

Appendix A – Acronyms and Abbreviations

ACPF - Agricultural Conservation Planning Framework

ACEP - Agricultural Conservation Easement Program

BMP - Best Management Practices

CAP - Continuing Authorities Program

CARL - Conservation and Recreation Lands

CFO - Confined Feeding Operation

cfs - cubic feet per second

CFU - Colony Forming Units

CREP - Conservation Reserve Enhancement Program

CRP - Conservation Reserve Program

CSCR - Charleston Side Channel Reservoir

CSOs - Combined Sewer Overflows

CSP - Conservation Stewardship Program

CWA - Clean Water Act

DO - Dissolved Oxygen

DWM – Drainage Water Management

ECHO – Enforcement and Compliance History Online

EIU - Eastern Illinois University

EMC - Event Mean Pollutant Concentrations

EQIP - Environmental Quality Incentives Program

ERMA - Embarras River Management Association

ENSOAQ - Environmental Solutions AQ

FC - Fecal Coliform

fIBI – Fish Index of Biotic Integrity

FEMA - Federal Emergency Management Agency

FIRM- Flood Insurance Rate Maps

FIS - Flood Insurance Studies

FSA - Farm Service Agency

GIS - Geographic Information Systems

GLO - General Land Office

HEL- Highly Erodible Land

HUC - Hydrologic Unit Code

IDNR- Illinois Department of Natural Resources

IDOA – Illinois Department of Agriculture

INLRS – Illinois Nutrient Loss Reduction Strategy

Illinois EPA - Illinois Environmental Protection Agency

INAI - Illinois Natural Areas Inventory

MapMod - Modernization Project

mg/L - milligrams per liter

mIBI – Macroinvertebrate Index of Biotic Integrity

MGD – Million Gallons per Day

NO₂ – Nitrite

NO₃ - Nitrate

NLCD - National Land Cover Dataset

NH₄ - Ammonia

NPDES - National Pollutant Discharge Elimination System

NPS - Nonpoint Source

NRCS - Natural Resource Conservation Service

NWI – National Wetland Inventory

PFC – Partners for Conservation

PCB - Polychlorinated Biphenyls

PLSS - Public Land Survey System

PRD - Planned Residential Developments

PUD - Planned Unit Developments

STEPL - Spreadsheet Tool for Estimation of Pollutant Load

SRP – Soluble Reactive Phosphorus

STP - Sewage Treatment Plant

SSRP – Stream Bank Stabilization and Restoration Program

SSURGO - Soil Survey Geographic Database

SWCD - Soil & Water Conservation District

T&E - Threatened and Endangered

TN - Total Nitrogen

TKN - Total Kjeldahl Nitrogen

TP – Total Phosphorus

TMDL - Total Maximum Daily Load

TSS - Total Suspended Solids

USACE - United States Army Corps of Engineers

USDA - United States Department of Agriculture

USEPA - United States Environmental Protection Agency

USGS - United States Geological Survey

USLE - Universal Soil Loss Equation

USWRC - United States Water Resources Council

WASCB – Water and Sediment Control Basin

WMP - Watershed Management Plan

WRP - Wetland Reserve Program

WTP - Water Treatment Plant

WWTP - Wastewater Treatment Plant

Appendix B – References

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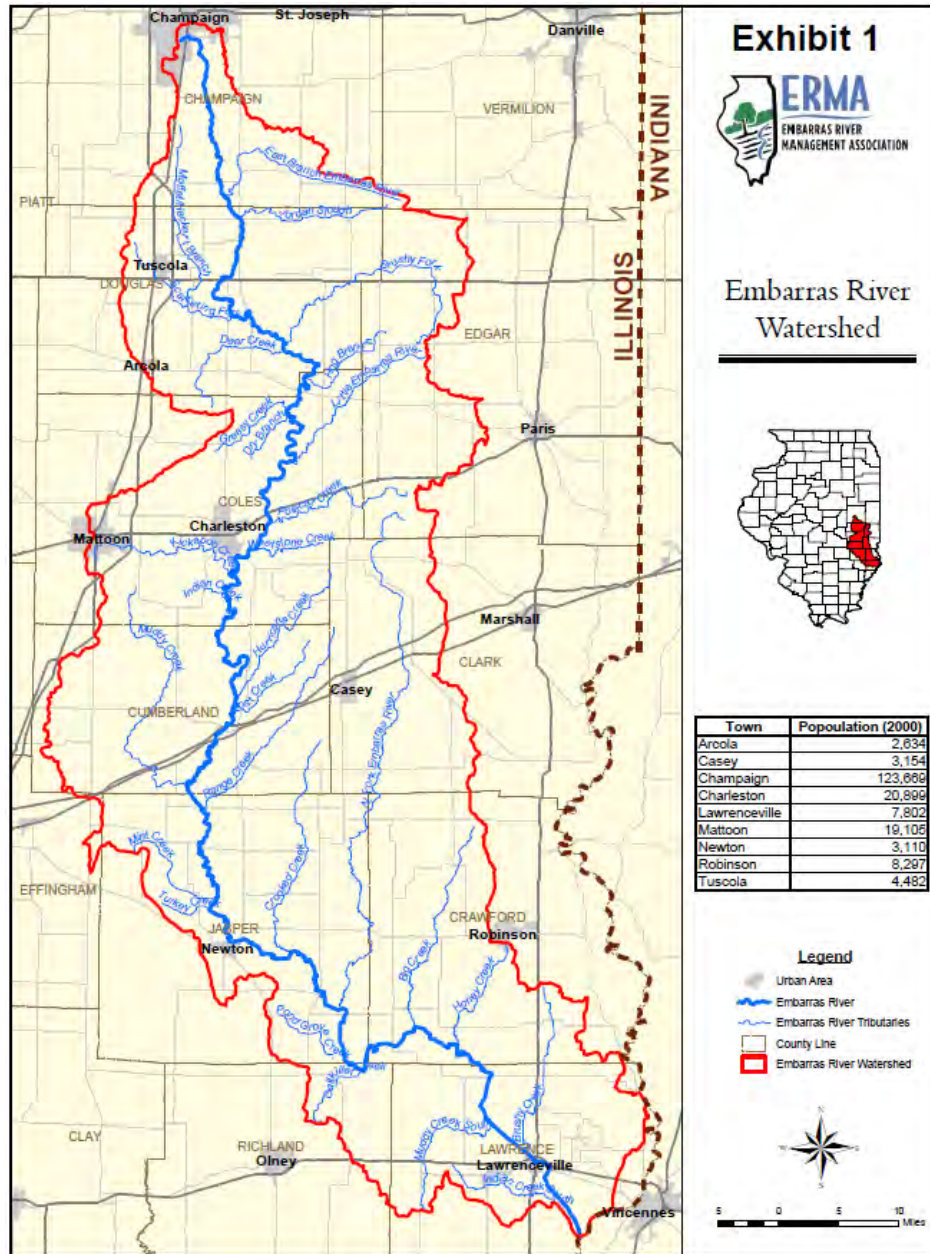
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Appendix C

Embarras Watershed Planning Meetings Feedback and Outlook Report – January 2020



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Introduction

In January 2020, the Illinois Farm Bureau (IFB), ten County Farm Bureaus, Soil and Water Conservation Districts (SWCD) and the University of Illinois Extension hosted a series of nine watershed planning meetings across the Embarras River Watershed (ERW). These planning meetings gave farmers and landowners the opportunity to share their concerns and interests across the entire watershed and allowed organizers to collect important information as the group continues their work in updating the 2011 Embarras River Watershed Management Plan. This report will provide background information on previous and current watershed update efforts, as well as identifying high level takeaways from each meeting within the watershed.

Background – Why do we need watershed plans?

The Embarras River Watershed (ERW) was identified in the Illinois Nutrient Loss Reduction Strategy as a priority watershed for reducing phosphorus losses. The NLRs guides state efforts to improve water quality in all sectors and capacities within the state. The ERW is one of the state's most critical watersheds in terms of phosphorus losses. One of the most impactful ways to address nutrient loss within watersheds is to develop a **watershed plan**.

A watershed plan includes a comprehensive summary of the overall condition of a watershed and the protected waters that may be impacted by sources of pollutants, as well as provides a framework for effectively and efficiently restoring water quality in impaired waters. Further, watershed plans give direction to strategic implementation of conservation practices within a watershed in order to meet water quality goals. Watershed plans have a life of 10 years, meaning the 2011 Embarras River Management Plan will expire in 2021. Without a watershed plan in place, stakeholders within the watershed have a decreased chance of receiving funding from certain state and federal programs for implementing conservation practices. All implementation of conservation practices is voluntary. Involving local stakeholders in the planning process is critical to the success of the watershed plan.

In Summer 2019, stakeholders across the ERW worked together to apply for a Section 319 Nonpoint Source Pollution Grant through the IEPA, with significant support from Jeff Boeckler (*Northwater Consulting*), Lauren Spaniol (*Coles County SWCD*) and Jennifer Woodyard (*U of I Extension*). Stakeholders across the watershed proved once again that they are committed to protecting the Embarras River by fundraising over 40% of the cost to update the watershed plan, a requirement set forth by the IEPA. While waiting to hear from IEPA on the status of the grant application, stakeholders across the watershed gathered to share their feedback on what the 2021 Embarras River Watershed Management Plan should include. With the help of a Nutrient Stewardship

Grant from the Illinois Farm Bureau, ten County Farm Bureaus and Soil and Water Conservation Districts, with University of Illinois Extension, hosted nine Watershed Planning Meetings across the watershed. These meetings, though targeted to farmers, attracted individuals from many backgrounds, including landowners, elected officials, conservation enthusiasts, and others. The subsequent sections of this report provide summaries of these nine meetings, including general information about the meetings and audience members, as well as their concerns and interests in implementing conservation practices in the watershed.

Richland and Lawrence Counties - January 7, 2020

The watershed planning meetings kicked off with a breakfast meeting hosted by Richland County Farm Bureau (*Kenzie Zwilling, Manager*), Richland County SWCD (*Loleta Yonaka, Resource Conservationist*), Lawrence County Farm Bureau (*Paige Langenhorst, Manager*), and Lawrence County SWCD (*Kristi Cooley, Resource Conservationist*). The audience for this meeting was composed of 45 individuals, primarily farmers from the counties.

Members of the audience started the meeting by discussing several of their issues across the watershed. Many of the farmers expressed major **erosion** issues, including streambank erosion and measurable sedimentation in streams and fields. One farmer expressed that he measured 4-5 feet of sedimentation in one location on his farm, a sentiment that many related to. Farmers who had **sedimentation** issues also found themselves questioning what they could do with mass volumes of sand and sediment, indicating that they were often met with challenges when trying to permanently remove sediment from their fields. Another area of concern for several members of this group centered around their experiences with **cover crops**. Some of the issues with cover crops included: challenges with getting them established, keeping them under control, accessing the



Audience members at the Richland and Lawrence watershed planning meeting shared their Embarras Watershed experiences, concerns, and interests with Jennifer Woodyard (U of I Extension) and Jeff Boeckler (Northwater Consulting).

right products for their fields, and major concerns about the costs and benefits of adding cover crops to their rotations.

For the watershed plan update, farmers had several interests and ideas for practices that should be included. Farmers in the audience indicated that there were fairly extensive **terraces** throughout the counties but would be interested in seeing **cost-share** or **technical support** for upgrading existing terraces, in addition to re-tiling where it makes sense. While many had previously expressed several concerns with cover crops, they also indicated that they would like to see more local education and economic data on cover crops. The group also expressed a lot of interest in developing **education and outreach** for the public. Many farmers felt it was important to educate the non-farming, general public on 'what's happening on the farm,' indicating that their non-farming neighbors (including their distant neighbors in Chicago and Springfield) often don't realize the need or benefit of conservation practices. In the words of one farmer, "How can we get funding if people representing us don't even know what we are doing or even care?"

Crawford County – January 7, 2020

To round out the first day of planning meetings, Crawford County Farm Bureau (*Kourtney Mellendorf, Manager*) and Crawford County SWCD (*Lorri Shaw, Administrative Coordinator*) hosted approximately 30 farmers at the Crawford County Forest Preserve.

