

PROGRESS OF IOWA WATERSHED PARTNERSHIPS



ENVIRONMENTAL POLICY
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ABOUT

Sand County Foundation is a nonprofit conservation organization dedicated to working with private landowners across North America to advance ethical and scientifically sound land management practices that benefit the environment. The Environmental Policy Innovation Center (EPIC) is a fiscally sponsored project of Sand County Foundation.

The mission of EPIC is to build policies that deliver spectacular improvement in the speed and scale of conservation. We focus on a narrow set of strategies:

- Improving policies that allow private sector funding or stewardship to expand or supplant public or charitable conservation work
- Transforming government policies to focus on what matters— outcomes
- Eliminating the organizational barriers that prevent public agencies from adapting to 21st century solutions

EPIC’s agriculture program uses cutting-edge technologies and novel policy solutions to 1) develop new sources of demand for conservation outcomes, 2) ensure conservation dollars are spent as cost-effectively and quickly as possible, and 3) incentivize the creation of new solutions to the most pressing resource concerns.

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EXECUTIVE SUMMARY

A total of nine Iowa cities have signed memoranda of understanding with the state Department of Natural Resources to establish watershed partnerships. These cities range in size from under 4000 people to the second largest in the state and from northwest Iowa to southeast Iowa. While some have just signed their agreements recently, others have established processes and devoted significant sums to watershed work.

It can be difficult to tease out how much of the funds cities have been induced to spend are directly producing credits against their permits, but it's assured that that number is well over a million dollars. One city alone has generated over 420,000 pounds of creditable nitrogen reductions into waterways since signing their MOU. In another city, the wastewater department requested \$100,000 for watershed work, and the city council—understanding its relative cost-effectiveness—insisted on appropriating \$200,000; they now plan to keep doing so annually for the next 20 years. City managers credit watershed partnerships with helping them fund dramatic reductions in flood risk and providing the flexibility to minimize impacts on ratepayers. In addition to the resources contributed directly by cities in the program, most municipalities have been able to leverage their resources with external grant support and additional cost share for watershed work from the agriculture and food industry.

Over the same time period, Iowa DNR has instituted and staffed a process to validate credits using the nutrient reduction exchange. While this system was in development for years, it is now fully operational and has worked through much of the backlog of credits. With satisfied early adopters and an established state methodology, watershed partnerships in Iowa have significant room to continue growing into a self-sustaining solution for nonpoint nutrient reductions.



Jensen Marsh, Madison County, Iowa

DUBUQUE

The City of Dubuque worked with county personnel and the Dubuque County Soil and Water Conservation District to establish the first MOU with the Iowa DNR that was signed in April of 2020. The agreement outlined how the City and its public works department could generate nutrient reduction credits against its NPDES discharge permit by doing work in the watershed that reduces nutrient contamination of ground and surface waters. The agreement also specifies how the permit holder can generate nutrient reduction credits using the [Nutrient Tracking Tool](#) and submit these credit applications to the DNR for validation. After establishing the MOU with the state, the three entities then established an Inter-governmental Agreement (called a 28E agreement in Iowa) that outlined how they could work together to combine resources and work to accelerate the use of conservation practices in rural and urban areas of the county.

Enthusiasm for establishing this multi-agency partnership may trace back to the success of an earlier project called the [Bee Branch Creek Restoration](#), in which a 100 year old previously underground storm sewer was “daylighted” and converted to a linear waterway park that protected infrastructure and provided new recreation opportunities for city residents. The initial budget for this [partnership](#) included \$130K from the City of Dubuque, \$230K from Dubuque County, and \$350K from the County Soil and Water Conservation District. The new entity hired several staff members including a Watershed Program Director, an Urban Watershed Coordinator and a Conservation Agronomist to work with farmers and landowners in the watershed. They also hired a local farm couple in the area to extend their outreach with other local farmers and landowners. Watershed staff helped form a farmer-to-farmer conservation group that held winter meetings, field days and demonstrations in the growing season, and even a farm-to-brew [meeting](#) on soil health practices.

