

# Boone River Watershed Current Conditions Report: Stormwater



*Boone River Watershed Management Authority*



*November 2020*

THIS PAGE LEFT INTENTIONALLY BLANK

# **Boone River Watershed Management Authority**



## **Current Conditions Report: Stormwater**

***November 2020***

***Prepared as part of the Boone River Watershed Management Plan***

---

## TABLE OF CONTENTS

<b>Table of Contents</b> .....	<b>iv</b>
<b>List of Tables</b> .....	<b>v</b>
<b>List of Figures</b> .....	<b>v</b>
<b>Introduction and Background</b> .....	<b>1</b>
Report Overview.....	1
Introduction to Resource.....	1
<b>Existing Data</b> .....	<b>1</b>
<b>State of the Resource</b> .....	<b>2</b>
Current Conditions.....	2
Historical Changes.....	6
Current Projects and Programs.....	6
Future Trends.....	7
<b>Recommendations</b> .....	<b>8</b>
Goals.....	8
Implementation.....	8
Education Strategies.....	10

**LIST OF TABLES**

Table 1: Developed Land in the Boone River Watershed ..... 2  
Table 2: Summary of Developed Areas in the Watershed for 2009 and 2019 ..... 6

**LIST OF FIGURES**

Figure 1: Environmental Facilities or Sites in the Boone River Watershed ..... 4  
Figure 2: Riverside Park Stormwater Wetland Project Site in Webster City ..... 5  
Figure 3: Riverside Park Stormwater Wetland Project Site After Completion ..... 5

---

## INTRODUCTION AND BACKGROUND

### REPORT OVERVIEW

The Boone River Watershed Management Authority (WMA) has identified eight primary resource concerns for the Boone River Watershed; Shorelines and Riparian Areas, Plant and Animal Communities, Sediment, Nutrients, Stormwater, Public Access, Flood Resiliency, and Hazard Mitigation. This report describes concerns with Stormwater and is one of eight reports developed for each of these concerns. Information contained in this report will facilitate the identification of resource and implementation priorities that will be used in the development of the Boone River Watershed Management Plan. Additionally, data gaps that are limiting such prioritization have been identified for future consideration.

### INTRODUCTION TO RESOURCE

In urban areas, stormwater originates when runoff from rain or snowmelt flows over impervious surfaces such as streets, parking lots, and building rooftops. This runoff transports pollutants like trash, debris, petroleum, nutrients, bacteria, and sediment to rivers, streams, and lakes. Stormwater generated from urbanized areas not only carries a multitude of pollutants but also runs off the land surface high rates, increasing streambank erosion and flooding.

The Iowa Department of Natural Resources (IDNR) issues individual stormwater permits to cities and universities under their Municipal Separate Storm Sewer System (MS4) program. Cities and universities are selected based on population, proximity to an urban area and/or discharge to an impaired waterbody (IDNR, 2020). While there are no MS4 communities in the watershed, stormwater management will play a critical role in protecting resources in the watershed. The impact of stormwater on local resources has been largely unstudied. While communities continually deal with stormwater management issues, information on the issues they face and corrective actions that have been taken or planned was not readily available.

Urban runoff has been identified as a concern in the Boone River Watershed and should be investigated further in future studies or watershed plans (USDA-NRCS, 2008). Stormwater management efforts in the Boone River Watershed supports water quality, conservation, wildlife, and flood mitigation goals established by federal, state, and local authorities.

### EXISTING DATA

There was no data or information readily available related to stormwater and its impacts to local resources.

## STATE OF THE RESOURCE

### CURRENT CONDITIONS

To some degree, the extent of urban stormwater issues can be gaged by the amount of impervious surfaces. In 2019, approximately 29,835 acres or 5.1 percent of the Boone River Watershed was comprised of “developed” areas (Table 1) (USDA, 2020).

The USDA Cropland Data Layer identifies four sub-categories of developed land; open space, low intensity, medium intensity, and high intensity. It is assumed that as you move from open space up to high intensity areas, the amount of impervious area increases. In 2019, open space comprised approximately 4 percent of the total watershed area and nearly 70 percent of the total developed area. Medium and high intensity development comprised only 0.4 percent of the watershed and 8.6 percent of the developed area.

