

2010 Water Quality Management Plan Update

Fox River Basin, Wisconsin

August, 2010

The Upper Fox River Watershed, a 151 mi² watershed located almost entirely in Waukesha County, with a very small portion located in Washington County (Map 1), has over 80 perennial stream miles, 12,000 wetland acres and 2,900 lake acres are located in the Upper Fox River Watershed. This watershed forms the farthest upstream portions for the entire Fox River.

The Frame Park Creek sub-watershed is severely affected by development and associated increases in impervious surface area. This lack of infiltration contributes to the flashy nature of the stream flows. Impoundment structures prevent fish migration and contribute to higher water temperatures and degraded water quality.

This plan is for the Upper Fox Watershed but provides a special focus on the Frame Park Creek sub-watershed.



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Watershed Details

Population and Land Use

The 2001 National Land Cover Data shows that the Upper Fox River Watershed is dominated by agricultural land use (37%), followed closely by urban and suburban land uses (30%) (Figure 1).

Frame Park Creek, which lies mostly in the City of Waukesha, with just under 10 % contained in the Towns of Brookfield and Waukesha. Data from the Southeastern Wisconsin Regional Planning Commission showed that in 2000, 75% of the land in the watershed was developed for residential, industrial and commercial uses or occupied by roadways and other utility corridors. Undeveloped open space accounted for 18% of the watershed with woodlands, wetlands and parklands rounding out the remaining 7%.

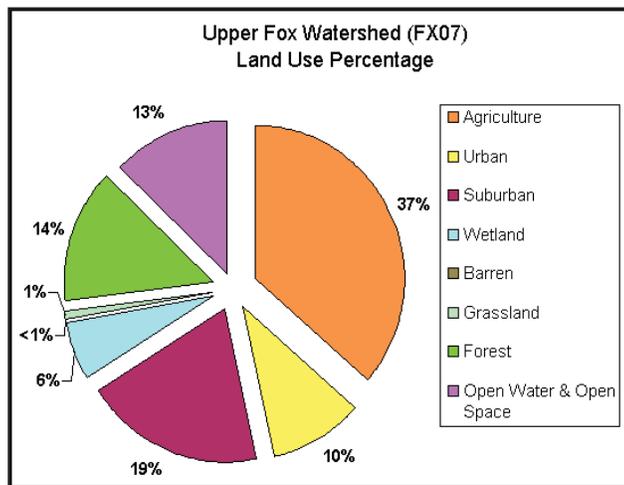


Figure 1. Land Use Upper Fox River Watershed

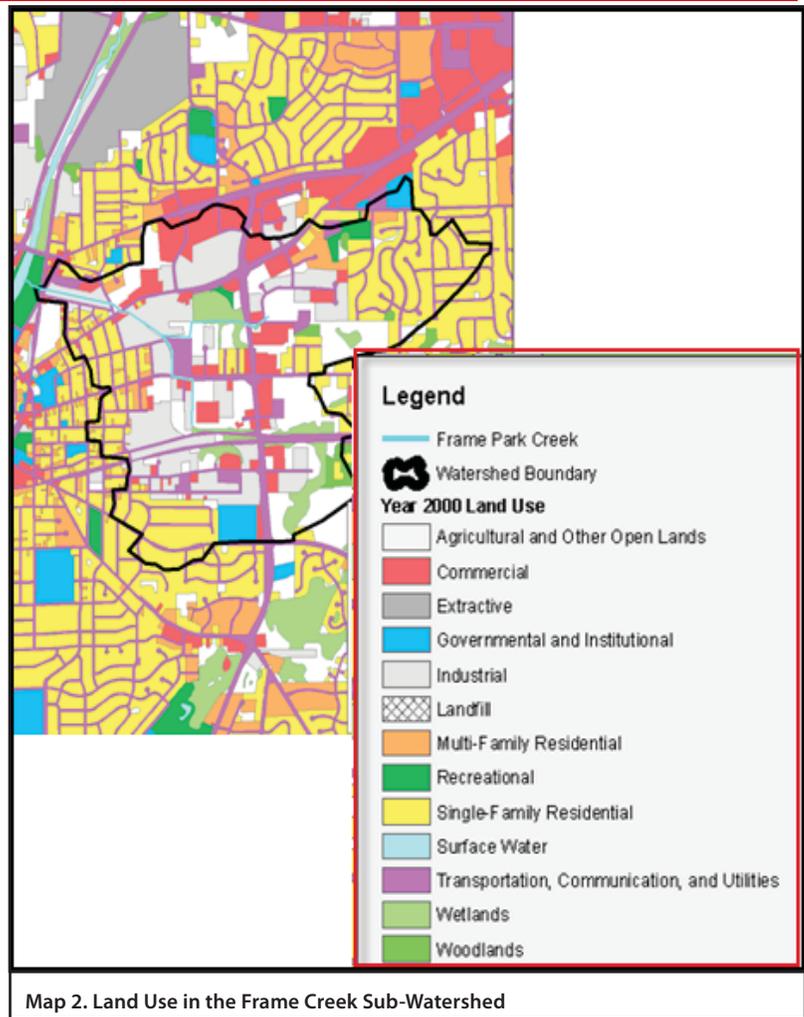
Year 2000 Land Use Distribution in the Frame Park Creek Sub-watershed (Map 2).

