

## Objective 2: Strategically Implement Flood Reduction Practices that also Improve Water Quality.

*This story was made with [Esri's Story Map Journal](#).  
Read the interactive version on the web at <https://arcg.is/Xqy5m>.*



### Strategies

1. Increase infiltration of the land
2. Implement water quality improvement projects
3. Store excess rainfall runoff
4. Restore and protect stream and river corridors and floodplains.

Actions have been identified to help accomplish each of these four Strategies. Actions are listed below by Strategy. Some of the analysis completed during the planning process provides insight to where specific actions should be implemented in the Upper Iowa River Watershed. Maps showing the analysis are included adjacent to specific Strategies. The Upper Iowa River WMA Board has set quantifiable goals by subwatershed so conservation practices can be effectively placed. To better understand watershed goals see the Subwatershed Explorer section of this plan.

# Strategy 1: Increase Infiltration of the Land



Implementation of on-site practices that enhance soil health will increase water holding capacity on rural and urban areas increases soil infiltration in the Upper Iowa River Watershed. Management practices that utilize NRCS's four principles 1) minimize disturbance, 2) maximize presence of living roots, 3) maximize soil cover, and 4) maximize biodiversity, work to improve soil health. Management practices that help achieve these four principles are listed below.

Click on the best management practice name to learn more about each practice.

## **Action 1: Implement Cover Crops**

Cover crops are planted between cash crop seasons in order to keep cover on the ground all year long. They provide vegetative cover during the dormant winter months and are harvested or terminated in the spring so the next crop can grow. Using cover crops along with a no-till management strategy improves soil organic matter, improving soil health and overall productivity.

## **Action 2: Practice No-till**

Performing no full tillage from the time of harvest or termination of one cash crop to the time of harvest or termination of the next cash crop, regardless of the depth of tillage.

## **Action 3: Strip-till or Reduced Tillage**

Strip-tillage is a form of reduced tillage in which strips of soil are tilled ahead of planting using a knife apparatus.

## **Action 4: Multi-cropping or Regenerative Agriculture**

Multi-cropping is a form of regenerative agriculture which includes relay-cropping, poly-cropping, double-cropping, or inter-cropping. More generally, multi-cropping is a practice of growing more than one crop in the same growing



season on the same section of land. Multi-cropping adds diversity to crop rotations, creates additional economic opportunities, reduces input costs and weed pressure, mimics nature, builds soil health, and more.

The use of Cover Crops and Multicropping with the use of No-till will help achieve all of the four NRCS principles to healthy soil.

**Learn more about cover crops and no till by watching this Video (link available only in online story)**

**Action 5: Implement CRP**

Establishing and maintaining permanent vegetative cover of native grasses, legumes and Forbes.

**Action 6: Implement Tree and Shrub establishment**

Establishing and maintaining permanent vegetation in the form woody plants in not forested areas.

Actions 5 and 6 provide all year round ground cover and living roots, plant diversity, and require no soil disturbance. These practices should be managed regularly through the timber stand improvement and mid contract management.

**Action 7: Install Contour Buffer Strips**

Contour buffer strips are strips of grass, or a mixture of grasses and legumes that run with the contour of the crop field.

**Action 8: Install Prairie Strips**

Similar to Contour buffer strips, prairie strips are strips of native grasses, legumes, and Forbes that run with the contour of a crop field. They alternate down the slope of a field with wider cropped strips.

**Action 9: Install Grass Waterways**

Grass waterways are constructed channels that are planted to grass or other suitable permanent vegetation to convey water to a stable outlet from a crop field.

Actions 7-9 provide areas within a crop field that capture water and sediment runoff, contain a high biodiversity, and provide ground cover and living roots all year round.

**Action 10: Practice Contour farming**

Contour farming means to farm with row patterns perpendicular with the slope of a hill, not up and down the slope. Creates little dams that work to slow runoff and reduce erosion.

**Action 11: Practice Strip cropping**

Strip cropping is growing one cultivated crop (like corn) in strips alternating with a sod forming crop (like hay) arranged to follow the contour of a field.

**Action 12: Plant diverse crop rotations**

Conservation crop rotation is growing different crops on the same piece of land year after year.

Actions 10-12 are crop management practices that help limit soil erosion.

**Action 13: Practice Rotational Grazing**

A grazing practice that moves cattle between smaller paddocks based on forage availability and nutritional needs. Rotational grazing maintains diverse plant foraging composition, leaves more living roots and above ground vegetation, and minimizes high traffic area disturbances.