Like the attendees at the Richland and Lawrence meeting, members of this audience expressed concerns with **sedimentation** and **erosion**, as well as with **log jams** and



Crawford County farmers shared their concerns and interests with Jennifer Woodyard, including repeatedly voicing the need for more financial support within the watershed.

emerging **gulleys** as a result of rapidly moving water. Many individuals were also concerned with the overall **cost**, **practicality**, and **time** associated with implementing conservation practices. Many also shared their concerns about getting sufficient **funding** to implement conservation practices in Southern Illinois.

Farmers in this audience indicated that their fields were **tiled**, which they clarified worked better for them than terraces because of the differing soil types in Crawford County. Audience members also shared that many fields across the county had **filter strips** and that there was not a

strong desire to add more. Many farmers in the audience were interested in adding **Water and Sediment Control Basins (WASCOBs)** and in introducing more subsurface irrigation and ponds within the county – in the words of one member “everyone wants a pond.” Several audience members also expressed the need for local, on-going **research** on conservation practices, including economic data from the region. Similar again to the Richland and Lawrence County audience, many attendees from Crawford County wanted to see more **funding** for conservation programs in Southern Illinois, specifically requesting **education and outreach** for landowners and the general public on existing conservation efforts and how they could get involved, as well as education and outreach for farmers to better understand existing programs and funding opportunities for implementing conservation practices.

Champaign County – January 16, 2020

On January 16th, the Champaign County Farm Bureau (*Brad Uken, Manager*) and Champaign County SWCD (*Erin Bush, Resource Conservationist*) hosted the third Embarras Watershed Planning Meeting. Roughly 20 individuals attended this meeting, with the majority of the audience being composed of farmers or other agriculture professionals.

Members of this group astutely identified the Villa Grove main channel as a key area of concern for them. Many felt that although the Embarras River was backing up in several places, it was especially poor in this area. This conversation drew out additional concerns about **regulatory restrictions** on main channel work, namely **streambank stabilization**. Many were also troubled by their urban neighbors, noting several instances of local lakes and wastewater treatment facilities that they felt were contributing to nutrient loss at a significant rate. Similar to feedback from previous participants, many members of the Champaign County audience expressed concerns about **cover crops**, including the cost, timing, and possible risks on future crop yields.



Champaign County farmers shared their concerns and interests for the watershed plan, including the need for improved education and outreach.

Many farmers in this audience indicated that they are using **Variable Rate Technology (VRT)** to apply fertilizers but believed there should be more farmers using these practices throughout the county to help make more significant changes. To help better address nutrient loss, some audience members identified a need for **research** on

natural baseline nutrient losses. Several also expressed interest in **cost-share** programs or initiatives to help off-set the cost of strip-till and other conservation equipment. This group also identified several areas for increased or improved **education and outreach**, including: best management practices for fertilizer application, specialized soil education to help eliminate erosion, managing cover crops, information on existing cost-share programs, and non-farmer landowner education and outreach of conservation practices.

Coles County – January 23, 2020

Coles County Watershed Planning Meeting attendees kicked off the first meeting on January 23 with a rainy-day breakfast at the Coles County Farm Bureau (*Tonya Eich, Manager*) in collaboration with the Coles County SWCD (*Lauren Spaniol, Research Conservationist*). The meeting was comprised of 17 individuals, with a roughly even split between farmers and non-farming landowners or members of local conservation organizations.



Jeff Boeckler shares some of the steps he will take as he updates the Embarras River Watershed Plan, including collecting data about the river and nutrient runoff.

Of course, **flooding** was once again identified as a primary concern within the watershed, including additional troubles with **water surges**. Many members of this group indicated that they had **ponds** to store water, but cited concerns that existing ponds are not working properly and that they had issues finding someone to design new ponds. Several individuals cited concerns with their **neighbors**, with most of the group being able to identify several landowners and farmers that they argue refuse to implement conservation practices for a variety of reasons. While many farmers in the audience indicated a significant amount of **field tiles** and **terraces** throughout the county, there was some concern that the sheer amount of tiling might be negatively impacting the rising river.

Audience members expressed a variety of interests they would like to see addressed in the watershed plan to help address their concerns. To start, a few individuals suggested working on a smaller watershed scale within the Embarras watershed in order to more accurately encompass the vast soil differences within the county. Many also supported the addition of various **edge of field practices**, such as woodchip bioreactors and saturated buffers, across the county, as well as in field practices such as **filter strips** and additional **grass waterways**. In addition, several farmers were interested in seeing

more **cost-share** for **cover crops** and conservation equipment rentals, as well as increased funding for **soil testing** and **data collection**.

Edgar County – January 23, 2020

Edgar County Farm Bureau (*Wyatt Williamson, Manager*) and Edgar County SWCD (*Tara Hopkins, Resource Conservationist*) hosted a group of 14 actively engaged farmers and agriculture professionals, marking the fifth of nine watershed planning meetings.

Like their fellow farmers across the watershed, this group also expressed concerns for accessing funds for conservation practices. Many supported the effort to request 319 funds, with a few even citing positive 319 experiences in the past but were concerned that there wasn't enough **financial support** in East Central Illinois to make effective change within the watershed. Additionally, several members of this group indicated that even when they were ready to implement a conservation practice, they often struggled to find **contractors** to design and install them. Anecdotally, some felt that there are limited contractors in the area and fewer who stayed.

To address their conservation concerns, farmers in attendance had already implemented extensive **waterways**, **terraces**, and **tiling** systems throughout the county, but expressed the need for **funding** for repairs. **Bank stabilization** and conservation practices that account for **surges** were key interests that the group would like to see addressed in the watershed plan. Many in the group were also interested in **cover crops** and cover crop **education and outreach**. Specifically, members of the audience indicated that they wanted to receive specialized, one-on-one **mentoring** on chemical application and cover crops for individual fields, including strong interests for more farmer-led presentations.

Douglas County – January 23, 2020

Roughly 30 individuals attended the sixth Embarras Watershed Planning Meeting, held at the Douglas County Ag Center (*Tyler Harvey, Farm Bureau Manager; Devon McCumber, SWCD Resource Conservationist*). As soon as this meeting started, farmers led the conversation on their concerns, conservation practices, and future interests within the watershed.

Numerous members of this audience expressed that they were already consistently using **cover crops** on their farms as a way to address nutrient loss. Several noted they were currently implementing cover crops without **cost-share** assistance, though cost-share helped them in initial years of adoption. Many felt continued cost-share

assistance would be a great asset to those who have not yet adopted or tried cover crops. Additionally, most farmers in the group indicated that they had some combination of **terraces**, **tiles** and **WASCOBs** in their fields. Many individuals also expressed that they were practicing **low** or **no-till** on their farms, as well as **spring-only fertilizer application**. Many members of this group raised specific concerns with capturing nutrients before they hit **drainage ditches**. Several felt that the only way to address these concerns would be to plant more acres of cover crops across the county, however, many indicated that their **neighbors** within and outside of the county may not be as willing to implement this conservation practice.

Several individuals expressed concerns with **gaps in data** and the implications this could have on farmers. For example, some indicated a lack of understanding in yearly fluctuating nutrient levels, long-term changes in nutrient levels, and effects of nutrient loss besides Nitrogen and Phosphorus in both streams and soils. To address this concern, several expressed the need for more **research** focused on numerous aspects of conservation and increased **funding** for organizations like the Illinois Nutrient Research and Education Council (NREC).



Farmers led the conversation at Douglas County on Jan. 23, covering topics such as research, cover crops, and spring fertilizer application.

Members of this audience expressed support for incorporating more acres of cover crops throughout the watershed within the watershed plan. Many indicated that they would also like to see more cover crop **technical assistance**, especially in picking seed mixes that are appropriate for individual fields, for example. Several members of the group expressed interest in developing a “**cover crop support group**” to support individuals who continue to use cover crops after conventional cost-share opportunities expire.

Jasper County – January 30, 2020

To begin the final day of Watershed Planning Meetings, the Jasper County Farm Bureau (*Tony Trimble, Manager*) and Jasper County SWCD (*Brad Tarr, Resource Conservationist*) hosted the seventh meeting, which included an audience of 30 members. Most attendees were farmers, but many also played various roles in the agriculture industry.

Flooding and **fast-moving water** were primary concerns for farmers in Jasper County, as well as **top-soil erosion**. For several attendees, **cover crops** were also an area of concern, primarily in terms of cost and return, maintenance, timing, and reliability of cover crops. Additionally, many attendees raised concerns about city and district **roads**, including major washouts and questions about the nutrient run-off coming from roads.

In order to address their concerns within the watershed, a few were using some **cover crops**, and most had varying **grass waterways**. Some members of the audience also had **retention ponds** to help manage water storage concerns. In the updated watershed plan, farmers indicated that they wanted to see more **research on legacy nutrients**, in order to better understand natural nutrient loss and to gauge how farm practices contribute to overall losses. Further, the group expressed interest in supporting regular clearing of **log jams**, as well as **dredging** parts of the river.



After breakfast, Jasper County farmers were ready to engage in watershed planning efforts. They shared their problems within the watershed, as well as the practices they would like to see in the updated plan.

Cumberland County – January 30, 2020

The Cumberland County Farm Bureau (*Sarah Walk, Manager*) and Cumberland County SWCD (*Randy Hurt, Resource Conservationist; Judy Meislahn, Administrative Coordinator*). hosted a lunchtime meeting on January 30. The audience for this meeting was composed of 30 individuals, with a majority being farmers or agriculture professionals, as well as landowners, contractors, and local Soil and Water board members.

Members of the group cited many water-related concerns, such as **gulleys**, stream **washout**, **sedimentation**, **streambank erosion**, **log jams**, and **sheet and rill erosion**. Additionally, the practicality and economics of **cover crops** were a concern for some farmers in the audience, who did indicate that they would be more interested in adding cover crops to their rotations if they had access to local, individualized **economic** and **technical guidance**. For some, deciphering whether they were allowed to repair or install their own conservation practices, or whether they had to involve regulatory agencies was another area of concern.



Randy Hurt leads audience participation, focusing on some of the local conservation practices in Cumberland County.

Farmers in this audience either currently employed or were interested in a variety of conservation practices to address their concerns. By way of raising hands, approximately 50 percent of the audience indicated that they had acres enrolled in some sort of **CRP** or other conservation program. Several were also currently planting **cover crops**, including winter wheat, or had tried them in the past and were interested in trying to utilize them again. Other interests included consistent **log jam** removal, in addition to **cost share** for several projects, such as: **ditch checks**, long-term cover crop programs, **terraces**, **dry dams**, road and ditch repair, as well as many others.

Clark County – January 30

The final Embarras River Watershed Planning Meeting was held at the Clark County Farm Bureau (*Tony Trimble, Manager*) with the Clark County SWCD (*Jim Nestleroad, Resource Conservationist*). The audience was composed of 20 attendees, with over half having some sort of farming or agriculture-related background.

Attendees expressed several concerns related to the watershed, including issues with **sheet and rill erosion** and **soil compaction**. For those experiencing these issues, many felt that erosion and compaction were the most prominent near and along the North Fork Embarras River. Many farmers in the audience indicated issues with **absentee landowners** along the river, especially with hunters who were skeptical to implement conservation practices that may interfere with hunting. Additionally, several attendees were concerned that their existing conservation practices had maintenance or functional issues, such as filter strips filling and then dumping water elsewhere.

Audience members identified several possible interests to include in the updated watershed plan. A few farmers indicated that they were consistently planting **cover crops** on their fields, and several agreed that they would likely plant cover crops if more long-term **cost share** programs existed. Most attendees expressed interest in support for **maintenance** of existence conservation practices across the county, including having parts of the **river dredged**. Finally, many farmers in the audience supported new approaches to **regional marketing campaigns**, particularly ones that could use videos from local farmers to share conservation practices “in action.”

Next Steps and Special Thanks

The stakeholders responsible for submitting the IEPA Section 319 grant expect to be notified by late spring 2020 if the grant was successfully funded. If the application is funded, the 2021 Embarras River Management Plan will incorporate the significant feedback from these planning meetings.