Below (Table 1) displays the Year 2000 Land Use analysis for the Frame Park Creek Watershed. This analysis is from SEWRPC and provides a detailed breakdown of the developed areas in the Frame Park Creek Watershed.

Hydrology

Frame Park Creek consists of a tributary and the mainstem; North Branch of Frame Park Creek and Frame Park Creek, respectively. Both the tributary and the mainstem are formed by springs, wetlands, and overland drainage, before receiving flow from urban stormwater runoff. Complicating matters, filled wetlands and leaching landfills are suspected of contributing contaminants to Frame Park Creek. After meeting the North Branch, Frame Park Creek flows northwest, then west, ultimately running underground for almost 600 meters, to emerge into a park managed by the City of Waukesha called, appropriately enough, Frame Park. The stream flows 100 meters through Frame Park before exiting into the Barstow Impoundment of the Fox River.

In addition to Frame Park Creek, the watershed has other significant water features. Despite decades of development happening all around them, marshes and streams in this watershed continue to provide habitat and natural stormwater detention.



Map 2. Land Use in the Frame Creek Sub-Watershed

Table 1. Year 2000 land use , Frame Park Creek Sub-watershed (SEWRPC Data, 2000).

Land Use Category	Acres	% of Total
Single-Family Residential	293	23
Industrial, Ag	250	19
Other Open Lands	237	18
Transportation/Communication and Utilities	230	18
Commercial	137	11
Wetlands	61	5
Multi-Family Residential	34	3
Governmental/Institutional	28	2
Woodlands	15	1
Recreational	13	1
TOTALS	1299	100

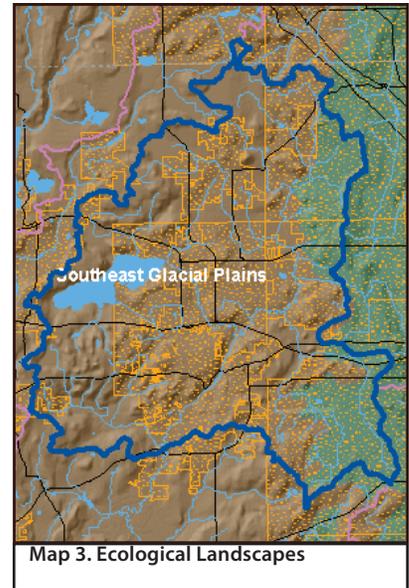


Children Enjoy Frame Park Creek, Photo by Brooke Robinson

Ecological Landscapes

The Upper Fox River - Illinois is located primarily in the Southeast Glacial Plains Ecological Landscape which makes up the bulk of the non-coastal land area in southeast Wisconsin (Map 3). This Ecological Landscape is made up of glacial till plains and moraines. Most of this Ecological Landscape is composed of glacial materials deposited during the Wisconsin Ice Age, but the southwest portion consists of older, pre-Wisconsin till with a more dissected topography. Soils are lime-rich tills overlain in most areas by a silt-loam loess cap. Agricultural and residential interests throughout the landscape have significantly altered the historical vegetation. Most of the rare natural communities that remain are associated with large moraines or in areas where the Niagara Escarpment occurs close to the surface.

