



**AFTER**

Vernon Springs (during low water)



**BEFORE**

Vernon Springs

# IOWA LOW-HEAD DAM MODIFICATION SUCCESS STORIES

by *Iowa Rivers*  
*revival*



❧  
*This booklet is dedicated  
to the 163 people known to have tragically lost their lives  
at Iowa's low-head dams since 1900.*  
❧

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Dear Friend of Iowa's Rivers –

Iowa Rivers Revival is happy to offer you this booklet that shows powerful examples of Iowans coming together to modify outmoded, often unsafe, low-head dams. Iowans are restoring their rivers to become treasured assets. With low-head dams in 57 of Iowa's 99 counties, this is clearly a statewide issue.

Together with government and other funding partners, dam owners in Iowa are leading the way for healthier rivers with safe passage, re-connected habitat, restored riverbanks, and amazing recreational opportunities.

If you have a low-head dam in your area, we hope this booklet will inspire and empower you. Be sure to visit some of these projects to experience for yourself the outstanding fishing, paddling, child-friendly play areas, and beauty these visionary Iowans have created.

Sincerely,



Jerry Peckum  
Board Chair

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# Why modify dams?

**According to the Iowa DNR's 2010 inventory, Iowa has 177 low-head dams in 57 of Iowa's 99 counties.** Deadly recirculating currents that form below these dams have killed 163 people since 1900. Low-head dams span the entire width of the river and are less than 30 feet high. Many of are past their expected lifespan and no longer serve their intended

## Remove the “drowning machine”

Beneath their drop, dams produce a powerful churning backwash, a recirculating current that can trap debris and people. The current takes objects to the bottom of the river, then back up to the surface, and then back down again. This cycle can continue indefinitely. In the past decade, there have been nearly two dam-related deaths each year in Iowa. Most of these fatalities occurred at low-head dams, where small drops often look deceptively gentle and harmless. Low-head dams pose serious risk to swimmers, boaters, waders, and anglers. Dams are also a liability concern to owners, which may be the state, counties, municipalities, corporate entities, or individuals.



*Recirculating currents beneath dams are nearly impossible to escape, even for skilled swimmers. People and objects can be trapped indefinitely in their powerful churning backwash.*

## Eliminate costly structural failures

Most dams today are obsolete and have outlived their design life, which is usually about 50 years. This, combined with major flooding events, has caused at least 15 structural failures in Iowa in the past 10 years.

Undermined dams can worsen flooding downstream; pose significant risk to human life; and release decades of trapped sediment, resulting in decreased water clarity and loss of habitat. The price tag for repairing dams can range from thousands to millions of dollars – often with no return on investment.



*The Klondike Mill Dam needed many repairs and frequent reconstruction over the years. Concrete continuously washed away and water flowed under the dam. In 2013, the dam was replaced with rock arch rapids for safety and to maintain the upstream pool used for water supply.*

## Enable fish passage

Fish need to migrate to reach overwintering habitat, access different feeding zones, avoid predators, and spawn. Young fish mature in small streams with fewer predators and then migrate to larger streams, and species like northern pike and trout occupy cooler water during the summer and warmer water during the winter. Also, fish seek cleaner water when low oxygen or pollution reduces water quality.

Dams prevent fish from reaching this critical habitat. Dams limit population numbers and diversity of all forms of aquatic life in Iowa's rivers and streams, including mussels.



*The Mon-Maq Dam in Monticello, Iowa, disconnects fish and other aquatic life from the rest of the Makoqueta River and its tributaries.*



purpose. Often, these dams pose safety threats to people and communities, burden owners with costly repairs, and diminish stream health and the vitality of aquatic life. Dam modification eliminates problems while improving safety, reducing financial costs, enhancing fisheries, restoring river connectivity and habitat, and increasing recreational opportunities.



The Center Street Dam in Des Moines, adjacent to the Principal Riverwalk, is responsible for 15 deaths. Any object near the "boil line," represented by the dotted blue line, is sucked toward the dam and into the deadly current.



The Boone Waterworks Dam was difficult to see from upstream. Five known dam-related deaths occurred here. The dam was converted to rock arch rapids in 2014.



After the Lake Delhi Dam on the Maquoketa River ruptured in 2010, more than 200,000 cubic yards of sediment were abruptly released downstream. Reconstruction costs are estimated at \$16 million.



Following the floods of '08 and '10, structural problems were discovered at the Littleton Dam on the Wapsipicon River, which has claimed nine lives. Concrete on the roughly 85-year-old dam is cracking and washing away.



Fish ladders were installed on many dams in attempts to meet requirements of Iowa law to reduce the negative effects of dams on fish. Unfortunately, most Midwestern fish species cannot use these ladders, which are designed for leaping fish such as salmon.



The Higgins eye pearlymussel is one of many endangered mussel species in Iowa. Among the reasons mussels are declining is their need for fish migration to distribute offspring. Mussels filter nutrients and improve water quality.



# Other benefits of dam modification

There are many reasons to modify dams. Modification helps restore rivers, which, in turn, enhances fishing, canoeing, and other recreational opportunities. Communities across the state have used dam modification to their advantage to boost local quality of life, tourism, and renew pride in Iowa's rivers.

## Improve habitat



As dams impound water, they restrict the flow of sediment, causing the upstream river to accumulate silt and become shallower over time. As the "sediment hungry" downstream river tries to regain balance, it erodes the river channel and stream banks, further worsening habitat and water quality. Poor water quality supports many fewer aquatic species. Allowing rivers to flow freely, however, restores the natural transport of sediment and creates a more productive environment and a variety of habitats needed by aquatic life.

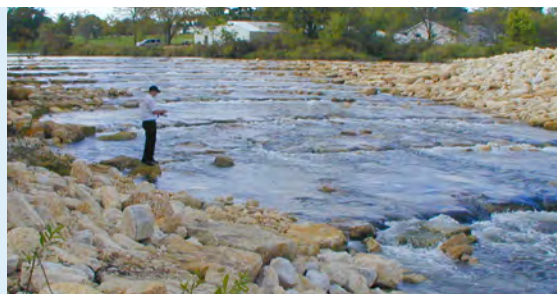


*Native vegetation along the Shell Rock River restores the floodplain, slows and infiltrates runoff, and improves habitat.*

## Reconnect rivers



Because dams fragment rivers, fish are limited in their movement, and only during high water can they reconnect with critical habitats. Removing dams enables a greater diversity of fish to reach more streams and tributaries across the state, providing new and better habitat and increasing opportunities for anglers. This also allows greater transport of nutrients to improve stream health and water quality, reduces flooding effects, and boosts local economies through quality of life improvements and tourism.



*The new rock arch rapids in Cresco, Iowa, provides safe access to the river and reconnects fish with 22 miles of the Turkey River.*

## Increase recreational opportunities



Modifying low-head dams not only removes safety hazards, but also, in many cases improves river access. What often follows is an increase in the number of river users, whether they are canoeists and kayakers, bird watchers, anglers, or local families walking along the banks to enjoy the scenery. Many communities have highlighted their dam modification projects by seeking water trail designations, thereby attracting even more river users to the area.



*Manchester's Whitewater Park, the longest in the state of Iowa, attracts river users and playboaters from across the country.*

## Spark economic development



More recreational opportunities means more economic development potential. Iowa's three whitewater park communities – Charles City, Elkader, and Manchester – have been successful in showcasing their rivers to attract tourists, businesses, and new residents. Smaller dam modification projects, too, can greatly improve fisheries, bring anglers to better fishing opportunities, and encourage families to safely enjoy the river.



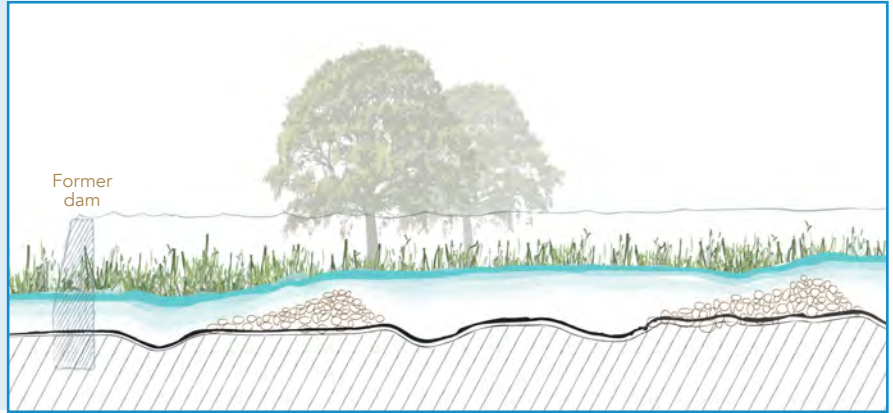
*Elkader, population 1,200, is seeing strong indicators of economic development since modifying its low-head dam and installing a whitewater park in 2014.*

# Low-head dam alternatives

Because every dam is different, every modification project is different, too. A range of techniques can be used, depending on a community's needs. Below are just four examples. Other modifications not shown, such as whitewater parks, can dramatically increase recreational opportunities.