Urban land use can result in increased surface runoff from impervious surfaces, like houses, businesses, schools, roads, driveways and parking lots. Urban transportation structures like roads and bridges can disrupt the natural flow patterns of water and can result in increased runoff from impervious cover. Practices used to increase the amount of permeable surfaces within an urban landscape are listed below. Click the practice to learn more about each one.

**Action 14: Plant Native Landscaping**

Establishing and maintaining permanent vegetative cover of native grasses, legumes and Forbs in the urban setting to improve infiltration and provide habitat for wildlife.

**Action 15: Implement Tree and Shrub establishment**

Establishing and maintaining permanent vegetation in the form woody plants in not forested areas.

**Action 16: Install Permeable Pavement**

Permeable pavement allows water to infiltrate around or through the paved surface into an engineered layer of rock below. Types of permeable pavement include; permeable pavers, pervious concrete or asphalt, and articulated pavers.

**Action 17: Install Bioswales**

Bioswales are installed as an alternate to storm sewer; they consist of native vegetation, permeable soil, perforated subdrain, and berms. They are installed on sloped areas and are conveyed into wetlands or detention basins before draining into a near by stream or waterbody.

**Action 18: Install Bioretention Cells**

Bioretention cells are landscaped depressions that capture and infiltrate runoff water from impermeable surfaces such as parking lots or streets.