The initial focus of the watershed partnership was to mitigate potential flood damage to infrastructure along Catfish Creek by working with farmers and landowners along the creek and its tributaries. The group enlisted other municipalities in the watershed and established a [Watershed Management Authority for the Catfish Creek watershed](#) in 2022. The partnership leveraged their existing resources to receive additional funds from the Iowa Department of Agriculture and Land Stewardship (IDALS), with additional grower conservation incentives from the Soil and Water Outcomes Fund, Practical Farmers of Iowa, and Truterra, the ecosystem services unit of the Land O’ Lakes Cooperative system. For 2024, this budget supporting conservation work in this county will grow to more than \$2.2M, plus additional support from a new NRCS Regional Conservation Partnership Program award to the Sand County Foundation to support farmer-led conservation groups in this region.

The watershed partnership program between the city of Dubuque and Dubuque County has gained [momentum](#) in terms of impacted acres and the number of farmers and landowners served over the past several years. In 2021, new conservation projects were adopted on more than 3,000 acres, and by the end of 2023, that number had grown to 17,402 acres. Farmers in Dubuque County that have adopted conservation incentives from participating partners include nearly 7,000 acres from Practical Farmers of Iowa, nearly 5,000 acres enrolled in the Soil and Water Outcomes Fund, and the Truterra program that pays 51 growers with nearly 6,000 acres enrolled. The program has funded construction of 6 new farm ponds, 8 sediment control basins, and 7 new grassed waterways in the watershed. Using the Nutrient Tracking Tool, watershed staff estimate that since the Dubuque County watershed partnership began, these conservation practices have resulted in nutrient loss reductions of more than 136,000 lbs of nitrogen and avoided the loss of more than 8,500 lbs of phosphorus. In addition, adopting practices such as cover crops and no-till, growers have helped sequester more than 10,800 tons of carbon in the watershed.

Although the Dubuque MOU established with the Iowa DNR in early 2020 provided the mechanism for generating nutrient reduction credits, as of late 2023, the City has yet to submit an application to the DNR for credits generated. They are keeping the data needed to submit these reduction credits if they are needed in the future. The Iowa Nutrient Reduction Exchange does specify a look-back period in which credit for agricultural practice change are valid if the practice was adopted any time after Iowa adopted the Nutrient Reduction Strategy (May 2013). The City of Dubuque’s Water and Resource Recovery Center treats more than seven million gallons of wastewater per day. Under their NPDES discharge permit, they are currently in compliance. Thus their intent is to continue to save all the information needed to apply for the nutrient credits they’ve generated, and submit these applications at some point in the future when the credits are needed by the City of Dubuque or another Iowa-based entity.

CEDAR RAPIDS

Cedar Rapids, located along the Cedar River in eastern Iowa, is the second-largest city in the state with a direct population of about 140,000 and 270,000 people in the metro area. It is known for being a center of manufacturing and light industry and processing more corn than any other city in the world.

The city experienced a huge flooding event in 2008 in which the Cedar River flowed over its banks and covered more than 10 square miles within the city limits. Exceeding previous 500-year event predictions, the flood destroyed infrastructure throughout the downtown area of the city, closed city offices and other public buildings for weeks, and shut down one of the two drinking-water plants and the water pollution control plant. The city, its residents, and local industries were devastated by the flood, and experts suggested that in a changing climate they should expect more frequent extreme rainfall events in the future. When the water receded, wise city leaders began asking what they needed to do now to avoid future floods. Initial answers included building higher levees and floodwalls to protect the city, and these improvements are part of the long-term flood mitigation plan, but the cost estimates and expected construction disruptions were deemed untenable. Alternative solutions were needed.

Beginning in 2020, the city of Cedar Rapids negotiated a watershed partnership agreement between the city and the Iowa DNR, utilizing the Dubuque MOU as a foundation for the final agreement that was ultimately the second MOU signed with the state. The agreement provides the opportunity for the city to earn nutrient credits that offset excessive nutrient levels in their wastewater treatment plant discharge by reducing nonpoint source nutrient pollution in its watershed. Crucially for city leaders, in some cases the watershed work focused on nutrients would have a co-benefit of reducing flooding.

They began their efforts on city-owned lands, primarily on farm ground the city owns adjacent to the Eastern Iowa Airport. The city's watershed program manager worked with Farmers National, a farm management company to incorporate language into their farm leases that encourages tenants to use cover crops and reduce tillage on city-owned farmland they lease. The lease language also included fines if they did not properly implement these practices. To date, the following results have been documented:

- 2,000+ acres of city-owned farm ground planted to cover crops (since 2020)
- 420,000+ pounds of banked nitrogen credits (2023)
- 20,000+ pounds of banked phosphorus credits (2023)



Downtown Cedar Rapids and Cedar River

STORM LAKE

The city of Storm Lake Iowa signed a MOU with the Iowa DNR in December of 2020. The agreement provides the opportunity for the city to generate credit against their NPDES discharge and storm water discharge permits through work in their watershed to reduce nutrient contamination of the lake. City and county officials developed and adopted a watershed management plan in 2012 using a grant from the Iowa DNR.