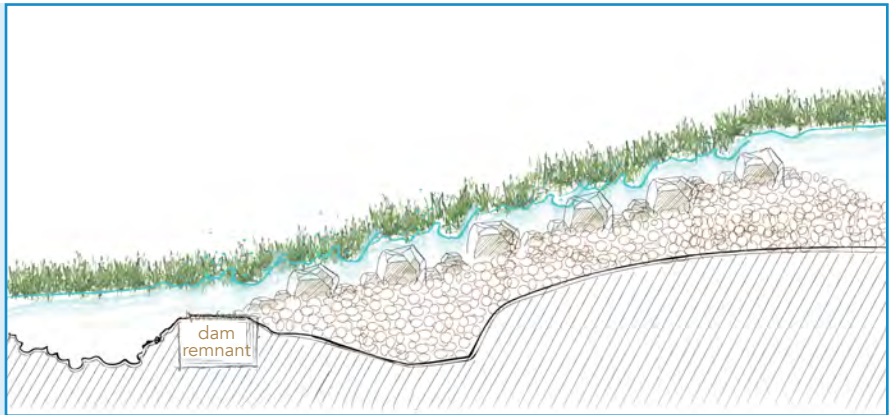
## Complete dam removal with river restoration

Maintenance costs for aging and deteriorating dams can be eliminated through complete dam removal. Floodplains restored with native vegetation in the former impoundment stabilize banks and improve water quality. Rock riffles help stabilize channel beds.



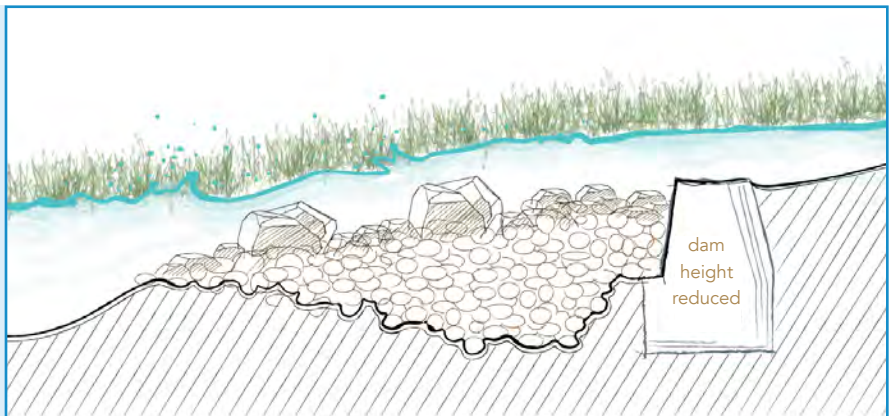
## Rock arch rapids

Some deteriorating and dangerous dams that still serve a purpose, such as maintaining depth for water supply, can be replaced with a backsloped rock arch rapids. The rock ramp maintains the water height of the former dam but improves safety and allows fish passage.



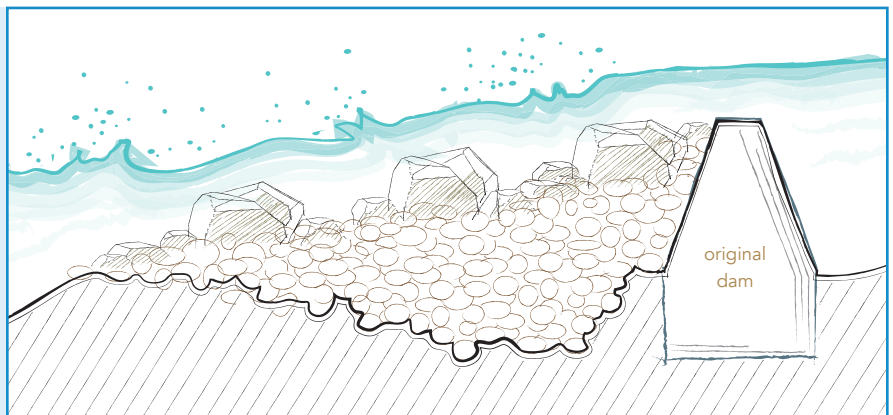
## Height reduction

Partial removal of a dam is preferred when complete removal would cause the excessive release of sediment. The rock ramp eliminates the dangerous recirculating current, allows fish passage, and transports sediment more slowly downstream.



## Rock ramps

Dangerous recirculating currents can be eliminated without removing a dam by strategically placing rocks and boulders downstream of the dam. The sloped rock formations also allow fish to reconnect with the river upstream.





# A brief history of dams in Iowa

Throughout Iowa's history, dams have been constructed for a wide variety of reasons, reflecting the needs, desires, and technology of the era in which they were built.

## 1800s: Mills



During Iowa's 19th-century settlement, many towns were founded along rivers because of rivers' ability to generate mechanical energy and spur economic growth. Rock and crib dams powered grist, woolen, and saw mills. Towns such as Cedar Rapids and Iowa Falls were named for their river features, which were ideal locations for water power dams. The first documented dam in Iowa was built in 1829 on the Yellow River for a saw mill. By 1870, there were over 1000 mills operating on rivers in Iowa.



*Mill dam in Quasqueton, Iowa.*

## 1900-1920s: Hydroelectricity



As Iowa's culture and economy shifted, dams became less important. Since floods regularly washed out dams, owners often covered them with concrete to stabilize them and reduce maintenance. Some dams were converted to produce hydroelectricity. By 1920, coal became the favored means of generating electricity, and the use of hydroelectric dams dropped.



*Dam converted to produce hydroelectricity in Manchester, Iowa.*

## 1930s-1940s: Depression era

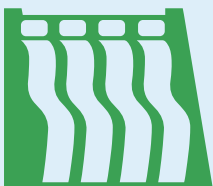


In the 1930s, the U.S. government's Civilian Conservation Corps, Works Progress Administration, and Civil Works Administration gave temporary work to unemployed men to construct dams. Some dams were promoted as recreational and aesthetic improvements to rivers, often called "beauty dams." Present-day locks and dams on the Mississippi River were also constructed in the 1930s under the Rivers and Harbors Act, which was intended to improve navigation.



*"Beauty" dam constructed in 1940 in Elkader, Iowa.*

## 1950s-present: Modern dams and modification

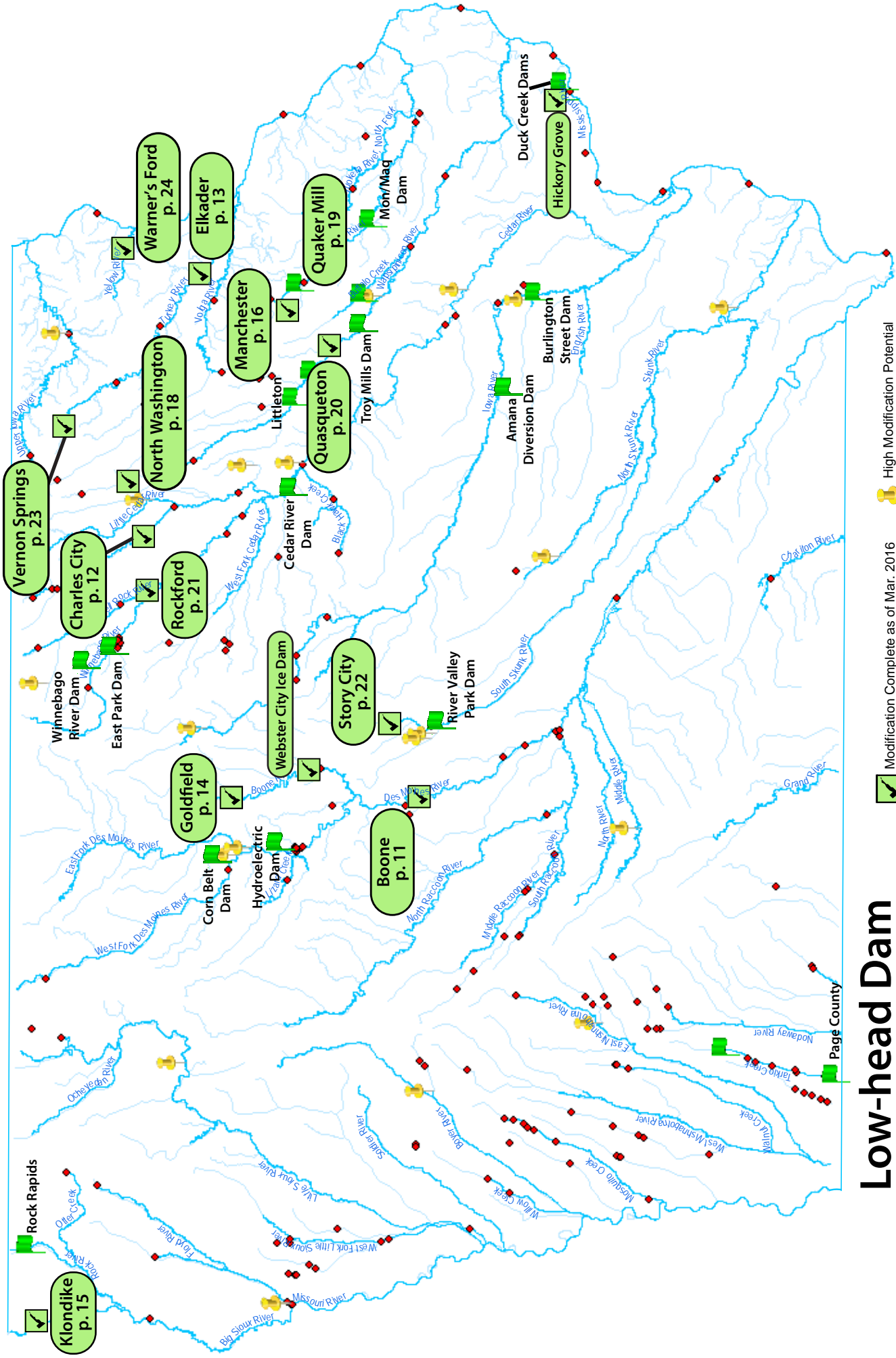


In the 1950s, large dams were constructed to reduce down-cutting of river bottoms, supply water, and control flooding. The large reservoirs created by dams also offered many recreational opportunities. In the 1990s and 2000s, grade stabilization dams were constructed in Missouri River tributaries to slow extreme erosion, which had caused over \$1 billion in damage to infrastructure and habitat as a result of stream straightening. In the 2000s, low-head dam modification took off! More dams are being modified every year.