Historically, vegetation in the Southeast Glacial Plains consisted of a mix of prairie, oak forests and savanna, and maple-basswood forests. Wet-mesic prairies, southern sedge meadows, emergent marshes, and calcareous fens were found in lower portions of the Landscape. End moraines and drumlins supported savannas and forests. Agricultural and urban land use practices have drastically changed the land cover of the Southeast Glacial Plains since Euro-American settlement. The current vegetation is primarily agricultural cropland. Remaining forests occupy only about 10% of the land area and consist of maple-basswood, lowland hardwoods, and oak. No large mesic forests exist today except on the Kettle Interlobate Moraine which has topography too rugged for agriculture. Some existing forest patches that were formerly savannas have succeeded to hardwood forest due to fire suppression.



Map 3. Ecological Landscapes

Historical Notes

One hundred and seventy years ago, before Waukesha County was settled, the Southeast Fox River Basin was much different than it is today. Native people-- the Fox, Winnebago, Potawatomi and Menominee--lived in a landscape that was rich with upland forests of maple, beech and basswood, and lowland areas dominated by tamarack, cedar and ash. In addition to the forests, the region was noted for being water and wetland rich. The abundant natural resources were catalysts for the first settlers' attempts at economic development in the basin .

Waukesha County was organized in 1846 and that same year the current City of Waukesha changed its name from Prairieville to the Village of Waukesha to become the county seat. Decades of city growth followed and the landscape that we now call the Frame Park Creek sub-watershed, transitioned from forests, prairies and wetlands to residential and industrial land uses with only minimal undeveloped open space.

Soon after, in August of 1869, Colonel Richard Dunbar changed the course of history. The Colonel, who had been suffering from incurable diabetes, drank from a spring in Bethesda and felt himself cured. This "miracle at Bethesda" generated a resort and tourist industry in Waukesha, the proclaimed "Saratoga of the West". People traveled from all around to visit beautiful parks, resorts, and "spring houses" in an attempt to find relief and relaxation from the more than 50 established spring sites. In 1915, springs, as a panacea for healing, was replaced in large measure by modern medicine. Commercial water bottling continued for over 100 years, and was eventually discontinued in 1997.



Hobbs Springs, Waukesha, Photo by Maureen McBroom, WDNR

Watershed Condition

Priority Issues

Due to its highly impaired condition and location near residential areas where young children are frequently found playing in and around the stream, Frame Park Creek is a priority for stream restoration efforts in the Upper Fox River Basin.

Water Quality Goals

The Upper Fox River Watershed has eleven waters listed as impaired. Restoration of these waters, with a focus on the creation of a total maximum daily load (TMDL) analysis and implementation plan for Frame Park Creek, is the highest water quality goal for this watershed.

Overall Condition

Today, both the mainstem and north branch of Frame Park Creek suffer from severe impairments. The majority of wetlands originally present have been drained and filled. The combined effects of stream modifications like channel manipulation, relocation, and enclosure have damaged water and habitat quality. These water bodies are included on WDNR's statewide list of polluted and impaired waters for degraded habitat, chronic toxicity, temperature, and low dissolved oxygen due to point and non-point source discharges.

Fish Consumption Advice

The WDNR has issued specific consumption advice for the Fox River for PCBs.

Point and Nonpoint Sources

Frame Park Creek drains 1,300 acres of mostly industrial, residential and commercial property on the northeast side of the City of Waukesha. It consists of a 1.9 kilometer long tributary called the North Branch, and a 2.1 kilometer long Mainstem called Frame Park Creek. Both the tributary and the Mainstem begin as wetland and overland drainage before receiving the majority of their flow from urban stormwater runoff.



Frame Park Creek Near Junction with Illinois Fox River
Photo by Brooke Robinson

River and Stream Condition

The Upper Fox River Watershed contains over 80 miles of perennial streams exhibiting a wide range of quality. The Fox River, Frame Park Creek, Spring Creek / Sussex Creek, Poplar Creek, Zion Creek, and various perennial streams are impaired and part of the state's 303(d) list.

