
 - Number of patents submitted
 - Number of peer reviewed publications
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of workshops, classes and seminars that provide information to professionals in the commercial horticulture industry.
 - Number of new fruit, vegetable and ornamental plant varieties sent for additional testing outside the University.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of Horticulture program participants that changed one or more horticulture practice as a result of attending Extension events.
2	Research will support new horticultural crops' growth.
3	Number of volunteer hours committed to providing Master Gardener training and expertise in order to create and improve Minnesota's green spaces.
4	Percentage of beekeepers who participate in programs who self-report they've changed their beekeeping practices to better support the bee population.

Outcome # 1

1. Outcome Target

Percentage of Horticulture program participants that changed one or more horticulture practice as a result of attending Extension events.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 204 - Plant Product Quality and Utility (Preharvest)
- 213 - Weeds Affecting Plants
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 205 - Plant Management Systems
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 102 - Soil, Plant, Water, Nutrient Relationships
- 132 - Weather and Climate

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Research will support new horticultural crops' growth.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 204 - Plant Product Quality and Utility (Preharvest)

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteer hours committed to providing Master Gardener training and expertise in order to create and improve Minnesota's green spaces.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 213 - Weeds Affecting Plants
- 132 - Weather and Climate
- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Percentage of beekeepers who participate in programs who self-report they've changed their beekeeping practices to better support the bee population.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Because commercial horticulture is a fast-growing industry, new government regulations and public policy interventions may influence the industry in the coming years. The degree of local volunteerism available is affected by economic and social influences, and population changes will affect outreach and education practices. Changes in data collection systems affect targets for the Master Gardener program, which is actively seeking the most effective methods for collecting information from a great number of loosely connected volunteers from all counties in the State of Minnesota.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Horticulture programs at the University of Minnesota Extension are developing logic models that will be used to guide future evaluation practices for educational efforts in consumer and commercial horticulture education.

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Agricultural Business Management

2. Brief summary about Planned Program

Update: Research on precision agriculture and remote sensing will increase in the coming years as we hired a second specialist in this field in 2015. An economist was also hired who specializes in the impact of the food supply chain on farms. Extension outcomes are unchanged.

Summary.

Extension. Agricultural Business Management (ABM) provides farm decision-makers with the knowledge about production, marketing and management that they need to improve their farming operation. ABM is also concerned for the whole Minnesota economy. ABM tracks financial performance of Minnesota farms to provide farm management information to farmers, bankers and others concerned with the future of Minnesota agriculture and develops educational programs on and off campus. Faculty on the Agricultural Business Management team are responsible for delivering and evaluating education about the farm bill so that farmers can make critical management decisions. ABM improves farmers' information and knowledge in areas where strategic and operational management changes can improve progress toward their business and family goals. The information this program provides farmers is based on MAES research that considers long-term and short-term business decisions, the impact of global markets, the opportunities of new technologies, the impacts of Minnesota's geography, and the political and social landscape for farm business management.

MAES. Research will also review policy that relates to agricultural business management, the farm bill, commodity crops and precision agriculture.

Key research studies will include the following:

- Research to support improved decision-making in farm planning and financing for farmers and lenders.
- Research to support improved decision-making in financing for agricultural business owners.
- Research on the economic interrelationships in both the domestic and foreign food and agricultural industries.
- Development and maintenance of an analytical support system that facilitates research and analysis on food, agricultural and trade policy issues.
- Evaluation of supply, demand and policy factors in the U.S. and abroad that influence both short-term and long-term trade prospects and patterns.
- Information to help public policy participants and decision makers evaluate issues and increase public understanding of these issues.
- Research regarding emerging agriculture technology and how it can be used to increase farm profitability.
- Evaluation of the transition to organic cropping systems and the issues farmers face with the transition.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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	20%		20%	
602	Business Management, Finance, and Taxation	20%		20%	
603	Market Economics	30%		30%	
604	Marketing and Distribution Practices	20%		20%	
610	Domestic Policy Analysis	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Farm records compiled by the University of Minnesota Department of Applied Economics consistently show a net farm income range of over \$150,000 between the most profitable and least profitable Minnesota farms each business year. As farm incomes have become more variable, the job of managing a farm has become ever more complex. Today's farm managers are managing more dollars and more people. They are often their own accountants, business analysts, market specialists, and human resource departments, as well as being production specialists. Shifting public policy demands attention to business decisions that affect their accountability and their bottom line. Demand for the information and events is shaped yearly as the reliability of the information is more commonly known, and as current events create demand for new information. Professionals on the Agricultural Business Management team have a priority to increase the information received by farmers and producers, as well as those providing inputs, services and markets to them.