First, many thanks go out to all of the stakeholders that helped to apply and fundraise for the Section 319 grant, including: Jeff Boeckler (Northwater Consulting), Jennifer Woodyard (U of I Extension), Lauren Spaniol (Coles County Soil and Water Conservation District), local SWCDs, County Farm Bureaus, the Illinois Farm Bureau, and many private funders.

In addition, a special thank you goes out to the Illinois Farm Bureau for funding the watershed planning meetings, and to IEPA for support of these efforts. Thank you also to the Richland, Lawrence, Crawford, Champaign, Coles, Edgar, Douglas, Jasper, Cumberland and Clark County Farm Bureaus for playing an integral part in promoting and hosting the planning meetings.

Finally, we would like to thank the nearly 190 individuals who attended the watershed planning meetings. Your feedback has been invaluable, and we hope to continue working with you in the Embarras Watershed.

Embarras River Watershed Plan

Information for stakeholders interested in the plan update

What is a Watershed-Based Plan and Why is it Needed?

A watershed-based plan summarizes the overall condition of the watershed and provides an integrated, holistic framework to effectively and efficiently restore water quality in impaired waters and to protect water quality in other waters adversely affected or threatened by point source and nonpoint source pollution.

The Embarras River Watershed (ERW) is identified as a phosphorus priority in the Illinois Nutrient Loss Reduction Strategy. This means that the ERW is one of the state's most critical watersheds in terms of phosphorus losses. In excess quantities, the nutrients phosphorus and nitrogen can impair drinking water quality, harm aquatic life, and limit recreational opportunities by fertilizing harmful algal blooms. This has been evident in the Gulf of Mexico hypoxic zone, but also closer to home in Illinois.

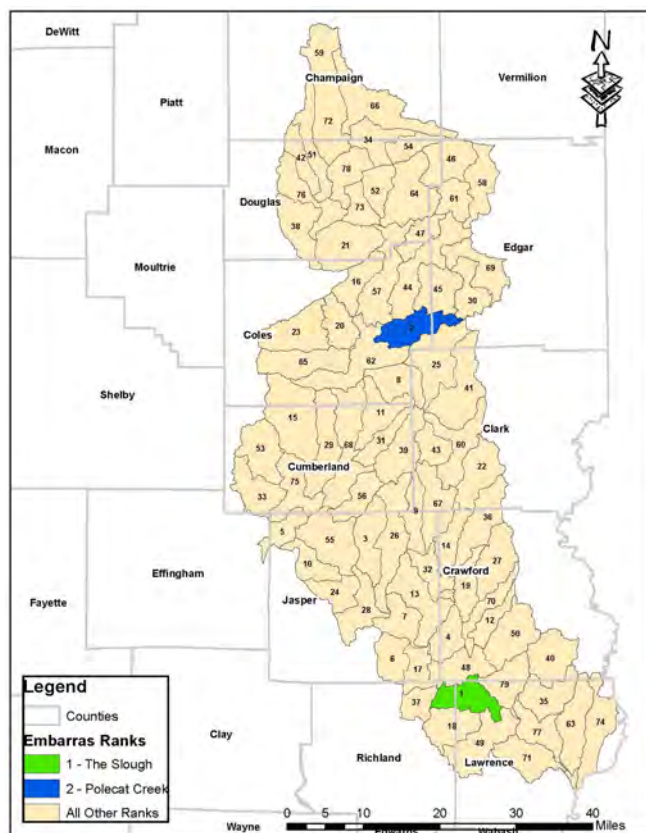


FIGURE 1 Map of the Embarras River Watershed with subwatersheds ranked for prioritized, detailed planning efforts. The Slough and Polecat Creek subwatersheds ranked highest and will be the focus subwatersheds during this planning effort.



FIGURE 2 Polecat Creek in Coles County (March 23, 2021).

Need to Know Items

- ✓ On behalf of all the stakeholders in the ERW, the Coles County Soil and Water Conservation District was awarded a Section 319 grant from Illinois EPA in January 2021 to update the watershed plan.
- ✓ Illinois EPA is providing \$106,614, while stakeholders in the ERW provided \$71,075 in match funds. Thank you for your support!
- ✓ Northwater Consulting is conducting the plan update with some assistance from local SWCDs, Extension, and Illinois Farm Bureau.
- ✓ The watershed plan update will take approximately one and a half to two years to complete.
- ✓ The entire HUC 8 ERW plan will receive a general update. Two HUC 12 subwatersheds, The Slough and Polecat Creek (see Figure 1), will receive detailed planning. These watersheds were selected based on a data-driven analysis, stakeholder input, and staff capacity.
- ✓ Stakeholders in the watershed, such as Soil and Water Conservation Districts and municipalities, can utilize watershed plans to apply for Section 319 Nonpoint Source Pollution Grant funds through the Illinois EPA. Stakeholders can use these funds to implement Best Management Practices to reduce nutrient losses into local water bodies. **Having an approved watershed plan strengthens applications for funding.**

Questions? Contact Jennifer Jones, Extension Watershed Outreach Associate, at 217-347-7773 or woodyar2@illinois.edu



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Section 9 – Subwatershed Based Implementation Plan

The planning committee chose eight priority HUC-10 subwatersheds to focus on in further detail in terms of identifying project locations and initiating project implementation. This was done due to the expansive size of the watershed and the need to focus on smaller areas in further detail. The priority subwatersheds are shown on exhibit 21. Several factors went into selecting these priority subwatersheds which include:

- Level of stakeholder interest and involvement potential
- Results from watershed inventory, modeling and GIS analysis
- IEPA 303(d) list

It is important to note that it is not the intent of the planning committee to neglect any of the other subwatersheds. This plan was made to support watershed improvements and project implementation for the entire watershed, and it is the hope of the planning committee that this plan provides the tools and resources to help support all efforts throughout the watershed.

All load reduction estimates shown in this section are general estimates for planning purposes only, sites specific and detailed load reduction estimates will have to be calculated on an individual project basis.

East Branch Embarras River Subwatershed

Subwatershed Characteristics

Subwatershed Location

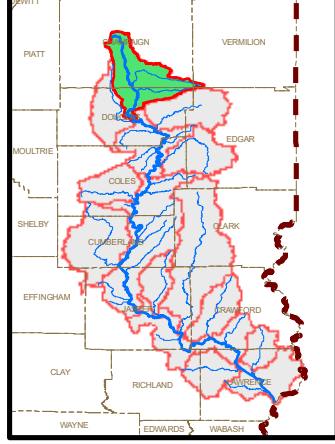
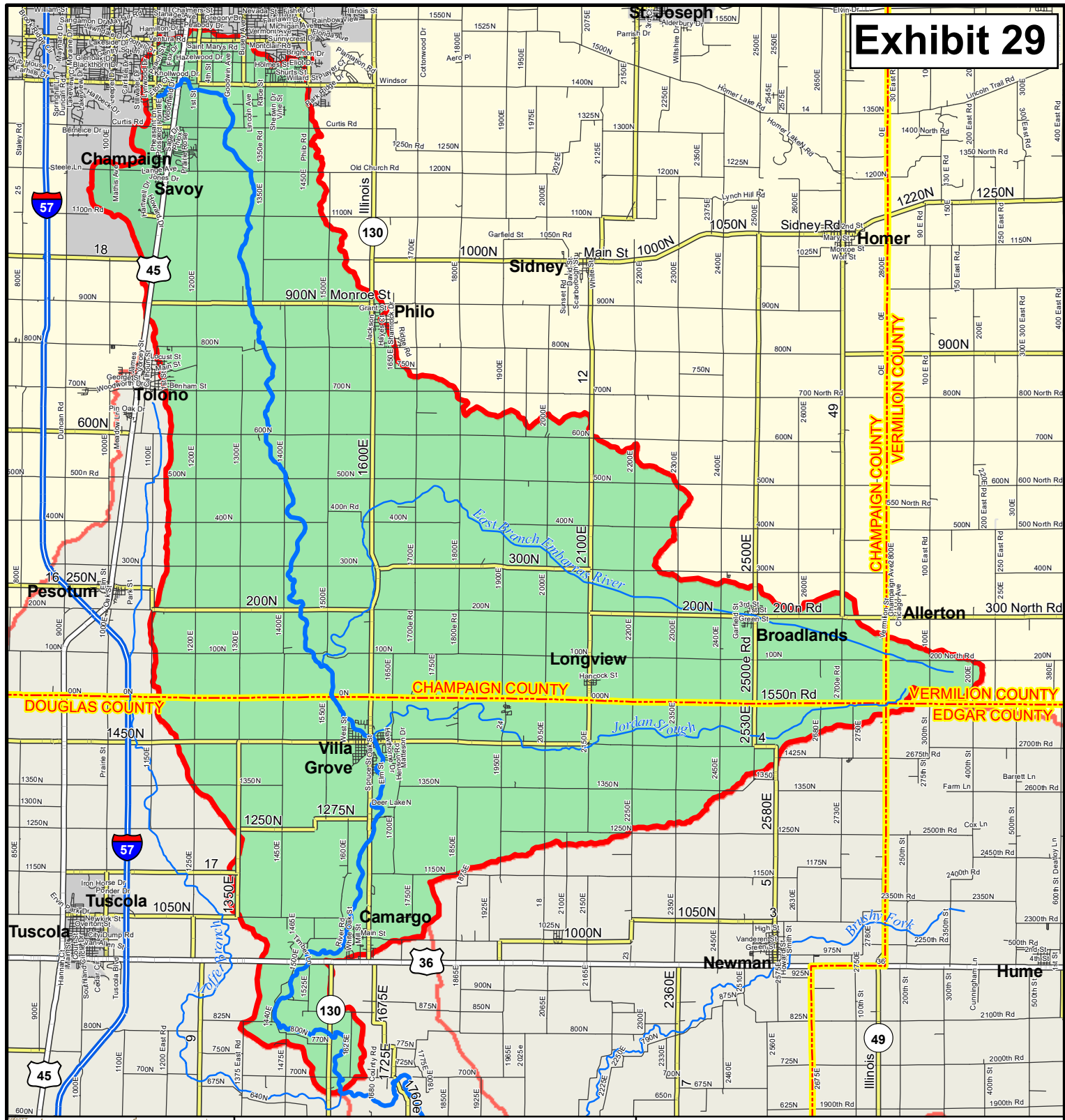
The East Branch Embarras River Subwatershed (HUC 10 – 0512011201) is located primarily in Champaign County with smaller portions in Douglas, Edgar and Vermilion Counties as shown in Exhibit 29. The subwatershed encompasses approximately 122,219 acres (7.8% of the watershed) and includes the Embarras River, East Branch Embarras River and Jordan Slough.

The Embarras River flows for approximately 32.3 miles generally north to south through the subwatershed. The East Branch Embarras River and Jordan Slough both flow east to west through the subwatershed to their confluence with the Embarras River. The East Branch Embarras River is approximately 19.9 miles long, while Jordan Slough is approximately 15.1 miles.

Population

According to the 1990 Census, the population within the East Branch Embarras River Subwatershed was approximately 19,398. In the 2000 Census, the population was approximately 22,187, an increase of 14.4%.

The majority of the subwatershed is relatively sparsely populated with population density averaging less than 0.2 people per acre. The most densely populated areas are located in the northern portion of the subwatershed and are associated with the City of Champaign.

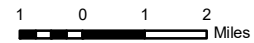
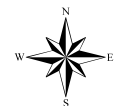


East Branch Embarras River Subwatershed

HUC: 0512011201 Acres: 122,219

Embarras River Watershed Plan

Subwatershed Location Map



Legend

- Urban Area
- Embarras River
- Embarras River Tributaries
- County Line
- East Branch Embarras River Subwatershed
- Embarras Subwatersheds
- Interstate
- US Highway
- State Highway
- Local Road
- Minor Road
- Other Road
- Ramp

Land Cover

Land Use within the East Branch Embarras River Subwatershed was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 82.4% of the subwatershed covered by agriculture (Table 9-1), the East Branch Embarras River Subwatershed still remains primarily rural and agricultural. The developed areas (approximately 12.3%) are concentrated in the northern portion of the subwatershed and are associated with the City of Champaign.