Cocoa Creek

Cocoa Creek, which flows into Pewaukee Lake, has the potential to support a cold water community. The Pewaukee River contains a fairly decent forage and gamefish population. Sussex Creek has been impacted by development and mining in the area. This area is severely impacted by development and by increases in the amount of impervious surfaces. This contributes to the flashy nature of the streams in this area. Impoundments contribute to decreased fish migration and degraded water quality.

Frame Park Creek

Frame Park Creek is the unofficial name of a largely overlooked small stream located in the midst of a densely urbanized landscape. It consists of a 1.9 kilometer long tributary called the North Branch, and a 2.1 kilometer long Mainstem called Frame Park Creek. Both the tributary and the Mainstem begin as wetland and overland drainage before receiving the majority of their flow from urban stormwater runoff. After the Mainstem and North Branch meet, just downstream of National Avenue, Frame Park Creek flows northwest for approximately 480 meters, going under Main Street, before turning

left under Cleveland Avenue. The creek then flows through a storm sewer that runs under Perkins Street. Frame Park Creek emerges from its underground enclosure west of the train tracks near Frame Park which borders the Illinois Fox River. The creek flows 100 meters through the park before pouring into the Barstow Impoundment of the Fox River. During the 1970's the creek was diverted from under a factory to the storm sewer under Perkins Street.

Frame Park Creek is severely impaired from historic stream modifications, including channel manipulations, relocations and enclosures, and polluted stormwater runoff, which have damaged both water and habitat quality. Both the mainstem and the North Branch are currently included on WDNR's statewide list of polluted and impaired waters for degraded habitat, chronic toxicity, temperature, and low dissolved oxygen due to point and non-point source discharges.

Pebble Creek

Pebble Creek, and its major tributary Brandy Brook, drain approximately 18 square miles located in the extreme southwest corner of the Upper Fox River Basin before flowing into the Illinois Fox River just north of State Highway 59. Pebble Creek has the potential to support a coldwater Class I and II brook and brown trout fishery. Although Brook trout have never been recorded in this urbanizing watershed, healthy populations of mottled sculpin, a coldwater indicator species, have been recorded in the headwaters of this stream system. Since the mid 1990s, the WDNR has annually stocked brown trout at CTH TT and the trout have responded well to this effort. While the upper portions of the watershed contain coldwater species, the lower portions of Pebble Creek extending from CTH D to the confluence with the Fox River contain northern pike among several other high-quality warmwater species. Citation: Pebble Creek Watershed Protection Plan, Southeastern Wisconsin Regional Planning Commission, Community Assistance Report No. 284, 2008.

Lake Health

Fifty lakes are located in the Upper Fox Watershed, ranging from small unnamed lakes near an acre in size to large impoundments of the Fox River, such as the Barstow Impoundment, which is 27 acres or the natural lake, Pewaukee, which covers 2493.0 acres in size. In the last 10 years 15 of these 50 lakes have been monitored, but only three have documented, confirmed condition information. Pewaukee Lake and Etter Lake are in 'good' condition, while Barstow Impoundment is in poor condition and is on the state's impaired waters list.

Wetland Health

Wetland Status

The Upper Fox River Watershed consists of primarily of wetland habitat. An estimated 11% of the current land uses in the watershed are wetlands. Only 54% of the original wetlands in the watershed are estimated to exist. Of these wetlands, a mixture of forested wetlands (43%), shrub wetlands (27%) and emergent wetlands (26%), which includes wet meadows and marshes dominate the landscape. Other unidentified types of wetlands make up 45% of the wetlands in the watershed.

Wetland Condition

Little is known about the condition of the remaining wetlands but estimates of reed canary grass infestations, an opportunistic aquatic invasive wetland plant, into different wetland types has been estimated based on satellite imagery. This information shows that reed canary grass dominates 62% of the existing emergent wetlands, which include marshes and wet meadows, and 23% of the remaining shrub wetlands. Reed Canary Grass domination inhibits successful establishment of native wetland species.

