Source Water Protection Plan

City Utilities of Springfield

Public Water System

PWSID # 5010754

301 E Central Street

Springfield, MO 65801

Date of Report: June 2024

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Emergency Notification and Assistance Contact Information

Discharges or spills of oil or hazardous substances:

Missouri Department of Natural Resources, Phone: 1-800-361-4827

City of Springfield Fire Department, Emergency Phone: 911, Non-emergency Phone: 417-874-2300

City of Springfield Police Department, Emergency Phone: 911, Non-emergency Phone: 417-864-1810

National Response Center, Phone: 1-800-424-8802

Emergency assistance, information and guidance is available from:

U.S. Environmental Protection Agency, Region 7 Phone: 1-800-223-0425

Missouri Department of Health and Senior Services, Phone: 573-751-6400

State Emergency Management Agency (SEMA), Phone: 573-526-9100

Missouri Region Poison Center, Phone: 1-800-222-1222

Safe Drinking Water Hotline (U.S. EPA) 1-800-426-4791

Contact Information for Public Water System:

Manager of Water Treatment and Supply - 417-831-8943

Manager of Water Quality - 417-831-8822

Director of Water Treatment and Supply - 417-831-8880

Supervisor of Lakes and Office Operations - 417-831-8881

City Utilities of Springfield

P.O. Box 551 Springfield, MO 65801

301 E Central Springfield, MO 65801

Public Water Supply ID Number: 5010754

County: Greene

Website: www.cityutilities.net

Chapter 1: Introduction

Purpose and Objectives

This plan can be used to provide education to the public about the water supply in your community. Source Water Protection is about protecting the public drinking water supply and is a fundamental step in enhancing public health and welfare of the community. The information in this book can guide you to becoming informed and educated on protecting the environment and watersheds in which we live, work and play.

Source water protection means to protect, preserve and, in some cases, enhance the quality of water resources that we use every day. This means the water we drink, as well as the water we use in agriculture, industry, and recreation. Individuals have the opportunity to help protect water and make a positive impact in the watershed where they live. Every drop of water is a precious resource that should not be wasted.

Water customers and concerned citizens can help protect our source water by the daily choices of what potential contaminants we use, where we use these contaminants and what we do with the leftover products. You can also become involved by serving on an action committee or volunteering to help clean water efforts taking place in your community. To find a watershed group in your area, see the resources list.

Background Information

Springfield-Greene County lies on a relatively flat watershed divide and is drained by the headwaters of the Sac and the James Rivers, which flow generally north and south of the divide respectively. The Little Sac Watershed is 390 square miles and includes Fellows Lake, McDaniel Lake, and Stockton Lake which make up the majority of the City of Springfield's public drinking water supply (see figure 1). In 1998, the Little Sac River was placed on the 303d list for bacterial contamination, for which a TMDL for Fecal Coliform was approved in 2006. In 2009, in a joint effort between the WCO and the Greene County Soil and Water Conservation District (GCSWCD), a nine element watershed management plan entitled “The Upper Little Sac Watershed Management Plan” was developed. It was accepted by the Missouri Department of Natural Resources on July 8, 2010.

The Little Sac Watershed lies within the Springfield Plateau sub-region of the larger Ozark physiographic region. In this area, Mississippian-age limestone predominates. Large springs drain the upland portions of the Little Sac Basin, including Fulbright Spring (the original and current source of drinking water for Springfield) and Sander Spring which fills Valley Water Mill Lake. This geology can provide connected underground passages for surface water to interact with groundwater.

The Little Sac Watershed is about 90 percent privately owned land and therefore the land management of the drinking watershed is largely voluntary. Many citizens who live inside the watershed(s) that provide our drinking water live outside the public water supply service area. Those citizens, however, almost always have private wells, and therefore, source water protection and education can still be of great benefit—whether or not they are a City Utilities customer. A Source Water Protection Plan (SWPP) is a very important tool for coordinating effective protection of the environment and watersheds in which we all live, work and play.

Geology and Groundwater

The Ozarks, including the Little Sac River watershed, are well known for karst geology characterized by numerous sinkholes, caves, bedrock fractures and streams. The karst developments that are typical of the Springfield plateau aquifer are mostly located in the southern portion, more urban and suburban portions of the Little Sac River Watershed. (Figure 1).

Two aquifers lie under the Little Sac River Watershed. The Ozark aquifer is a high-yielding, deep confined aquifer of generally very good quality. It provides for municipal, agricultural, and industrial water. The Springfield plateau aquifer is an unconfined shallow aquifer located from near the surface down to 200 to 300 feet and is recharged by precipitation. The shallow aquifer was generally of fairly good quality and was a major drinking water supply resource until the mid-1950s. Karst geologic conditions in the Springfield area can result in contamination to the shallow aquifer combined with improper investigation and construction techniques. Contamination of this aquifer has prompted stricter regulations for wells, which now require wells to be drilled to the deep aquifer and cased through the shallow aquifer. Most of the domestic water is now pumped from the deep Ozark aquifer, but the Springfield plateau aquifer still provides agricultural and industrial water.

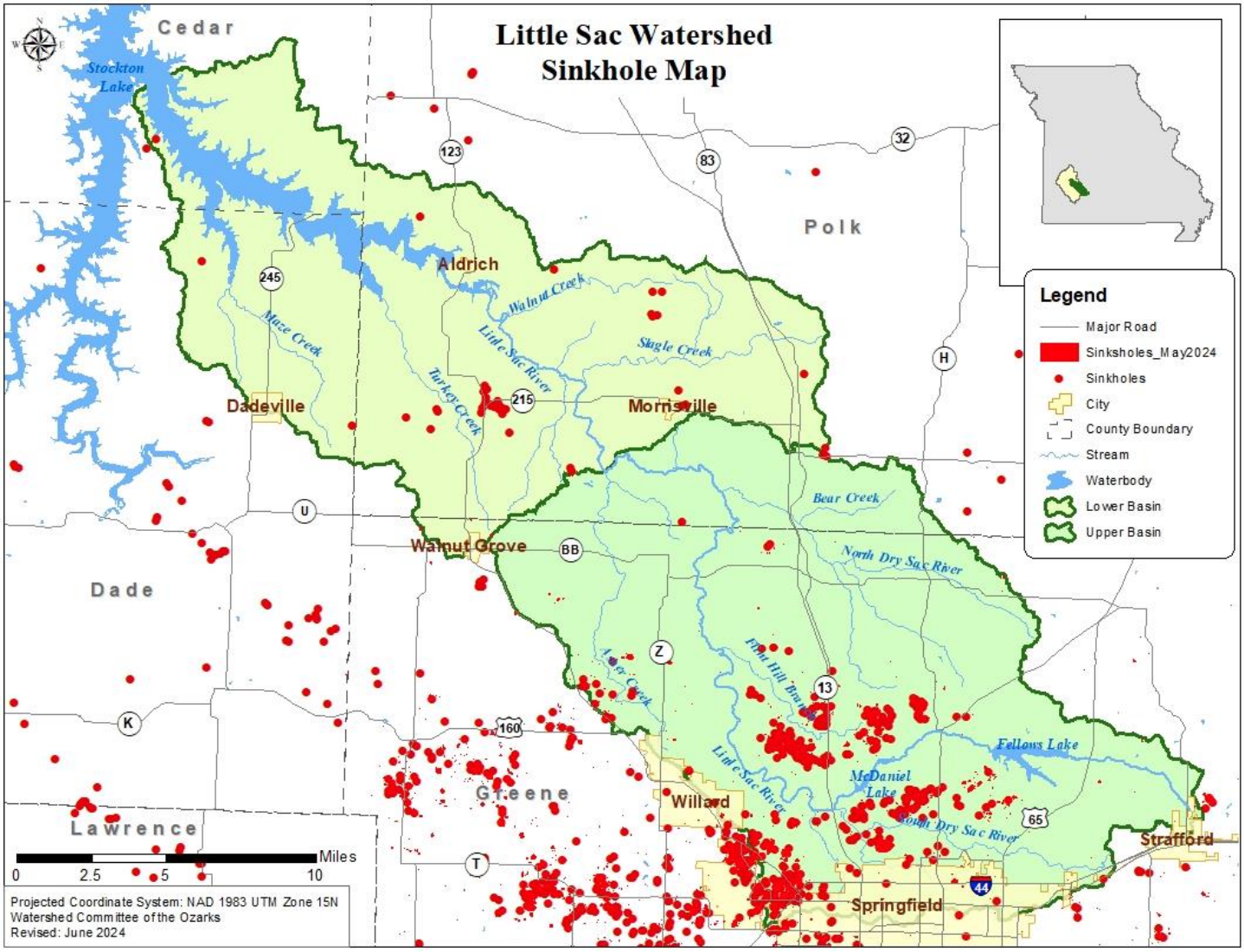

Figure 1: Map of Sinkholes in Little Sac Watershed

Land Use

The Little Sac River Watershed is located in the Ozark Border Area, Major Land Resource Area (MLRA). This area is part of the northeast and central farming forest region. The Ozark Border MLRA is comprised of approximately 35 % forest, 25 % pasture mainly of introduced grasses and legumes, and 40 % cropland. Feed grains and hay are the main crops. Summer droughts and steep slopes limit the use of the land for crop production. Shallow wells, small creeks, or springs are often used for livestock needs. Deep wells supply drinking water and water for high volume uses. This area supports oak-hickory forests. The grassland supports a combination of introduced and native tall-prairie grasses consisting mainly of Indian grass, little bluestem, big bluestem, and switch grass. Introduced grasses include fescue, annual crab grasses, and Kentucky bluegrass. The pastures are mostly in fescue grass over-seeded with red clover.

The watershed consists mostly of grassland (67 %) and forests (30 %). The grassland designation includes hay, pasture, and land enrolled in the Conservation Reserve Program (CRP). Hay and CRP land, which are sometimes considered cropland, behave more like grassland in terms of runoff, erosion, and nutrient loads and have been left in this class. Urban areas comprise 2.4% of the watershed. A high contamination potential exists due to the high urban population density and the number of impervious surfaces. Estimates indicate that the most urbanized portion of this watershed has about 25% imperviousness.