Table 9-1: East Branch Embarras River Subwatershed Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	100,736	82.4%
Barren	53	0.0%
Developed	15,068	12.3%
Forest	2,101	1.7%
Grassland	4,051	3.3%
Open Water	95	0.1%
Wetlands	115	0.1%
Total	122,219	99.9%*
*Note – Percent totals do not add to 100% due to rounding		

Soil Characteristics

The soils within the East Branch Embarras River Subwatershed fall into five major associations (Table 9-2). Over half of the subwatershed falls within the Catlin-Flanagan-Drummer association (58.0%) which consists of nearly level to gently sloping silty soils.

Table 9-2: East Branch Embarras River Subwatershed Soil Associations		
Association	Acres	Percentage
Catlin-Flanagan-Drummer	70,838	58.0%
Plano-Proctor-Worthen	26,543	21.7%
Saybrook-Dana-Drummer	12,440	10.2%
Lawson-Sawmill-Darwin	1,583	1.3%
St. Charles-Camden-Drury	10,815	8.8%
Total	122,219	100.0%

Highly erodible soils comprise approximately 754 acres (0.6%) of the subwatershed, while hydric soils consist of 49.1% (60,044 acres) of the subwatershed.

Natural Resources

Illinois Natural Area Inventory Sites (INAI) are natural landscape features and communities of the highest quality still remaining in Illinois. In most cases, these sites are also where State and/or Federally listed Threatened and Endangered species have been found. Two INAI sites are located within the East Branch Embarras River Subwatershed: Barnhart Prairie and Embarras River – Camargo.

Approximately 320 acres of land within the watershed is identified as conservation or recreational land, while 1610 acres are within the Conservation Reserve Program.

Wetland areas cover approximately 1507 acres of the watershed with Bottomland Forest being the predominant type at 44.6%

The Illinois Department of Natural Resources was contacted to provide any Natural Heritage Data or related records for all listed threatened, endangered or rare species, high quality natural communities or natural areas documented within the Embarras River Watershed. Five species were located within the East Branch Embarras River Subwatershed including: Kirkland's Snake, Loggerhead Snake, Upland Sandpiper, Franklin's Ground Squirrel, and Little Spectaclecase.

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The 303(d) list indicates that approximately 39.9 miles of the Embarras River within the East Branch Embarras River Subwatershed was impaired at the time of the 2008 listing. It should be noted that if a stream is not listed on the 303(d) list it may be impaired; however the data (or lack thereof) does not indicate the impairment at the time of publication. The potential causes of the impairment include pH, Phosphorus (Total), Sedimentation/Siltation, Total Suspended Solids (TSS), and Fecal Coliform.

Available water quality data from the United States Geological Survey (USGS) and the Illinois Environmental Protection Agency (IEPA) was analyzed based on screened water quality parameters. There are three USGS water quality stations within the East Branch Embarras River Subwatershed, however only one of these stations (03343395) contains data on the screened parameters. Only one IEPA station (BE-14) is located within the subwatershed. Table 9-3 below summarizes the USGS and IEPA sampling mean value of each parameter screened and the corresponding water quality target.

Table 9-3: East Branch Embarras River Water Quality Sampling Summary				
Water Quality Parameter	USGS Mean Value	IEPA Mean Value	Water Quality Target	
Dissolved Oxygen	9.0 mg/L	Not available	between 4.0 and 12.0 mg/L	
Fecal Coliform	887 CFU/100mL	Not available	200 CFU/100mL	
Nitrate + Nitrite	8.2 mg/L	3.8 mg/L	1.8 mg/L	
Total Phosphorus	0.125 mg/L	0.159 mg/L	0.118 mg/L	
TSS	46.2 mg/L	42.0 mg/L	50.0 mg/L	

Based on the available water quality information, the East Branch Embarras River consistently tests higher than the water quality targets in Nitrate + Nitrite and Total Phosphorus. Fecal Coliform tested higher than the water quality target in the USGS sampling however Fecal Coliform data was not available for the IEPA station. Dissolved Oxygen falls within the acceptable ranges and TSS consistently tests lower than the target therefore these parameters are not a concern for this subwatershed.

NPDES permits are also indicative of the land use and water quality within a subwatershed. Compliance records for the NPDES facilities within the watershed were analyzed for the past three years. Effluent exceedances were noted based on the number of times in the past three years the permit allowed discharge was exceeded. The water quality parameters screened in this analysis included Dissolved Oxygen (DO), Total Suspended Solids (TSS), Nitrogen (N) and Fecal Coliform (FC). There are 2 NPDES permits active within the East Branch Embarras River Subwatershed. According to compliance records, there have been no formal enforcement actions within the last 5 years; however there have been several noted effluent exceedances within the last 3 years. These exceedances included 2 reports of Dissolved Oxygen and 5 reports of Total Suspended Solids.

Five landfills were identified within the East Branch Embarras River Subwatershed.

Biological Data

IEPA has completed several habitat and biological studies within the Embarras River Watershed. Within the East Branch Embarras River Subwatershed, one IEPA site has biological information available. Sampling data was available from an August 2001 study and an August 2006 study. Table 9-4 summarizes the IEPA mean value for the Macroinvertebrate Index of Biotic Integrity (mIBI) and the Index of Biotic Integrity (IBI).

Table 9-4: East Branch Embarras River Subwatershed IEPA Biological Sampling Summary	
Habitat/Biological Parameter	IEPA Mean Value
mIBI	56.6
IBI	42

With a mIBI score of 56.6, the East Branch Embarras River Subwatershed shows no impairment for macroinvertebrate communities and an IBI score of 42 indicates that there is no impairment in the fish community.

Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-5 summarized the modeling results for the East Branch Embarras River Subwatershed.

Table 9-5: East Branch Embarras River Subwatershed NPS Modeling Summary	
Parameter	Loading
Total Suspended Solids	0.33 ton/ac/yr
Nitrogen	3.90 lb/ac/yr
Phosphorus	0.78 lb/ac/yr
Fecal Coliform	1.87 CFU bill/ac/yr

East Branch Embarras River Subwatershed Implementation Plan

Figure 9-1: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

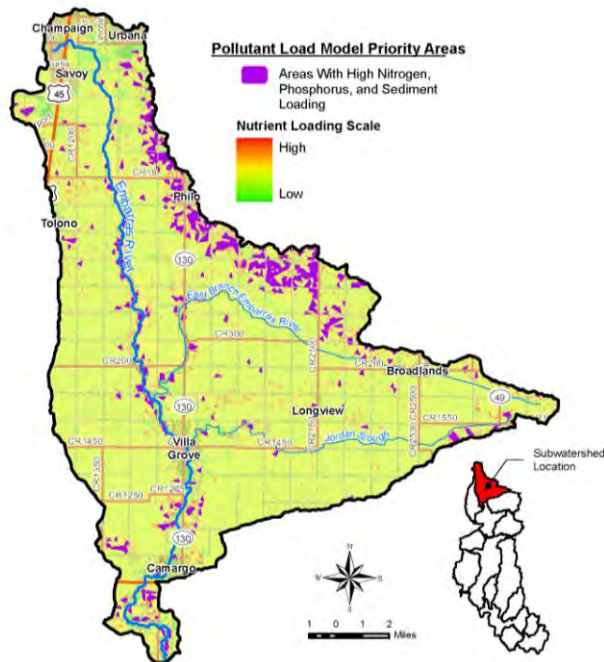


Table 9-6: East Branch Embarras River Subwatershed Pollutant Load Model Priority Areas		
Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	4,204	3.44%

Figure 9 – 2: Fecal Coliform Bacteria Project & Priority Areas

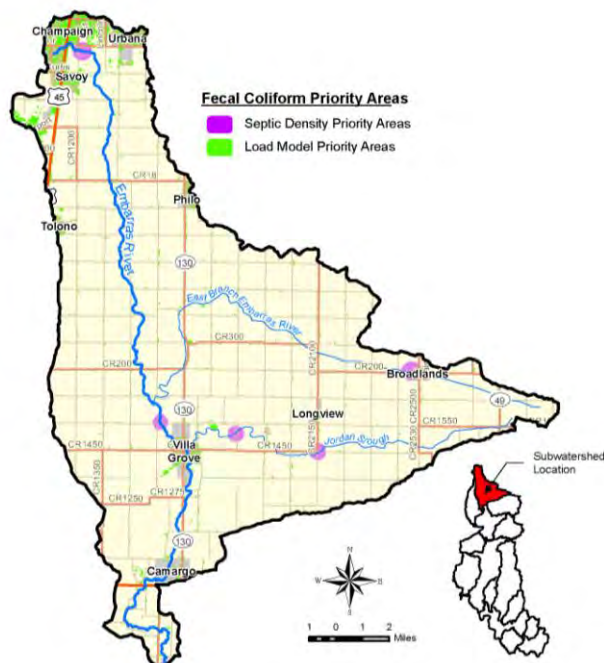


Table 9-7: East Branch Embarras River Subwatershed Fecal Coliform Bacteria Priority Areas		
Parameter	Acres	Percent in Watershed
Septic Density Priority Areas	1,119	0.92%
Load Model Priority Areas	5,951	4.87%

Figure 9-3: Highly Erodible Land Project & Priority Areas

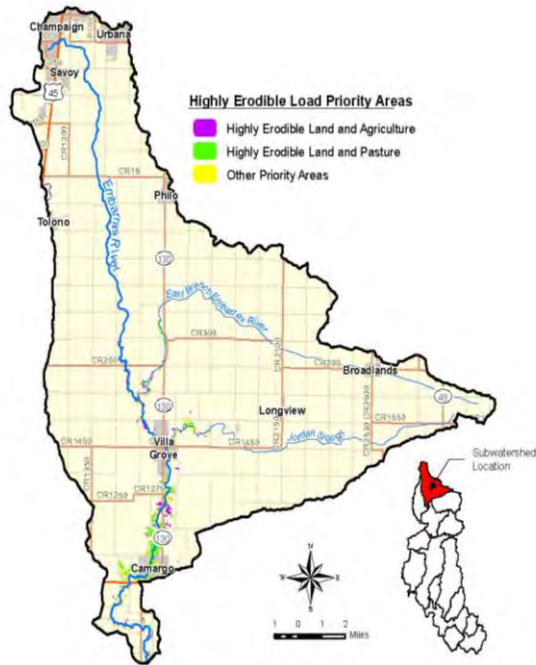


Table 9-8: East Branch Embarras River Subwatershed Highly Erodible Land Priority Areas		
Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	89	0.07%
Highly Erodible Land and Pasture	213	0.17%
Other Priority Areas	678	0.55%

Figure 9-4: Wetland Restoration/Flood Mitigation Project & Priority Areas

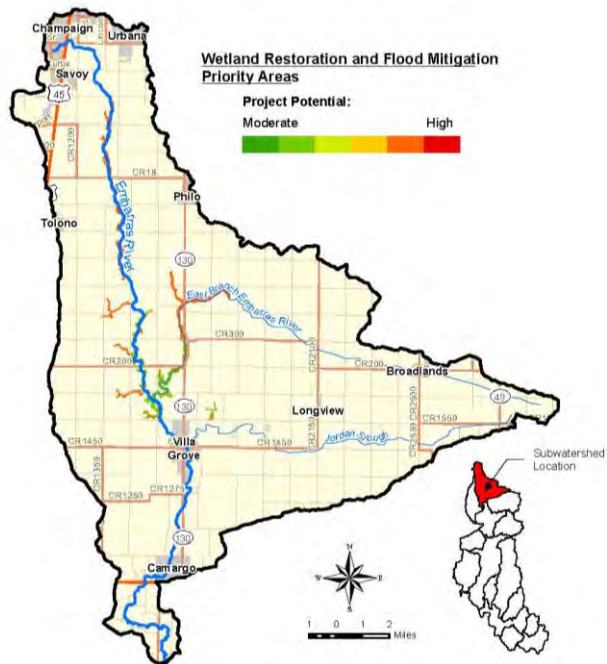


Figure 9-5: Stakeholder Identified Priority Projects

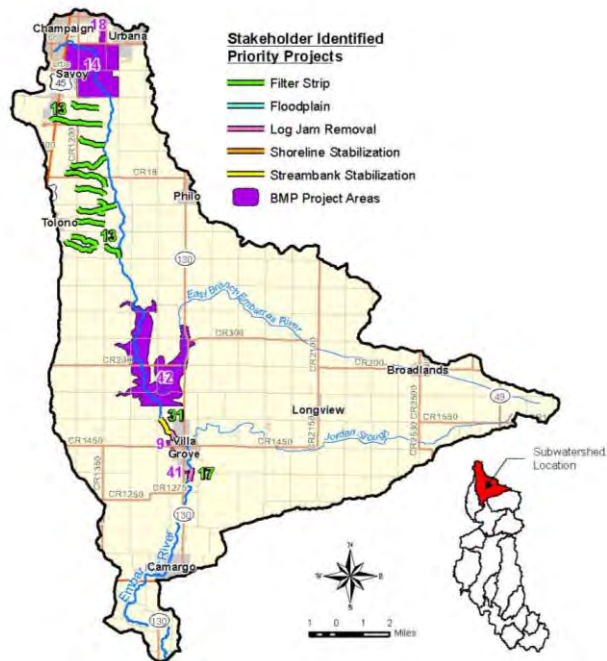


Table 9-9: East Branch Embarras River Subwatershed Estimated Load Reductions for Stakeholder Identified Priority Projects