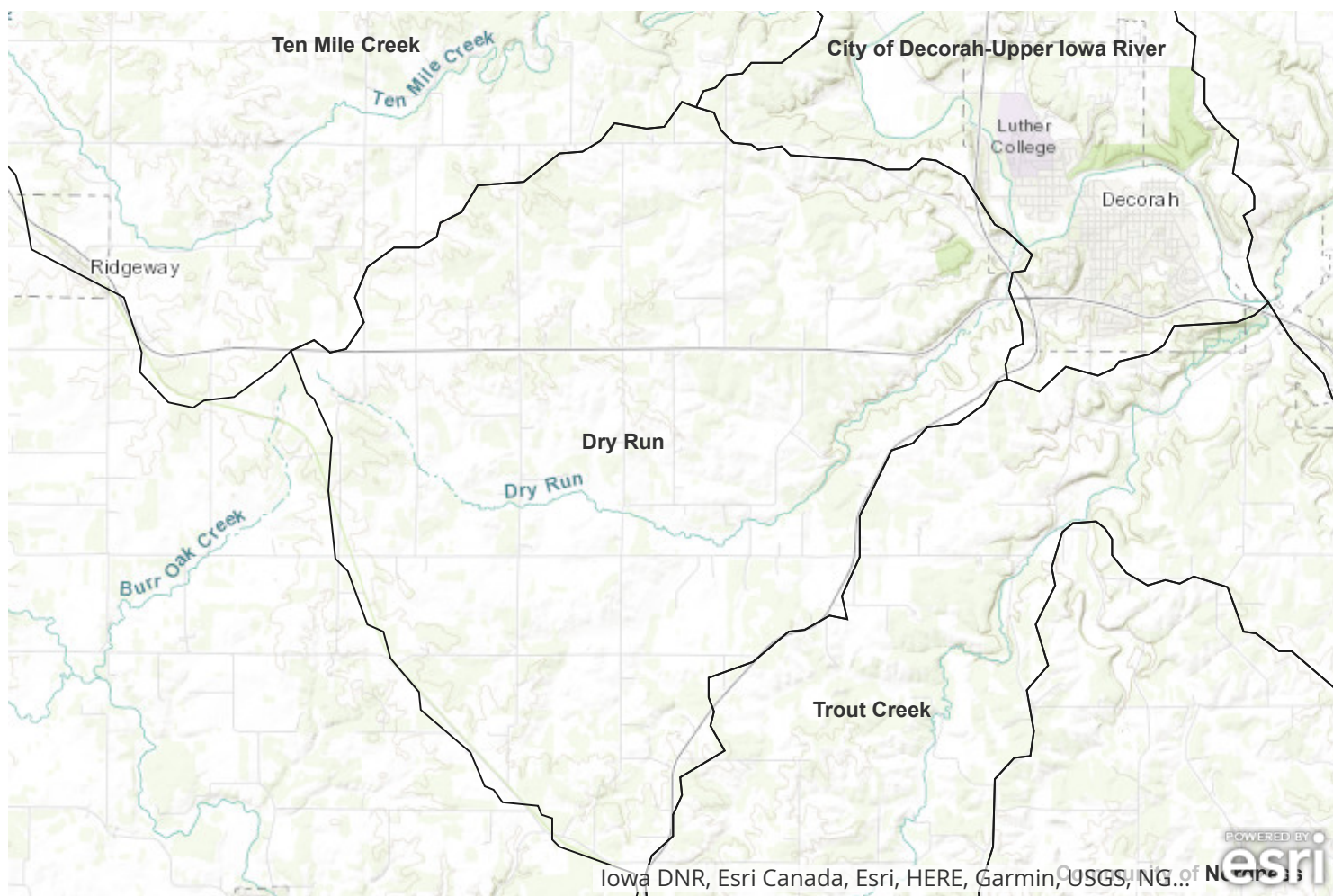
**Action 19: Plant Rain Gardens**

Rain gardens are shallow bowl like gardens that capture water from driveways, roofs or yards. Runoff that is captured in a rain garden creates a small temporary pond.

Actions 14-19 work to capture and infiltrate runoff from impermeable surfaces. They help reduce flows and filter out pollutants associated with urban areas.

Photo courtesy of Jessica Rilling

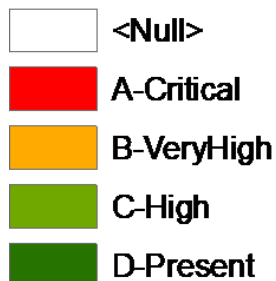
# Runoff Risk



The map on the right shows the runoff risk on agricultural fields in the Upper Iowa River Watershed. Fields in red and orange represent areas that have critical or very high runoff risk. It is recommended that "Critical" areas should be prioritized first for the Actions in Strategy 1 listed above.

## Legend

### Run off Risk



Northeast Iowa RC&D completed a GIS analysis of existing cover crop acres in the Upper Iowa River watershed. The analysis estimated the number acres and the spatial location of cover crop adoption in the Upper Iowa River Watershed during the spring of 2017. Results from this analysis are located [here](#).



## Strategy 2: Implement Water Quality Improvement Practices



The Upper Iowa River watershed contains approximately 300 miles of impaired streams listed between 2004 to 2016. Water quality is very important for the overall resiliency of the watershed. Increasing soil health and soil infiltration as explained in the previous strategy also improves water quality. Click on the practices listed below to learn more about urban and rural best management practices that improve water quality and protect groundwater sources.

### **Action 1: Install Nutrient Reduction Wetlands**

Nutrient Reduction Wetlands can be implemented in both rural and urban settings to collect and filter runoff before entering a major stream or river. Nutrient Reduction Wetlands are marshy areas that contain water loving plants. They can contain standing water all year round or for only part of the year. They allow sediment and pollutants to be filtered before entering a stream, river, or groundwater sources.

### **Action 2: Practice Nutrient Management**

Nutrient management is managing the amount, source, placement and timing of plant nutrients and soil amendments to reduce the amount of added nutrients that gets washed into surface and groundwater supplies.

### **Action 3: Install Manure Storage Systems**

Protects downstream surface and groundwater sources from manure runoff by storing it until conditions are optimal for field application.

### **Action 4: Install Bioreactors**

Bioreactors are an edge of field structure that contain a carbon source that enhances denitrification of excess nitrogen from field tile drainage.

### **Action 5: Install Saturated Buffers**

Saturated buffers are a riparian buffer in which subsurface drainage from tile is diverted allowing excess nutrients to filter before entering a drainage ditch or other body of water.

**Action 6: Install Drainage Water Management System**

Allows the height of the water table within a field to be controlled. It allows farmers to hold water in the root zone of plants when they need it most, and drain it when there is too much. Drainage Water Management helps reduce the amount of nutrients that escapes through tile drainage.

**Action 7: Practice Livestock Stream Exclusion**

Livestock stream exclusion limits the time and area livestock spend in a stream or river, which decreases the amount of excess nutrients and bacteria that directly enter the stream.

**Action 8: Practice Source Water Protection**

According to the Iowa DNR Source water protection is defined as the, *“act of preventing contaminants from entering public drinking water sources.”* Due to the geology of the Upper Iowa River Watershed, surface water is often exchanged with groundwater sources making it more susceptible to contamination. Certain aquifers are better protected than others. To learn more about source water in the Upper Iowa River Watershed click [here](#).

To view potential best management practice locations in each Subwatershed in the Upper Iowa River Watershed click [Here](#), or to search for potential conservation practices on your land click [here](#).