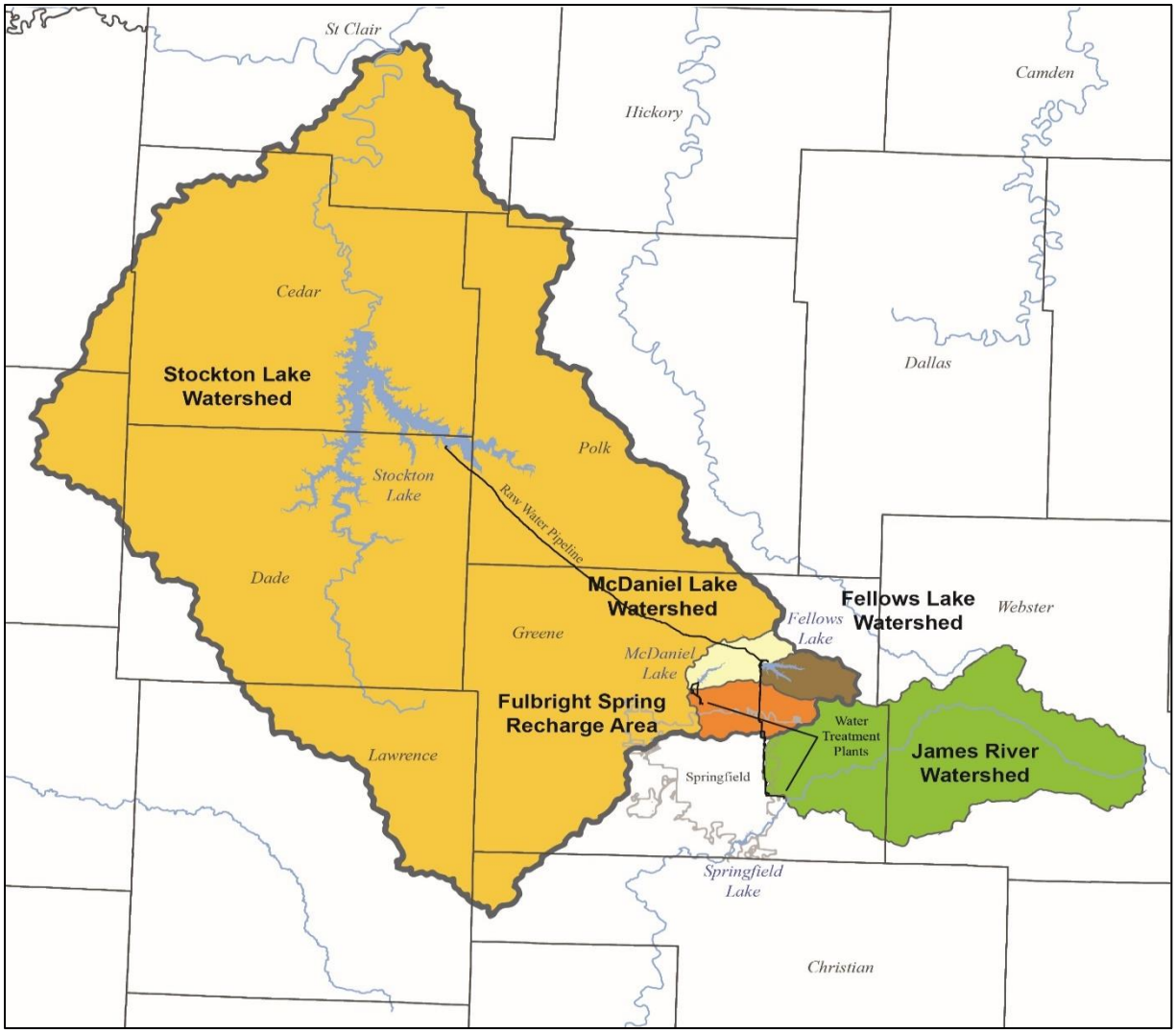

Figure 2: Sac River Watershed Map

Chapter 2: Source Water Information

The City of Springfield's public drinking water is supplied by a combination of groundwater and surface water sources. It consists of two groundwater wells, three surface water impoundments, Stockton, Fellows, and McDaniel Lakes and two reservoirs, Fulbright, and Valley Water Mill. Figure 3 shows a map of Springfields local water sources and watersheds. City Utilities operates and maintains a complete water system that currently serves approximately 86,068 residential, commercial, and industrial customers. City Utilities has managed the City of Springfield's entire water supply, treatment, and distribution since 1957.

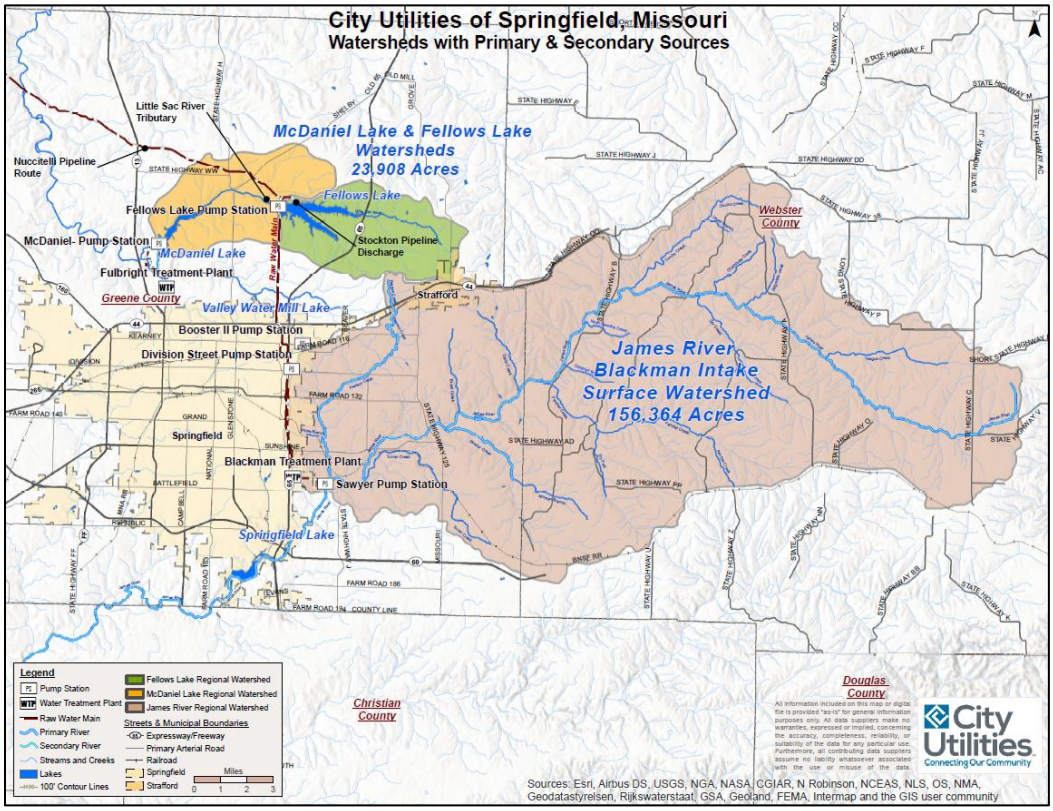

Figure 3: Source Water Map

Figure 4: 2024 Aerial Map of McDaniel Lake, Fellows Lake, and Fulbright Spring. Source Google Earth

Supply

Water is supplied to the Springfield water system from three lakes, a river, two wells, and a spring. The three lakes are McDaniel Lake, Fellows Lake, and Stockton Lake. Fellows and McDaniel Lakes are located on the Little Sac River and share a combined watershed. The total combined capacity of the Fellows and McDaniel impoundments is approximately 11.5 billion gallons.

Water from McDaniel Lake is pumped to the Fulbright WTP and the Fulbright Reservoir through 24-inch and 30-inch transmission mains. The McDaniel Pump Station includes 9.5 mgd, 13.5 mgd, and 23.5 mgd pumps. The 9.5 and 13.5 mgd pumps are equipped with a diesel engine for back-up power. City Utilities continues to optimize its program for chemically treating McDaniel Lake to reduce taste and odor issues, including ongoing testing of an alternative algaecide that can be more easily applied.

Water from Fellows Lake supplies the Blackman Water Treatment Plant (WTP). Water from Fellows Lake is pumped to the Blackman WTP using four pumps capable of delivering 15 mgd each. Water from Fellows Lake regularly overflows into a natural streambed running into McDaniel Lake.

When there is sufficient volume and appropriate quality, water can also be supplied to the Blackman WTP from the James River. There are five vertical turbine pumps at the James River Pumpstation. Two of them are rated at 5 mgd and the other three are rated at 10.0 mgd each.

When local reservoirs are low due to drought and need to be recharged, water from Stockton Lake can be pumped from the Stockton Pumpstation to Fellows Lake via a 30 mile, 36-inch pipeline. The pumpstation includes four pumps rated for approximately 10 mgd each. Water can be sent directly to Fellows Lake, indirectly to McDaniel Lake, or a combination of the two. CU has a contract with the Corps of Engineers (COE) for 50,000 acre-feet (yield of about 30 mgd).

The most well-known source of water for the Springfield water system is the historic Fulbright Spring. It is connected by natural underground channels to the South Dry Sac River just downstream of the Valley Water Mill Reservoir. Water from the spring is pumped to the Fulbright Treatment Plant.

Raw water is also supplied by two wells. Well No. 1 at the Fulbright Treatment Plant supplies raw water directly to the treatment plant. Well No. 12 (3952 S. Kansas Avenue) supplies water directly to the distribution system after on-site treatment with chlorine and fluoride. Staff continue to work in several areas to actively monitor and protect Springfield watersheds. Construction permits require active erosion control and the City of Springfield, CU, and the County are working cooperatively on stream corridor buffers.

Distribution

Distribution of finished drinking water includes a network of pipes, valves, hydrants, tanks, and pump stations. There are over 1284 miles of mains varying in diameter from 1 ½ to 48 inches. The system is composed of three different pressure planes to facilitate delivery of water at manageable pressures to all area customers, regardless of the elevation at their location. Elevated and ground level storage tanks stabilize water pressure when there are variations in water use. The system's storage tanks can hold up to 19.25 million gallons of water.

Treatment Process

The combined firm capacity of the Fulbright and Blackman water treatment plants is 73 mgd. As the water flows through the treatment plant processes, several different chemicals are added. Coagulant is used to attract and remove dirt and other particles. Carbon and potassium permanganate are used to remove iron and manganese as well as taste and odor compounds. Sodium hypochlorite is added to provide disinfection. Fluoride is added to help prevent tooth decay. And finally, Soda Ash is added to bring the pH and alkalinity of the water up so it is less aggressive to piping and fixtures.

Conventional water treatment processes are used at both of the treatment plants. This includes rapid mixing, flocculation, sedimentation, filtration, and disinfection (see Figure 4). The residuals from the treatment process are stored on City Utilities properties.

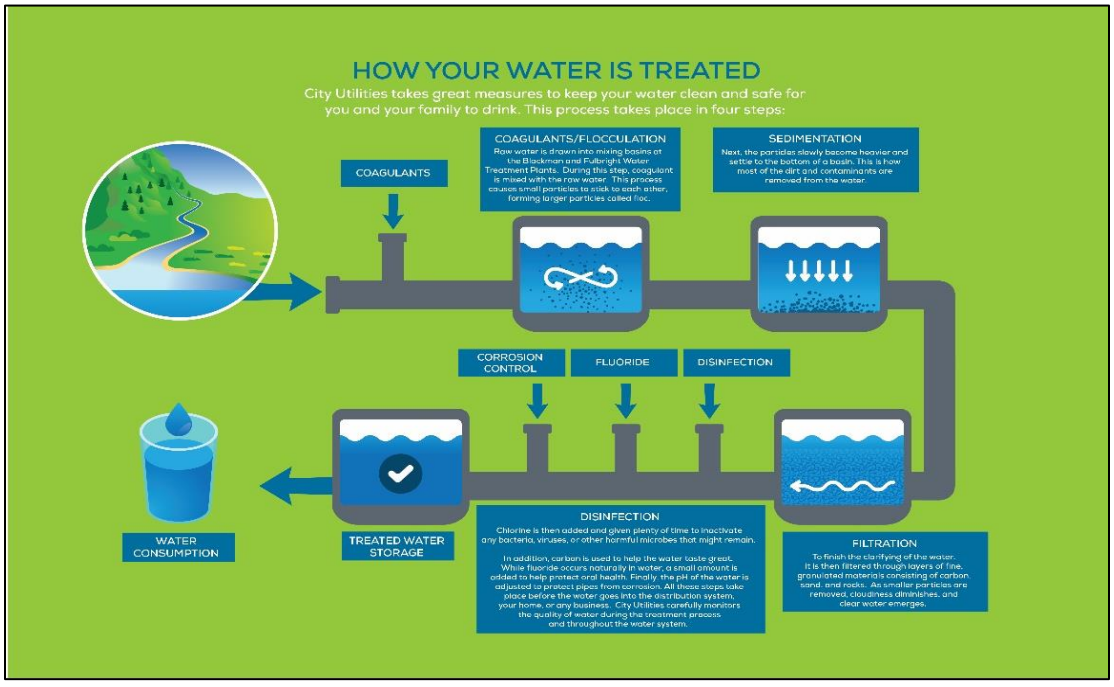

Figure 5: Water Treatment Procedure

Fulbright Water Treatment Plant

Fulbright WTP is located on the northwest side of Springfield. The primary and largest portion of the plant was constructed between the years 1937 and 1941 and has a firm capacity of 20.5 mgd (Figure 5). Site assets include four high service pumps rated for 4 mgd, 8 mgd, 11 mgd, and 13 mgd each. In case there is a loss of power, the site is equipped with backup power consisting of three diesel engines to run the pumps and a diesel generator to provide electricity.