**Table 1: Developed Land in the Boone River Watershed**

Land Use Category	Developed Area (acres)	Portion of Developed Area (%)	Portion of Total Watershed (%)
Developed/Open Space	20,862	69.9%	3.6%
Developed/Low Intensity	6,395	21.4%	1.1%
Developed/Med Intensity	1,950	6.5%	0.3%
Developed/High Intensity	628	2.1%	0.1%
<b>Totals</b>	<b>29,835</b>	<b>100.0%</b>	<b>5.1%</b>

Data Source: USDA, 2020

In 2008, the USDA-NRCS completed a Rapid Watershed Assessment report for the Boone River Watershed (USDA-NRCS, 2008). As part of this assessment, a list of facilities/sites in the watershed that are regulated for environmental protection was compiled (Figure 1). Many of these facilities/sites are subject to stormwater management. The following types of facilities/sites were identified in the watershed (USDA-NRCS, 2008):

- Solid Waste Permit Facilities include:
  - Municipal and industrial waste landfills
  - Transfer stations
  - Compost facilities and some recycling centers
  - Land application, land farming and beneficial reuse
  - Appliance demanufacturing
  - Cathode ray tube device collection and recycling
- Underground Storage Tanks
  - Storage of substances, primarily petroleum products National Pollutant Discharge

- Elimination System (NPDES)
  - Regulates the discharge of wastewater into surface waters
- Resource Conservation and Recovery Act (RCRA)
  - Management of hazardous waste in treatment, storage or disposal units
- Toxic Release Inventory System (TRIS)
  - Data on manufacturing facilities that release toxic chemicals into the environment through the air, water, and land.
- Non-National Priority Sites
  - Hazardous waste sites that did not make the final EPA National Priority List (NPL) (NPL- sites eligible for extensive, long-term clean-up actions under the Superfund program)
- Unsewered Communities
  - Small communities with aging septic systems or drain tile networks that discharge sewage directly into surface waters. In Kossuth County there are 184 homes without septic systems. The other counties do not have information available.