Map ID	Project Type	Stakeholder	Length (ft)	Area (Acres)	Potential Annual Load Reductions				Project Details
					N (lbs)	P (lbs)	Sediment (tons)	Fecal Coliform (bill fc)	
37	WASCB/Retention	Crawford SWCD/NRCS		18	2	1	14	0	Focus work in this subwatershed
4	CNMP/Waste Utilization	Jasper SWCDD/NRCS		2,060	2,884	989	247	643	High Concentration of confined swine opps within 5mi radius of Ste. Marie; CNMPs
2	All BMP	Douglas SWCD/NRCS		11,437	13,724	4,575	1,144	2,974	Oakland/Hog Branch watershed; potential willing landowners, all BMPs
31	Streambank Stabilization	Douglas SWCD/NRCS	3,585		3,226	1,290	1,147	839	Main Stem
43	Wetland Restoration	Douglas SWCD/NRCS		205	11,255	3,274	368	2,128	Wetland WRP
13	Filter Strip	Champaign SWCD/NRCS	5,692		18,214	9,505	3,130	6,178	Filter strips where CRP does not exist
14	Filter Strips; Other BMP	Champaign SWCD/NRCS		0.33	13	5	0	3	Filter strips and other appropriate BMPs on Uofl Property
14	Filter Strips; Other BMP	Champaign SWCD/NRCS		2,242	2,691	897	224	583	Filter strips and other appropriate BMPs on Uofl Property
18	Runoff Control	Champaign SWCD/NRCS		0	13	5	0	3	Runoff control for Uofl Dairy Farm; 319 was applied for in the past
18	Runoff Control	Champaign SWCD/NRCS		80	3,213	1,285	96	836	Runoff control for U of I Dairy Farm; 319 was applied for in the past
42	Wetland Restoration	Champaign SWCD/NRCS		3,166	174,113	50,651	5,698	32,923	Wetland restoration and flood storage in 100yr floodplain
9	Detention	City of Villa Grove		51	2,025	810	38	527	Detention of runoff entering city
17	Log Jam Removal	City of Villa Grove	4,798		0	0	0	0	Flood prevention
41	Wetland	City of Villa Grove		10	533	155	17	101	Detention of flood water
31	Streambank Stabilization	Douglas SWCD/NRCS	3,585		3,226	1,290	1,147	839	Main Stem

Scattering Fork Subwatershed

Subwatershed Characteristics

Subwatershed Location

The Scattering Fork Subwatershed (HUC 10 – 0512011202) is located primarily in Douglas County with smaller portions in Champaign and Coles Counties as shown in Exhibit 30. The subwatershed encompasses approximately 69,875 acres (4.5% of the watershed) and includes the Moffet/Hackett Branch and Scattering Fork.

The Moffet/Hackett Branch flows for approximately 18.3 miles generally north to south through the subwatershed to its confluence with Scattering Fork. Scattering Fork flows northwest to southeast through the subwatershed to its confluence with the Embarras River. Scattering Fork is approximately 13.4 miles long.

Population

According to the 1990 Census, the population within the Scattering Fork Subwatershed was approximately 9,574. In the 2000 Census, the population was approximately 9,902, an increase of 3.4%.

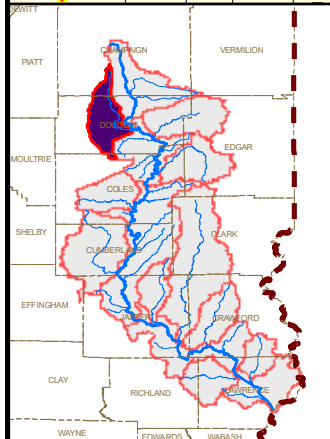
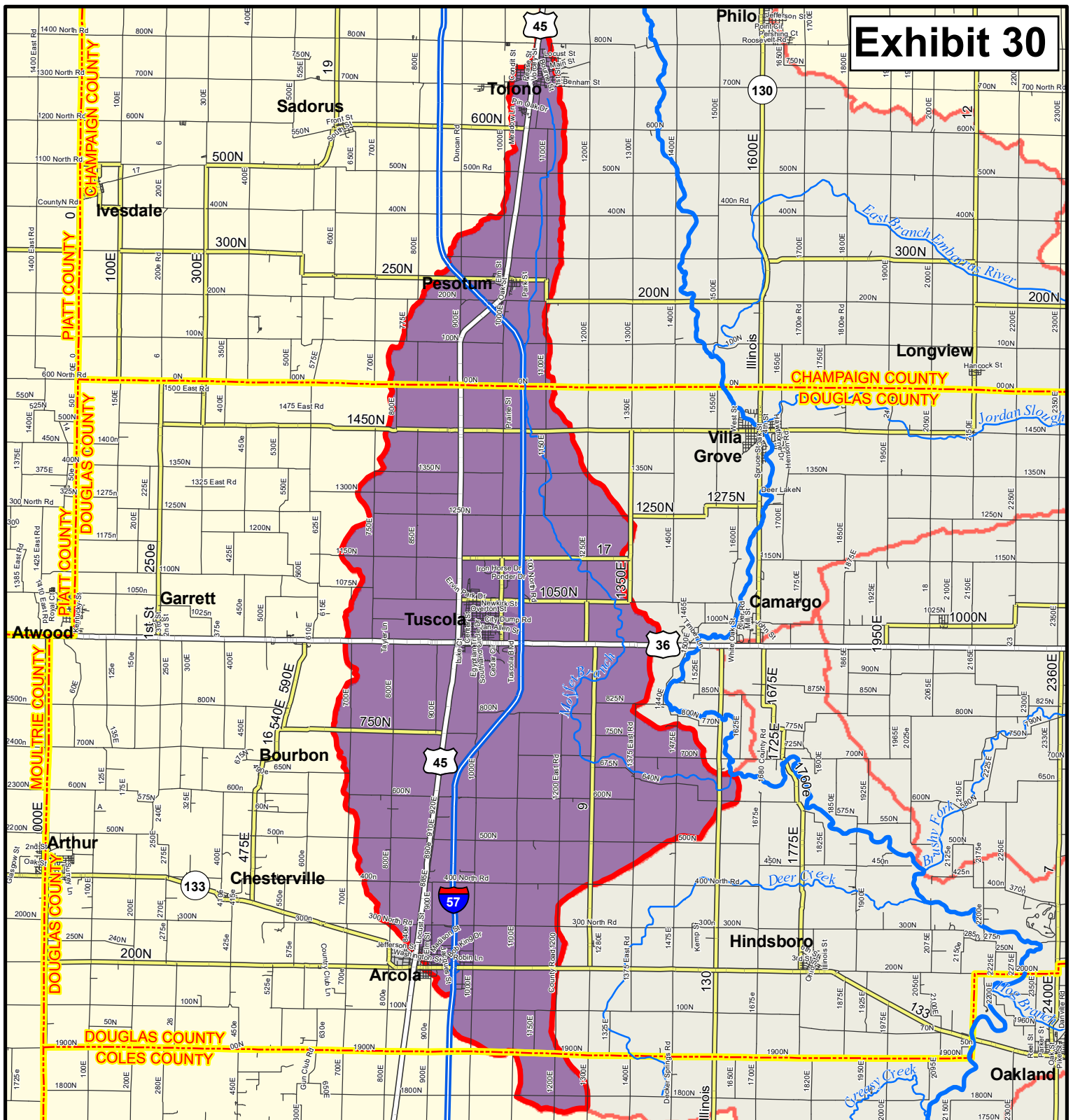
The majority of the subwatershed is relatively sparsely populated with population density averaging less than 0.2 people per acre. The most densely populated areas are located in the central portion of the subwatershed associated with the City of Tuscola and in the southern portion of the subwatershed associated with the City of Arcola.

Land Cover

Land Use within the Scattering Fork Subwatershed was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 83.1% of the subwatershed covered by agriculture (Table 9-10), the Scattering Fork Subwatershed still remains primarily rural and agricultural. The developed areas (approximately 14.4%) are concentrated in the central portion of the subwatershed associated with the City of Tuscola and in the southern portion of the subwatershed associated with the City of Arcola.

Table 9-10: Scattering Fork Subwatershed Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	58,061	83.1%
Barren	111	0.2%
Developed	10,037	14.4%
Forest	340	0.5%
Grassland	1,182	1.7%
Open Water	126	0.2%
Wetlands	18	0.0%
Total	69,875	100.1%*
*Note – Percent totals do not add to 100% due to rounding		

Exhibit 30

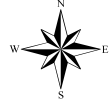


Scattering Fork Subwatershed

HUC: 0512011202 Acres: 69,875

Embarras River Watershed Plan

Subwatershed Location Map



1 0 1 2 Miles



Legend

- Urban Area
- Embarras River
- Embarras River Tributaries
- County Line
- Scattering Fork Subwatershed
- Embarras Subwatersheds
- Interstate
- US Highway
- State Highway
- Local Road
- Minor Road
- Other Road
- Ramp

Soil Characteristics

The soils within the Scattering Fork Subwatershed fall into six major associations (Table 9-11). The majority of the subwatershed falls within the Catlin-Flanagan-Drummer association (69.2%) which consists of nearly level to gently sloping silty soils.

Table 9-11: Scattering Fork Subwatershed Soil Associations		
Association	Acres	Percentage
Catlin-Flanagan-Drummer	48,362	69.2%
Plano-Proctor-Worthen	3,890	5.6%
Martinton-Milford	14,456	20.7%
Lawson-Sawmill-Darwin	213	0.3%
Birkbeck-Sabina-Sunbury	2,495	3.6%
St. Charles-Camden-Drury	458	0.7%
Total	69,874	100.1%*
*Note – Percent totals do not add to 100% due to rounding		

Highly erodible soils comprise approximately 100 acres (0.1%) of the subwatershed, while hydric soils consist of 60.4% (42,172 acres) of the subwatershed.

Natural Resources

Illinois Natural Area Inventory Sites (INAI) are natural landscape features and communities of the highest quality still remaining in Illinois. In most cases, these sites are also where State and/or Federally listed Threatened and Endangered species have been found. Only one INAI site is located within the Scattering Fork Subwatershed: Embarras River – Camargo.

The Prairie Wind trail located at the southern end of the watershed is identified as conservation or recreational land, while 808 acres are within the Conservation Reserve Program.

Wetland areas cover approximately 222 acres of the watershed with Open Water Wetlands being the predominant type at 49.9%

The Illinois Department of Natural Resources was contacted to provide any Natural Heritage Data or related records for all listed threatened, endangered or rare species, high quality natural communities or natural areas documented within the Embarras River Watershed. There are no known threatened, endangered or rare species located within the Scattering Fork Subwatershed.