Figure 6: Fulbright Treatment Plant

Blackman Water Treatment Plant

Blackman WTP is located in the southeast portion of the city and was brought online in 1980. It has a firm capacity of 52.5 mgd. The site has eight high service pumps rated for up to 60 mgd. The plant has dual electrical feeds and will soon have natural gas generators to backup the entire site.

Figure 7: Blackman Water Treatment Plant

McDaniel Lake

McDaniel Lake (Figure 7) is a 1.5 billion gallon reservoir created by a nearly 50 foot high, 1,200 foot long concrete dam. Its purpose, since construction in 1929, is to supply drinking water to Springfield. The 300 acre lake is located on the Little Sac River four miles north of Springfield and one mile upstream of the confluence of the Little Sac and South Dry Sac Rivers. The 484 foot long concrete spillway consists of twenty-two bays, each 21 feet long separated by support structures. There are two slidegates which can be used to control the lakes level. The 39 square mile watershed that feeds the lake includes Fellows Lake. Water from McDaniel can be pumped from the adjoining pumpstation (Figure 8) located at the toe of the concrete dam to the Fulbright Treatment Plant and to the Fulbright Reservoir. The pumpstation has three pumps which are rated at 9 mgd, 13 mgd, and 23 mgd. A carbon feed system at the site aids taste and odor reduction efforts.

Figure 8: McDaniel Lake

Figure 9: McDaniel Lake Pumphouse

Fellows Lake

Fellows Lake is Springfield's primary drinking water source. The reservoir lies approximately four miles north of Springfield near the upper end of the Little Sac River watershed. The 815 acre lake holds approximately 10 billion gallons of water and is fed by a 20 square mile watershed. The earthen dam, built during the drought of 1954 and 1955, is 102 feet high and 2,100 feet long. The dam transitions into a concrete spillway 100 feet wide and 1,600 feet long. Recreational areas are provided and maintained around the lake for public use, however certain areas, activities, and equipment are restricted in order to protect the water supply. A pumpstation, completed in 1983, sits below the dam and consists of four pumps rated at 15 mgd each. These pumps are used to transfer water to the Blackman Water Treatment Plant.

Figure 10: Fellows Lake Intake

Figure 11: Fellows Lake

Stockton Lake

Stockton Lake is an Army Corps of Engineers reservoir. Water is conveyed to Fellows Lake using an intake, pumps, and 30 miles of transmission main. The intake incorporates a unique sloped piping system with four submersible pumps. This design minimizes lake disturbance while maximizing aesthetics. The current pumping capacity is 24 mgd.

Figure 12: Stockton Lake Intake

Figure 13: Stockton Lake

James River

The James River Pump Station was constructed to supply water from the James River to the Blackman Water Treatment Plant in 1980. The Pump Station has a capacity of 30 MGD with two 5 mgd pumps and three 10 mgd pumps. Approximately 6,600-ft of 36-inch ductile iron pipe connects the Pumpstation to the Blackman WTP.

Figure 14: James River Intake

Wells & Fulbright Spring

City Utilities owns and operates two wells. Fulbright's Well #1 is 1,400' deep and provides 3 mgd. Well #12 on Kansas Avenue produces 1.5 mgd of water.

Fulbright Spring was one of the original sources of drinking water for Springfield in the late 1800's. It is located in the bluff near Fulbright WTP. A concrete containment provides a sump for two submersible pumps rated at 6 mgd and 3 mgd. Water is pumped into the treatment process along with water from Well #1, McDaniel Lake, and Fulbright Reservoir.

Figure 15: Fulbright Spring

Water System History

In the early 1900s, changes were taking place in our community. With a population close to 24,000 and less than seven square miles to the city limits, Springfield was experiencing quite a growth. The downtown area was booming with construction, the first electric lights were installed, automobiles led to the end of streetcars, and railroads facilitated the progress of industrial expansion. Springfield's continual growth would heighten the need for measures to provide adequate and safe drinking water for its community.

Mr. Paul Perkins is understood to be the franchisee of Springfield's first water system which began in 1883. Fulbright Spring was the main source of water supply for the city until 1887. Then Jones' Spring (now the site of Ozarks Technical College) on the eastern edge of the city was leased and utilized. Growth of the city around Jones' spring soon made the water unsuitable for drinking and it was abandoned. In 1889, Perkins sold the water system to George Wescott and Samuel Hanson of Maine, under the name of Springfield Water Works Company. From 1889 until the early 1900s, the demand for additional water supplies continued and resulted in the purchases of Valley Water Mill Reservoir, Ritter Springs, and Owen Springs. When H.B. McDaniel bought into the company, it was reorganized again as the Springfield Water Company. In 1910, the water company addressed issues of dirty water complaints by installing Springfield's first filtration and disinfection plant at the Fulbright site. In 1911, ownership again changed and the system would operate as Springfield City Water Company. Soon after, Well #1 was added and the Fulbright Reservoir was completed. By 1929, McDaniel Lake and it's associated pumpstation was constructed.

In 1930, the Consumers Water Company of Portland, Maine purchased the waterworks. Scares of e-coli bacteria in the water and reported cases of typhoid fever raised concern for the quality of the water. As a result, ammonia chlorination facilities were added to battle these issues and help ease the fears of the community. In 1937, the construction of Fulbright Water Treatment Plant began.

By 1957, the community continued to suffer from the drought that hit in 1952, and the response by the water company had been too little, too late. Although the water company had constructed Fellows Lake during the drought, it was not a usable resource and a temporary plant had been constructed near the James River. City Utilities purchased and began operation of the water system with the mandate to provide adequate planning and construction of facilities to prevent any further shortages of water.

In 1963, two additional settling basins and other capacity improvements were completed at Fulbright Plant

In 1968, a $2 million bond issue financed additional pumping capacity at McDaniel Lake, conversion of Fulbright high service pumps to electric drive, and completion of filtration improvements at Fulbright Plant to increase the plant capacity.

In 1971, a $6 million bond issue financed the purchase of the Parkview, Parkcrest, and Orchard Crest Water Companies; a computer control system at the Fulbright Plant; and a zero-discharge waste disposal system for filter backwash water and settling basin sludge. A site was also selected for a new water treatment plant utilizing the James River.

In 1978, a $22.5 million bond issue financed new treatment capacity including construction of Blackman Plant, Well #13 at the Blackman Water Treatment Plant, and an intake and pumpstation along the James River.

In 1983, a pumpstation with intake was completed at Fellows Lake. This allowed the Blackman plant to continue operation at times when the James River volume was too low.

During the mid-1990s, the filters at Blackman Plant were converted to dual media, the pH control was converted to soda ash, and the coagulant used was changed to polyaluminum chloride. Emergency shut-off valves were also installed on all chlorine cylinders.

In the late 1990s, a phased expansion plan was developed to increase the Blackman Plant's capacity. Pilot plant studies were conducted on high-rate, deep-bed filters resulting in an exception to traditional design requirements 18 by the

Missouri Department of Natural Resources, allowing Filter #3 to be tested plant scale. The success resulted in a schedule for phased steps of electrical and filter backwash upgrades along with eight filter conversions and pump upgrades all within the existing plant's basic structure to ultimately raise the plant capacity from 30 mgd to 52.5 mgd. Filter conversions were done in 1999, 2000, 2002, 2006, 2008, 2011, and 2012 and 2014.

In early 1996, the Stockton Pump Station and pipeline began delivering water from Stockton Lake to Fellows Lake.

Beginning in 2002, a program was initiated to reduce taste and odor challenges by occasionally treating McDaniel Lake with a chelated copper compound along with adding powdered activated carbon at the pumpstation.

In 2001, a Vulnerability Assessment was performed and an Emergency Response Operating Plan prepared.

In 2003, silt was removed from the Valley Water Mill reservoir in coordination with a project by the Watershed Committee of the Ozarks to construct wetlands and a Watershed Institute for public educational purposes.

In 2009, spillway improvements and repairs were completed at the Fellows Lake Dam.

In 2013, an onsite sodium hypochlorite generation system was constructed at the Blackman Water Treatment Plant.

In 2014, a new 1-million-gallon elevated storage tank was constructed on Highway 60 east of Springfield.

In 2018, a 10 mg clearwell was under construction at Blackman Water Treatment Plant.

History of the Watershed Committee

The Watershed Committee of the Ozarks began about 30 years ago when Springfield Mayor Harry Strawn sent a memo to the Chair of the Board of Public Utilities, N. L. "Mac" McCartney. The memo began: "With your concurrence, I have appointed an ad hoc task force to develop a program for the protection of surface and subsurface watersheds which supply Springfield and the surrounding area with drinking water." It was a prophetic statement and a visionary approach. Development was encroaching into the drinking watersheds and officials worried about whether public policies and programs would effectively protect our precious drinking water supplies.

In November 1983, the Task Force issued its report and recommendations, many of which are pertinent and instructive even today. One recommendation centered on the need for a permanent body whose primary purpose would be oversight and protection of public drinking water sources. From this recommendation, the Watershed Management Coordinating Committee was established in 1984. In 1989, the organization became a non-profit corporation and changed its name to Watershed Committee of the Ozarks. The Watershed Committee of the Ozarks (WCO) adopted a six-member board, comprised of three citizen appointees representing the respective sponsors and three at-large positions. The mission of the Watershed Committee of the Ozarks is "to sustain and improve the water resources of Springfield and Greene County through education and effective management of the region's watersheds."

The Watershed Committee of the Ozarks with community partnerships and support created the Watershed Center at Valley Water Mill Park. The Watershed Center is a 100-acre parcel with great geologic and historic interest. It contains a prominent fault zone where streams flow into underground channels. It was the site of a grist mill before the Civil War. And it contains a wide variety of natural and man-made features, including a seventeen-acre lake, wetlands, spring-fed stream, caves, sinkholes, glades and forests. The Watershed Committee utilizes this site to teach students, citizens and local businesses about our drinking water resources in the Ozarks and how to protect them.