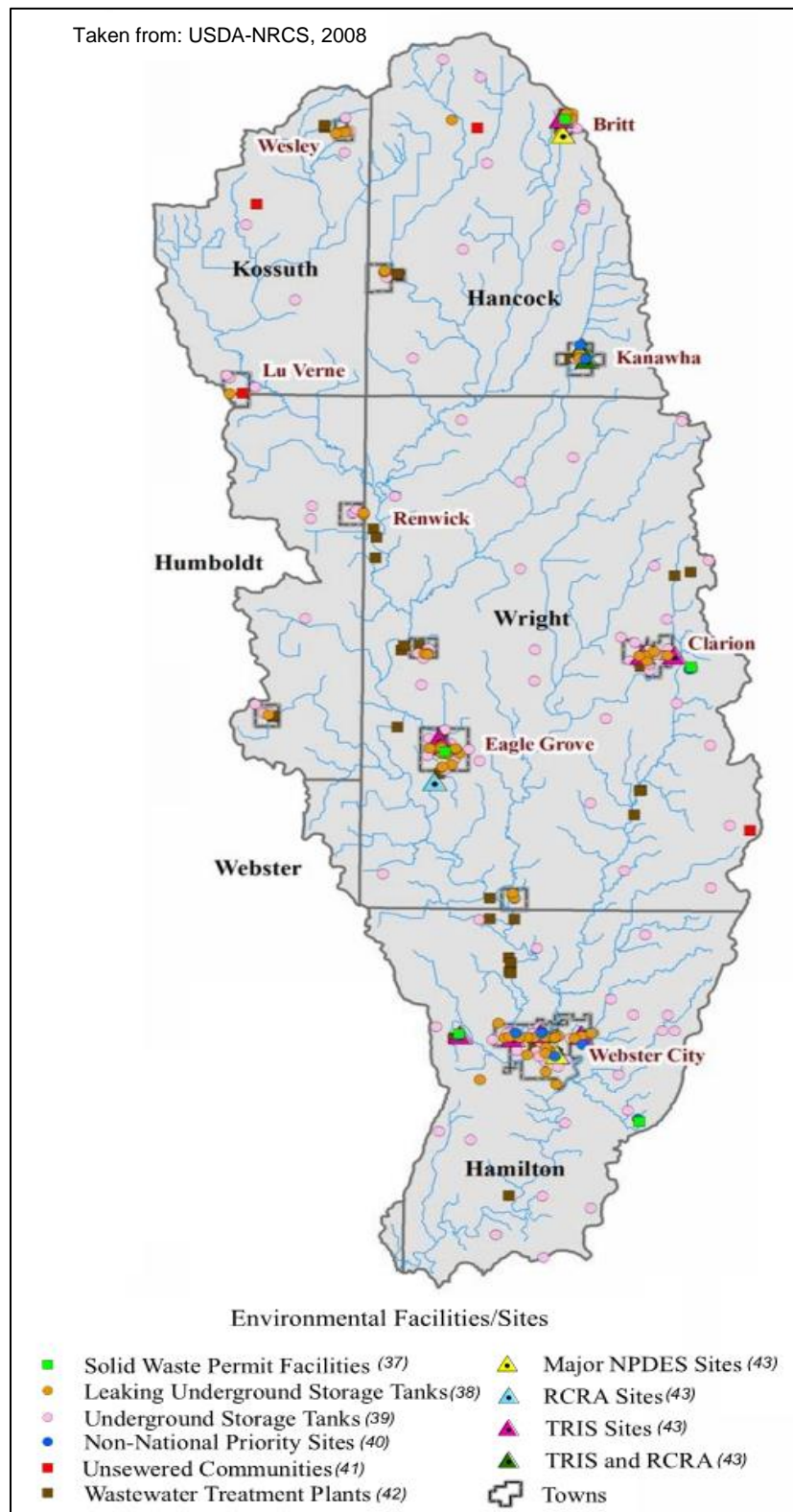
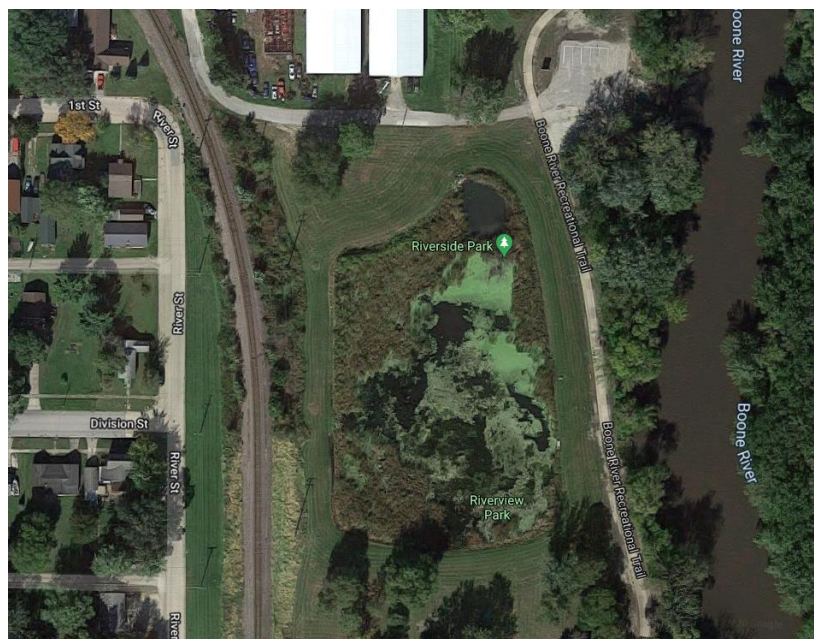


Figure 1: Environmental Facilities or Sites in the Boone River Watershed

While communities continually deal with stormwater issues, details on these issues and management actions that have been completed or planned were not available. Open space within a community often provides opportunities to manage stormwater. For example, Webster City recently completed a stormwater project by turning open space into a wetland (Figure 2 and Figure 1) to treat stormwater runoff before it entered into the Boone River. This also serves to help reduce flooding by slowing down runoff.