*Completed in 1969, the Red Rock Dam in Marion County, Iowa, was a flood control project of the U.S. Army Corps of Engineers. It created the largest lake in Iowa.*





# Low-head Dam Modification 2016





Charles City Whitewater Park

# IOWA LOW-HEAD DAM MODIFICATION SUCCESS STORIES



# Boone Waterworks Dam

On July 8, 2006, an inner tubing trip among three friends turned tragic when Megan Pavelick, a 22-year-old Iowa State University graduate, got trapped in the Boone Waterworks Dam's recirculating current and drowned.

Megan was the dam's fourth victim. The dam drop was just over a foot that day, demonstrating the deceiving and often underestimated force of small low-head dams, which are sometimes hard to see from upstream.

Following Megan's death, warning signs were installed immediately and volunteers constructed a portage trail for users to walk around the dam and re-enter a safe distance downstream. Even so, a fisherman drowned below the dam in 2012. With funds Megan's parents donated from a settlement with the city, and additional DNR, city, and U.S. Fish and Wildlife funds, the City of Boone modified the dam in 2014.

Because the dam's reservoir supplied water to wells upstream, complete removal was not the best option. Instead, conversion to rock arch rapids was chosen for its three-fold benefit of eliminating the "drowning machine," maintaining upstream water elevations, and creating fish passage.

Initially, anglers were worried about losing their familiar fishing spots. These concerns were eased, however, after speaking with the Iowa DNR and learning that a rock arch rapids would create more fishing holes.

To minimize costs, the city awarded two contracts – one for the supply and delivery of materials and the other for dam modification. Still, construction expenses came out higher than anticipated. Access roads were narrow and the boat ramp small, so deliveries of rock had to be light and frequent. Midway through construction, the crew also discovered that more rocks were required than estimated.

Work to convert the dam began in December 2013, with extremely cold weather delaying the project. The east and west wings and a center portion of the dam were removed, but otherwise the dam remained intact. By March, the conversion to rock arch rapids was complete.

Paddlers and tubers should still be cautious while navigating through the rock arch rapids, but the safety of the Des Moines River has improved dramatically. The city is now pursuing projects to improve access, the boat ramp, and parking for the popular area.

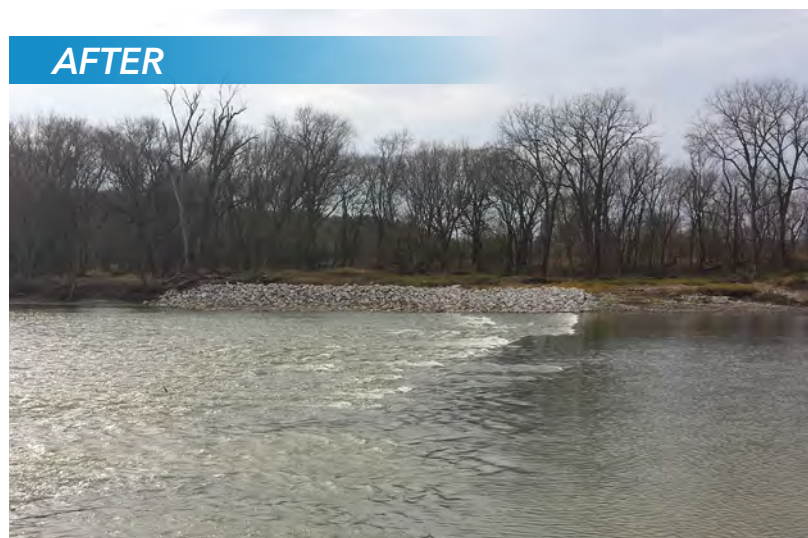
**River/stream:** Des Moines River  
**Location:** Boone County  
**Owner:** City of Boone  
**Height:** 3'  
**Length:** 212'  
**Age:** ~100 years – constructed circa 1900 and modified in 2014  
**Historic use:** Water supply  
**Project type:** Rock arch rapids  
**Project goals:** Safety; fish passage  
**Project designer:** Iowa DNR  
**Project contractors:** Keller Excavating of Boone, IA (for supply and delivery of materials); Richards Construction of Sac City, IA (for dam modification)  
**Start and completion dates:** December 2013 – March 2014  
**Miles of river reconnected:** 46  
**Closest river barriers:** Upstream – Fraser Dam; downstream – Saylorville Dam Spillway  
**Cost:** \$528,800  
**Collaborators:** City of Boone, Boone County, Iowa DNR, US Fish and Wildlife Service

**"I have only received positive feedback from the community concerning the dam conversion. I consider the project a success due to the elimination of a safety hazard while still providing recreational opportunities at the site."**

*– Wayne Schwartz, City of Boone Engineer*



The former Boone Waterworks Dam has claimed five lives. Its small drop was difficult to see from upstream and looked deceptively gentle.



The dam was converted to rock arch rapids in March 2014, improving the safety of the Des Moines River.

# Charles City Whitewater Park

Like many Iowa towns, the river running through Charles City has caused great devastation to homes and businesses during flood season. After the floods of '93, '96 and '99, Charles City bought 28 acres along the river using FEMA funds, which it then maintained as green space.

Improvements were made, including a walking and bike trail, but the area was rarely used. Then, in 2001, Charles City approved a 7% hotel/motel tax with 40% of revenues allocated to parks and recreation and 60% to tourism. With the additional resources, the Parks and Recreation Department decided to explore developing this green space in 2006.

The department worked with Iowa State University and architectural firms to explore options. One firm included in its proposal a whitewater feature, so the city set out to explore what whitewater kayaking was all about.

They were surprised to find there are 4 million kayakers in the U.S.; kayakers will travel up to eight hours many times a year to kayak; kayaking is expected to grow 24% through 2024; and kayakers spend \$292 per trip, on average.

What's more, Charles City seemed like the perfect place to host such an attraction: with the river running through the heart of downtown, river users could easily access food, gas, accommodations, and other amenities.

Suddenly, the city was considering a whitewater park with several features. Due to safety issues and federal floodway regulations, the dam had to be removed.

The city held many public hearings and

special meetings to provide information and receive input from the community. It was a tough sell at first, especially to anglers who fished at the dam. But in December 2007, the city council voted to remove the dam and construct a whitewater park – the first in Iowa.

An engineering firm drafted a preliminary plan in April 2008, but the project was soon halted because of flooding. The city had to divert funding to recovery efforts, and grants were lost. In addition, the permitting process was delayed. By 2010, grant funding was restored, and construction work began.

Today, the one-quarter mile whitewater park boasts three distinct features for paddlers and tubers of all skill levels. The design is naturalistic, with rocks supplied from a quarry just five miles away. The once-steep banks were restored to a more natural state and provide better access to the river. Because fish habitat, fish passage, and access to the water's edge improved, angling has increased.

The whitewater area is just one part of the surrounding Riverfront Park, which includes an amphitheater, ravine play area, picnic shelters, stormwater fountain, and labyrinth.

The whitewater park and annual competitive events draw river recreation enthusiasts from across the Midwest, which the city estimates has an annual economic impact of \$764,000.

Charles City was designated an Iowa Great Place and received numerous awards for this project, including Iowa Rivers Revival's "River Town of the Year" award and the EPA's "Smart Growth Achievement" award.

**River/stream:** Cedar River  
**Location:** Charles City, Floyd County  
**Owner:** City of Charles City  
**Height:** 7'  
**Length:** 260'  
**Age:** 77 years – constructed in 1934 and modified in 2011  
**Historic uses:** "Beauty" dam; recreation  
**Project type:** Whitewater park  
**Project goals:** Safety; recreation; economic development; fish passage; habitat improvement  
**Project designer:** Recreation Engineering and Planning of Boulder, CO  
**Project contractor:** Minnowa Construction of Harmony, MN  
**Start and completion dates:** Winter 2010 – Summer 2011  
**Miles of river reconnected:** 13  
**Closest river barriers:** Upstream – Charles City Main Street Dam; downstream – Cedar Lake Dam  
**Cost:** \$1 million  
**Collaborators:** Community residents, organizations, and businesses; City of Charles City; Floyd County; ISU; Iowa Whitewater Coalition; Iowa Great Places; Iowa DNR; FEMA

## BEFORE



*The dam in downtown Charles City provided little benefit to the community before its modification in 2011.*

*"The whitewater park has drawn visitors from across the state and beyond, receiving positive reviews from guests and residents alike. Charles City's initiative has been replicated in nearby communities, enabling marketing of Iowa to the nation as a whitewater destination!"*

*– Ginger Williams, Marketing and Tourism Coordinator for the Charles City Chamber of Commerce*

*"It's given me more spots to check. I used to have only a couple of spots I liked, and now I have probably eight or nine."*

*– Troy Loeckle, local angler*

## AFTER



*Today, Charles City's Whitewater Park attracts river users locally and from across the Midwest with an estimated annual economic impact of \$764,000.*



# Elkader Whitewater Park

On June 10, the Flood of 2008 hit Elkader. The river rose 18 feet and inundated scores of homes and businesses, causing millions of dollars in damage.