Urban areas and residential communities also have a large connection with water quality and heavily rely on certain drinking water sources. Municipal infrastructure upgrades may be needed due to aging infrastructure, or an increase in wastewater and stormwater treatment volume. Poorly functioning septic tanks allow untreated wastewater into streams and rivers. Practices listed below work to make sure that urban wastewater and stormwater are carefully managed to reduce bypass directly into a stream or river, and mixing between the two systems.

**Action 9: Practice Septic system management**

Properly designed, sized and maintained wastewater treatment systems safely remove and treat wastewater from the home and protect pollutants from entering water sources near by.

**Action 10: Educate Watershed Residents**

Education programs that teach about lawn fertilizer and pesticide application, waste dumping in sinkholes, streams and rivers, and picking up waste produced from pets are a couple are some ways community members can help protect their drinking water and recreational resources.



## Strategy 3: Store Excess Rainfall Runoff



According to the Iowa Flood Center, the number of heavy 3+ inch rainfalls are becoming more frequent (UIR Hydrologic Assessment). Water detention practices hold water in the landscape by capturing runoff from these heavy rainfall events before it enters a stream or river. These practices limit peak flows associated with flash floods. Water detention practices can be implemented in an urban or rural area, and many of them offer multiple benefits in addition to flood reduction.

### **Action 1: Install Detention Ponds**

Detention ponds can be designed to hold water all year round, or for only a short period of time. Detention ponds that enough water all year round can be used for recreational activities like fishing. Detention ponds provide additional storage for runoff water from neighboring fields or landscapes.

### **Action 2: Install Water and Sediment Control Basins (WASCOB)**

WASCOB is an embankment structure that collects runoff water at the bottom of a drainage area and slowly releases it allowing sediments and nutrients to filter out.

### **Action 3: Create and Restore Wetlands**

Wetlands provides areas where excess water can be stored and filtered before entering a nearby stream or river.

### **Action 4: Create and Restore Oxbows**

Oxbows are old stream meanders that have naturally or artificially been cut off from the main stream or river channel. Oxbows store excess runoff, filter pollutants and sediment, and provide habitat for wildlife.

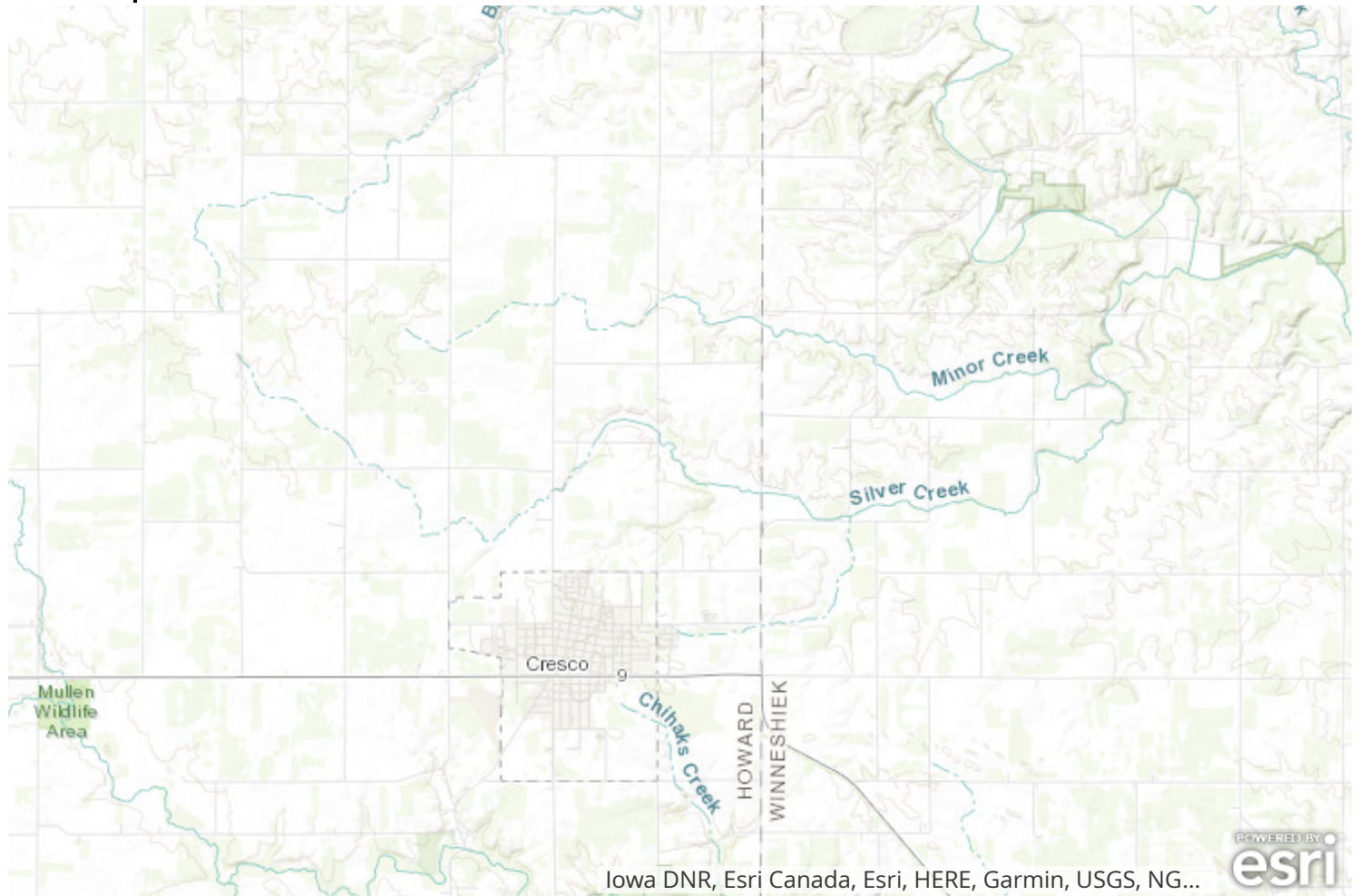
### **Action 5: Install Rain Water Harvest systems**