Figure 16: C.W. Titus Educational Facility at Watershed Center at Valley Water Mill

2024 Water Supply Facts

WATER USAGE

	Residential	Commercial	Industrial
Average Number of Customers	77,226	8,666	176
Annual Water Bill	$466	$2,349	$11,223
Thousand Gallons Water Used	56	455	4,056
Revenue per Thousand Gallons	$8.32	$5.16	$2.77

Record Pumpage Peak	59.4	Million Gallons-August 13, 2007
Water Distribution	1,284	Miles
Fire Hydrants	8,770	

WATER SUPPLY

	Date In Service	Capacity (Nominal) MGD
Water Treatment Facilities		
Fulbright Treatment Plant	1941	20.50
Distribution Well	1971	1.40
Blackman Treatment Plant	1981	52.50
Total		74.40
Water Supplies (Average Daily Yield, Drought Conditions)		
Fulbright Spring	1883	2.7
Fulbright Well No. 1	1915	2.0
McDaniel Lake	1929	3.4
Fellows Lake	1957	10.8
Distribution Wells	1971	1.2
James River	1981	7.5
Stockton Lake	1996	22.5
Total		50.1
Average Daily Pumpage (MGD--million gallons per day)		28.87
Water Impoundment Areas		
McDaniel Lake	1929	1.5 Billion Gallons
Fellows Lake	1955	10.0 Billion Gallons
Total		11.5 **Billion Gallons**

Figure 17: 2023 Water Supply Facts, Source https://www.cityutilities.net/corporate/aboutcu/quick-facts

Chapter 3: Implementation Actions

The source water protection committee was formed in 2014 with citizens from diverse backgrounds and represents a variety of local community organizations. This group met quarterly for one year to research, gather and discuss local source water information and help create the source water protection plan. The committee created action goals as a guide for implementing future source water protection actions in our community.

Source Water Protection Planning Committee Members

Teri Arceneaux	Stormwater Technician, City of Springfield-Department of Environmental Services Stormwater Quality Division	teri.arceneaux@springfieldmo.gov
Tim Davis	Environmental Compliance Manager, Greene County Resource Management	tdavis@greenecountymo.gov
Tyler Ham	Fisheries Biologist, Missouri Department of Conservation	tyler.ham@mdc.mo.gov
Janet Hicks	Senior Public Health Investigator, Springfield Greene-County Health Department	
Cecilia, James	James River Basin Partnership	vista@jamesriverbasin.com
Mike Kromrey	Executive Director, Watershed Committee of the Ozarks	mike@watershedcommittee.org
Spencer Morrissey	Stormwater Specialist, City of Springfield-Department of Environmental Services Stormwater Quality Division	smorrissey@springfieldmo.gov
Elizabeth Robertson	Water Treatment and Supply, City Utilities	elizabeth.robertson@cityutilities.net
Will Sappington	Blackman Laboratory, City Utilities	will.sappington@cityutilities.net
Stacey Armstrong Smith	Projects Manager, Watershed Committee of the Ozarks	stacey@watershedcommittee.org
Ken Tomlin	Missouri Department of Natural Resources	ken.tomlin@dnr.mo.gov
Kara Tvedt	Fisheries Biologist, Missouri Department of Conservation	kara.tvedt@mdc.mo.gov
John Waitman	City of Springfield-Department of Environmental Services-Clean Water Services	jwaitman@springfieldmo.gov
Sarah Wilkerson	Senior Stormwater Specialist, City of Springfield-Department of Environmental Services Stormwater Quality Division	sarah.wilkerson@springfieldmo.gov
Kari Wolken	Blackman Laboratory, City Utilities	kari.wolken@cityutilities.net

Action Goals

Goal Date	Protection Activity – Scope of Work
2024	Update Source Water Protection Plan according to DNR guidelines. PFAS – Targeted education efforts. Quarterly testing of 12 source water sites. Monitor PFAS levels in James River for UCMR5. Blend James River and Fellows Lake to stay below the MCL of 4ppt PFOS. Work with MDC to survey Fellows Lake for Hydrilla and Curly-leaf Pondweed around March-April. Work with MDC to treat Fellows Lake for Curly-leaf Pondweed with Sonar PR in the Spring and Fall. Obtain an NPDES Treatment Permit for Fellows Lake. Revive the Source Water Protection Planning Committee. Launch four floating wetlands into McDaniel Lake and one island in Fellows Lake and monitor trends in nutrient levels. Plant shoreline species in upper end of McDaniel Lake.

2025	Public Education and Outreach: Partner with WCO to mail informational letters to the residents and business owners located in the Fellows and McDaniel drinking watersheds and invite them to be active stakeholders. Notify pet stores/plant nurseries about invasive aquatic species. PFAS – Targeted education efforts. Quarterly testing of 12 source water sites. Research volunteer efforts for cleaning source water. Work with WCO to install a boat washing station at Fellows to deter invasive species. Monitor floating wetlands and possibly add more to Fellows and McDaniel Lake. Work with MDC to survey Fellows Lake for Hydrilla and Curly-leaf Pondweed around March-April. Work with MDC to treat Fellows Lake for Curly-leaf Pondweed with Sonar PR in the Spring and Fall.
2026	Public Education and Outreach: Educate water users about the true cost of water by providing information on the 2025 CCR about water costs in other regions. Create and install signs on major highways to indicate that drivers are entering a drinking water protection area. Add signage to bike trails, playgrounds, and other areas near source water. Monitoring: Complete some bacterial source tracking studies on Pierson Creek and the James River above Blackman Intake. Apply for funding to expand floating wetlands and shoreline planting projects to other source water sites. Work with MDC to survey Fellows Lake for Hydrilla and Curly-leaf Pondweed around March-April. Work with MDC to treat Fellows Lake for Curly-leaf Pondweed with Sonar PR in the Spring and Fall. Hydrilla enters transitions from “Monitoring Phase” to “Eradication Phase.”
2027	Review James River Watershed Management Plan with the Jame River Basin Partnership. Review Forestry Management Plan with MDC. Apply for funds to continue capping abandoned wells. Research conservation easement opportunities near drinking water reservoirs. Research state revolving funds to identify any proactive water quality measures these funds might pay for such as BMP’s and draft white paper for proposal. Work with MDC to survey Fellows Lake for Hydrilla and Curly-leaf Pondweed around March-April. Work with MDC to treat Fellows Lake for Curly-leaf Pondweed with Sonar PR in the Spring and Fall.

2028-2029	Conduct Bacteria Source Tracking in Little Sac Watershed. Work with MDC to survey Fellows Lake for Hydrilla and Curly-leaf Pondweed around March-April. Continue 6-year treatment plan Curly-leaf Pondweed in Fellows Lake, with last treatment occurring in Spring 2029. Implement Forestry Management Plan.
2030-2034	Continue Monitoring to identify early warnings signs, such as groundwater monitoring. Update and Revise Source Water Protection Plan. Work with MDC to survey Fellows Lake for Hydrilla and Curly-leaf Pondweed around March-April. Update Upper Little Sac Watershed Management Plan.

How you can help protect drinking water

Water is essential to life and the daily choices we make can have a large impact on our water supply. The quantity of water we use, how we use it and what activities we do on the land can all impact our drinking water.

-Install a Rain Barrel or learn how to make your own here: www.watershedcommittee.org/wpcontent/uploads/2008/06/rain-barrell-brochure-rev1.pdf
-Use water wisely by installing low flow fixtures in your home: https://www.cityutilities.net/save/
-Plant Native Landscaping that uses less water and can easily survive drought
-Plant a Rain Garden to filter water in your yard and reduce flooding
-Pick up your pet's waste (urban areas)
-Don't dump in storm drains because they drain directly to your local stream
-Do Not Litter (we all live down steam)
-Install Pervious Pavement or Pavers to reduce stormwater runoff
-Practice good sanitation and hand washing hygiene before eating when swimming, learn more here: http://www.cdc.gov/healthywater/swimming/
-Water lawn only as needed (1 inch per week)
.

Use and dispose of harmful materials properly.

Don't dump them on the ground! Hazardous waste that is dumped on or buried in the ground can contaminate the soil and can move down into the ground water or be carried into nearby surface waters by runoff during rainstorms. You might be surprised to learn that a number of products you use at home contain hazardous or toxic substances. Products like motor oil, pesticides, leftover paints or paint cans, mothballs, flea collars, weed killers, household cleaners and even a number of medicines contain materials that can be harmful to surface water and ground water.

Don't overuse pesticides or fertilizers.

You might apply fertilizers to make your grass thick and green, your flowers colorful and your vegetable crop abundant. You also might use pesticides to keep bugs from ruining what the fertilizers have helped to produce. What you might not know is that many of these fertilizers and pesticides contain hazardous chemicals that can travel through the soil and contaminate ground water. If you feel you must use these chemicals, use them in moderation.

Volunteer in your community.

Find a watershed or wellhead protection organization in your community and volunteer to help. Such as Watershed Committee of the Ozarks, visit: www.watershedcommittee.org to learn more. Use EPA's Adopt Your Watershed to locate groups in your community.

Join in stream team or stream cleanup.

You can make new friends while you help protect source water. To learn more about Missouri Stream Team programs or to join a Stream Team visit: http://www.mostreamteam.org.

Prepare a presentation about your watershed for a school or civic organization.

Discuss water quality threats, including polluted runoff and habitat loss. Highlight things people can do to protect water quality, including limiting fertilizer use and eliminating the use of herbicides and pesticides. Research your presentation using EPA's Nonpoint Source Program.

Organize a storm drain stenciling project.

Stencil a message next to the street drain reminding people "Dump No Waste - Drains to River" with the image of a fish. Stencils are also available for lakes, streams, bays, ground water and oceans, as well as the simple "Protect Your Water" logo with the image of a glass and faucet. Produce and distribute a flyer for households to remind residents that storm drains dump directly into your local water body.

Learn how to conserve water at your house on this interactive website. http://www.h2ouse.org/

The do’s and don’ts around the house http://water.epa.gov/polwaste/nps/dosdont.cfm

Appendix 1: Emergency Water Conservation Plan

In times of drought conditions, City Utilities has determined a course of action to try to conserve water. The Emergency Water Conservation Plan – Starts with a water watch when heightened awareness is necessary, followed by a water warning at stored water volume equal to or less than 65% of capacity followed by three emergency stages. Emergency Water Conservation Plan - Key Points

Key Points

Water Watch Heightened Awareness Necessary
Customers requested to practice conservation and to minimize or discontinue water use for non-essential purposes. Irrigation limited to the Odd-Even Watering Schedule (3 days). Requests shutting off fountains.
Water Warning - Stored water is approximately 65%
Restrictions same as WATCH
Stage I Water Shortage - Stored water equal to or less than 60%
Provisions of "Emergency Conservation Water Service Rate" applicable. No washing of paved areas and no operation of ornamental fountains. Filling of private pools limited to a 4 hour period one day a week. Noncommercial washing of vehicles limited to specific hours one day per week. Water at restaurants only on request. No use of water for dust control. Irrigation is limited to midnight to 6 a.m., one day per week.
II Water Emergency - Stored water equal to or less than 55%
Stage I restrictions remain in effect. Use of sprinkler systems – prohibited. Filling of private pools – prohibited. Noncommercial washing of vehicles – prohibited. Provisions of Emergency Water Conservation Rate still applicable.
III Water Crisis Stored water equal to or less than 55%
Stage I and II restrictions – remain in effect. Washing of vehicles, trailers or boats – prohibited. Watering lawns – prohibited. Trees, plants, etc. – from a handheld container. Filling of all pools – prohibited. Water usage from a fire hydrant shall be limited to usage for human consumption, necessary watering of animals, or fire safety. No new water service connections with the exception of Fire Services. Excessive use surcharge becomes effective, based on previous January, February, March billing. Additional provisions of Emergency Conservation Water Service Rate applicable.

Source: City Utilities Emergency Water Conservation Plan - Complete Plan

EMERGENCY WATER CONSERVATION PLAN
Sec. 110-131. TITLE OF DIVISION.
This division shall be known as the "Emergency Water Conservation Plan."
Sec. 110-132. DEFINITIONS.