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The 303(d) list indicates that approximately 20.4 miles of the streams within the Scattering Fork Subwatershed was impaired at the time of the 2008 listing. It should be noted that if a stream is not listed on the 303(d) list it may be impaired; however the data (or lack thereof) does not indicate the impairment at the time of publication. The potential causes of the impairment include Phosphorus (Total).

Available water quality data from the United States Geological Survey (USGS) and the Illinois Environmental Protection Agency (IEPA) was analyzed based on screened water quality parameters. No USGS or IEPA stations are located with Scattering Fork Subwatershed.

NPDES permits are also indicative of the land use and water quality within a subwatershed. Compliance records for the NPDES facilities within the watershed were analyzed for the past three years. Effluent exceedances were noted based on the number of times in the past three years the permit allowed discharge was exceeded. The water quality parameters screened in this analysis included Dissolved Oxygen (DO), Total Suspended Solids (TSS), Nitrogen (N) and Fecal Coliform (FC). There are 8 NPDES permits active within the Scattering Fork Subwatershed. According to compliance records, there have been no formal enforcement actions within the last 5 years; however there have been several noted effluent exceedances within the last 3 years. These exceedances included 10 reports of Dissolved Oxygen, 5 reports of Total Suspended Solids, and 7 reports of Nitrogen.

Five landfills were identified within the Scattering Fork Subwatershed.

Biological Data

IEPA has completed several habitat and biological studies within the Embarras River Watershed. Within the Scattering Fork Subwatershed, no IEPA sites with biological data were available.

Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-12 summarized the modeling results for the Scattering Fork Subwatershed.

Table 9-12: Scattering Fork Subwatershed NPS Modeling Summary	
Parameter	Loading
Total Suspended Solids	0.27 ton/ac/yr
Nitrogen	4.01 lb/ac/yr
Phosphorus	0.77 lb/ac/yr
Fecal Coliform	2.07 CFU bill/ac/yr

Scattering Fork Subwatershed Implementation Plan

Figure 9-6: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

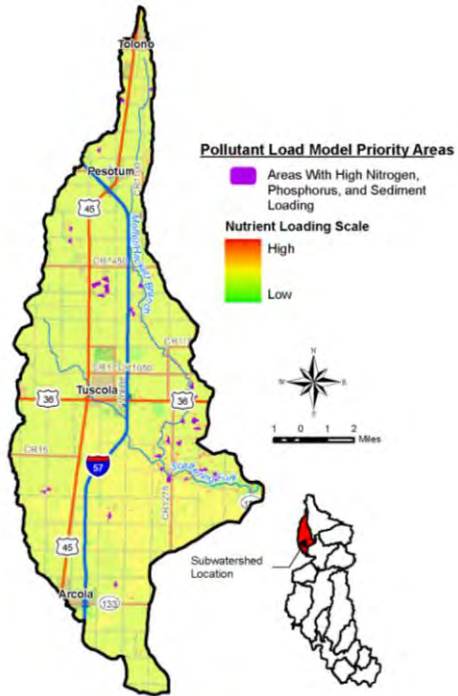


Table 9-13: Scattering Fork Subwatershed Pollutant Load Model Priority Areas		
Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	319	0.46%

Figure 9-7: Fecal Coliform Bacteria Project & Priority Areas



Table 9-14: Scattering Fork Subwatershed Fecal Coliform Bacteria Priority Areas

Parameter	Acres	Percent in Watershed
Septic Density Priority Areas	176	0.25%
Load Model Priority Areas	4,949	7.08%

Figure 9-8: Highly Erodible Land Project & Priority Areas

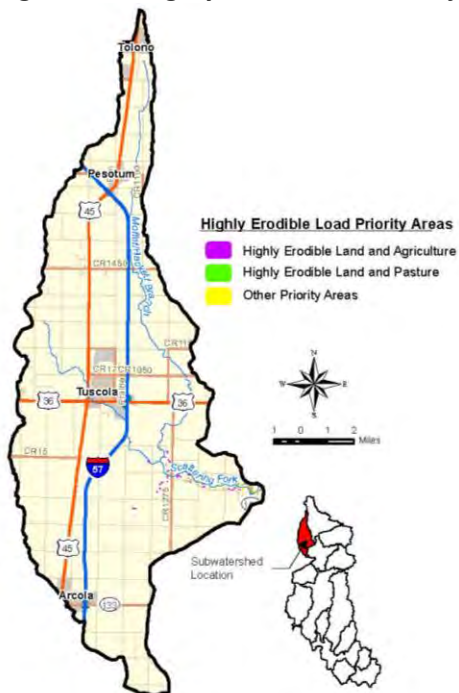


Table 9-15: Scattering Fork Subwatershed Highly Erodible Load Priority Areas		
Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	23	0.03%
Highly Erodible Land and Pasture	10	0.01%
Other Priority Areas	98	0.14%

Figure 9-9: Wetland Restoration/Flood Mitigation Project & Priority Areas



Figure 9-10: Stakeholder Identified Priority Projects

Table 9-16: Scattering Fork Subwatershed Estimated Load Reductions for Stakeholder Identified Priority Projects

Map ID	Project Type	Stakeholder	Area (Acres)	Nitrogen (lbs)	Phosphorus (lbs)	Sediment (tons)	Fecal Coliform (bill fcu)	Project Details
8	Detention	City of Tuscola	0	3	1	0	1	Detention/Wetland; additional flood storage; part of other practices
8	Detention	City of Tuscola	54	2,156	862	40	561	Detention/Wetland; additional flood storage; part of other practices
35	Two Stage Drainage Ditch	City of Tuscola	12	10	4	3	3	Augment existing plan to deepend ditch; two stage ditch with wetlands
36	Two Stage Drainage Ditch	City of Tuscola	0	0	0	0	0	Stream channel improvement; 2 stage drainage ditch; part of other practices
36	Two Stage Drainage Ditch	City of Tuscola	16	15	6	5	4	Stream channel improvement; 2 stage drainage ditch; part of other practices
40	Wetland	City of Tuscola	51	2,795	813	91	529	Wetland creation for flood control; part of other practices; consider CREP

Deer Creek – Embarras River Subwatershed

Subwatershed Characteristics

Subwatershed Location

The Deer Creek – Embarras River Subwatershed (HUC 10 – 0512011205) is located primarily in Douglas and Coles Counties with a smaller portion in Edgar County as shown in Exhibit 31. The subwatershed encompasses approximately 94,017 acres (6.0% of the watershed) and includes the Embarras River, Deer Creek, Hog Branch, Greasy Creek and Dry Branch.

The Embarras River flows for approximately 33.3 miles generally north to south through the subwatershed. Greasy Creek and Dry Branch flow southwest to northeast; Deer Creek flows north and then turns east; and Hog Branch flows northeast to southwest through the watershed to their confluence with the Embarras River. Deer Creek is approximately 13.8 miles, Hog Branch is approximately 10.8 miles, Greasy Creek is approximately 10.1 miles and Dry Branch is approximately 5.6 miles long.

Population

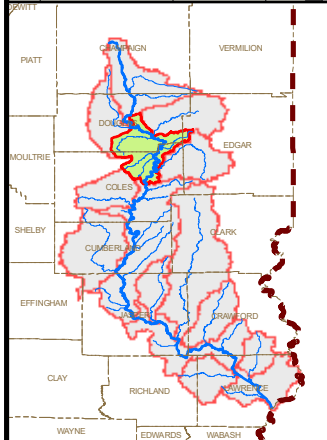
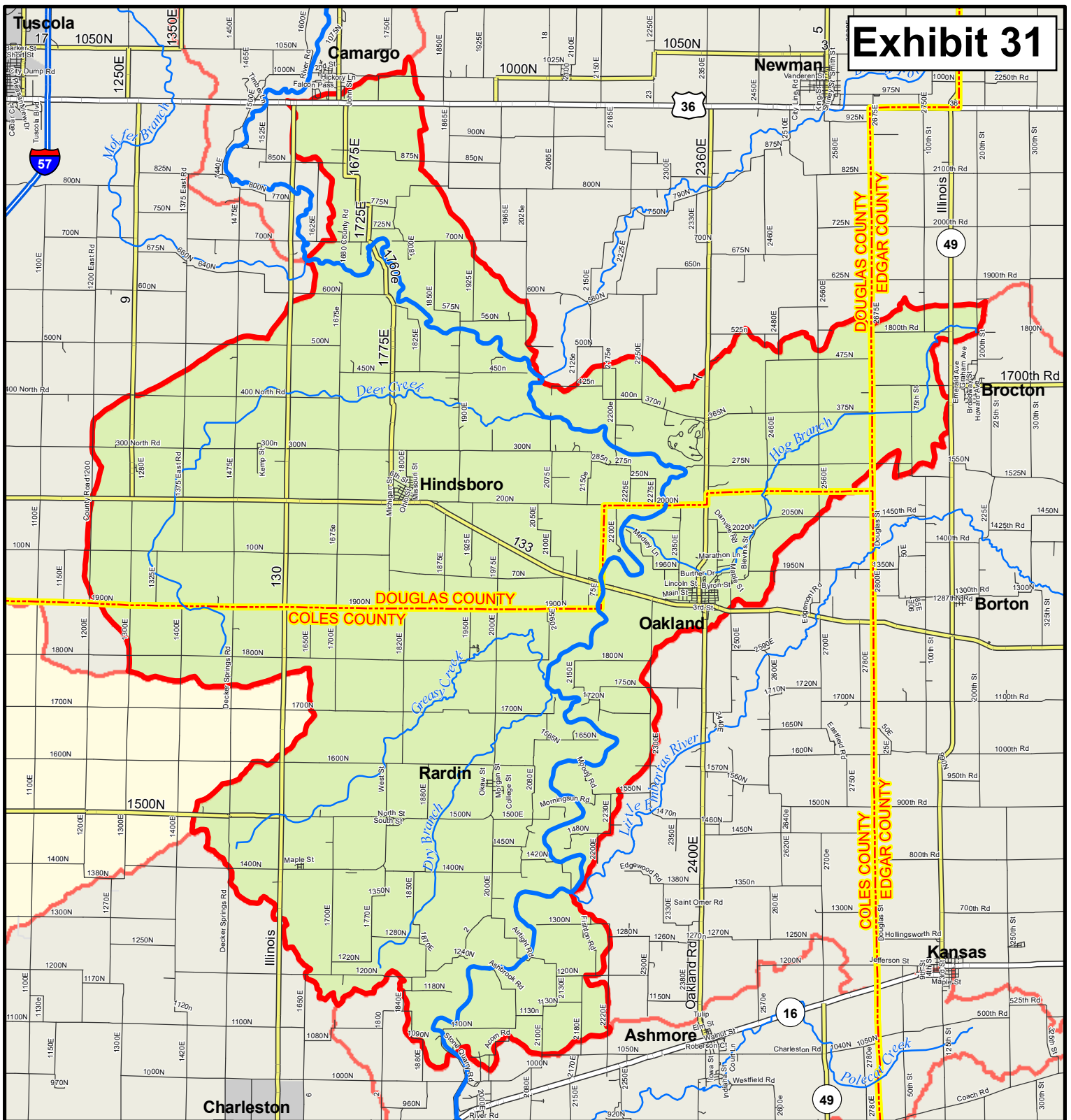
According to the 1990 Census, the population within the Deer Creek – Embarras River Subwatershed was approximately 2,564. In the 2000 Census, the population was approximately 2,534, a decrease of 1.1%.

The majority of the subwatershed is relatively sparsely populated with population density averaging less than 0.1 people per acre.

Land Cover

Land Use within the Deer Creek – Embarras River Subwatershed was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 76.3% of the subwatershed covered by agriculture (Table 9-17), the Deer Creek – Embarras River Subwatershed still remains primarily rural and agricultural.