Wetland Restorability

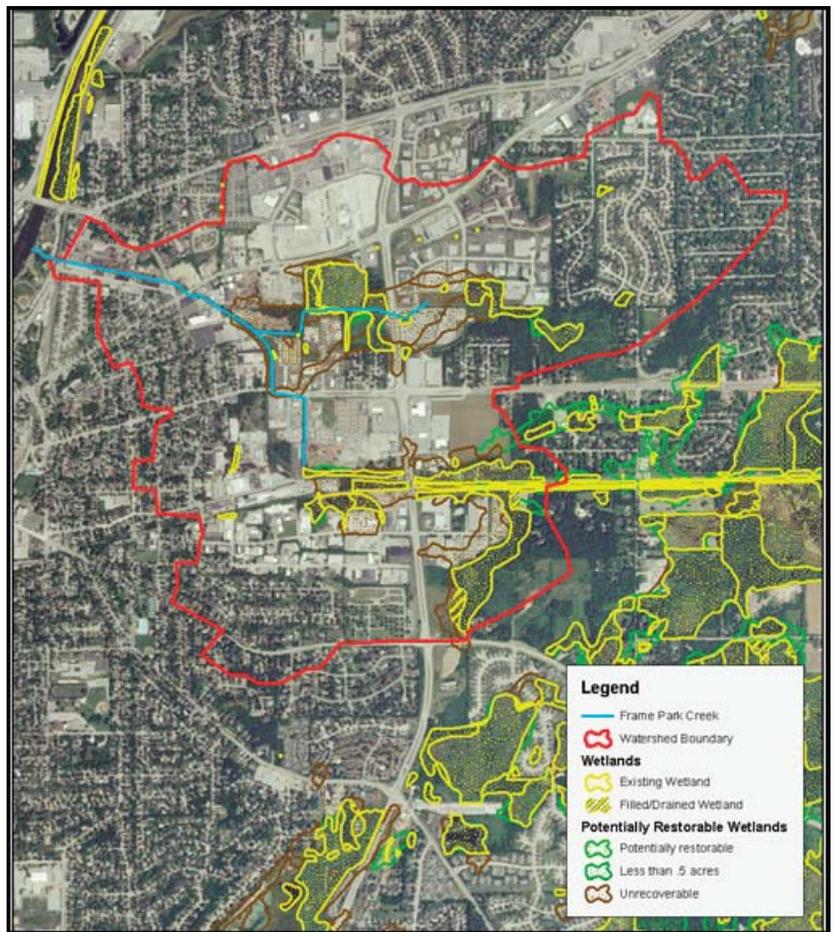
Of the 8,850 acres of estimated lost wetlands in the watershed, approximately 53% are considered potentially restorable based on modeled data, including soil types, land use and land cover (Chris Smith, DNR, 2009).



Wetlands, North Branch of Frame Park Creek, 2010.
Photo by Brooke Robinson

Frame Park Creek Sub-watershed's Wetlands

Besides Frame Park Creek, the sub-watershed's other major visible surface water features are several wetlands scattered throughout the basin. Several of these wetlands are relatively large. The mainstem originates in a 30 acre wetland located behind several large retail buildings just east of Highway 164 and south of Arcadian Avenue. This wetland is crossed by the New Berlin Recreational Trail which makes it particularly accessible to bicyclists and walkers. Another large, square shaped 14 acre wetland is located along the North Branch just southwest of the junction of Mainstreet and Highway 64. A portion of this wetland is used as a golfball driving range. Frame Park Creek's existing wetlands, and those wetlands that have been filled or drained in the past but have the potential to be restored, provide important habitat, recreational, aesthetic, storm-water management and water quality filtering purposes. These wetland areas are highly valuable and should be protected from further infringement. Figure 3 shows the Frame Park Creek sub-watershed with the historic and present day wetland habitat.



Map 4. Frame Park Creek - Including Historic and Present day wetland habitat

Groundwater

The City of Waukesha, one of Wisconsin's 10 most populous cities, gets most of its municipal water from the deep sandstone aquifer. This water frequently exceeds the federal standard for radium, a naturally occurring radioactive element. The City is currently under a state order to reduce the radium in its water by June 30, 2018 to comply with the federal standard. The City is currently investigating several options for reducing its radium concentrations including the increased blending of radium tainted water from the deep aquifer with radium free water from new shallow aquifer wells, the installation of radium removal equipment, and procuring Lake Michigan water.