The Storm Lake watershed covers approximately 17,000 acres, of which the lake itself covers more than 3100 acres. About 60% of the land in the watershed is farmland, with corn and soybean production dominating the landscape. Storm Lake is a major draw for tourism in the area, so protecting water quality and use of the lake for recreation is a major imperative for both the city and Buena Vista County. The main priority for the watershed is to reduce phosphorus and sediment moving into the lake which can contribute to increased turbidity and harmful algae blooms in the water.

The city worked with ISG Inc., an engineering consulting firm to develop an action plan. Much of their efforts were focused on outreach and education to help local residents understand the challenges and the need for everyone to reduce further contamination of the lake. Since 2012, there has been an ongoing effort to dredge the lake from April-October to remove sediment and increase the average depth of the lake. The city has also installed a number of rain gardens, permeable pavers, and sediment control basins and adopted best management practices for city-owned turf in public parks and athletic fields. Again the goal is to reduce the amount of Total Suspended Solids (TSS) and associated Phosphorus entering the lake.

Many of the urban water quality practices are not addressed in the Nutrient Tracking Tool, the standard means of estimating nutrient reductions under Iowa's Nutrient Reduction Exchange. The NTT was designed to model reductions in nutrient movements and losses from agricultural systems. Engineers and staff at ISG Inc. worked on behalf of the City of Storm Lake to investigate other models that could estimate nutrient loss reductions from urban practices. They presented results of their work to the DNR, and ultimately the DNR agreed to accept results from a simulation model called the Minimum Impact Design Standard (MIDS) which was developed at the University of Minnesota. ISG estimated they spent roughly \$20,000 finding and adopting the MIDS model, but only billed the city of Storm Lake for about 1/3 of their total costs as they thought they could use the results with other municipal clients.

To date, the city has not submitted any requests for nutrient reduction credit with the DNR. Their reasoning is that even though results from the MIDS model are accepted by the DNR, the results from assessing the impacts of urban conservation practices and structures are relatively minor in terms of reducing nutrients entering the lake. One city official said that "the view is not worth the climb" for urban practices. Future efforts to protect the lake will focus on agricultural fields outside city limits.

Ames' wastewater treatment plant was constructed in 1989 and has a long record of complying with operating requirements, including nitrogen and phosphorus levels in its discharge to the river. In 2013, as a part of the Iowa Nutrient Reduction Strategy, nutrient reduction targets were updated to recommend NPDES permit holders reduce the amount of nitrogen discharged by 67% and reduce phosphorus discharged by 75%. At the time, the city was discharging significantly more nitrogen and phosphorus than these new target levels, and they initiated a study to find out how they could meet them. Their goal was to meet new target levels of nutrients in their discharge while maximizing their current infrastructure investment and minimizing increases in the rates they need to charge their customers. The study examined the source of nutrients in their watershed, and showed that the discharge from the treatment facility produced 21% of the total phosphorus in the Skunk River, but only 5% of the nitrogen in the system. They considered several options to upgrade or optimize their current treatment components with cost estimates ranging from five to fifteen million dollars but ultimately decided that they needed a major upgrade to reconfigure and replace existing infrastructure in the plant. However, replacing the entire plant over a short time was going to drive up costs to ratepayers that would result in significant hardship.

Their solution was to begin the reconfiguration and reconstruction of the plant but stretch the work out in phases, while working in the watershed to reduce nonpoint contamination and maintain regulatory compliance. Ames officials collaborated with Sand County Foundation personnel to negotiate and sign an MOU with the Iowa DNR that outlined how the city might participate in Iowa's Nutrient Reduction Exchange to earn credits against their discharge permit. John Dunn, Director of the Ames Water and Pollution Control Department, approached their city council in 2021 to ask that \$100,000 be added to their budget to begin a nonpoint source reduction effort in their watershed. Surprisingly, the city council countered with a budget increase of \$200,000 with further instructions that this was not likely enough and the department should spend it wisely and come back later with a larger request.