Table 9-17: Deer Creek – Embarras River Subwatershed Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	71,690	76.3%
Barren	15	0.0%
Developed	7,660	8.1%
Forest	10,088	10.7%
Grassland	4,267	4.5%
Open Water	173	0.2%
Wetlands	125	0.1%
Total	94,018	99.9%*
*Note – Percent totals do not add to 100% due to rounding		



Deer Creek-Embarras River Subwatershed

HUC: 0512011205 Acres: 94,017

Embarras River Watershed Plan

Subwatershed Location Map



1 0 1 2 Miles



Legend

- Urban Area
- Interstate
- Embarras River
- Embarras River Tributaries
- County Line
- Deer Creek-Embarras River Subwatershed
- Embarras Subwatersheds
- US Highway
- State Highway
- Local Road
- Minor Road
- Other Road
- Ramp

Soil Characteristics

The soils within the Deer Creek – Embarras River Subwatershed fall into seven major associations (Table 9-18). Almost half of the subwatershed falls within the Catlin-Flanagan-Drummer association (44.7%) which consists of nearly level to gently sloping silty soils.

Table 9-18: Deer Creek - Embarras River Subwatershed Soil Associations		
Association	Acres	Percentage
Catlin-Flanagan-Drummer	42,040	44.7%
Plano-Proctor-Worthen	471	0.5%
Saybrook-Dana-Drummer	7,825	8.3%
Martinton-Milford	14,685	15.6%
Lawson-Sawmill-Darwin	10,267	10.9%
Birkbeck-Sabina-Sunbury	18,036	19.2%
St. Charles-Camden-Drury	693	0.7%
Total	94,017	99.9%*
*Note – Percent totals do not add to 100% due to rounding		

Highly erodible soils comprise approximately 3,578 acres (3.8%) of the subwatershed, while hydric soils consist of 48.2% (45,342 acres) of the subwatershed.

Natural Resources

Illinois Natural Area Inventory Sites (INAI) are natural landscape features and communities of the highest quality still remaining in Illinois. In most cases, these sites are also where State and/or Federally listed Threatened and Endangered species have been found. Two INAI sites are located within the Deer Creek – Embarras River Subwatershed: Walnut Point and Embarras River – Camargo.

Approximately 745 acres of land within the watershed is identified as conservation or recreational land not including the Prairie Wind Trail which runs from east to west through the middle of the subwatershed, while 2,275 acres are within the Conservation Reserve Program.

Wetland areas cover approximately 2,142 acres of the watershed with Bottomland Forest being the predominant type at 72.8%

The Illinois Department of Natural Resources was contacted to provide any Natural Heritage Data or related records for all listed threatened, endangered or rare species, high quality natural communities or natural areas documented within the Embarras River Watershed. Six species were located within the Deer Creek – Embarras River Subwatershed including: Arkansas Sedge, Kidneyshell, Kirkland's Snake, Little Spectaclecase, Slippershell and Snuffbox.

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The 303(d) list indicates that no streams within the Deer Creek – Embarras River Subwatershed were impaired at the time of the 2008 listing. It should be noted that if a

stream is not listed on the 303(d) list it may be impaired; however the data (or lack thereof) does not indicate the impairment at the time of publication.

Available water quality data from the United States Geological Survey (USGS) and the Illinois Environmental Protection Agency (IEPA) was analyzed based on screened water quality parameters. There are three USGS water quality stations within the Deer Creek – Embarras River Subwatershed, however only one of these stations (03343550) contains data on the screened parameters. There are three IEPA stations (RBP-1, RBP-2, and RBP-3) are located within the subwatershed. Table 9-19 below summarizes the USGS and IEPA sampling mean value of each parameter screened and the corresponding water quality target.

Table 9-19: Deer Creek – Embarras River Water Quality Sampling Summary			
Water Quality Parameter	USGS Mean Value	IEPA Mean Value	Water Quality Target
Dissolved Oxygen	Not available	Not available	between 4.0 and 12.0 mg/L
Fecal Coliform	Not available	Not available	200 CFU/100mL
Nitrate + Nitrite	Not available	1.1 mg/L	1.8 mg/L
Total Phosphorus	Not available	0.234 mg/L	0.118 mg/L
TSS	288.9 mg/L	37.7 mg/L	50.0 mg/L

Based on the available water quality information, the Deer Creek – Embarras River consistently tests higher than the water quality target in Total Phosphorus for the IEPA stations however Nitrate+Nitrite tested lower than the water quality target. TSS tested higher than the water quality target in the USGS sampling however it tested lower than the target at the IEPA station. Fecal Coliform and Dissolved Oxygen were not available in either data set.

NPDES permits are also indicative of the land use and water quality within a subwatershed. Compliance records for the NPDES facilities within the watershed were analyzed for the past three years Effluent exceedances were noted based on the number of times in the past three years the permit allowed discharge was exceeded. The water quality parameters screened in this analysis included Dissolved Oxygen (DO), Total Suspended Solids (TSS), Nitrogen (N) and Fecal Coliform (FC). There is one NPDES permit active within the Deer Creek – Embarras River Subwatershed. According to compliance records, there have been no formal enforcement actions within the last 5 years; there have also been no noted effluent exceedances within the last 3 years.

No landfills were identified within the Deer Creek – Embarras River Subwatershed.

Biological Data

IEPA has completed several habitat and biological studies within the Embarras River Watershed. Within the Deer Creek – Embarras River Subwatershed, no IEPA sites with biological data were available.

Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-20 summarized the modeling results for the Deer Creek – Embarras River Subwatershed.

Table 9-20: Deer Creek – Embarras River Subwatershed NPS Modeling Summary	
Parameter	Loading
Total Suspended Solids	0.43 ton/ac/yr
Nitrogen	4.05 lb/ac/yr
Phosphorus	0.86 lb/ac/yr
Fecal Coliform	1.76 CFU bill/ac/yr

Deer Creek – Embarras River Subwatershed Implementation Plan

Figure 9-1: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

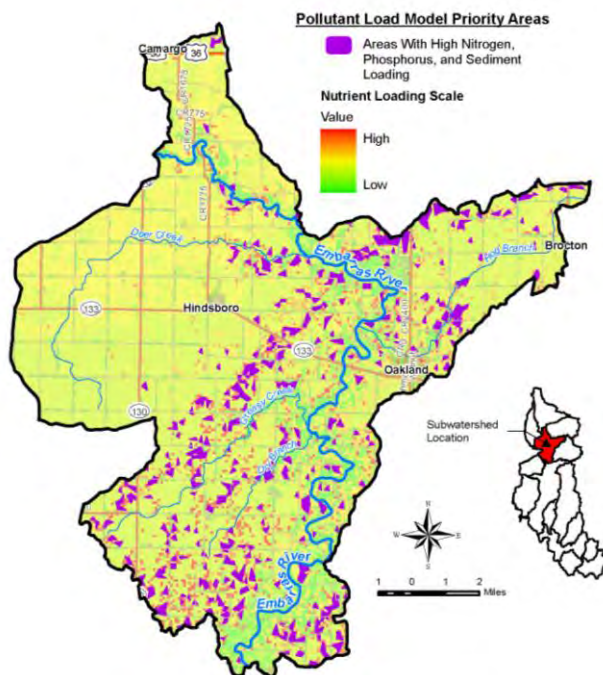


Table 9-21: Deer Creek – Embarras River Subwatershed Pollutant Load Model Priority Areas		
Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	4,709	5.01%

Figure 9-12: Fecal Coliform Bacteria Project & Priority Areas

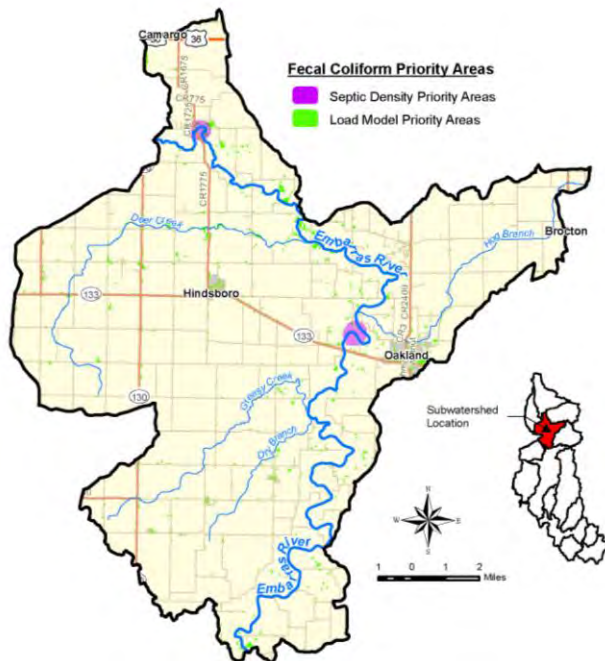


Table 9-22: Deer Creek – Embarras River Subwatershed Fecal Coliform Bacteria Priority Areas

Parameter	Acres	Percent in Watershed
Septic Density Priority Areas	493	0.52%
Load Model Priority Areas	1,993	2.12%

Figure 9-13: Highly Erodible Land Project & Priority Areas

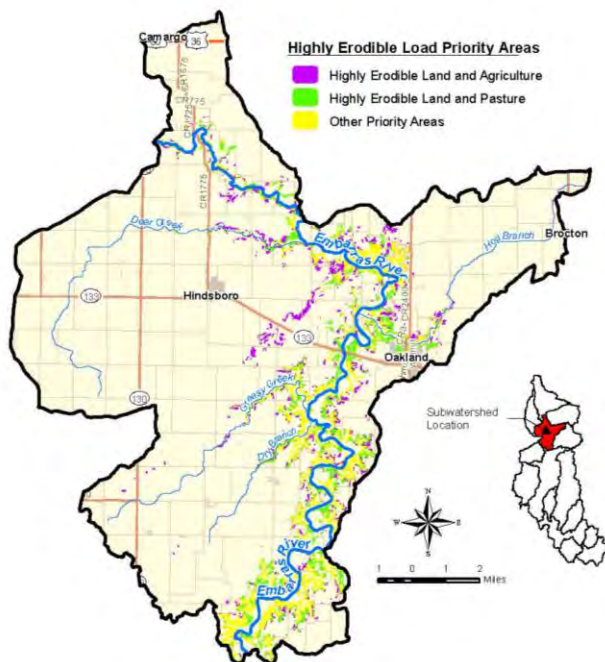


Table 9-23: Deer Creek – Embarras River Subwatershed Highly Erodible Load Priority Areas		
Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	821	0.87%
Highly Erodible Land and Pasture	877	0.93%
Other Priority Areas	4,625	4.92%

Figure 9-14: Wetland Restoration/Flood Mitigation Project & Priority Areas

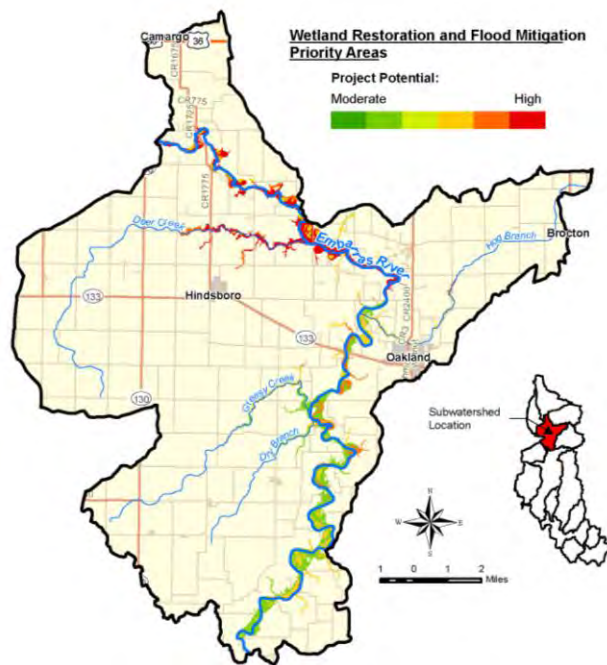


Figure 9-15: Stakeholder Identified Priority Projects

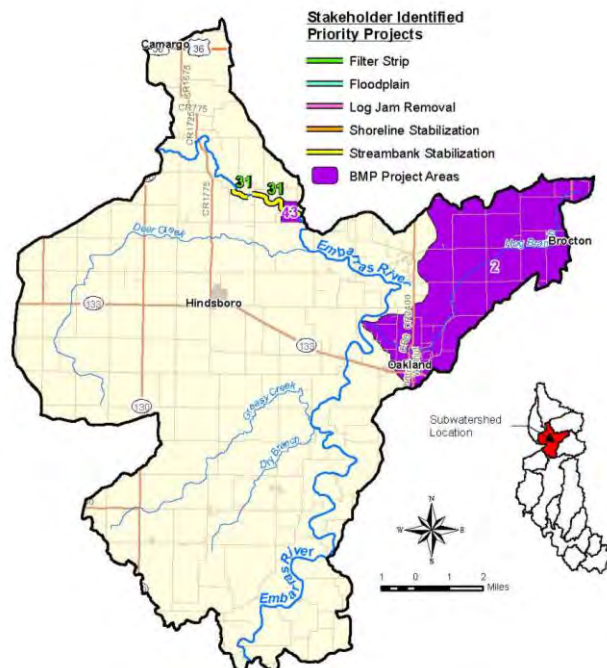


Table 9-24: Deer Creek – Embarras River Subwatershed Estimated Load Reductions for Stakeholder Identified Priority Projects									
Map ID	Project Type	Stakeholder	Length (ft)	Area (Acres)	Nitrogen (lbs)	Phosphorus (lbs)	Sediment (tons)	Fecal Coliform (bill fcu)	Project Details
2	All BMP	Douglas SWCD/NRCS		11437	13,724	4,575	1,144	2,974	Oakland/Hog Branch watershed; potential willing landowners, all BMPs
31	Streambank Stabilization	Douglas SWCD/NRCS	3,585		3,226	1,290	1,147	839	Main Stem

Kickapoo Creek Subwatershed

Subwatershed Characteristics

Subwatershed Location

The Kickapoo Creek Subwatershed (HUC 10 – 0512011206) is located within Coles County as shown in Exhibit 32. The subwatershed encompasses approximately 65,461 acres (4.2% of the watershed) and includes Kickapoo Creek.