The following words, terms and phrases, when used in this division, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Board: The Board of Public Utilities of Springfield, Missouri.

Customers and Users: Persons receiving water service from City Utilities of Springfield, Missouri.

Emergency: A sudden or unexpected natural or man-made event restricting the ability of City Utilities to supply water to customers.

General Manager: The General Manager of City Utilities of Springfield, Missouri, or designee.

Lake Storage Capacity, or capacity: 11,600 million gallons of water stored at McDaniel Lake and Fellows Lake.

Persons: As defined in Section 1-2 of the Springfield City Code and includes governmental bodies.

Plan: Chapter 110, Article IV, Division 2, Sections 110-131 to 110-138, inclusive of the Springfield City Code.

Short term: A period of fewer than seven (7) consecutive days.

Stored Water Volume: The quantity of water contained in McDaniel and Fellows Lakes.

Water Consumption: The projected daily unrestricted use of water provided by City Utilities to customers or users.

Sec. 110-133. SOURCE CONSERVATION STAGES.
Source conservation stages under this division are as follows:

(1) WATER WATCH

a. A Water Watch shall be in force and effect when:

1. Due to concerns regarding stored water volumes, City Utilities management deems heightened awareness is necessary, or

2. An emergency exists or occurs
and the General Manager determines and declares as provided in Section 110-135 the existence of a Water Watch.

b. The Water Watch is intended to increase awareness and accomplish an overall system-wide reduction in water consumption as follows:

1. Customers and users shall comply with the following restrictions when using water supplied by City Utilities and it shall be unlawful for customers and users to violate the following:

i. Irrigation of lawns and landscaped areas shall be limited to Wednesday, Friday and Sunday for all customers with a street address ending in an even number, and Tuesday, Thursday and Saturday for all water customers with a street address ending in an odd number.

c. In addition to the above mandatory requirements, all water customers and users are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes. Nonessential purposes include things such as:

1. Use of water to wash down sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas.

2. Use of water to wash down buildings or structures for purposes other than immediate fire protection.

3. Use of water for dust control.

4. Use of water for flushing gutters or permitting water to run or accumulate in any gutter or street.

5. Operation of any ornamental fountain or pond except where necessary to support aquatic life.

d. When the General Manager determines and declares that the circumstances requiring implementation of a Water Watch have sufficiently moderated or been eliminated, the Water Watch may be terminated.

(2) WATER WARNING

a. A Water Warning shall be in force and effect when:

1. Stored water volume is approximately equal to or less than 65% of lake storage capacity or

2. An Emergency exists or occurs and the General Manager determines and declares as provided in Section 110-135 the existence of a Water Warning.

b. The Water Warning is intended to heighten awareness greater than a Water Watch and accomplish an overall increased system-wide reduction in water consumption as follows:

1. Customers and users shall continue to comply with the restrictions and requests detailed in the Water Watch.

c. When the General Manager determines and declares that the total volume of water stored at McDaniel and Fellows Lakes has returned to approximately 70% of capacity, or that the circumstances requiring implementation of a Water Warning have sufficiently moderated or been eliminated, a Water Warning may, at the discretion of the General Manager, revert to a Water Watch or be terminated.

(3) STAGE ONE – WATER SHORTAGE.

a. Stage One Shall be in force and effect when:

1. Stored water volume is equal to or less than 60% of lake storage capacity; or

2. An emergency exists or occurs and the General Manager determines and declares as provided in Section 110-135 the existence of a Stage One-Water Shortage.

b. Stage One is intended to accomplish an overall system-wide reduction in water consumption of 15% as follows:

1. Customers and users shall comply with the following restrictions when using water supplied by City Utilities and it shall be unlawful for customers and users to violate the following:

i. No washing of sidewalks, driveways, parking areas, buildings, gutters, tennis courts, patios or other paved areas; no operation of any ornamental fountain or pond except where necessary to support aquatic life.

ii. Filling or refilling of any and all privately owned residential swimming, wading, or hot tub pools shall be limited to 4 hours per week between the hours of 8 PM and midnight.

iii. Noncommercial washing of motor vehicles, trailers or boats, shall be limited to washing from a bucket between 6 to 8 AM or 8 to 10 PM Sundays for all customers with a street address ending in an even number and 6 to 8 AM or 8 to 10 PM Saturdays for all water customers with a street address ending in an odd number.

iv. No use of water for dust control.

v. Irrigation of lawns and landscaped areas shall be limited to midnight to 6 AM Sundays for all customers with a street address ending in an even number, and midnight to 6 AM Saturdays for all water customers with a street address ending in an odd number.

vi. No eating establishment shall serve water except upon specific request and shall display notice to that effect.

c. Stage One provisions of City Utilities' "Emergency Conservation Water Service Rate" shall be applicable as set forth in the "Emergency Conservation Water Service Rate".

d. When the General Manager determines and declares that the stored water volume equals at least 65% of capacity, or that the circumstances requiring implementation of Stage One have sufficiently moderated or been eliminated, Stage One shall be terminated, or may revert to a Water Watch or Water Warning. The normal "Residential Water Service Rate" and "General Water Service Rate" shall be applicable as set forth in the "Emergency Conservation Water Service Rate".

(4) STAGE TWO – WATER EMERGENCY.

a. Stage Two shall become effective when:

1. Stored water volume is equal to or less than 55% of capacity or

2. An emergency occurs or continues or

3. Stage One has not accomplished a 15% reduction in water consumption, as determined by the records of pumpage at the Fulbright and Blackman Water Treatment Plants. and the General Manager determines and declares as provided in Section 110-135 the existence of a Stage Two-Water Emergency.

b. Stage Two is intended to accomplish an overall system-wide reduction in water consumption of 20%, as follows:

1. Restrictions of Stage One shall remain in effect, except as modified below and it shall be unlawful for customers and users to violate the following:

i. The use of permanently installed automatic sprinkler systems and hose end sprinklers is prohibited at all times.

ii. Filling or refilling of any and all privately owned residential swimming, wading, or hot tub pools is prohibited. Using water for recreational purposes such as water slides or yard play is prohibited.

iii. Noncommercial washing of vehicles is prohibited.

c. Stage Two provisions of City Utilities' "Emergency Conservation Water Service Rate" shall be applicable as set forth in the "Emergency Conservation Water Service Rate" .

d. When the General Manager determines and declares that the stored water volume has returned to 60% of capacity, or that the circumstances requiring implementation of Stage Two have sufficiently moderated or been eliminated, Stage Two may, at the discretion of the General Manager, revert to Stage One or be terminated. Depending on whether Stage Two is reverted to Stage One or terminated, the "Emergency Conservation Water Service Rate" or the normal "Residential Water Service Rate" and "General Water Service Rate" shall be applicable as set forth in the "Emergency Conservation Water Service Rate".

(5) STAGE THREE – WATER CRISIS.

a. Stage Three shall become effective when:

1. Stored Water volume is equal to or less than 50% of capacity or

2. An emergency occurs or continues; or

3. Stage Two has not accomplished a 20% reduction in water consumption, as determined by the records of pumpage at the Fulbright and Blackman Water Treatment Plants and the General Manager determines and declares as provided in Section 110-135 the existence of Stage Three-Water Crisis.

b. Stage Three is intended to accomplish an overall system-wide reduction in water consumption of 25%, as follows:

1. As respects water supplied by City Utilities, it shall be unlawful for customers and users to violate the following:

i. All requirements of Stages One and Two shall remain in effect except as modified below:

ii. All washing of vehicles, trailers or boats is prohibited.

iii. Watering of any lawn, garden, or landscaped area is prohibited. Trees, shrubs, and plants may be watered from a handheld container.

iv. Filling or refilling of any and all swimming, wading or hot tub pools is prohibited.

v. No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains or water service facilities that fall under a building permit applied for after implementation of Stage Three shall be approved until circumstances requiring implementation of Stage Three have sufficiently moderated or been eliminated. This section shall not apply to fire services.
Customers and users who consume more than their average water use during the most recent January, February, and March billing months shall be subject to the surcharge as defined in the "Emergency Conservation Water Service Rate".

vii. Water usage from a fire hydrant by customers and users shall be limited to usage for human

consumption, necessary watering of animals or for fire safety purposes.

c. Stage Three provisions of City Utilities' "Emergency Conservation Water Service Rate" shall be applicable to usage during the next complete regular billing cycle following determination and declaration by the General Manager that Stage Three of the Emergency Water Conservation Plan is in effect.

d. When the General Manager determines and declares that the stored water volume has returned to 55% of capacity, or that the circumstances requiring implementation of Stage Three have sufficiently moderated or been eliminated, he shall direct that Stage Three revert to Stage Two or Stage One, or be terminated. Depending on whether Stage Three is reverted to Stage Two, Stage One, or terminated, the "Emergency Conservation Water Service Rate", or the normal "Residential Water Service Rate" and "General Water Service Rate" shall be applicable as set forth in the "Emergency Conservation Water Service Rate".

Sec. 110-134. PEAK DAY CONSERVATION.

(1) PEAK DAY CONSERVATION.

a. Peak Day Conservation shall become effective when the General Manager of City Utilities determines and declares as provided in Section 110-135 that:

1. The daily treatment capacity of City Utilities' water processing facilities may be exceeded by the daily usage; or

2. That an emergency exists which limits, or threatens to limit, the amount of water that City Utilities is able to supply to Customers.

b. Peak Day Conservation shall be short-term, intended to accomplish an overall system-wide reduction in daily water consumption of 50%.

1. Reduction shall be measured against water consumption, as herein defined. The General Manager shall consider daily flow in the James River, mechanical condition of the Fulbright and Blackman Water Treatment plants, stored water volume, integrity of the transmission and distribution piping systems, and other pertinent factors in determining the daily treatment capacity.

2. Whenever the General Manager of City Utilities has determined and declared that it is necessary to implement Peak Day Conservation, it shall be unlawful and a violation for customers and users to engage in any of the following activities respecting water supplied by City Utilities:

i. Washing of sidewalks, driveways, parking areas, tennis courts, patios or other paved areas and pumping of fountains.

ii. Filling or refilling of any and all swimming, wading, or hot tub pools.

iii. Using water for recreational purposes, such as water slides or yard play.

iv. Noncommercial washing of vehicles, trailers or boats.

v. Use of water for dust control.

vi. Flushing of mains by City Utilities personnel, except to alleviate individual water quality problems. Using water from fire hydrants, except for fire safety, for human consumption, or for necessary watering of animals.

viii. Watering of any lawn, garden, landscaped area, tree, shrub or other plant.

ix. No eating establishment shall serve water except upon specific request and shall display notice to that effect.

x. Using water supplied by City Utilities in any vehicle washing business.

3. In addition to the mandatory restriction of 2, (above), General Service Rate customers shall reduce daily short-term consumption by 50%.

c. When the General Manager of City Utilities determines that daily demand no longer threatens to exceed the daily treatment capacity, or that an actual or imminent shortage of water requiring implementation of Peak Day Conservation has otherwise been sufficiently moderated or eliminated, he shall direct that Peak Day Conservation be terminated.

Sec. 110-135. NOTIFICATION OF CUSTOMERS.

(a) All persons shall be conclusively presumed to have notice of the implementation of any stage of the Plan as herein before set forth and shall be subject to its provision (including City Utilities' "Emergency Conservation Water Service Rate"), upon the filing of a notice of such implementation of any Section hereof with the City Clerk of the City of Springfield, Missouri, and when a copy of such notice is posted at the customer entrance to the Robert E. Roundtree Center at 301 East Central, Springfield, Missouri.