Afterward, 32 houses in the Turkey River floodplain were bought out, and the city held visioning sessions to determine what the community now wanted along 11 acres of the riverfront. Ideas included a soccer field, a playground, an amphitheatre, trails – and a whitewater park.

The original plan called for the Little Dam to stay in downtown Elkader. But a feasibility study determined that in order to acquire a “no-rise certificate” – required by FEMA to demonstrate that any change to the floodway would not result in higher water elevations – the dam had to be removed.

Stream biologists gave public talks on the benefits to fish of dam removal, and a historic review concluded that the dam was not eligible for the National Register of Historic Places. Yet, the idea of removing the Little Dam bothered many in the community who appreciated its history and fishing spots. A petition circulated but never gained enough signatures to go before the city council.

The project received strong support, too: from the Cultural and Entertainment District, comprised of downtown businesses; the Turkey River Recreation Corridor, which includes the towns of Elgin and Clermont; Main Street Iowa; Iowa Great Places; and many individuals, businesses, and organizations in Elkader.

After numerous public hearings, open houses, and council meetings, the city

council voted in 2013 to remove the dam and construct the whitewater feature.

Since the park’s completion in 2014, river usage has grown. Visitors from across the state and beyond have visited the town to test out the park’s signature feature, the “Gobbler,” a 22-foot constant wave that is perfect for free-style kayaking, boogie boarding, and tubing.

People interact with the river in other ways, too, according to Tom Gifford, a local who helped initiate the project. “It’s not uncommon to see a dozen to 15 people just hanging out by the river,” he said, whether they are watching play boaters, fishing, walking dogs, picnicking, or playing on the sandbar. “None of that ever happened before.”

According to DNR biologist Gary Siegwarth, the project has improved fishing by adding more shoreline for anglers and creating deep water habitat to shelter gamefish. The river is also more accessible: previously, the steep drop beneath a riverside retaining wall made it difficult to reach the river, but an accessible ramp and viewing platform now make it possible for everyone to enjoy it.

Bank stabilization, plantings, a walking trail, and river access on the other side of the river are ongoing projects.

Local officials have observed that the number of trail users, campground visitors, out-of-town shoppers, and hotel/motel tax revenue have all gone up. According to Roger Thomas, the Elkader Development Corporation Director, there also has been growing interest in opening new sports stores, too.

**River/stream:** Turkey River

**Location:** Elkader, Clayton County

**Owner:** City of Elkader

**Height:** 4’

**Length:** 235’

**Age:** 74 years – constructed in 1940 and modified in 2014

**Historic uses:** “Beauty” dam; recreation

**Project type:** Whitewater park

**Project goals:** Safety; recreation; economic development; fish passage; habitat improvement

**Project designers:**

RiverRestoration.org of Carbondale, CO; MSA Professional Services of Ankeny, IA

**Project contractor:** C.J. Moyna and Sons of Elkader, IA

**Start and completion dates:** Fall 2013 – Spring 2014

**Miles of river reconnected:** 38

**Closest river barriers:**

Upstream – Big Dam in Elkader; downstream – none

**Cost:** \$389,900 (in-water work only)

**Collaborators:** Community residents, organizations, and businesses; Clayton County; Vision Iowa; Iowa DNR

“There wasn’t really anywhere to fish but maybe a couple of spots. Now on both sides, you’ve got room for 15 anglers, so there’s a lot more room to fish from the bank and a lot more accessibility to the area than before.”

– Mike Plumley, local angler



Gaining access to the river and the risks of the “beauty” dam were once challenges for community members.



Since modifying the dam to create a whitewater park, an accessible ramp has improved river access, anglers have more shoreline and fishing holes, and the local economy has been bolstered through tourism.

“It’s gotten me in the water, and I feel much better and healthy.”

– Dan Beck, local kayaker

# Goldfield River Park Dam

Goldfield's dam mitigation project started over coffee one day when two retired residents, Joe Skinner and Orville Steffenson, decided that something had to be done about the deteriorating dam at Goldfield River Park.

The dam was constructed in the 1930s by a group of citizens so that a local tour boat could take passengers up and down the Boone River. The dam negatively affected fishing, according to locals, and over the years, many of the boulders holding the dam together had washed out.

Repairing the dam was not an option, since neither the city nor the state would provide funding for such a project. However, Skinner and Steffenson's alternative looked even better: convert the dam to rock arch rapids to let fish migrate upstream at all times of the year; slow erosion; and allow community members to walk, tube, paddle, and fish along the Boone River.

The project received unanimous support from the city council and the Wright County Conservation Board. To raise money, the duo posted flyers around town and wrote a fundraising appeal in a newsletter sent to Goldfield High School alumni.

About \$100,000 flowed in from businesses and private donations. Because farmers donated rocks and boulders, the project came in under budget.

The rapids were completed in August 2014, and the area has seen more use and restored community pride in the park along the river. Now, with funds to spare, additional plans to revitalize Goldfield River Park are underway.

Mimi Cameron, a Goldfield resident, remembers the park in its glory days. "The park was the center of my life when I was a kid. We lived at that park," she said. It featured playground equipment, shelters, a merry-go-round, Renaissance fairs, and Chautauqua assemblies. But all of that changed as annual floods gradually wiped out the park's amenities and residents stopped visiting.

Cameron is hopeful that the once-vibrant park will make a comeback. The city is investing in flood-resistant picnic tables, benches, and shelters that will be anchored with concrete. The park will also be handicap accessible. Two boat ramps will be placed close to the rapids, making it easier for tubers, kayakers, and canoeists to enter and exit the river. With these improvements plus the removal of the dam, there have been talks of designating the Boone River as a water trail.

"It has a lot of potential," Cameron said. "Not every town has a beautiful river going through it."

**River/stream:** Boone River

**Location:** Goldfield, Wright County

**Owner:** City of Goldfield

**Height:** 4.5'

**Length:** 50'

**Age:** 80 years – constructed in 1934 and modified in 2014

**Historic use:** Impoundment

**Project type:** Rock arch rapids

**Project goals:** Safety; recreation; fish passage; stream stabilization; habitat improvement

**Project designer:** Iowa DNR

**Project contractor:** Lund Construction of Eagle Grove, IA

**Start and completion dates:** May 2014 – August 2014

**Miles of river reconnected:** 19

**Closest river barriers:** Upstream – none; downstream – Webster City Dam

**Cost:** \$64,000

**Collaborators:** City of Goldfield, Wright County Conservation, Wright County Soil and Water Conservation, Wright County Supervisors, Women's Club, Commercial Club, Goldfield Legion, current residents, school alumni, business community, and Iowa DNR

## BEFORE



Boulders holding together Goldfield's dam had steadily washed out over the years.

"As an impetuous twenty-something girl, I once canoed over our old and dangerous dam during high raging water. Fortunately, I made it out with only a large hole in the canoe caused by hitting one of the many big boulders. I am so thrilled now for the next generation to try our new safe and adventuresome rapids. It has to be a blast!"

– Sonna Johnson, Goldfield resident

## AFTER



With tremendous community support, a rock arch rapids now provides recreational opportunities where the dangerous dam had once been.



# Klondike Mill Dam

The Klondike Mill Dam was no match for the regular flooding of the Big Sioux River. Originally constructed in 1883 for the Kruger Flour Mill and converted in 1922 to create hydropower, the dam required numerous repairs and reconstructions throughout its life – even after it had ceased its economic functions in the 1930s. Stones and concrete regularly washed away with each spring flood, and water flowed through the dam. It was listed on the National Register of Historic Places in 1975 but was removed from the list in 1989 due to its extremely degraded condition.

The dam also was the largest barrier to fish passage on the Big Sioux River. A study found nine species of fish below the dam that were not found upstream, including the blue sucker and silver chub, which are identified as species of greatest conservation need.

After the 2008 flood, the dam was undermined yet again. This was of special concern to the Lyon and Sioux Rural Water System, which relied on the dam to maintain water elevations upstream for six alluvial wells that supply water to rural parts of Lyon County. The rural water system contacted the Iowa Department of Natural Resources and South Dakota Game, Fish, and Parks to consider options to address the deteriorating dam.

The overwhelming desire from canoeists and kayakers was to remove the dam completely for safety reasons. However, preserv-

ing the upstream pool of water was also important for the local drinking water supply. As a result, conversion to rock arch rapids was chosen to accommodate all needs.