After several iterations, the final solution is that the city will begin a phased wastewater treatment infrastructure upgrade that will cost more than \$81 million over the next 15 years. They plan on spending approximately \$4 million over 20 years on projects to reduce nonpoint source contamination in order to maintain compliance with their discharge permit while the plant is being upgraded. They have leveraged the city's investments to successfully compete for several million dollars annually of state and federal funds for expanding conservation practices in their watershed. Initially, their efforts focused on reducing nutrient losses from city-owned land and projects inside Ames city limits including parks, turf, wellfields, and farmland around the airport. Subsequent efforts targeted farmland and private lands upstream from the city of Ames. In FY2023-2024, the city has budgeted nearly \$900,000 for nonpoint source nutrient reduction, and this is expected to increase over time. City officials currently plan to bank nutrient reduction credits and "spend" them as needed to avoid penalties during their infrastructure replacement project.

City officials are especially pleased with and proud of some of the ancillary benefits achieved from working in the watershed, including flood damage mitigation, reduced erosion resulting in less sediment in surface waters, storm water protection, and increased use of their rivers and streams for recreation.

MUSCATINE

The City of Muscatine, Iowa signed a MOU with the Iowa DNR in 2021 that outlined how the city and the Muscatine Waste and Resource Recovery Facility could generate nutrient reduction credits from working with farmers and landowners in its watershed to maintain compliance with their NPDES nutrient permit requirements. The city has been under a consent decree from the US EPA that requires the completion of efforts to separate sewage wastewater from its storm water runoff. Planning for the final phase of the separation project has been underway and construction will begin shortly. Cost estimates to complete the wastewater/stormwater ([combined sewer overflow](#)) separation are approximately \$55 million. The treatment plant has been under a nutrient discharge study phase mandated by the Iowa DNR, and the study phase was recently extended into 2025, which is when the facility's current NPDES permit is scheduled to expire.

To date, the city and the current permit holder have not initiated any projects in the watershed that would qualify to generate nutrient reduction credits under the agreement with the Iowa DNR. Preliminary study of nutrients in surface water in the watershed indicates the level of phosphorus in surface waters is relatively low compared to the amount of nitrogen contamination from nonpoint sources. There is a possibility that farmers and landowners could help reduce nitrogen runoff with new conservation practices, which could be important to maintain compliance with nutrient discharge targets in the future.

The plant did engage in a pilot project to test the feasibility of using rotating algal biofilm from Gross-Wen Technologies to remove nitrogen and phosphorus from wastewater. After testing the system for six months, they investigated scaling up the pilot as part of their wastewater treatment process, and found that the full installation was going to cost too much and drive ratepayers bills up more than was acceptable.

Plant personnel and their consulting engineers continue to seek innovative solutions to satisfy their permit requirements. A complete report of how the facility plans to meet discharge targets is due to the DNR in 2025. That plan will likely include a combination of physical plant upgrades, new chemical treatment technologies, revised management of lagoon decants containing high amounts of ammonia, and hopefully conservation practices and structures in the watershed.



Becky Bridge, Muscatine, Iowa

MASON CITY AND FOREST CITY

Sand County Foundation introduced the concept of Iowa's Nutrient Reduction Exchange (NRE) to several municipalities in North Central Iowa in a series of in-person meetings in spring of 2022 that included Mason City, Forest City, and the Clear Lake Sanitary District. After working with Mason City to help them draft a MOU with the Iowa DNR, the first in this area was signed in July of 2022. Forest City and Mason City are about 30 miles apart, and both are located along the Winnebago River. When Forest City decided they were also interested in a MOU with the DNR, they agreed to keep the exact same language used in the Mason City agreement, just changing the name of the city and geographic descriptions. These two cities continue to work together in launching conservation efforts in their shared watershed and may end up signing the first multi-city watershed partnership agreement.

Forest City and Mason City both own wastewater treatment facilities that are aging and nearing the end of their useful life. Both plants are currently not meeting nutrient discharge levels mandated by Iowa's Nutrient Reduction Strategy, and both facilities will likely need costly upgrades in the near future. Officials in both cities are concerned about the impact these expensive upgrades will have on their ratepayers. Similar to the strategy employed by the city of Ames, Mason City and Forest City are exploring ways to leverage nutrient loss reduction in their watershed through Iowa's Nutrient Reduction Exchange to postpone or defer a portion of the infrastructure investment to prevent drastic increases in future wastewater treatment bills.