(b) Reasonable effort shall be made to utilize news media and other means to publicize the implementation of various stages of the Plan. Notice shall be posted and filed at least 24 hours prior to the time for implementation of Stages One, Two and Three, and at least one hour prior to the time for implementation of Peak Day Conservation.

(c) Notification to customers of violation of this Emergency Water Conservation Plan will be U.S. Mail, notification left at the account address, overnight mail, or other method of notice determined at the time the account is established or updated.

Sec. 110-136. COMPLIANCE.

(a) During Stage Two and Three of the Plan in which the "Emergency Conservation Water Service Rate" is in effect, customers will be provided (printed on bills) with at least the usage threshold below which the Stage Three Excessive Use Surcharge will not apply in the upcoming billing period as set forth in the “Emergency Conservation Water Service Rate”.

(b) Compliance with the Plan -- Customers and users who receive water service from City Utilities shall be entitled to receive such water service only upon compliance with provisions of Section 110-131 to 110-138, inclusive.

1. First failure to comply with the provisions of this Ordinance shall result in a written warning and notification to the customer. A failure to comply will be verified by City Utilities personnel or contractors.

2. Second and any subsequent failure to comply will result in an additional warning and notification to the customer. After City Utilities personnel or contractors have verified the violation, and the notice of violation has been issued, an Emergency Water Conservation Verification charge in the amount as approved by the Board of Public Utilities as part of Policy 5.50-Customer Service Fees, will be added to the Customer’s bill. The Emergency Water Conservation Verification charge shall be calculated based on the criteria set forth in Policy 5.47, Service Rules and Regulations, Section I.20, Special Services. The notification will include information regarding the Verification charge. The Emergency Water Conservation Verification charge will be part of the customer’s bill, and due and payable in the same manner as for other utility services.

3. Third and any subsequent failure to comply will result in termination of service as set forth in City Utilities Service Rules and Regulation, Policy 5.47, and an Emergency Water Conservation Disconnect/connect charge will be added to the

Customer's bill, in the amount as approved by the Board of Public Utilities as part of Policy 5.50-Customer Service Fees. The Emergency Water Conservation Disconnect/connect charge shall be calculated based on the criteria set forth in Policy 5.47, Service Rules and Regulations, Section I.20, Special Services. Service will be restored as set forth in City Utility policies upon payment of the Emergency Water Conservation Disconnect/connect charge and any unpaid Emergency Water Conservation Verification charges.

4. Customers and users with dedicated irrigation service meters who fail to comply with any irrigation restrictions shall be issued a written notification of violation and termination of service. If service is terminated, service will not be restored until Stages One, Two and Three of the Emergency Water Conservation Plan have been terminated and all fees, including the Emergency Water Conservation connect/disconnect charge, have been paid, subject to the relief provided in Section 110-138.

(c) Violation of this Emergency Water Conservation Plan shall be considered a violation of City Utilities Service Rules and Regulations, Policy 5.47, and termination of services shall be as set forth and according to said Service Rules and Regulations, and the City Utilities Customer Service Fees, Policy 5.50.

Sec. 110-137. MISDEMEANOR; NEW CUSTOMERS.

(a) Any person who shall violate the provisions of Section 110-133 or Section 110-134 shall be guilty of a misdemeanor and punished as provided in Section 1-7 of the Springfield City Code.

(b) Any customer who applies for service during any time the restrictions on water use contained herein are in effect will be advised of that fact by City Utilities.

Sec. 110-138. GRANTING OF EXCEPTIONS.

(a) Request for exception. Exceptions to the application of use restrictions and relief from the "Emergency Conservation Water Service Rate" may be requested in writing, setting forth in reasonable detail the factual basis for such request. Such request shall be signed by the customer making it, delivered to the General Manager of City Utilities. Any request for exception or appeal following notification of violation shall be as set forth as described in this Section 110-138 (a), and received by the General Manager within ten calendar days of the mailing or personal notification to the customer or user by City Utilities.

(b) Appeals. Any person aggrieved by a decision of the General Manager may appeal the same under Chapter 536 "V.A.M.S."

Appendix 2: Hydrilla (*Hydrilla verticillata*) Information

What is hydrilla? Hydrilla is a federally listed noxious weed that can be detrimental to our aquatic resources. It is native to the Indian sub-continent and was first observed in the United States in the early 1950s, more than likely from the aquarium trade. Today, hydrilla has spread from Florida to Maine on the eastern seaboard and is even found in the state of Washington. Right now, at least 29 states are dealing with introduced populations of hydrilla. Hydrilla has several different methods of reproduction including fragmentation, tuber production, turions (above ground tuber like structures that eventually fall into the sediment) and seed dispersal. Depending on the variety of hydrilla, the tubers and turions can stay viable in the soil for at least four years or up to 10 years. Because of the persistence of this invasive plant, any control plan should include continued monitoring and, as necessary, follow-up treatments for several years.

Why are we concerned? Hydrilla can quickly spread throughout freshwater systems including ponds, lakes, reservoirs, and even streams. Hydrilla displaces the local aquatic plant community, interferes with boating and fishing, clogs water intake systems, and adversely changes the dynamics of fish populations. In places that have hydrilla, pond owners and lake managers are faced with expensive control measures. In short, this plant is not only detrimental to small ponds and lakes, but it will harm Missouri's economy through hindering fishing and other recreational uses at our larger impoundments if it is allowed to spread.

Controlling the spread of hydrilla is extremely difficult, making it imperative that eradication efforts are put in place promptly. Hydrilla is difficult to control because it can grow in about any wet area, so even the smallest watering hole and drainage area will need to be monitored and possibly treated. If hydrilla becomes established in larger rivers and impoundments, control efforts will be almost impossible and cost prohibitive. Once established, managing the plant then becomes the only option and that will still be an expensive challenge. Florida was spending over $14.5 million per year in the mid1990s just to manage the plant. Missouri's only chance to protect our state's water resources is to implement a multifaceted control plan within smaller drainage areas and be proactive against future introductions.

How does it move from one place to another? Hydrilla spreads primarily through fragmentation which means that it only takes one small piece of plant to enter a waterbody and start a new stand. Common modes of transportation include boat trailers, fishing gear, waterfowl, mammals, or even fish and plant introductions from other waterbodies that have hydrilla.

What do we do now? We need to take swift action and try to eliminate the plant from the area ponds that are impacted. This will take a coordinated effort and will require participation from all impacted pond owners. Research has revealed that chemical control methods provide the best results. However, with the implementation of any large scale aquatic vegetation control effort using herbicides, there are some risks, such as 34 losing a few fish through oxygen depletion from excessive vegetation decomposition and possible effects on non-target plants in treated water bodies. We can minimize the oxygen depletion risk by treating when water temperatures are cooler such as early spring or even in the fall. We are also aware that several of the infested ponds are primary water sources for livestock and this will be taken into consideration. In fact, the control method selected for each pond will be based on its use, potential for sport fish management, and equipment accessibility.

In certain situations, the effectiveness of herbicides can be enhanced by incorporating grass carp and timely water level drawdowns into the treatment plan. Grass carp are known to be effective consumers of hydrilla but may also consume more favorable aquatic plant species. So, once the hydrilla is under control, the grass carp numbers should be reduced to encourage the establishment of desirable aquatic plants.

What can you do to prevent the spread of the hydrilla? One of the main routes for spread outside of the immediate area is via a plant fragment hitching a ride on something such as boat trailer, within a boat's livewell, or even in a bait bucket. To help reduce the spread of hydrilla, you and those that use your pond(s) should implement the following measures immediately:

- Do not bring in outside boats to fish any of these impoundments. Boats that stay on a particular small lake or pond are still okay to use, but should not be transported to another impoundment. If a boat has been in a pond or small lake with hydrilla and has traveled to another waterbody, we need to know that information as soon as possible. Please contact:

  Kara Tvedt
  Fisheries Management Biologist
  Missouri Department of Conservation
  417/895-6881, ext. 1626

  In addition, any trailers or other equipment that enter the pond(s) or small lakes should not be moved to other water bodies.
- Thoroughly clean all fishing gear after each trip.
- Do not transport plants or fish to another waterbody.
- Do not remove hydrilla plants from your property. Disposal of these plants should be handled on-site and under advisement from the Department of Conservation.
- Do not allow anyone to collect the plant for aquarium use or empty the contents of an aquarium in your pond or small lake.
- Do not purchase, plant, or sell hydrilla.

Common Characteristics of Hydrilla:

- Submersed, usually rooted aquatic plant
- Slender stems reaching 30 feet in length in deep water
- Leaves are whorled around the stem with 3 to 8 leaves per whorl
- Leaves are narrow and up to 0.8 inches long
- Leaves have serrated edges
- Leaves have spines or nodules on the under- side midrib.
- Branching is limited until it reaches the sur- face
- Can have small (~0.25 inch), potato like tubers attached to the roots.

Figure 18: Hydrilla leaves

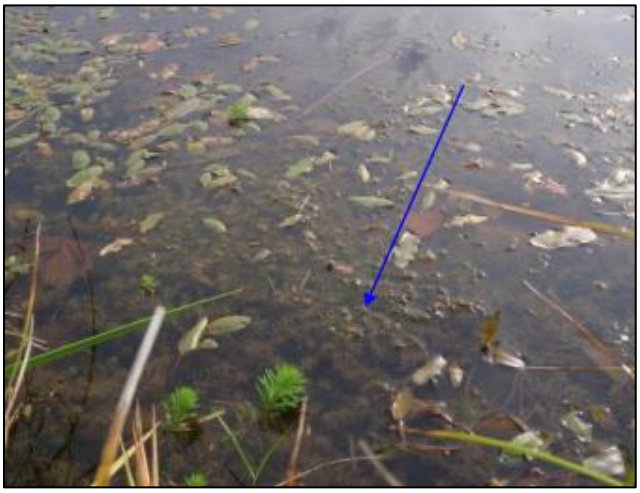

Figure 19: Hydrilla in a lake habitat

Figure 20: Hydrilla at Fellows Dock

Figure 21: Hydrilla size and scale

Appendix 3: Curly-leaf Pondweed (*Potamogeton crispus*) Information

What is curly-leaf pondweed? Curly-leaf pondweed is a noxious invasive aquatic plant originally native to Eurasia, Africa, and Australia. Curly-leaf pondweed was first observed in the US in the mid-1800s and was likely an accidental introduction when Common Carp were imported to the US. The plant has since spread to all 48 contiguous states and one Canadian province. Curly-leaf pondweed primarily spreads via fragmentation or turions (hardened vegetative propagules that serve as overwintering structures in sediment). Seed production does occur with curly-leaf pondweed but is not considered a major source of reproduction. Research has shown curly-leaf pondweed turions can remain viable in the sediment for anywhere from one to six years and can survive being stored in dry air for up to two weeks. Much like hydrilla, any control efforts for curly-leaf pondweed must account for an extended treatment and monitoring period.

What sets curly-leaf pondweed apart from other aquatic invasive plants is the unique life cycle of the plant. Simply put, curly-leaf pondweed grows when most other submerged aquatic plants do not. Generally, turions break dormancy and begin to grow in the fall. This early grow persists through the winter, even under ice, and begins growing very early in the spring. By late spring or early summer, the plant begins to form and drop turions and the entire plant typically dies back by the middle of summer only to begin the cycle again.