In the midst of the planning process, another flood in 2009 damaged the dam, forcing temporary repairs which entailed stacking rocks above the dam to maintain the water supply. Because of this flood, FEMA was able to provide funding for the dam mitigation project. To comply with the National Historic Preservation Act, a historic review was conducted. The review determined that the only remaining significant structure was an intact mill race foundation, which was preserved.

Following the dam's conversion to rock arch rapids, fish have access to 38 more miles of the Big Sioux River and 1,840 miles of tributary streams to find essential habitat and breeding grounds. This has had a positive effect on fishing, and more anglers are using the river now. The rapids also reliably maintain water levels for the rural water system and provide safe passage for canoeists and kayakers. Steep banks were sloped back and replanted to minimize erosion and improve river access.

The Lyon County Conservation Board added a day-use area and made bank improvements to the Iowa side of the Big Sioux River. Now that the safety hazard of the dam is gone, the conservation board is also working on developing a water trail between Sioux Falls and Sioux City.

**River/stream:** Big Sioux River

**Location:** Klondike, Lyon County

**Owners:** States of Iowa and South Dakota

**Height:** 12'

**Length:** 175'

**Age:** 130 years – constructed in 1883 and modified in 2013

**Historic uses:** Flour mill; hydroelectricity

**Project type:** Rock arch rapids

**Project goals:** Safety; water supply; fish passage; habitat improvement

**Project designer:** Iowa DNR

**Project contractor:** Merryman Excavation of Woodstock, IL

**Start and completion dates:** January 2013 – May 2013

**Miles of river reconnected:** 38

**Closest river barriers:**

Upstream – natural falls in Sioux Falls; downstream – Canton Rubble Dam

**Cost:** \$580,000

**Collaborators:** Lyon and Sioux Rural Water System, Inc.; Lyon County Conservation Board; Lyon County; Iowa DNR; South Dakota Environmental Bureau; South Dakota Game, Fish and Parks; South Dakota Canoe and Kayak Association; FEMA; US Fish and Wildlife Service

**"The conversion of the dam changed it from a drowning machine to a passable waterway."**

*– David Finck, South Dakota Canoe and Kayak Association*



**BEFORE**

The degraded Klondike Mill Dam needed numerous costly reconstructions throughout its life.



**AFTER**

The dam's modification to rock arch rapids has eliminated the need for repairs, improved the safety of canoeists and kayakers, maintains water levels for rural wells, and allows fish to reconnect with upstream habitats.



# Manchester Whitewater Park

## BEFORE



Manchester's dam was a safety hazard for the downtown.

"The whitewater project was promoted by the Manchester Good to Great organization as a means to continue to be aggressive in the improvement of our community with a mindset that a recreational/tourism-focused project would help draw people to our community. Not only is this project an attraction for visitors, but an additional quality of life factor which we know will make Manchester a place people wish to consider when looking to expand their business or relocate their families. We feel this project will have a long-term positive impact on our community, and the fishing is great."

– Ryan Wicks, Manchester Good to Great River and Recreation Committee Chair

It all began back in 2008 with "Manchester Good to Great," a volunteer organization launched by community leaders. Using the book *Good to Great* by Jim Collins as a guide, the group held a number of public charettes (guided planning meetings) to evaluate the community and envision the town's future, asking: *How can we reverse our declining population? How can we improve the community's quality of life? How do we transform Manchester into a place where families and entrepreneurs want to call home?* As a result of these charrettes, nine subcommittees were formed to address these questions.

One of the committees was the River and Recreation Subcommittee, where the idea of a whitewater park soon gained traction.

Over the next several years, the subcommittee studied this possibility. They raised money to conduct a feasibility study, hired a consulting firm to develop a conceptual plan, re-

## DURING CONSTRUCTION



Construction work occurred throughout the winter and spring to create six 18-inch drop features, rocky pools, bank terraces, and access points.

## AFTER



Manchester's Whitewater Park, completed in May 2015, attracts kayakers, tubers, boogie boarders, swimmers, canoeists, anglers, and many others along the banks.

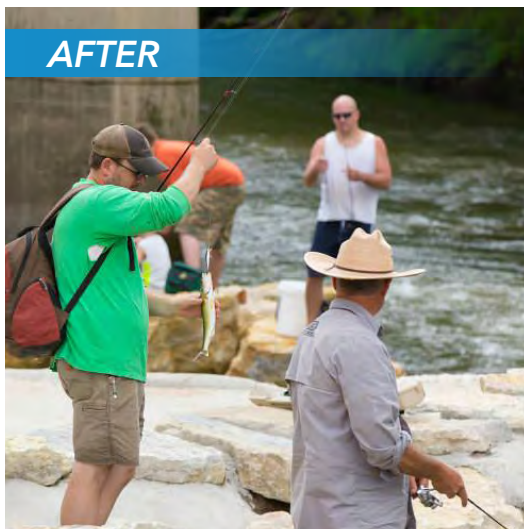
searched and visited other communities, analyzed economic impacts, and met with DNR river programs staff and river biologists. In 2010, they presented a proposal for a whitewater park to the city council, demonstrating that it would improve safety by removing the low-head dam, enhance fish habitat and numbers, and boost economic development.

"It was a way for [the subcommittee members] to say that this will improve the downtown and turn the river that was kind of a backyard into the front yard," said City Manager Timothy Vick. "They were able to show that for every person in the water, there are usually four people on the bank."

The city council unanimously supported the initiative and committed to funding one-third of the cost.

Listening to the community was key in gaining the public's confidence in the project. Residents wondered if flooding would worsen, how the look and feel of downtown would change,



**AFTER**

*The whitewater park's pools and drops create deep, aerated water, which is great for fish habitat.*

"The Manchester Whitewater Park is a great example of fish habitat improvement and fishing access enhancement. Modifying the old dam has improved habitat by allowing fish to move up and down river for spawning, overwintering, and recolonization. Structures used to create the park provide easy "walk-to" access on the Maquoketa River, and the pools, runs, and currents associated with the project are attractive to popular game fish, including smallmouth bass and walleye. The Manchester Whitewater Park puts anglers and fish together at the same location, and that is a recipe for fishing success."

– Dan Kirby, DNR Biologist

**River/stream:** Maquoketa River

**Location:** Manchester, Delaware County

**Owner:** City of Manchester

**Height:** 9'

**Length:** 185'

**Age:** 111 years – constructed in 1904 and modified in 2015

**Historic uses:** Grist mill; hydroelectricity

**Project type:** Whitewater park

**Project goals:** Safety; recreation; economic development; fish passage; habitat improvement

**Project designers:** Recreation Engineering and Planning of Boulder, CO (for the whitewater park); AHTS Architects of Waterloo, IA (for bank and amenity improvements)

**Project contractor:** Taylor Construction, Inc. of New Vienna, IA

**Start and completion dates:**

September 2014 – May 2015

**Miles of river reconnected:** 24

**Closest river barriers:** Upstream – Quaker Mill Dam (removal projected to begin in late 2016); downstream – Water Gauge Dam

**Cost:** \$2.1 million

**Collaborators:** Community residents, organizations, and businesses; Manchester Good to Great; City of Manchester; Delaware County; Vision Iowa; Iowa DNR; Army Corps of Engineers

**AFTER**

*Iowa's third and longest whitewater park, located in the heart of downtown Manchester, is helping to create a viable, sustainable, and attractive community for families and local businesses.*

if the upstream water level would decrease, and how fishing would be affected. By addressing these concerns at informational meetings, many who were wary at first became avid supporters of the park.

Within a year, the project raised \$630,000 in donations from individuals, businesses, and organizations in the community. The remainder of the funding came from grants and partnerships.

The city held a public hearing, approved plans and contracts, and obtained permits. Construction started in September 2014 and continued throughout the winter and spring to create six 18-inch drop features, rocky pools, bank terraces, and access points along 800 feet of the Maquoketa River. The park was completed in May 2015, making Manchester home to Iowa's third – and longest – whitewater park.

The park attracts a wide array of users: kayakers, tubers, anglers, boogie boarders, swimmers, canoeists, pedestrians,

joggers, bikers, picnickers, and spectators. The large limestone boulders along the shoreline provide ample opportunity for visitors to sit beside and connect with the river. The drops and pools create deep, aerated water which is great for fish habitat. Improved river access makes the whitewater park an excellent place to fish in cooler weather, an ideal time when other river users aren't blocking places to cast.

What's more, the park attracted two businesses before it was even open: The Watershed, a kayak and canoe rental store, and Franklin Street Brewing Company, a local microbrewery that moved into a historic building just across the street.

By turning the river into a focal point of the community, Manchester is creating for itself a strong and healthy future. Iowa Rivers Revival named Manchester "River Town of the Year" in 2015 in recognition of these efforts.



# North Washington (Haus Park) Dam

With families and young kids often using the park and regularly playing in the river, the North Washington (Haus Park) Dam situation didn't look good. A large hole in the dam measuring three feet by six feet exposed steel rods, and kids could be found climbing over the dam's compromised concrete walls. Water ran through the dam, and debris continuously got stuck in its recirculating current during high water.

"The danger was getting worse and worse every day," said Chickasaw County Conservation Director Brian Moore.

The dam also hurt fishing in the area. Once a great northern pike fishery, the dam had clogged this section of the Little Wapsi with sediment over the years, destroying fish habitat and restricting fish passage.