Although both Mason City and Forest City have signed nearly identical agreements with the Iowa DNR, their motivations for implementing conservation practices in their watershed differ in their priorities. Forest City owns most of the Winnebago River flood plain including land along the river through town. There are several public parks and recreation areas north (upstream) of the town, and the city owns a golf and disc golf course, a campground, and athletic fields all adjacent to the river in town. The city has a goal of becoming a recreation destination for kayakers and canoeists interested in floating the river below Forest City. Forest City officials are most interested in creating highly visible projects such as renovating ponds, oxbows and wetlands along the rivers that would be capable of removing nutrients that currently flow into the river, and demonstrate the connection between city residents and the river.

Mason City is located downstream from Forest City, and although they may have the desire to generate nutrient credits to offset discharges from their wastewater treatment plant, their highest priority is to mitigate potential flood damage. Mason City is home to the only hotel designed by Frank Lloyd Wright and a number of homes designed in the Prairie Style by Wright's proteges, as well as the boyhood home of Meredith Wilson and the associated museum at the Music Man Square. The city and much of its downtown infrastructure could be vulnerable to flooding if a significant rainfall event occurs in the Winnebago watershed and/or along Willow Creek, a major tributary that enters the Winnebago on the east side of Mason City.

Mason City is hosting a meeting on December 7, 2023 to convene all the municipalities and entities that may be interested in forming a Winnebago River Watershed Management Coalition. They have invited representatives from all cities and towns located in the watershed, and representatives from the four counties and the Soil and Water Conservation Districts that include portions of the watershed upstream from Mason City. Representatives from the Shell Rock River Watershed Management Coalition (the Winnebago River enters the Shell Rock River southeast or downstream from Mason City) are expected to attend. They have also invited USDA NRCS staff who work in the watershed, and interested parties from recreation groups, conservation nonprofits, and representatives from the agricultural sector. It is anticipated that the group will agree to the formation of the Watershed Management Consortium, and following the meeting, will likely sign an intergovernmental agreement to form this partnership. The expected next step after registering the organization with the secretary of State in Iowa will be to seek grant funds to begin assembling the Winnebago watershed management plan.

BURLINGTON

The city of Burlington in Des Moines County signed a MOU with the Iowa DNR in March 2023. The agreement outlined the conditions and methods through which the city could generate nutrient reduction credits or offsets to avoid penalties from exceeding nutrient levels in their waste- and stormwater discharge under their NPDES discharge permit. The city has not yet submitted any requests for nutrient reduction credits, but they do believe they have completed several green infrastructure projects within city limits that would be eligible for credit.

City officials have met with potential conservation partner organizations including Des Moines County officials, the Des Moines County Soil and Water Conservation District, and local USDA-NRCS staff to investigate funding opportunities to support creation of a joint watershed plan. They have applied for several grants but as of now, have not been successful in obtaining funds. The city is working with HR Green, an engineering consulting firm with the intent of using the Agriculture Conservation Planning Framework to target fields and subfields in their watershed that would be high priority targets for in-field practices and edge-of-field structures when resources are available.

Des Moines County owns and operates the Leopold Recreation Area, a 235 acre preserve along Flint Creek on the north side of Burlington. City and county officials believe that creating and restoring a wetland on this property would likely be part of the watershed plan. A restored wetland on this property should generate valid annual nutrient reductions in the water that flows through the wetland and enters the Mississippi River.



Great River Bridge, Burlington, Iowa

OSAGE

Osage is a small city in western Iowa that serves as the county seat of Mitchell County. It is home to a manufacturing facility for [Valent Biosciences](#) that produces. Osage has been in compliance with their permit, but a planned expansion by Valent—which discharges to the city’s wastewater plant—would have exceeded their plant’s capacity. Not wanting to deny additional industry in the city but also not ready to upgrade their facility, Osage needed a solution that would let Valent cover the cost of any additional nutrients beyond the city’s permitted discharges. Valent, a company committed to on-farm sustainability, was excited by the prospect of supporting the health of the watershed through agricultural best management. Thus, Sand County Foundation shared with them a template for a watershed partnership MOU.

On December 11, 2023, the Osage city council approved their memorandum of understanding to allow it to enter into watershed partnerships to offset the impact of Valent’s additional discharges. As of publication, this agreement was ready to be signed by the Iowa DNR. Valent and the city have a handshake agreement that Valent will purchase nitrogen reduction outcomes from the Soil and Water Outcomes Fund and gift them to the city under a contract which will soon be formalized.



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