**Figure 2: Riverside Park Stormwater Wetland Project Site in Webster City**



**Figure 3: Riverside Park Stormwater Wetland Project Site After Completion**

## HISTORICAL CHANGES

Landscape in the Boone River Watershed has changed dramatically the past 150 years. These changes include significant losses to native prairie, wetlands, and forested areas. Increased population has resulted in an expansion of urban areas resulting in more stormwater management challenges.

To evaluate more recent changes to developed areas in the watershed, 2009 land use data was compared to 2019. The amount of developed area in the watershed decreased from 38,830 acres in 2009 to 29,835 acres in 2019, which equates to a 23 percent decrease (Table 2). It was unclear if this decrease was due to better resolution in the land use data, or if it truly represents a decrease in the amount of impervious surfaces in the watershed. The latter is possible as rural areas across Iowa have been declining in population. The extent of rural development in the watershed is unknown, however, “residents, stakeholders and agencies identified rural residential development as a priority in the Boone River Watershed” (USDA-NRCS, 2008).

**Table 2: Summary of Developed Areas in the Watershed for 2009 and 2019**

Land Use 2009	Developed Area (acres)	Portion of Developed Areas (%)	Portion of Total Watershed (%)
Developed/Open Space	31,785	81.9%	5.5%
Developed/Low Intensity	5,177	13.3%	0.9%
Developed/Med Intensity	1,460	3.8%	0.3%
Developed/High Intensity	408	1.1%	0.1%
Totals	38,830	100.0%	6.7%
Land Use 2019	Developed Area (acres)	Portion of Developed Areas (%)	Portion of Total Watershed (%)
Developed/Open Space	20,862	69.9%	3.6%
Developed/Low Intensity	6,395	21.4%	1.1%
Developed/Med Intensity	1,950	6.5%	0.3%
Developed/High Intensity	628	2.1%	0.1%
Totals	29,835	100.0%	5.1%

Data Source: USDA, 2020

## CURRENT PROJECTS AND PROGRAMS

The primary program that addresses stormwater in Iowa is the NPDES Stormwater program administered by the IDNR. However, this permitting program is focused on MS4 communities. Since there are no MS4 communities in the watershed, communities may be dealing with

stormwater more indirectly through; zoning and subdivision regulations, land use policies, floodplain regulations, and public works specifications.

### **IOWA STORMWATER MANAGEMENT EDUCATION PARTNERSHIP (ISWEP)**

The Iowa Stormwater Management Education Partnership (ISWEP) is a nonprofit organization that provides support for local stormwater management programs including statewide education and outreach. The ISWEP provides support to MS4 and non-MS4 communities.

### **IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP (IDALS) URBAN CONSERVATIONIST PROGRAM**

IDALS supports four Urban Conservationists across the state that provide technical assistance and guidance to cities and soil and water conservation districts on implementing urban stormwater projects. Additionally, grant money is often available from IDALS to implement these projects.

### **FUTURE TRENDS**

Population increases and the expansion of urban areas will present future challenges in effectively managing stormwater. Without knowing the current extent and magnitude of stormwater problems in the watershed, a projection of future trends and impacts are not possible. The identification of stormwater as a priority issue in the watershed provides the necessary first step to effective management.



---

## RECOMMENDATIONS

The following goals have been developed for initial discussion with the WMA regarding stormwater concerns. It is anticipated that these goals may be modified for inclusion in the final Boone River Watershed Management Plan.

### GOALS

General goals for stormwater management in the watershed include:

- Collect the necessary information to evaluate the impact of stormwater on local water resources and communities (i.e. drinking water and flooding).
- Inform and education the public, contractors, consultants, and decision makers on stormwater concerns facing the watershed.
- Work with interested communities to develop a coordinated approach to implement cost-effective stormwater management measures.
- Monitor and quantify the effectiveness of individual stormwater control measures.
- Evaluate the effectiveness of stormwater management efforts in the watershed.

### RESOURCE GOALS

Resource goals should be developed once knowledge and an understanding of stormwater impacts to specific resources is gained.

### IMPLEMENTATION

#### STRATEGIES

Improving stormwater management in the watershed will include a mixture of regulatory and nonregulatory approaches. While regulations may be needed to avoid future stormwater problems in the watershed, voluntary implementation will be needed to mitigate existing problems in non-MS4 communities. Implementing urban stormwater projects can be expensive, as such, funding may be a big barrier in getting stormwater controls in place and keeping them maintained.

