Progress Report to City of Decatur

Period Covered: July – October 2015

This report summarizes activities and progress during this period under the agreement between the Agricultural Watershed Institute (AWI) and the City of Decatur for financial support of watershed research, on-farm demonstrations, and educational activities.

Sediment and nutrient reduction / TMDL implementation:

In 2014, AWI completed **Total Maximum Daily Load (TMDL) implementation plans** for two subwatersheds of the Lake Decatur watershed: the Big Creek/Long Creek watershed located east of Decatur in Macon County and the Big Ditch watershed near Rantoul in Champaign County. These plans include perennial biomass crops to reduce sediment and nutrient loss and several innovative Best Management Practices (BMPs). Now that the plans have been completed and approved, they are guiding activities by AWI and partners, including the Macon County Soil & Water Conservation District and Prairie Rivers Network, to reduce sediment and nutrient loads impacting Lake Decatur.

As previously reported, AWI collaborated with Macon County SWCD and other partners on a successful application for funding through USDA's **Regional Conservation Partnership Program (RCPP)** which provides federal funding for on-farm conservation practices. Added funding comes from a variety of partners. During the Jan-Jun 2015 reporting period, the Macon County RCPP application was approved by USDA and work started on the project. AWI is participating in recruiting partners and identifying sites for BMPs including **bioreactors, saturated buffers, and drainage water management systems**. AWI senior scientist Dr. Greg McIsaac has developed monitoring plans to evaluate performance of these BMPs. During the current reporting period, we identified a site in the Friends Creek watershed for one bioreactor.

Tim McMahon of AWI continues to collect water samples as part of monitoring of the **saturated buffer** installed by the Agricultural Drainage Management Coalition near Cisco (Piatt County) as part of a USDA Conservation Innovation Grant.

During this period, AWI worked with Prairie Rivers Network on a project funded in part by a grant from the Lumpkin Family Foundation to plan on-farm demonstrations of experimental BMPs in the Sangamon, Embarras, and Kaskaskia watersheds. In August, we held a workshop on **Perennial Biomass Crops and Nutrient Loss Reduction** as outreach and education for this project. AWI identified two sites in the Lake Decatur watershed for harvestable saturated buffers and slopes and began working with landowners on the design of these on-farm demonstrations. These practices are included in our TMDL plans and represent innovative approaches to reduce soil and nutrient loss by converting sloping or poorly drained land to perennial crops.

Water resources planning and management:

As ongoing activities during this period, AWI staff participated in meetings and activities of various watershed stakeholder groups including:

- The Heart of the Sangamon Ecosystem Partnership
- Oakley Township Sediment Basin Advisory Committee (Tim McMahon)
- Macon County Community Environmental Council (CEC) board (Steve John)
- CEC subcommittee created to promote the Sangamon River Water Trail plan and improvements to Lincoln Trail Homestead State Park (Steve)
- Steering committee exploring creation of a statewide Environmental Utility (Steve)

AWI continued to manage prairie establishment for the City's **Corley landfill "mud-to-parks" project.** Activities this period included planting of the prairie seed mixture and application of herbicide by FDC Enterprises and removal of teasel, an invasive weed growing on the edge of the site. FDC Enterprises is a company specializing in prairie for bioenergy, forage, and conservation. This photo shows Tim McMahon cutting teasel for removal from the Corley site.

Steve John participated in several meetings of the statewide steering committee that is exploring creation of an Illinois Environmental Utility (EU). This innovative concept grew out of the Mississippi River Nutrient Dialogues and is directly related to implementation of the new Illinois Nutrient Loss Reduction Strategy. Many of the strategies in the NLRS effectively reduce soil erosion and sedimentation, as well as nutrient loss. During this period, AWI collaborated with The Nature Conservancy and other committee members to prepare and submit an initial inquiry to the McKnight Foundation for a Needs Assessment to evaluate potential funding sources and institutional arrangements for an EU. This inquiry was not successful but the Foundation's Mississippi River program grant officer encouraged us to resubmit when planning for the EU is a little farther along. Steve John attended the One Water Leadership Summit in San Francisco where he helped lead a breakout session on the Watershed Protection Utility concept.