Frame Park Creek Wetlands Summary Notes:

- Total subwatershed area = 1299.18 acres
- Existing wetlands as of 2005 = 81.03 acres
- Filled/draind wetlands (since 1987) = 3.08 acres
- Potentially restorable wetlands = 7.68 acres
- Unrecoverable lost wetlands = 123.53 acres

Waters of Note:

Outstanding and Exceptional Resource Waters (ORW/ERW)
 There are no ORW/ERW waters in this watershed.

Trout Waters

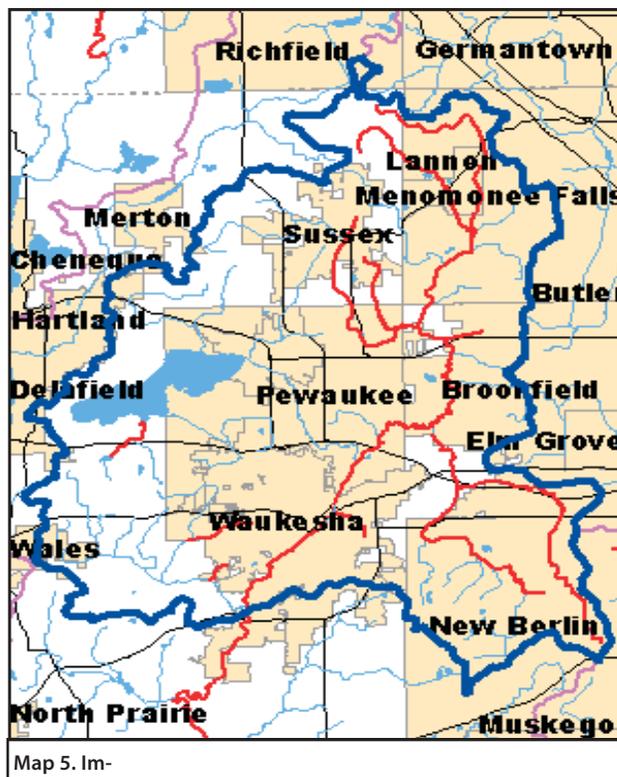
There are three waters designated as Trout waters - Brandy Brook, Pebble Creek, and Coco Creek support partial or complete natural reproduction of salmonid species.

Impaired Waters

The Upper Fox River Watershed contains eleven impaired waters, one of which is Frame Park Creek. Majority of the pollutants in these waters include: PCBs, phosphorus, sediment/total suspended solids; thus, leading to degraded habitat, contaminated sediment, low dissolved oxygen levels, and contaminated fish tissues. See table below for Frame Park Creek impairment details.

Aquatic Invasive Species

Unfortunately all of the following aquatic invasive species are documented in this watershed: Zebra mussels, Eurasian Water Milfoil, Curly-Leaf Pondweed, Brown Mystery Snail, Rusty Crayfish, Purple Loosestrife, Reed Canary Grass.



<i>Impaired Segments of Frame Park Creek</i>	<i>Low Do</i>	<i>Habitat Alteration</i>	<i>Sediment</i>	<i>Toxicity</i>	<i>Temperature</i>
Frame Park Creek – Mainstem	x	x	x	x	x
Frame Park Creek – North Branch	x	x	x	x	x

Watershed Actions

Grants and Projects

There have been numerous grants carried out within the Upper Fox River Watershed, majority of them being for the Fox River, and various smaller creeks and lakes. Grants include various lakes grants, aquatic invasive grants, and NPS grants, that entail lake protection activities, aquatic invasives education, large scale lake planning efforts, and urban non-point stormwater conduction activities.

Monitoring

Monitoring efforts in the Upper Fox River Watershed include lakes baseline and trends monitoring, various fisheries projects, AIS monitoring and prevention work, and citizen based lake monitoring network (CLMN) data collection. This watershed was part of a selected area studied by the USGS National Water Quality Assessment (NAWQA) program.

The Citizen Lake Monitoring Network, the core of the Wisconsin Lakes Partnership, involves over 1000 citizen volunteers statewide. The goals are to collect high quality data, to educate and empower volunteers, and to share this data and knowledge. Volunteers measure water clarity, using the Secchi Disk method, as an indicator of water quality. This information is then used to determine the lakes trophic state. Volunteers may also collect chemistry, temperature, and dissolved oxygen data, as well as identify and map plants, watch for the first appearance of Eurasian Water Milfoil near boat landings, or alert officials about zebra mussel invasions on Wisconsin lakes.