Initially, a coarse analysis of each community should be conducted. This would include the collection, compilation, and evaluation of existing information done on the community level. This may include the development of a GIS database to assist in the identification of existing and potential outfall locations and drainage patterns.

The GIS database and resource information can be used to identify priority areas that should be targeted for a more detailed field evaluation. Field evaluations should be conducted to facilitate site ranking through an objective scoring system. Highest ranking sites should be considered for additional planning which includes; the development of conceptual management actions and the identification of potential partners and funding mechanisms. In some cases, actions may be addressed through regulation changes.

The Rapid Watershed Assessment report for the Boone River Watershed indicated there were several small communities in the watershed with aging septic systems or drain tile networks that discharge sewage directly into surface waters (USDA-NRCS, 2008). These communities should be considered a high priority for more detailed studies.

## **ACTION STEPS**

Due to the lack of information pertaining to stormwater impacts on local resources, initial action steps should be focused on addressing data gaps.

- Identify communities that have aging septic systems or drain tile networks discharging directly to surface waters
- Prioritize communities based on potential stormwater contributions and impacts to receiving streams.
- Within priority communities, identify and rank sites for the implementation of controls.

## **PROJECT OPPORTUNITIES**

Opportunities for implementing specific projects to managing stormwater within communities can be found in underutilized areas. This can include sites with old buildings or vacant land. Additionally, areas that have pervious cover, such as parks, can be used for stormwater controls. Landscape based approaches to address stormwater, such as “green infrastructure”, is becoming increasingly popular. This approach can also be utilized by individual homeowners to improve runoff quality and reduce runoff volume from their property. The following lists of best management practices for stormwater should be considered for incorporation into the Boone River Watershed Management Plan:

- Bioswales
- Bioretention cells
- Constructed wetlands
- Green roofs
- Permeable pavers
- Tree boxes and benches
- Rainscaping
  - Native turn
  - Rainwater harvesting
  - Rain gardens

- Soil quality restoration
- Native landscaping

## EDUCATION STRATEGIES

It is imperative that resource managers, decision makers, and general public understand the issues related to stormwater including resource impacts, management tools, and costs associated with control and mitigation. This can only be achieved through continuous communication, education, information transfer, and monitoring and assessment. Specific education strategies should be considered within the context of the overall goals and recommendations in the Boone River Watershed Management Plan. Therefore, the development of education strategies should be completed after watershed goals have been finalized.

Communities within Iowa and across the country have begun to realize the value of multiple-benefit practices can bring. When stormwater controls are viewed as an asset beyond their functional role in cleaning stormwater, there is a greater potential for long-term success and viability because of their aesthetic, recreational, or habitat value.

The Iowa Stormwater Education Partnership provides stormwater planning assistance to MS4 and non-MS4 communities. Advice and input from this organization should be pursued prior to developing educational strategies for the watershed.

Educational opportunities regarding the Iowa Storm Water Management Manual (Manual) should be provided to community leaders and professionals that are within or serve the watershed communities. The Manual was developed by a team representing cities, State and federal agencies, and academic and research professionals from colleges and universities. The manual provides information on hydrologic changes with urban development, uniform sizing criteria, and low-impact development alternatives and design guidelines for practices that protect water quality and reduce stream corridor erosion. It is a good guide for local ordinances for controlling storm water. The manual can be found at the following location:

<https://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Storm-Water/Storm-Water-Manual>

**References**

Iowa Department of Natural Resources (DNR). 2020. Iowa stormwater regulations. Iowa Department of Natural Resources, Des Moines, Iowa, USA. (retrieved from: <https://iowastormwater.org/regulations>)

U.S. Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS). 2008. Boone River Watershed 8-Digit Hydrologic Unit Profile. May 2008. (retrieved from: [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_006983.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_006983.pdf))

U.S. Department of Agriculture, 2020. Cropland Data Layer. Published crop-specific data layer [Online], Washington D.C.: National Agricultural Statistics Service. (retrieved from: <https://nassgeodata.gmu.edu/CropScape/>).