Some of the primary issues Minnesota agricultural producers need to address as a result of changes in the agricultural industry and policy include: strategic positioning, estate transfers, management decisions, frequent performance monitoring, evaluating new technology, monitoring external factors, and accountability to laws and regulations.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research

- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Farms have assets that are transferred to the next generation, requiring a careful plan of transfer. If farm businesses understand the markets, and have tools for making business decisions within those markets, they will maximize their productivity and longevity. Those who own farms need unbiased and broad-based information to understand their opportunities in the market and be able to effectively access those opportunities. The farm bill affects profitability, and management decisions are dependent on an understanding of the effects of the farm bill.

2. Ultimate goal(s) of this Program

Agricultural Business Management programs will bring in-depth, research-based expertise to critical, cutting edge issues in managing farms. As a result, revenue generated by the agricultural sector in Minnesota will be optimized.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	8.4	0.0	11.5	0.0
2018	8.4	0.0	11.5	0.0
2019	8.4	0.0	11.5	0.0
2020	8.4	0.0	11.5	0.0
2021	8.4	0.0	11.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Extension. Through educational events, consultations and media resources, Extension's Agricultural Business Management programs will provide education about:

- farm business transfer and estate planning
- agriculture tax issues
- land rent data
- machinery management
- strategic planning and business planning
- earning a living on a modern farm
- current events in agricultural business management

- special purpose technology
- agricultural lending

MAES. Research foci will be on review of policy that relates to agricultural business management, the farm bill, commodity crops and precision agriculture. Key research studies will include the following:

- Research to support improved decision-making in farm planning and financing for farmers and lenders.
- Research to support improved decision-making in financing for agricultural business owners.
- Research on the economic interrelationships in both the domestic and foreign food and agricultural industries.
 - Development and maintenance of an analytical support system that facilitates research and analysis on food, agricultural and trade policy issues.
 - Evaluation of supply, demand and policy factors in the U.S. and abroad that influence both short term and long-term trade prospects and patterns.
 - Information to help public policy participants and decision makers evaluate issues and increase public understanding of these issues.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • One-on-One Intervention 	<ul style="list-style-type: none"> • Web sites other than eXtension • Other 1 (Software) • Other 2 (Books, Articles, Pubs)

3. Description of targeted audience

Target audiences for Ag Business Management programs include:

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

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of educational events.

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of participants that change one or more business management practice as a result of attending an Agricultural and Business Management workshop or conference session.
2	Dollar amount of profitability increased as a result of agricultural business decisions made after receiving Extension information.

Outcome # 1

1. Outcome Target

Percentage of participants that change one or more business management practice as a result of attending an Agricultural and Business Management workshop or conference session.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

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

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Dollar amount of profitability increased as a result of agricultural business decisions made after receiving Extension information.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

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

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

The Agricultural Business Management educational content constantly adjusts to help farmers address current public policy issues, current economics and risk management for natural disasters. These matters will fluctuate constantly and the program will continue to be nimble in addressing those issues.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

The logic model of the Agricultural Business Management program moves all activities toward the successful management of key business issues in Minnesota's farms. Surveys are distributed six months after program delivery in order to determine how information from agricultural business management programs was used. Land transfer programs measure the use of that information, and monitors the number dollar value of land successfully transferred to the next generation as a result of programming.