Why are we concerned? Like many aquatic nuisance species, curly-leaf pondweed can spread and establish quickly if left unchecked. The plant has been known to alter and displace the local aquatic plant community, interfere with recreational activities, and can clog or foul infrastructure such as water intakes. While there hasn't been extensive research into the matter, there is some belief that the curly-leaf pondweed life cycle can contribute to nutrient issues in infested waters. Since curly-leaf pondweed dies and decays during the warmest parts of the year, it could create conditions favorable for algal blooms and other water quality issues. Not only can these issues impact the recreational use of a waterbody, they can also severely impact public water systems in lakes used for water supply.

How does it move from one place to another? Curly-leaf pondweed spreads primarily through fragmentation of plants bearing turions. As mentioned, these turions as especially hardy and can survive desiccation or freezing for periods. Therefore, it can be easy to spread from waterbody to waterbody from small fragments. Common modes of transportation include boats, boat trailers, fishing gear, and possibly waterfowl. Curly-leaf pondweed has some popularity in the aquarium trade so this may serve as another vector via dumping.

What do we do now? We need to take swift action and try to eliminate the plant from the area ponds that are impacted. This will take a coordinated effort and will require participation from all impacted pond owners. Research has revealed that chemical control methods provide the best results. However, with the implementation of any large-scale aquatic vegetation control effort using herbicides, there are some risks, such as losing a few fish through oxygen depletion from excessive vegetation decomposition and possible effects on non-target plants in treated water bodies. We can minimize the oxygen depletion risk by treating when water temperatures are cooler such as early spring or even in the fall. We are also aware that several of the infested ponds are primary water sources for livestock and this will be taken into consideration. In fact, the control method selected for each pond will be based on its use, potential for sport fish management, and equipment accessibility.

In certain situations, the effectiveness of herbicides can be enhanced by incorporating grass carp and timely water level drawdowns into the treatment plan. Grass carp are known to be effective consumers of curly-leaf pondweed but may also consume more favorable aquatic plant species. So, once the curly-leaf pondweed is under control, the grass carp numbers should be reduced to encourage the establishment of desirable aquatic plants.

What can you do to prevent the spread of the curly-leaf pondweed?
One of the main routes for spread outside of the immediate area is via plant fragment(s) hitching a ride on something such as boat trailer, within a boat's live well, or even in a bait bucket. To help reduce the spread of curly-leaf pondweed, you and those that use your pond(s) should implement the following measures immediately:

- Do not bring in outside boats to fish any of these impoundments. Boats that stay on a particular small lake or pond are still acceptable for use but should not be transported to another impoundment. If a boat has been in a pond or small lake with curly-leaf pondweed and has traveled to another waterbody, we need to know that information as soon as possible. Please contact:

  Tyler Ham
  Fisheries Biologist
  Missouri Department of Conservation
  417/895-6881, ext. 1623

  In addition, any trailers or other equipment that enter the pond(s) or small lakes should not be moved to other water bodies.
- Thoroughly clean all fishing gear after each trip.
- Do not transport plants or fish to another waterbody.
- Do not remove curly-leaf pondweed plants from your property. Disposal of these plants should be handled on-site and under advisement from the Department of Conservation.
- Do not allow anyone to collect the plant for aquarium use or empty the contents of an aquarium in your pond or small lake.
- Do not purchase, plant, or sell curly-leaf pondweed.

Common Characteristics of curly-leaf pondweed:

- Submersed, usually rooted aquatic plant
- Can grow in depths up to 15-20 feet
- Leaves are oblong and can be slightly stiff (~1-4" in length and ½" wide)
- Leaves are wavy and finely-toothed (resembling small lasagna noodles)
- Leaves are arranged alternately, are directly attached to the stem, and become denser toward the end of the stem
- Turions are similar to small pinecones and are greenish-brown.
- Flower stalk grows up above the water surface, typically in June. It grows to about one inch tall and appears reddish-brown in the water, but is actually green when examined closely.

Figure 22: Curly-leaf Pondweed from Fellows Lake (2023)

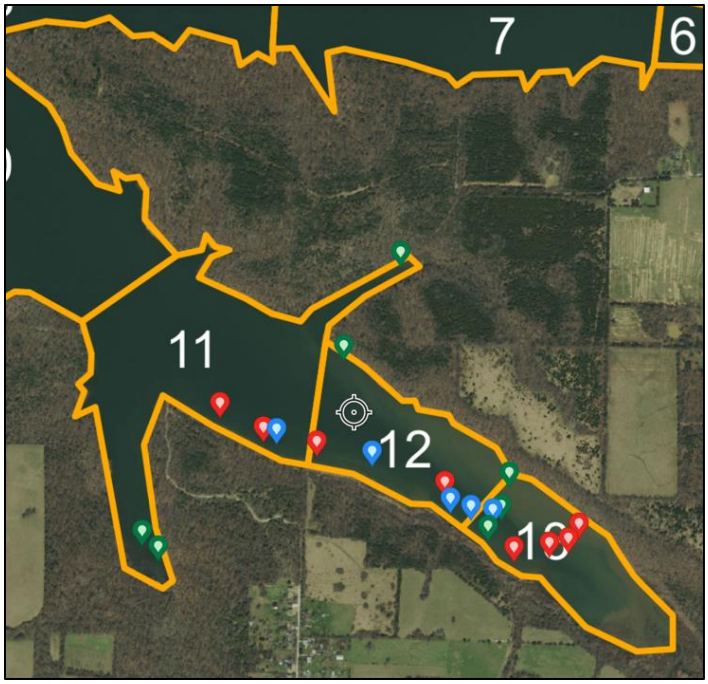

Figure 23: Locations of Curly-leaf Pondweed from MDC samples taken June 2023

Appendix 4: McDaniel Lake - Wetlands Project

City Utilities of Springfield is partnering with the Missouri Department of Conservation (MDC) to launch floating wetlands (FTWs) into McDaniel Lake, as well as planting native wetland species along the northeastern shoreline of the lake. This project includes a large collaboration of entities including Ozarks Technical Community College (OTC), Missouri State University (MSU), the Watershed Committee of the Ozarks (WCO), Watershed Natives, the Missouri Department of Natural Resources (MoDNR), the City of Springfield (CoS) and the James River Basin Partnership (JRBP).

McDaniel Lake experiences seasonal algal blooms due to excess nutrients, such as nitrogen and phosphate. These algal blooms are treated annually with copper- or oxygen-based algaecides. These treatments are costly and must be scheduled so as to remain within the discharge permit limits of CU's NPDES (MO-0130486). In order to reduce treatments at the lake, CU has decided to take a preventative approach by using natural, green methods.

Wetlands plants are excellent for the bioremediation of excess nutrients in drinking water sources. They are also a natural source of food for pollinators, a habitat for fish, and encourage the growth of algae-eating invertebrates. MDC has developed a project in which artificial islands are constructed out of non-plastic materials and planted with wetlands species native to the Springfield, MO area. These wetlands will consist of pontoon floaters and metal caging to eliminate the chance of releasing microplastics into the surrounding water. The perennial wetlands plants are sourced from the Watershed Natives nursey and will includes species such as Arrowhead, Blue Lobelia, Blue Mist Flower, Bur Sedge, Cardinal Flower, Copper Iris, Fringe Sedge, Lizard's Tail, Pickerelweed, Rose Mallow, Shinning Bluestar, Soft Rush, Soft-Stem Bulrush, Southern Blue Flag Iris, Swamp Milkweed, and Wool Grass.

The McDaniel Lake project consists of four floating wetlands and some shoreline planting. Launching of the islands and planting along the shoreline will take place in June 2024. The islands will be monitored through the 2024 algal season to determine growth rates and upkeep costs. Data will be collected to see how nutrients rates are affected in the lake system.

The McDaniel Lake FTWs will not be accessible to the public, but MDC will launch an additional FTW in Fellows Lake. Floating islands are also planned for Doling Park and Valley Water Mill. Signage will be placed at all public locations to educate the community on the benefits of wetlands species. This will allow the public to view a bioremediated approach to reducing pollutants in water sources. MDC will employ community outreach and training workshops to encourage local farmers to use FTWs on their own properties.