Perennial biomass crops for renewable energy, forage, and water quality:

A major focus of AWI activity continues to be on our Local Bioenergy Initiative, which is funded mainly by the City of Decatur and the Walton Family Foundation. City funding is applied to work in, or directly benefitting, the Lake Decatur watershed. Initiative goals are: (1) Establish the Lake Decatur watershed as a showcase for research, demonstrations, and education on co-production of perennial biomass and ecosystem services, especially water quality; (2) Advance learning networks in Illinois and throughout the Midwest to explore and promote co-production

of perennial biomass and ecosystem services; and (3) Monitor, evaluate, and promote the development of perennial biomass equipment, supply chains, markets, and enterprises.

Activities related to perennial biomass and watershed management during this period include:

- Steve John continues to serve on the Green Lands Blue Waters (GLBW) steering committee and Watershed Initiative core group and co-chair the Perennial Biomass Working Group. GLBW is a multi-state consortium that promotes perennial crops and cover crops for clean water and other benefits.
- Steve also continues to serve on the Illinois Biomass Working Group and helped organize the 2015 Illinois Renewable Energy Conference held in Bloomington in July.
- AWI advised entrepreneurs interested in exploring use of grass biomass for heat, including owners of the new National Foodworks Services food incubator.
- The Lumpkin perennial grass project and the August workshop on Perennial Biomass Crops and Nutrient Loss Reduction described above are part of the biomass initiative.
- Maintained the Caterpillar—AWI Prairie for Bioenergy demonstration plots.
- Advised and assisted landowners and farmers in the Lake Decatur watershed who have planted, or may decide to plant, perennial biomass crops in the Lake Decatur watershed.
- Steve gave a presentation titled "Working Prairies in the Emerging Multifunctional Agriculture Paradigm: Applying Historical Lessons" at the Iowa Prairie Conference.
- Staffed displays on biomass heating and prairies for bioenergy at Richland Community College's Teachers Clean Energy Workshop.
- Staffed a display and gave a presentation on "Biomass Energy and a New Agricultural Paradigm" at the Illinois Renewable Energy Fair in Oregon, IL.
- Completed planning and plot management and hosted the Energy Grass Education Area at the 2015 Farm Progress Show, in collaboration with the University of Illinois. By our count, 714 people visited the exhibit tent and/or the energy grass plots during the Show. The following article is copied from the Official Program for the Farm Progress Show:

Get a feel for energy grasses at the show

BY **JOSH FLINT**
@FPSHOW

VENTURE north along the Farm Progress Show grounds in Decatur, Ill., and you'll eventually come across a plot that looks like someone let a pasture grow unchecked for an entire year.

In essence, that's sort of what the Energy Grass Education Area is. It's a bunch of grasses that have been planted to demonstrate the properties of the most popular biomass grasses on the market. The project is a joint effort with the Agricultural Watershed Institute and University of Illinois Extension.

Steve John, AWI executive director, expects the bioenergy plots will be even more popular this year as farmers consider buffer strips in an effort to improve water quality.

"Perennial grasses for forage or bioenergy can provide a lot of water quality benefits," he notes. "This is even more relevant with the new water-quality protection guidelines released earlier this year."

ENERGY GRASS: Visitors at a past Decatur, Ill., Farm Progress Show examine the Energy Grass Education Area. Check it out along the north edge of the exhibit field.

The plots feature the two bioenergy grass heavy hitters: miscanthus and switchgrass. In recent years, the AWI staff has added other grasses to bolster the plots' visual experience. The newest addition is eastern gamagrass. It's a native warm-season, perennial bunch grass.

According to the USDA Natural Resources Conservation Service, eastern gamagrass is a distant relative of corn that can reach up to 8 feet in height. Seed heads are 6 to 10 inches in length. Seed production runs from May to July. Eastern gamagrass is adapted to a wide variety of soil textures and favors moist sites that receive at least 25 inches of annual rainfall. It is classified as a facultative wetland plant and will tolerate brief periods of flooding. John adds that it makes a great hay crop.