Clearly, something had to be done. So, in 2014, the county chose to fix both problems by removing the non-functioning dam. A vortex weir – a minor rock structure made of large boulders –

was placed downstream of the former dam site, creating a consistent flow and directing water to the center of the channel.

Public response to the project has been positive. Cletus Ries, a resident of Chickasaw County, is glad the old dam is gone.

"It was money well-spent," he said of the dam removal. "I was very concerned that some child or grown-up would get sucked into that."

Ries recalled a recent visit to the park with his grandchildren, who enjoyed safely climbing over the new vortex weir and playing in the water. He hopes that removing the dam and adding the weir increases the park's usage.

Fishing conditions and opportunities have also improved. The vortex weir created deeper pockets for fish to gather, and collected sediment has been allowed to wash away. Banks were sloped to make river access easier, and aquatic life now has access to 22 miles of the Little Wapsi that had been cut off for a century.

**River/stream:** Little Wapsipinicon River

**Location:** North Washington, Chickasaw County

**Owner:** Chickasaw County

**Height:** 8'

**Length:** 54'

**Age:** ~100 years – constructed circa 1900 and removed in 2014

**Historic use:** Mill

**Project type:** Complete removal; add vortex weir

**Project goals:** Safety; fish passage; habitat improvement; river access

**Project designer:** Iowa DNR

**Project contractor:** Speicher Excavating of Fredericksburg, IA

**Start and completion dates:** February 2014 – August 2014

**Miles of river reconnected:** 22

**Closest river barriers:** Upstream – Lylah's Marsh Dam; downstream – Alcock Park Dam

**Cost:** \$21,000

**Collaborators:** Chickasaw County, Chickasaw County Conservation Board, Iowa DNR

"We can now take our grandchildren to the park and they can enjoy the river without us worrying about the dangerous dam. The park is very well maintained."

– Cletus Ries, Chickasaw County resident

**BEFORE**



Kids could once be found climbing over the deteriorating and dangerous North Washington (Haus Park) Dam.

**AFTER**



A vortex weir (shown here at low water) was placed downstream of the former dam, creating consistent flow by directing water to the center of the channel, and making a safer place to play.



# Quaker Mill Dam (in process)

When Willard Hawker bought the Quaker Mill Dam in 1996 from Alliant Energy, it was with the intention of preserving it: the dam was historically significant, and it created a pond in Hawker's backyard that he wanted to keep as a waterfowl refuge. Hawker repaired the structure, built portages, landscaped the riverfront, and cleaned up the area.

But after several major floods, all of that changed.

The floods of 1999, 2004, 2008, and 2010 rapidly filled in the pond with about ten feet of silt, estimates Hawker, who describes the river as "a moving glacier of sand." Where there once was water now stands a grove of trees. The pond is completely gone.

Making matters worse is the breached levee just upstream of the Quaker Mill Dam. It was first undermined during the 2004 flood, creating a new channel that connected to Honey Creek to the east. Delaware County fixed the levee in 2009, but it broke again during the 2010 flood and has not been repaired since. The channel diverts water away from the original pond site and now puts pressure on the Honey Creek Bridge, which was never intended to withstand such powerful streamflows.

The safety of the bridge is of utmost concern for Delaware County. To eliminate the hazard, the county considered completely rebuilding

the Honey Creek Bridge to withstand the channel's new depth and velocity, but it was determined that the best and most cost-effective solution was remeandering the Maquoketa River back to its original course. This requires removing the Quaker Mill Dam.

Because a historic review of the dam concluded that the structure is historically significant, measures will be taken to acknowledge the loss of the dam. This could include photographic documentation or a commemorative plaque, for example.

Hawker has supported the dam modification project from the beginning. "All dams should be taken out," he said. "Rivers should go back to their natural state." After completion of the project, he plans to give some of the surrounding land to Delaware County for use as a park.

According to Hawker, the project ties in perfectly with Manchester's new whitewater park. Removing these dams on the Maquoketa River will allow fish to migrate much farther upstream than before, and river enthusiasts will be able to paddle all the way to the whitewater park without having to portage. In addition, remeandering the river will reduce flood risk to residents in the nearby neighborhood known as Sunset Beach.

The project is expected to begin in late 2016.

**River/stream:** Maquoketa River

**Location:** Manchester, Delaware County

**Owner:** Willard Hawker

**Height:** 22'

**Length:** 196'

**Age:** 102 years – constructed in 1914

**Historic use:** Flourmill and hydroelectricity

**Project type:** Complete removal

**Project goals:** Safety; fish passage; river restoration and stabilization; flood mitigation

**Project designer:** Iowa DNR

**Project contractor:** TBD

**Start and completion dates:** Construction projected to begin in late 2016

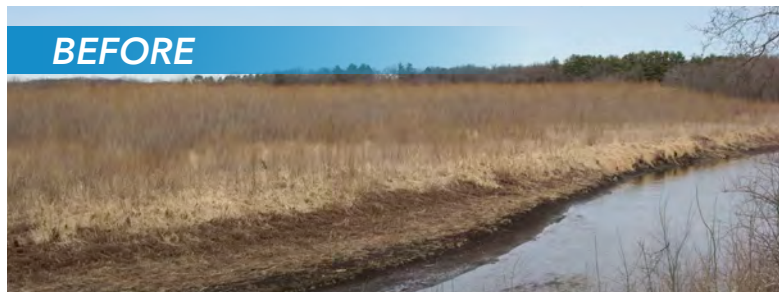
**Miles of river reconnected:** 30

**Closest barriers:** Upstream – Backbone Lake Dams; downstream – Water Gauge Dam (remnants remaining) and Delhi Dam

**Estimated cost:** \$504,000

**Collaborators:** Willard Hawker, Delaware County, Iowa DNR

## BEFORE



Following several major floods, the Quaker Mill Pond is filled with silt and vegetation.

"The removal of the Quaker Mill dam will dovetail nicely with the recently completed dam removal and Whitewater Park construction in downtown Manchester. This will serve to open up the Maquoketa River through Delaware County from Backbone State Park all the way to Lake Delhi, allowing a long stretch of this river to return to its natural state."

– Doug Hawker, DNR Environmental Specialist

## BEFORE



After removing the Quaker Mill Dam, the Maquoketa River will be remeandered back to its original course, providing better recreational opportunities for anglers, kayakers, and canoeists.

# Quasqueton Dam

The town of Quasqueton derives its name from the Algonquin word "quasquetuk," meaning "swift running water." It sits right on the Wapsipinicon River, along a segment designated by the state as both a protected water area and a water trail. According to the Iowa DNR, "The Wapsipinicon River has the longest continuous stretch of natural and scenic river corridor in [the area], and quite possibly in the entire state."

The conversion of Quasqueton's 82-year-old dam to a rock arch rapids enhanced the river even further.

Despite the dam being a well-known and beloved feature of the town – its motto is "The friendliest town by a dam site" – talks about removing the dam began in 2009.

Trees and debris were continually trapped in the dam's recirculating current and, in 1993, four people were rescued when their pontoon boat went over the dam, got stuck, and flipped. In a harrowing rescue, emergency responders saved all on board.

In addition, the dam impeded the movement of aquatic life, including

walleye, northern pike, bass, and the endangered Higgins eye pearl mussel, among other species.

After learning about the Iowa DNR's low-head dam mitigation grants, the city realized that it would be better and more cost effective in the long run to modify the structure, rather than risk future accidents and continually use funds to maintain and repair it.

Now, part of the historic dam remains while weirs constructed downstream gradually lower the slope of the river to eliminate the recirculating current, allow fish passage, and maintain the pool of water upstream.

According to Mayor Chad Staton, community members appreciate the attractiveness of the new rapids.

While improvements to fishing have yet to be measured at the rock arch rapids site, anglers have reported better than average fishing upstream, and the dam removal may be a contributing factor.

**River/stream:** Wapsipinicon River

**Location:** Quasqueton, Buchanan County

**Owner:** City of Quasqueton

**Height:** 6'

**Length:** 210'

**Age:** 82 years – constructed in 1932 and modified in 2014

**Historic use:** Flour mill

**Project type:** Rock arch rapids

**Project goals:** Safety; fish passage; habitat improvement; maintain water elevation

**Project designer:** Cardno JFNew of Appleton, WI

**Project contractor:** Gallery Excavating of Winthrop, IA

**Start and completion dates:** March 2014 – August 2014

**Miles of river reconnected:** 25

**Closest river barriers:** Upstream – Independence Lower Dam; downstream – Troy Mills Dam (active mitigation project to be completed in 2016) and Central City Dam

**Cost:** \$427,000

**Collaborators:** City of Quasqueton, Buchanan County, Northeast Iowa RC&D, State of Iowa, Iowa DNR, Iowa DOT, US Fish and Wildlife Service

## DURING CONSTRUCTION



Rather than continually maintain and repair its dangerous low-head dam, Quasqueton chose to modify the structure to rock arch rapids.

"We are very happy with the rock arch rapids project that took place here in Quasqueton. As an avid outdoorsman and local business owner, I could not be happier with the fishing opportunities as well as the beauty of the project. Visitors came to Quasqueton to see the project throughout the construction process and have continued to flow into town to view it from our deck with many positive comments."