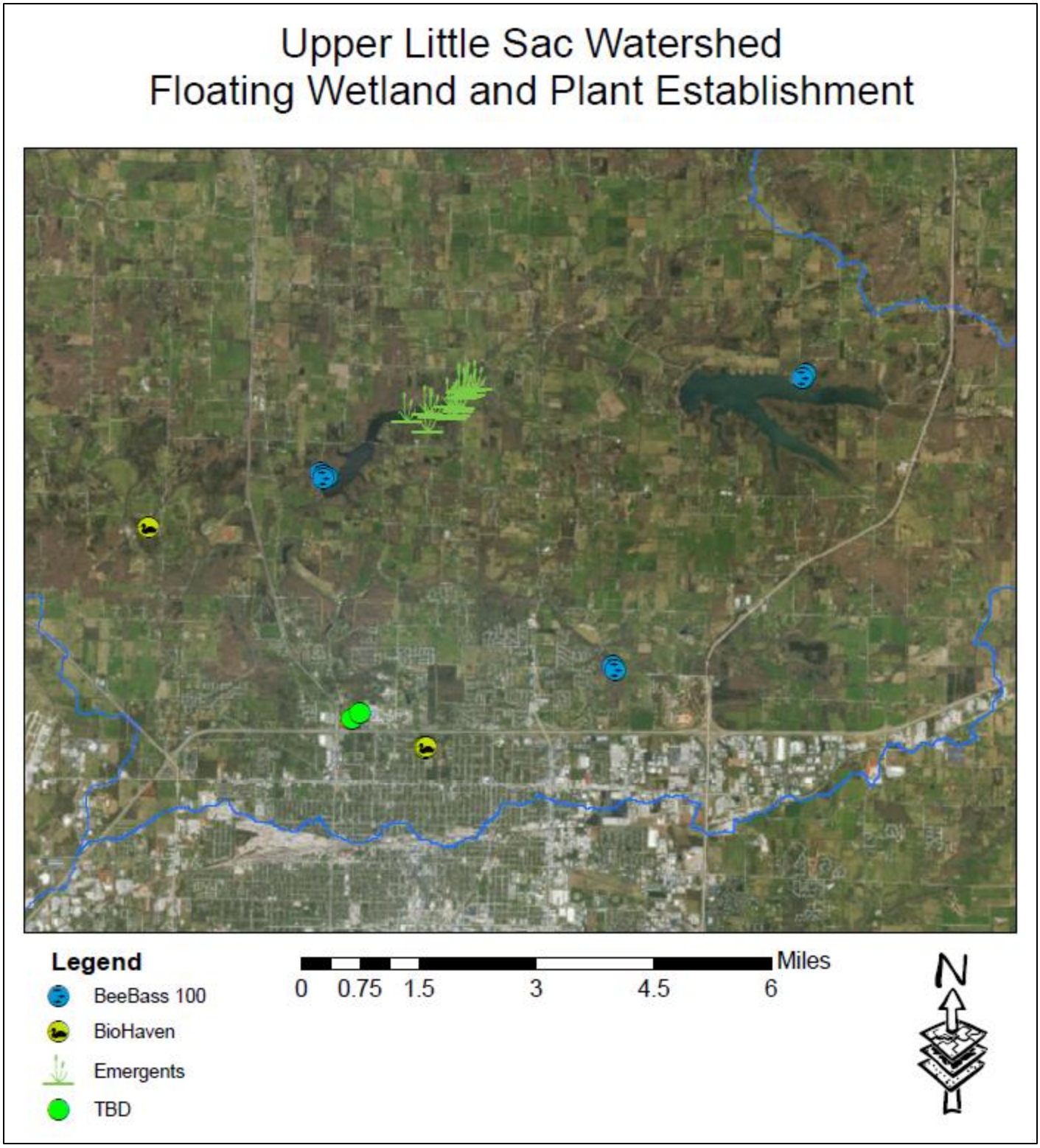

Figure 24: Map of Floating Islands and Shoreline Planting

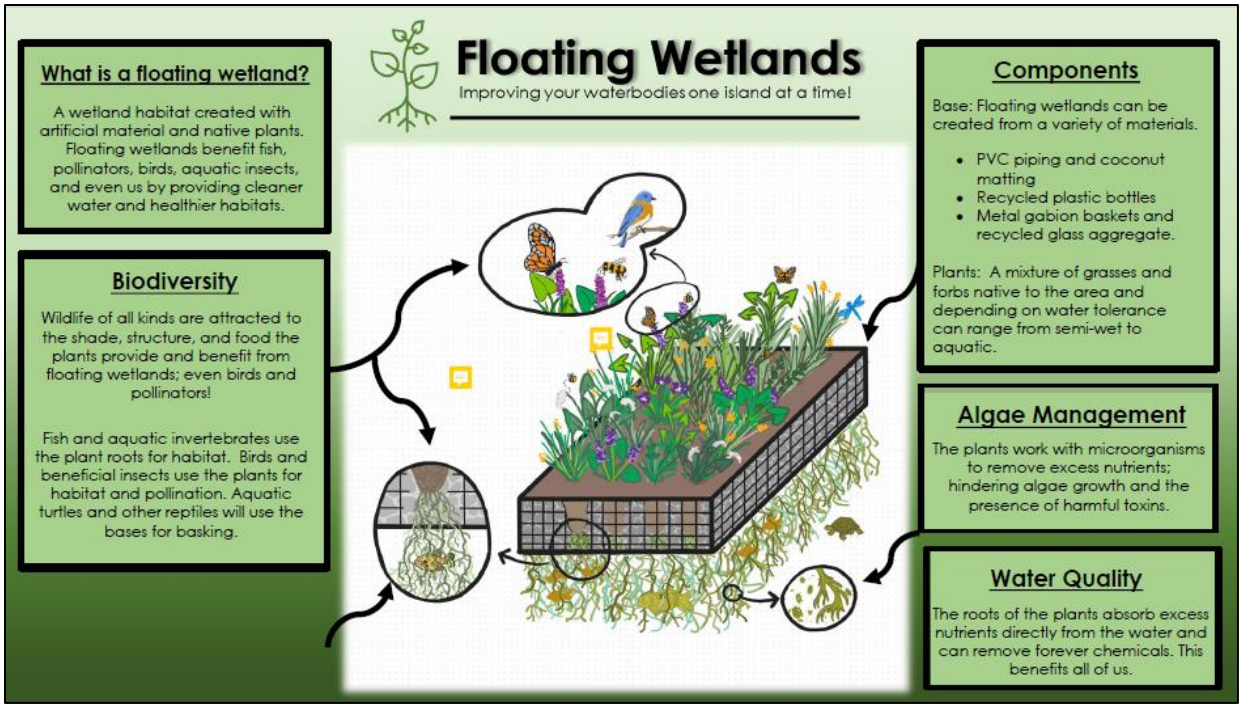

Figure 25: Diagram of Floating Wetlands

Appendix 5: Source Water Protection Resources

City Utilities Consumer Confidence Report 2016:
https://www.cityutilities.net/customer/water/

Northwest Wastewater Treatment Plant Contingency Plan, City of Springfield Public Works Department Sanitary Services Division. 2008

City of Springfield Sewer Overflow Response Plan, February 1, 2006

Greene County, Missouri. Application for Stormwater Permit for Small Municipal Separate Storm Sewer System (MS4). Stormwater Management Program, September 10, 2007

Greene County Multi-Jurisdictional Hazard Mitigation Plan, 2015-2020.
https://greenecountymo.gov/files/files.php?id=29958

Springfield-Greene County Emergency Operations Plan, 2008.
https://greenecountymo.gov/oem/

The City of Springfield Municipal Separate Storm Sewer System (MS4) Permit Annual Report, July 2011-June 2012.
https://www.springfieldmo.gov/DocumentCenter/View/3249

Local Stormwater Pollution Hotline 417-864-1010 and after hours contact Springfield Fire Department 417-874-2300

Upper Little Sac River Watershed Management Plan, Watershed Committee of the Ozarks and the Greene County Soil and Water District. 2009

City Utilities of Springfield, MO Triennial Report on the Condition and Operation of the Water System September 30, 2007 Black & Veatch

Water Quality Protection Policy for Fulbright Spring, Pierson Creek, and Sinkhole Watersheds #8648 City of Springfield, MO April 1999

City of Springfield Flood Control and Water Quality Protection Manual: A Stormwater Design Guide for Development in Springfield. 2017
https://www.springfieldmo.gov/DocumentCenter/View/34088

Watershed Groups:
Watershed Committee of the Ozarks www.watershedcommittee.org
Ozarks Water Watch www.ozarkswaterwatch.org/
James River Basin Partnership www.jamesriverbasin.com/

Water Treatment and Supply Management Program
(Includes Emergency Plans)

Appendix 6: Internet Resources

The following links may be of use for obtaining information pertinent to water quality and source water protection efforts.

Missouri Department of Natural Resources (MoDNR) main page http://www.dnr.mo.gov
- https://dnr.mo.gov/document-search/regional-office-map-directory (Regional Office map)
- https://dnr.mo.gov/about-us/division-environmental-quality/environmental-services-program (Environmental Services Program main page)
- https://dnr.mo.gov/publications-fact-sheets?page=0 (Publications and Fact Sheets)
- https://dnr.mo.gov/document-search/abandoned-wells-locating-plugging-reporting-pub2900/pub2900 (Abandoned wells)
- https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/wells-drilling/well-protection-maintenance (Well Protection and Maintenance)

MoDNR Division of Environmental Quality (DEQ) main pagehttps://dnr.mo.gov/about-us/division-environmental-quality

MoDNR Water Protection Program (WPP) main pagehttps://dnr.mo.gov/about-us/division-environmental-quality/water-protection-program
- https://mosoilandwater.land/sites/mosoilandwater/files/plug-wells.pdf (Power Point)
- http://www.dnr.mo.gov/env/wpp/sdwc/index.html (Safe Drinking Water Commission link)
- https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/wells-drilling (Wells and Drilling)
- https://dnr.mo.gov/content/public-drinking-water-branch (Contact Info)
- Public Drinking Water Systems main page: https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/public-drinking-water-system
- https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/public-drinking-water-system (2024 PWS Census)
- http://dnr.mo.gov/ccr/index.html (Consumer Confidence Reporting Information)
- https://www.dnr.mo.gov/DWW/DNRLogin.jsp (Drinking Water Watch Login)
- https://dnr.mo.gov/water/hows-water/monitoring-data/drinking-water (Drinking Water Monitoring)
- https://dnr.mo.gov/water/business-industry-other-entities/technical-assistance-guidance/public-drinking-water-systems/security (Drinking Water Security)

Center for Agriculture, Resource and Environmental Systems (CARES-MU) Drinking Water/Watershed Internet Resources https://extension.missouri.edu/programs/cares
- https://careshq.org/map-rooms/ (CARES map rooms)
- http://drinkingwater.missouri.edu/ (CARES drinking water main page)
- https://careshq.org/caresproject/missouri-source-water-assessment-portal-2/ (Missouri Sosurce Water Assessment Portal)
- http://www.dnr.mo.gov/env/wpp/stormwater/index.html (stormwater issues)
- http://www.dnr.mo.gov/env/wpp/cwc/index.html (Clean Water Commission link)

MoDNR Water Resources Center (WRC) main page https://dnr.mo.gov/about-us/missouri-geological-survey/water-resources-center
- https://dnr.mo.gov/publications-fact-sheets (WRC publications and Fact Sheets)
- https://dnr.mo.gov/document-search/groundwater-provinces-missouri-northeast-missouri-groundwater-province-pub2998/pub2998 (major groundwater provinces of Missouri)
- https://drinkingwater.missouri.edu/

MoDNR Division of Geology and Land Survey (DGLS) main page https://dnr.mo.gov/land-geology

https://dnr.mo.gov/land-geology/businesses-landowners-permittees/permits (Land and Geology-Related Permits)
https://dnr.mo.gov/land-geology/maps-data-research/geologic (Geologic Maps)

MoDNR Soil and Water Conservation Program (SWCP) main page https://dnr.mo.gov/land-geology/soil-water-conservation
https://mosoilandwater.land/ (Soil and Water Conservation Districts of Missouri)

MoDNR Financial Assistance Center (FAC) main page https://dnr.mo.gov/about-us/division-environmental-quality/financial-assistance-center
https://dnr.mo.gov/commissions-boards-councils/safe-drinking-water-commission (SDWC Homepage)
https://dnr.mo.gov/water/what-were-doing/state-revolving-fund-srf (Application forms for CWC SRF and DW SRF and guidance information)
https://dnr.mo.gov/water/what-were-doing/state-revolving-fund-srf/plans-reports (State Revolving Fund Plans and Reports [including Intended Use Plans])

United States Environmental Protection Agency (USEPA) main page http://www.epa.gov/
http://www.epa.gov/ow/ (EPA Office of Water main page)
http://www.epa.gov/safewater/ (EPA Office of Groundwater and Drinking Water main page)
http://www.epa.gov/safewater/sdwa/index.html (Safe Drinking Water Act)
https://www.epa.gov/tmdl/overview-total-maximum-daily-loads-tmdls (EPA info on TMDL's)
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-missouri (Water Quality Standards Regulations: Missouri)
https://www.epa.gov/aboutepa/epa-region-7-midwest (EPA Region 7 main page)
https://www.epa.gov/laws-regulations/summary-clean-water-act (Summary of the Clean Water Act)
https://www.epa.gov/wqs-tech (EPA water quality standards information)

Other Links
http://www.moruralwater.org (Missouri Rural Water Association main page)
http://www.asdwa.org/ (Association of State Drinking Water Administrators)
http://www.awra.org/ (American Water Resources Association)
http://www.awwa.org/ (American Water Works Association)
http://www.nrcs.usda.gov/ (NRCS main page)
http://www.mdc.mo.gov/ (Missouri Department of Conservation)
http://www.mostreamteam.org/ (Missouri Stream Teams)
http://www.usda.gov/wps/portal/usdahome (US Dept. of Agriculture main page)
http://mda.mo.gov/ (MO Dept. of Agriculture main page)
http://www.usace.army.mil/ (US Army Corps of Engineers main page)
http://www.usgs.gov/ (USGS main page)
http://water.usgs.gov/ (USGS main water page)
http://www.watershedcommittee.org/ (Watershed Committee of the Ozarks)

Appendix 7: Source Water Assessment and Susceptibility Determination Sheets

What is a source water assessment? A source water assessment is a study that defines the land area contributing water to each public water system, identifies the major potential sources of contamination that could affect the drinking water supply, and then determines how susceptible the public water supply is to this potential contamination. Public utilities and citizens can then use the publicly available study results to take actions to reduce potential sources of contamination and protect drinking water. As required by the Safe Drinking Water Act, states have completed source water assessments for virtually every public water system. To find Springfield's complete source water assessment visit https://drinkingwater.missouri.edu/ and use City Utilities' Public Water System No. 5010754.