Recommendations

The recommendations below highlight this plan's focus on the Frame Park Creek Watershed. Due to its highly impaired condition and its location near residential areas where young children are frequently found playing in and around the stream, Frame Park creek is a priority for WDNR stream restoration efforts in the Upper Fox River Basin.

Frame Park Creek

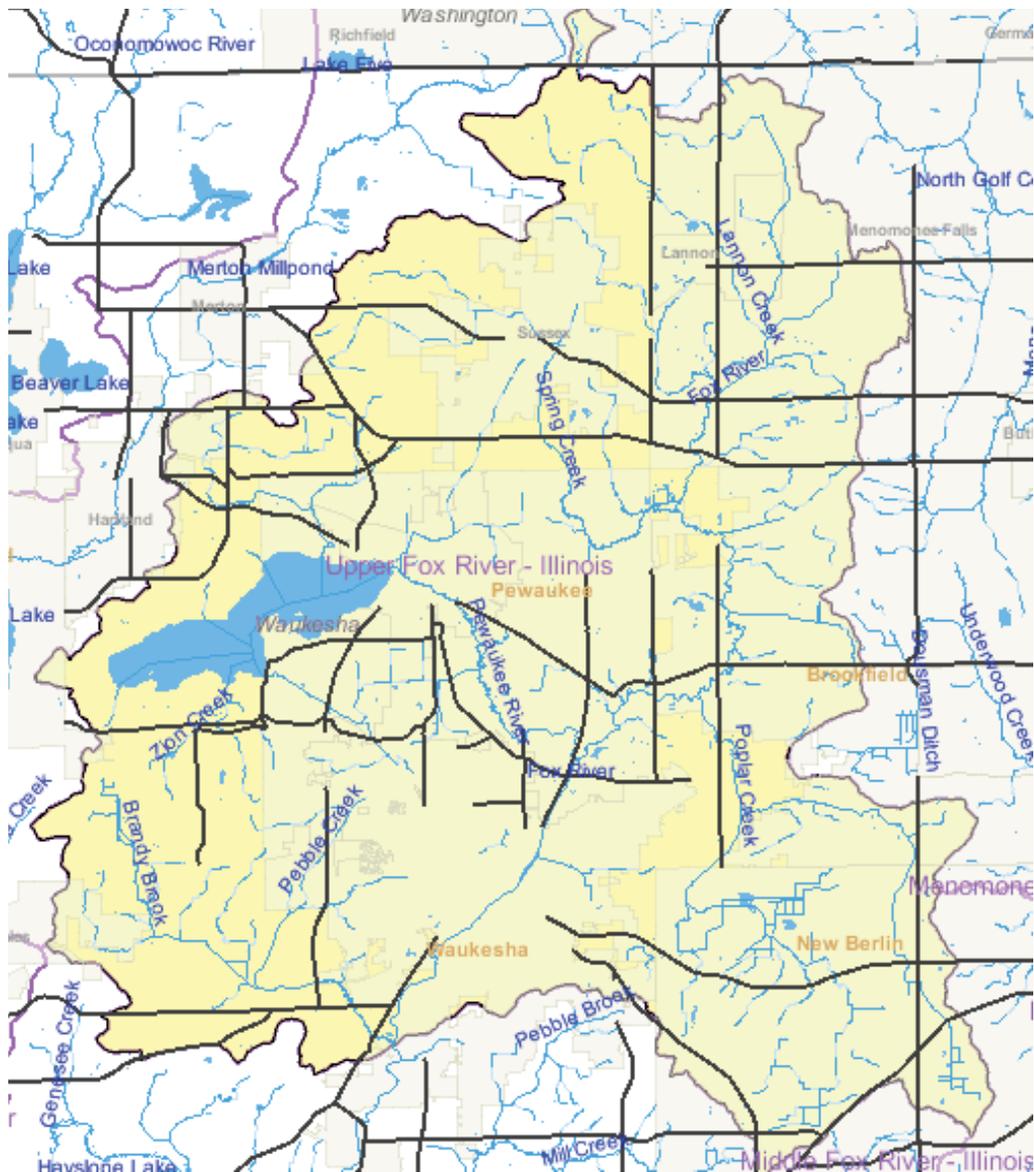
- Officially name Frame Park Creek.
 - Delineate Frame Park Creek sewershed. Review sewershed map with City of Waukesha staff.
 - Conduct desk-top review of WPDES permitted facilities within watershed; update and contact non-permitted sites accordingly.
 - Work with outside partners (City and Private Property Owners) to identify potential restoration/remediation/improvement projects. Pursue funding to complete projects. Start with the following priorities:
 - a. Protect and restore stream buffers
 - b. Protect and restore green space in upland areas
 - c. Pursue opportunities to re-meander channelized stream segments
 - d. Investigate removal of the hydraulic barrier to fish and aquatic life passage
 - e. Investigate sources of high levels of pollutants.
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- Mid Reaches of Frame Park Creek, , Photo by Brooke Robinson
- Potentially develop Frame Park Creek Technical Advisory Team (TAT) with known stakeholders including industrial businesses, the Fox River Commission, WDNR, and the City of Waukesha.
 - Develop watershed-specific monitoring protocol & benchmark goals to measure success; include evaluation of benchmark goals and monitoring results after a certain time period.
 - Reach out to upstream property owners about the uses of the stream in the park and water quality concerns.
 - Assemble a list of reported spills or other violations and develop site-specific recommendations to prevent future spills.
 - Schedule and coordinate FPC Watershed Plan update meetings with stakeholders.
 - a. Develop strategy to focus on stormwater, ground water, wetland restorations, industrial discharges, etc.
 - b. Encourage adoption of stormwater best management practices