– Ronnie Wolfe, owner of Wolfey's Outback Bar & Grill

## AFTER



Residents of Quasqueton are pleased with the rock arch rapid's safety and aesthetic improvements to the Wapsipinicon River.



# Rockford Dam

The Rockford Dam, a concrete-covered wooden structure, was crumbling apart and rotting on the inside. It required numerous expensive repairs over several decades, and partial-failure incidents were becoming more frequent. A whirlpool formed when water flowed under the dam, increasing the safety hazard to community members. Small animals got caught in the whirlpool, and it seemed only a matter of time before a person would, too.

The dam also caused flooding upstream with such frequency that people stopped using a nearby campground, according to Randy Schweitzer, Rockford's Maintenance Supervisor. "Economically, it hurt really badly," he said.

Doug Schroeder, the former Floyd County Conservation Director, recognized the dam as a problem and made several attempts to have it removed. Making things difficult, though, was the fact that it was co-owned by both Floyd County and a private landowner. Plus, many in the community wanted the dam to remain for its historic value.

Over time, though, Schroeder noticed a gradual change in local sentiment as more information about the dangers of low-

head dams and the positive effects of dam removal became known. With the safety of the community in mind, the county board of supervisors voted to remove it in 2012.

"Good things can happen if you hang in there, if you're persistent and you have a consistent message for people," Schroeder said.

Prior to the dam's removal, the upstream impoundment was never used: it was only eight to ten inches deep due to siltation and could not support much wildlife. Now, the water is clearer and deeper, and fishing occurs all along the river.

Research by Iowa DNR Fisheries biologists shows that within the first year after the dam's removal, fish populations and diversity improved: golden redbreast and northern hog sucker were found upstream of the dam where they had never been seen before, and the number of channel catfish and smallmouth bass increased above the dam, too.

Other work in the area included resloping the banks to improve river-floodplain connectivity and replanting them with native vegetation.

**River/stream:** Shell Rock River

**Location:** Rockford, Floyd County

**Owner:** Floyd County

**Height:** 10'

**Length:** 200'

**Age:** 142 years – constructed in 1872 and modified in 2014

**Historic use:** Grist mill

**Project type:** Complete removal

**Project goals:** Safety; fish passage; eliminate maintenance costs

**Project designers:** Barr Engineering Company of Minneapolis, MN

**Project contractor:** Beemer Companies of Fairmont, MN

**Start and completion dates:** January 2014 – February 2014

**Miles of river reconnected:** 21.5

**Closest river barriers:** Upstream – Nora Springs Mill Pond Dam; downstream – Marble Rock Dam

**Cost:** \$245,989.50

**Collaborators:** Floyd County Conservation Board, Floyd County Board of Supervisors, Floyd County, Iowa DNR, US Fish and Wildlife Service

"The City of Rockford's Wyatt Park Campgrounds has been greatly improved by the dam removal. We have seen a 50 percent increase in the number of campers since its removal because the campers no longer have to move out in the middle of the night because of a two-inch rain upstream. The local fishermen tell me there is more diversity of fish upstream where there were only rough fish before the dam removal. Also, we can now mow the park right after it stops raining, whereas before, it would take days or even a week after the high water."

– Randy Schweitzer, Rockford Maintenance Supervisor



Water flowed under Rockford's deteriorating dam, creating a dangerous whirlpool.



Removal of Rockford's dam has improved safety, wildlife habitat, the adjacent park, and the diversity of aquatic life.

# Story City Dam

In 2007, Story City completed Iowa's very first low-head dam mitigation project. The Story City Dam, located on the South Skunk River Canoe Trail at South Park, was constructed of concrete and sheet piling. It posed a danger to canoeists, kayakers, and anyone near it.

In 2003, the Skunk River Paddlers, Story County Conservation, and Prairie Rivers of Iowa RC&D received a large federal recreational trails grant to improve the canoe trail. With it, they upgraded launch and landing areas, added access sites, improved wheelchair accessibility, installed signage, and extended the trail another ten miles. Through a REAP grant, they also improved the safety of the river by modifying the dam.

Little information about dam modification was available at the time, which proved to be a problem. Finding contractors to even bid on the construction work was a challenge. Rocks also had to be transported to the site from a distant location.

"There was a big learning curve," said Story County Special Projects Ranger Carol

Williams, who wrote the grant application for the project.

A notch was cut into the dam to let paddlers through, and three rock weirs were constructed. Once complete, the area with its new big waves became a popular spot for whitewater playboaters. The project also helped minimize bank erosion and allowed fish to migrate back upstream. The weir construction suited the Skunk River because it already contained natural riffles throughout its course.

Today, parts of the weirs have been repositioned by floods, suggesting that the stones were not large enough.

"This project just didn't have the budget or know-how that we have now," said Nate Hoogeveen, River Programs Coordinator for Iowa DNR. "Knowing what we do now about building these structures, we'd love the chance to work with Story City again to permanently repair this project."

Story City Parks and Recreation maintains South Park, and projects in the area include landscaping, bank improvements, and upgraded signage.

**River/stream:** South Skunk River

**Location:** Story City, Story County

**Owner:** Story City

**Height:** 4'

**Length:** 100'

**Age:** Unknown

**Historic use(s):** "Beauty" dam

**Project type:** Rock arch rapids

**Project goals:** Safety; fish passage; habitat improvement; recreation

**Project designer:** Iowa DNR

**Project contractor:** Lund Construction of Eagle Grove, IA

**Start and completion dates:** July 2007 – August 2007

**Miles of river reconnected:** 22

**Closest river barriers:** Upstream – none; downstream – US Filter Dam

**Cost:** \$23,292

**Collaborators:** Skunk River Paddlers, Story City, Story County Conservation Board, Prairie Rivers of Iowa RC&D, Iowa Whitewater Coalition, Iowa DOT, Iowa DNR

"The rock arch rapids conversion was great while it maintained its shape. There was no dam-created hydraulic, and paddlers could work on skills using each set of eddies and a bottom arch surf wave. The new rapids provided paddler recreation and a very nice teaching location. Unfortunately, a few rocks shifted, then more. This renewed the dam exposure and removed the eddies between the degrading arches. If the arches were repaired using rocks of sufficient size, I'm sure the spot would again provide very nice paddler recreation."

– Piper Wall, kayaking instructor

**BEFORE**



The Story City Dam was constructed of concrete and sheet piling, posing a danger to anyone using the river.

**AFTER**



Iowa's first-ever low-head dam modification enhanced recreation on the Skunk River.



# Vernon Springs Dam

Over the decades, the Vernon Springs Dam required many renovations. When an 80-foot section of the dam was wiped out during the Flood of 2008, it lowered the depth of the mill pond upstream by 18 inches, causing concern since it was a popular spot for boating in Howard County. After repairs began, the contractors quickly discovered that the dam was in much worse shape than previously thought: it was rotting from the inside out.

After considering various solutions, Howard County went forward with the first rock arch rapids conversion project in Iowa. Replacing the dam's eight-foot drop are now 280 feet of pools and rapids. This not only maintains the upstream mill pond, but it also eliminates the dangerous recirculating current that formed below the dam. Plus, it gives fish access to 83 continuous miles of the Turkey River.

The project has improved fishing, according to Ryan Sindelar, a local angler. He has seen different species upstream of the former dam and

noticed an increase in fish population since the structure's removal. It took a couple of years, he said, before he started to see these changes.

Iowa DNR studies have corroborated Sindelar's observations. After the conversion, biologists found suckers and walleye where they had not been seen previously. They also found largescale stoneroller and banded darter above the dam, which are designated as species of greatest conservation need. Other species found above the dam that were not found pre-conversion include black redhorse, smallmouth bass, quillback carpsucker, and largemouth bass.

Jeff Korsmo, Park Ranger for Howard County Conservation, said the river has become a well-known fishery for the quality and quantity of fish since the conversion to rock arch rapids.

"It's amazing the number of users that are down here now since it's been completed," he said.

**River/stream:** Turkey River

**Location:** Cresco, Howard County

**Owner:** Howard County Conservation Board

**Height:** 8'

**Length:** 150'

**Age:** 153 years – constructed in 1857 and modified in 2010

**Historic use:** Mill

**Project type:** Rock arch rapids

**Project goals:** Safety; fish passage; habitat improvement; maintain water elevation

**Project designer:** Iowa DNR

**Project contractors:** Mehmert Tiling Inc. of Lime Springs, IA; Bruening Rock Products of Decorah, IA

**Start and completion dates:** July 2010 – August 2010

**Miles of river reconnected:** 22

**Closest river barriers:** Upstream – none; downstream – Weist Mill Dam

**Cost:** \$313,179

**Collaborators:** Cresco Bank and Trust Company, Cresco Union Savings Bank, Iowa DNR, US Fish and Wildlife Service, National Fish and Wildlife Foundation



The Vernon Springs Dam required numerous repairs throughout its life and was deteriorating from the inside out.

"I used to focus down below the dam, and now fishing is just as good, if not better, above the dam."

– Ryan Sindelar, local angler



Since modifying the dam to rock arch rapids, the dam's safety hazard has been eliminated, and stream biologists have found suckers and walleye where they had not been seen before.



# Warner's Ford

In 2003, large metal culverts were installed as part of a concrete crossing on the Yellow River. The culverts were intended to move water and provide fish migration, but they created several problems: the tubes continually clogged up with debris, and they were a major safety hazard to anyone canoeing or kayaking down the river.