Two years ago, AWI also introduced prairie cordgrass to the plots. It's a tall (6 to 8 feet) native grass. USDA NRCS says strong rhizomes with the ability to grow 5 to 10 feet per year separate this grass from the other desirable native warm-season grasses.

Prairie cordgrass is easy to identify by sharp, serrated edges of the leaf blade. Seed heads are composed of 10 to 20 spikes attached to the main stem. Each spike has up to 40 spikelets, all growing in two rows on the side of the spike away from the stem. The seed typically matures within a week or two of frost, and is flat and paper-like with barbed awns that attach firmly to fur or fabric. There are 197,000 seeds per pound.

Quite relevant this year, prairie cordgrass is well-adapted to flood-prone areas, John notes. So, again, a buffer strip near a stream to suck up extra nitrogen is a great use of this grass.

Market and enterprise development is a critical part of the long-term strategy to establish the Decatur area and Lake Decatur watershed as a national showcase for perennial crops grown for renewable energy and water quality. During this period, we continued to work with GLBW and other coalitions to overcome economic and technical barriers to use of biomass crops for heating, power generation, and advanced biofuels. We also made two significant trips related to building contacts and exploring medium or long term opportunities for local biomass business development. (Travel expenses for these trips were not charged to the City of Decatur.)

- In July, Tim McMahon participated in a week-long Bioenergy Study Trip to Germany organized by the German—American Chamber of Commerce. Other participants were from University of Illinois Extension, Roeslein Alternative Energy, plus Illinois farmers interested in on-farm heating with grass biomass. Benefits of the tour included seeing and learning about biomass and biogas projects such as district heating systems and making new contacts or strengthening relationships with potential partners. Of particular interest for AWI was a tour and meeting with Heizomat, a manufacturer of multi-fuel biomass boilers, which appears to be a promising unit to use grass biomass for small- to medium-scale applications for farm, residential, or institutional heating. AWI partners are working to arrange U.S. distribution of Heizomat boilers, which could advance biomass markets.
- In September, Steve John met with Wes Bolsen and two other executives of Cool Planet Energy Systems at the company headquarters in Greenwood Village, CO. We previously arranged for Mr. Bolsen (who grew up near Decatur) to speak at the AWI/GLBW conference in November 2014. The CPES business model calls for development of small scale biorefineries using thermo-mechanical processes to produce drop-in hydrocarbon fuels and biochar. Their energy conversion technology can use a wide range of feedstock including perennial grasses. The purpose of meeting in-person was to solidify a relationship with the company and discuss mutual benefits of a strategic partnership between CPES, AWI and other Decatur-area partners to locate their first biorefinery using grass feedstock in Central Illinois when they ramp up implementation of their plan.

As previously reported, AWI collaborated with Argonne National Laboratory and other partners on a grant proposal for the U.S. Department of Energy's "Landscape Design for Sustainable Bioenergy Systems" program. We knew that DOE only expected to award a few grants nationally and that competition would be intense. During this period, we were advised by DOE that the Argonne team was not selected; however, the DOE letter said the Argonne proposal "was found to have merit" and could be considered for a grant if funding becomes available. AWI worked with our Argonne colleague to develop a draft proposal for a project that would include parts of the original ANL proposal with changes based on our understanding of DOE priorities. The draft we are working on emphasizes the potential of strategically sited and managed perennial biomass crops to provide bioenergy feedstock and forage plus nutrient loss reduction. It also includes on-farm demonstration of biomass heating equipment. AWI and the Upper Sangamon Watershed are prominent in the draft proposal now being refined for submittal to DOE. While there is no assurance of DOE funding, AWI is pleased that our ongoing work to link biomass production and water quality appears to be of great interest to DOE and we are cautiously optimistic that DOE funding may be awarded for a project that would allow us to continue and expand the work we have been doing in recent years with funding from the City of Decatur and the Walton Family Foundation.