Rain water harvest systems capture runoff water from buildings both large and small, and store it above or below ground to be used as non potable water. Smaller systems collect runoff from the roofs of homes and can be later used on gardens. Large systems capture water from large industrial buildings and store it above or below ground in large tanks. Large volumes of captured water can be used to feed livestock, wash buildings, or for non potable water inside the home.

To view potential Pond and WASCOB locations in each Subwatershed in the Upper Iowa River Watershed click [Here](#).

## Restore and Protect Stream and River Corridors and Floodplains



The Upper Iowa River Watershed contains many areas where residents are at risk to flooding due to their proximity to stream and river corridors and floodplains. Protecting and restoring these areas can help maintain and improve the riparian area stream flow capacity. The Upper Iowa River watershed is also home to the most stream segments with naturally reproducing trout in Iowa (with 19 stream segments). Protecting these stream and river corridors will reduce the downstream effects of sedimentation, which is detrimental to trout reproduction.

### Action 1: Restore Floodplain Connectivity

Restoring flood plain connectivity protects stream and river riparian areas. Flood plains can become unconnected by down cutting of a stream or river channel, flow alterations, physical barriers, or soil deposition in the floodplain. Disconnection of a flood plain causes higher peak flows associated with flooding and loss of wetland wildlife



habitat. Floodplains provide diverse ecosystems, help trap and remove sediments and nutrients, and provide lateral flood storage which lowers the intensity of peak flows during flood events. Reconnection of the floodplain can be achieved by rerouting a stream or river to take on a new flood plain area, removing or modifying obstructions in the floodplain such as dams or road infrastructure, or modifying the stream bank to allow the stream or river to flood at a lower stream level. Permanently protecting properties along streams and rivers from urbanization through voluntary easements and public land purchase is another way to protect floodplain connectivity from disconnection.

USGS conducted a floodplain study in Green Island, Iowa on the importance of floodplain connectivity, for more information on this study click [here](#).

#### **Action 2: Plant Riparian Forest Buffers**

Forest Buffers are forested strips planted along streams or rivers to reduce the amount of sediment, nutrients and pesticides in surface runoff. They also provide habitat and help to reconnect the floodplain.

#### **Action 3: Plant Filter Strips**

Native grasses, or prairie strips planted along stream or river banks to reduce the amount of sediment, nutrients and pesticides in surface runoff. They also provide habitat and help to reconnect the floodplain.

#### **Action 4: Install Stream Bank Stabilization**

Deep rooted vegetation, multi species buffer, rip rap or other treatment used to stabilize and protect stream banks from erosion.





The map on the right shows riparian areas that are in need of improvements based on analysis using the [Agricultural Planning Framework Tool](#). Each subwatershed in the Upper Iowa River Watershed contains potential areas where riparian practices could be implemented. Areas in red are considered a “critical zone,” special consideration should be taken in those areas. Zoom into the map or search for an address to take a closer look at your area of interest.

## Legend

### Potential Riparian Area Practice

-  Critical Zone
-  Deep Rooted Vegetation
-  Multi Species Buffer
-  Stiff Stemmed Grasses
-  Stream Bank Stabilization