Watershed

Initiatives to protect and restore the water resources of the Upper Fox River Watershed should be a collaborative process, including local municipalities & agencies, private partners and the general public.

1. Collect data on streams, wetlands and lakes in the watershed. Make information available in usable forms to technical staff and to the general public.
2. Issue and enforce industrial, municipal, construction, animal waste, wastewater, waterway and wetland permits in urban and non-urban areas in the watershed.
3. Work with partners to protect and restore wetland communities identified in the Southeast Wisconsin Regional Planning Commission's (SEWRPC) Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin to provide water quality, habitat and scenic benefits to the area.
4. Identify long-term sediment removal projects and other water quality projects and work with local authorities and other interested parties on strategies and implementation of these restoration efforts.

5. Promote access to recreational opportunities in and around the Upper Fox River watershed's streams, lakes and wetlands. Promote educational opportunities and partnerships in and around these areas.
6. The Department of Natural Resources should continue to work cooperatively with local municipalities and other interested parties on water diversion issues.
7. Interested partners, including conservation & environmental groups, private stakeholders, local, state and federal agencies, etc., should work cooperatively to effectively relay water quality information to the public and to implement water quality initiatives and projects.



Upper Fox River Watershed (FX07) Detail

Map of Entire Fox River Illinois. from Absolute Astronomy, <http://image.absoluteastronomy.com/images/encyclopediainages>



About the Fox River Headwaters
From, "<http://image.absoluteastronomy.com>"

The Fox River rises near Menomonee Falls, Wisconsin, a village in Waukesha County, Wisconsin, and is part of the Greater Milwaukee area. The river flows past

The population of Menomonee Falls was 32,647 at the 2000 census, making it the most populous village in Wisconsin. It is the fourth largest community in Waukesha County. The River flows past Brookfield, city in Waukesha County (population 38,649 at the 2000 census). Brookfield is the second largest community in Waukesha County, and the leading commercial suburb of Milwaukee.

Waukesha, through which the river flows, is a city and the county seat of Waukesha County, Wisconsin, in the Upper Midwest region of the United States. As of the 2008 population estimate, Waukesha had a total population of 68,008, and was the largest community in the county. The city is located adjacent to the Town of Waukesha.



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Wisconsin DNR's mission involves preserving, protecting, and restoring natural resources. Watershed Planning provides a strategic review of water condition to enhance awareness, partnership outreach, and the quality of natural resource management.

Upper Fox Watershed Frame Park Creek