Kurt Warner, Iowa football legend, bought the 1,200-acre farm including the crossing. His father, Gene Warner, manages the property. Gene recalled a time when three kids injured themselves by kayaking through the tubes on a dare.

"I always had the fear of someone drowning during high water in those tubes," he said.

The metal culverts were only sufficient for modest flows. As a result, during high water, the river would spill over the crossing and it would act like a dam. This caused water to flow around the structure and ruin the road. Warner periodically patched the hole in the road over a three year period, spending roughly \$10,000 each year on rock. However, the rock would eventually wash down the river, creating an island that led to erosion of downstream river banks.

Gene Warner contacted the Iowa DNR about the problem. DNR staff recognized that kayaking, canoeing, and inner tubing had increased significantly due to a new campground and a new rental business just upstream of the Warner property. They had also received several letters and e-mails describing dangerous "near-miss" incidents at the crossing. Iowa DNR decided to partner with Warner to convert the concrete crossing into a low-water ford crossing and they awarded a cost-share grant to the Warners.

The new ford was placed slightly below the natural bottom elevation of the river. A single rock arch was constructed downstream to add stability and maintain a water level of at least six inches over the crossing. This enables fish to migrate.

The new crossing has eliminated costly repairs for Warner, and today his only maintenance requirement is to periodically clean sediment off the concrete crossing with a skid loader. The crossing has made canoeing and kayaking on the Yellow River much safer.

**River/stream:** Yellow River  
**Location:** Allamakee County  
**Owner/Manager:** Kurt/Gene Warner  
**Height:** 8'  
**Length:** 120'  
**Age:** Unknown; metal culverts installed in 2003  
**Historic use:** Fish passage; farm crossing  
**Project type:** Low-water crossing  
**Project goals:** Safety; eliminate maintenance costs  
**Project designer:** Iowa DNR  
**Project contractor:** Brennan Construction of Lansing, IA  
**Start and completion dates:** December 2010 – May 2011  
**Miles of river reconnected:** 36  
**Closest river barriers:** Upstream – none; downstream – none  
**Cost:** \$70,000  
**Collaborators:** Iowa DNR, Gene Warner

"The metal tubes on the Yellow River caused a whirlpool that would suck you right in. The current was so swift that if you got anywhere close, you were in trouble. Now that they're gone, there are no more dangers or worries."

– Marcy Palmer, Big Foot Canoe Rental

## BEFORE



The large metal culverts beneath a concrete crossing on the Yellow River continually clogged up with debris and were a major safety hazard to canoeists and kayakers.

## AFTER



The new low-water ford eliminates costly repairs, provides safe passage for canoeists and kayakers, and allows fish to migrate.



# Resources

## Organizations

### **Iowa DNR Low-Head Dam Mitigation Program**

Iowa DNR is one of the first stops to make when considering a low-head dam modification project. Iowa DNR provides grants, technical assistance, and expert advice to communities throughout the planning and modification process. Contact the River Programs staff to find out how your community might modify its low-head dam.

**Website:** [www.iowadnr.gov/Recreation/CanoeingKayaking/LowHeadDams](http://www.iowadnr.gov/Recreation/CanoeingKayaking/LowHeadDams)  
**Phone:** 515-281-3134 and 515-725-2991  
**Email:** [nate.hoogeveen@dnr.iowa.gov](mailto:nate.hoogeveen@dnr.iowa.gov)

### **Iowa Rivers Revival**

Iowa Rivers Revival is a nonprofit statewide leader in river education and advocacy and is committed to protecting some of our most precious natural resources – our rivers and streams. Contact us if you have questions about this booklet or if you need help locating resources for your dam modification project.

**Website:** [www.iowarivers.org](http://www.iowarivers.org)  
**Phone:** 515-724-4093  
**Email:** [info@iowarivers.org](mailto:info@iowarivers.org)

### **Iowa Whitewater Coalition**

Iowa Whitewater Coalition is an organization dedicated to improving river safety, education, and recreation in Iowa, with a strong focus on low-head dam modification. It is a great resource to find out where Iowa's dangerous low-head dams are located and pertinent information about each one.

**Website:** [www.iowawhitewater.org](http://www.iowawhitewater.org)  
**Email:** [iowawhitewater@yahoo.com](mailto:iowawhitewater@yahoo.com)

### **American Rivers**

American Rivers is a nationwide conservation organization with a wealth of resources on the benefits of dam modification, financial assistance opportunities, and guides on how to start your own dam modification project. Several of their publications are listed below, and many more can be found on their website.

**Website:** [www.americanrivers.org](http://www.americanrivers.org)  
**Phone:** 202-347-9240

## Financial Resources

### **Federal Resources and National Organizations**

National Fish Passage Program, US Fish and Wildlife Service  
Partners for Fish and Wildlife Program, US Fish and Wildlife Service  
Aquatic Ecosystem Restoration, US Army Corps of Engineers  
Watershed and Flood Prevention Operations Program, Natural Resources Conservation Service, USDA  
Environmental Quality Incentives Program, Natural Resources Conservation Service, USDA  
National Fish Habitat Partnership  
National Fish and Wildlife Foundation

### **State Resources**

Low-head Dam Mitigation Grants, Iowa Department of Natural Resources  
Fish Habitat Program, Iowa Department of Natural Resources  
Resource Enhancement and Protection (REAP) Program, State of Iowa  
Federal and State Recreation Trails Program, Iowa Department of Transportation  
Vision Iowa Program, Iowa Economic Development Authority  
Iowa Resource Conservation and Development (RC&D) Councils (planning and grant-writing assistance)

## Readings

*Dam Removal: A Citizen's Guide to Restoring Rivers*, by Rivers Alliance of Wisconsin and Trout Unlimited.

*Exploring Dam Removal: A Decision-Making Guide*, by American Rivers.

*Paying for Dam Removal: A Guide to Selected Funding Sources*, by American Rivers.

*Reconnecting Rivers: Natural Channel Design in Dam Removals and Fish Passage*, by Luther Aadland, Minnesota Department of Natural Resources.

*Removing Small Dams: A Basic Guide for Project Managers*, by American Rivers.

*Solving Dam Problems: Iowa's 2010 Plan for Dam Mitigation*, by Nate Hoogeveen, Iowa Department of Natural Resources, available on Iowa DNR's Dam Mitigation and Safety website.



# Getting Started

There are many steps to begin the low-head dam modification process. Here is a list of key considerations, whether you are a concerned local citizen, an elected official or local leader, a dam owner, or a community group. A vital resource to help you every step of the way is the Iowa DNR River Programs staff at 515-725-2991, or [nate.hoogeveen@dnr.iowa.gov](mailto:nate.hoogeveen@dnr.iowa.gov). A companion piece to this booklet that would be very useful is the DNR's *Solving Dam Problems: Iowa's 2010 Plan for Dam Mitigation*, which can be found online.

1. **Look around in your community and talk with others.** Who shares your concern about addressing a low-head dam in your community? Who might work with you to begin a community conversation? Call Iowa DNR's River Programs staff to find out about the range of resources they offer as you begin these discussions.

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2. **Form a small group of interested citizens that can work together.** Find out what some of the issues are. Some may be obvious, others not. A few questions you might ask: Is the dam a safety hazard? Who faces liability issues? Are there species of concern in the river? Is flooding an issue? How is the river used? The Iowa DNR River Programs staff can help you answer many of these questions.

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3. **Gather information about local history related to your dam.** Do you have a local historian who might take this on? When was the dam built and why? What has changed since? Does it serve a purpose today? How safe is the dam today? Have the community's perceptions of the river changed over time? If there is no local historical society in your community, the two state historical societies are good resources, particularly for county histories.

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4. **Identify the individuals and organizations in your community** who might be most affected and interested in this issue. Think broadly and include elected officials, business and community leaders, anglers, public safety officials, outdoor groups, paddlers, economic developers, minority and immigrant groups, public health workers, adults and youth, historic groups, and preservation societies.

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5. **An initial public meeting is important** to connect diverse interests, share information and perspectives on the issues involved, and honor the spirit of transparency and community involvement. This isn't a time for specific solutions but a time to focus on concerns, information, and think about the future of your river and community.

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6. **Use diverse communication strategies** to reach people who may be interested or, potentially, affected. Include public forums, information sessions, presentations to local groups, open houses, and local media (newspapers, radio, bulletin boards, social media). Consider training volunteers to give presentations to classes, service groups, and other community gatherings.

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7. **Continue hosting community meetings with all those interested.** Invite the public to express their views, and hold meetings at times community members can attend. Together, develop a vision and set of goals for your river, the dam, and your community's relationship to them. For the greatest success, this will probably be an on-going effort that involves many people in an inclusive process.

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8. **Stay transparent.** Communication about the project should be open, honest, and timely. Work hard to make sure the community knows what stage you're at and what is going on.

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9. **Respond to all concerns.** Be prepared to listen, respond to, and incorporate feedback given by community members. When community members have the chance to share their views and provide input and feedback, they gain a sense of ownership for the project.

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10. **Reach out to communities featured in this booklet.** They have experienced many of the same challenges you are facing, and they are eager to serve as resources.

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**Danger**

**Dam Ahead**

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**← Exit Now!**