Kickapoo Creek flows generally west to east through the subwatershed to its confluence with the Embarras River. Kickapoo Creek is approximately 18.9 miles long.

Population

According to the 1990 Census, the population within the Kickapoo Creek Subwatershed was approximately 30,216. In the 2000 Census, the population was approximately 28,193, a decrease of 6.7%.

The majority of the subwatershed is relatively sparsely populated with population density averaging approximately 0.4 people per acre. The most densely populated areas are located in the western portion of the subwatershed associated with the City of Mattoon and in the eastern portion of the subwatershed associated with the City of Charleston.

Land Cover

Land Use within the Kickapoo Creek Subwatershed was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 61.8% of the subwatershed covered by agriculture (Table 9-25), the Kickapoo Creek Subwatershed still remains primarily rural and agricultural. The developed areas (approximately 21.2%) are concentrated in the northern western portion of the subwatershed associated with the City of Mattoon and in the eastern portion of the subwatershed associated with the City of Charleston.

Table 9-25: Kickapoo Creek Subwatershed Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	40,474	61.8%
Barren	40	0.1%
Developed	13,877	21.2%
Forest	6,800	10.4%
Grassland	4,107	6.3%
Open Water	155	0.2%
Wetlands	7	0.0%
Total	65,460	100.0%

Soil Characteristics

The soils within the Kickapoo Creek Subwatershed fall into five major associations (Table 9-26). Over half of the subwatershed falls within the Catlin-Flanagan-Drummer association (57.9%) which consists of nearly level to gently sloping silty soils.

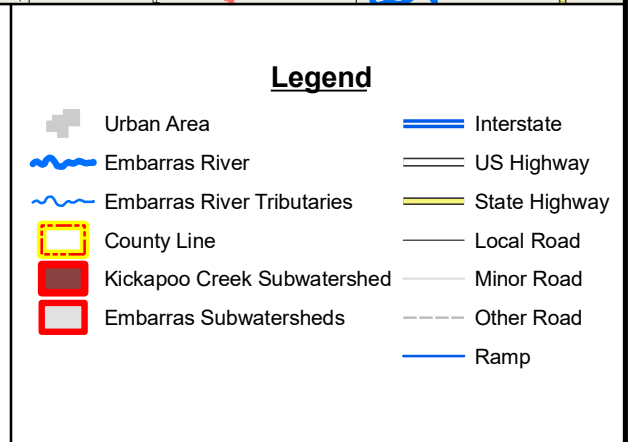
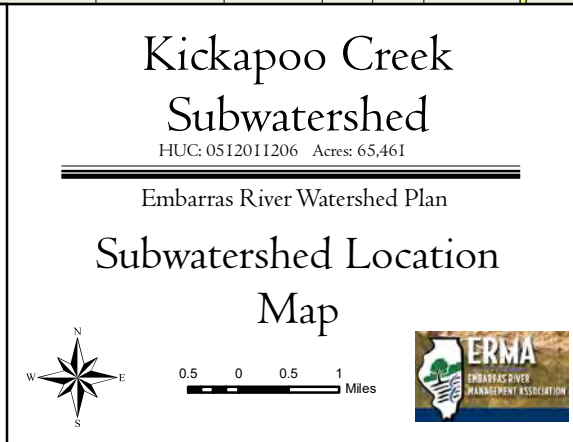
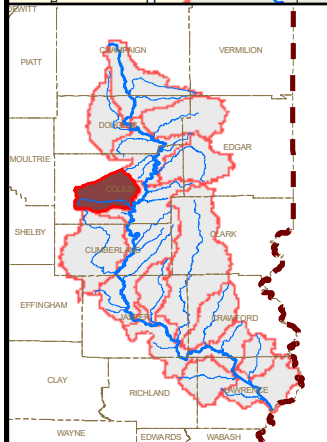
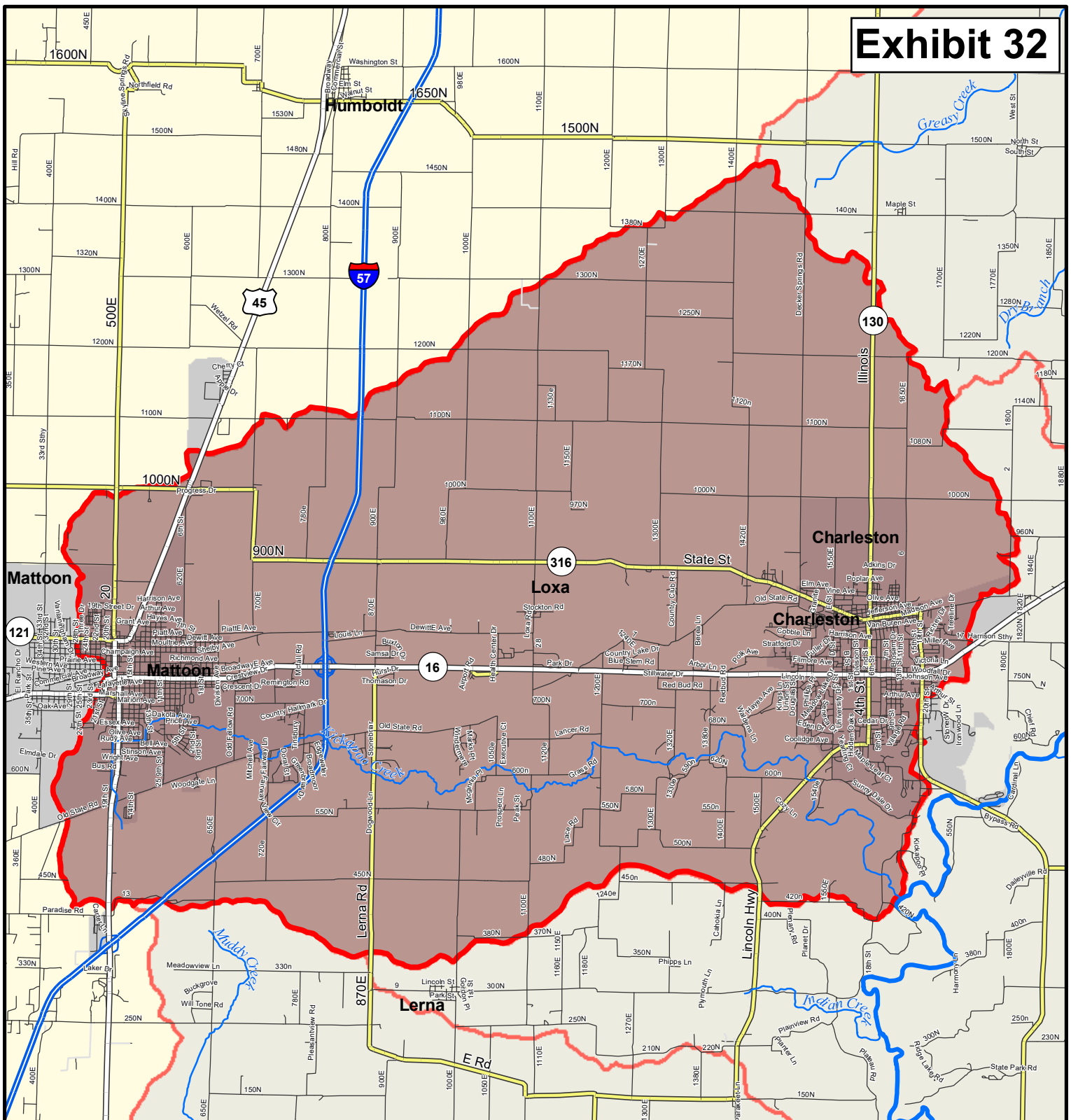


Table 9-26: Kickapoo Creek Subwatershed Soil Associations		
Association	Acres	Percentage
Catlin-Flanagan-Drummer	37,882	57.9%
Saybrook-Dana-Drummer	7,274	11.1%
Lawson-Sawmill-Darwin	2,468	3.8%
Birkbeck-Sabina-Sunbury	14,535	22.2%
Dodge-Russell-Miami	3,302	5.0%
Total	65,461	100.0%

Highly erodible soils comprise approximately 3,173 acres (4.8%) of the subwatershed, while hydric soils consist of 33.1% (21,679 acres) of the subwatershed.

Natural Resources

Illinois Natural Area Inventory Sites (INAI) are natural landscape features and communities of the highest quality still remaining in Illinois. In most cases, these sites are also where State and/or Federally listed Threatened and Endangered species have been found. One INAI site is located within the Kickapoo Creek Subwatershed: Riley Creek.

There is no land within the watershed identified as conservation or recreational land; however 720 acres are within the Conservation Reserve Program.

Wetland areas cover approximately 664 acres of the watershed with Bottomland Forest being the predominant type at 59.8%.

The Illinois Department of Natural Resources was contacted to provide any Natural Heritage Data or related records for all listed threatened, endangered or rare species, high quality natural communities or natural areas documented within the Embarras River Watershed. Three species were located within the Kickapoo Creek Subwatershed including: Eastern Sand Darter, Kirkland's Snake, and Upland Sandpiper.

The Douglas-Hart Nature Center is also located in the watershed and features more than 70 acres of prairie, wetland and forest habitat. The nature center provides the communities with a unique opportunity to learn and discover nature. The non-for-profit center is owned and maintained by the Douglas-Hart Foundation and governed by a board of directors.

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The 303(d) list indicates that approximately 22.8 miles of streams within the Kickapoo Creek Subwatershed were impaired at the time of the 2008 listing. It should be noted that if a stream is not listed on the 303(d) list it may be impaired; however the data (or lack thereof) does not indicate the impairment at the time of publication. The potential causes of the impairment include pH and Phosphorus (Total).

Available water quality data from the United States Geological Survey (USGS) and the Illinois Environmental Protection Agency (IEPA) was analyzed based on screened water quality parameters. No USGS or IEPA stations are located with Kickapoo Creek Subwatershed.

NPDES permits are also indicative of the land use and water quality within a subwatershed. Compliance records for the NPDES facilities within the watershed were analyzed for the past three years Effluent exceedances were noted based on the number of times in the past three years the permit allowed discharge was exceeded. The water quality parameters screened in this analysis included Dissolved Oxygen (DO), Total Suspended Solids (TSS), Nitrogen (N) and Fecal Coliform (FC). There are 3 NPDES permits active within the Kickapoo Creek Subwatershed. According to compliance records, there have been no formal enforcement actions within the last 5 years; however there have been several noted effluent exceedances within the last 3 years. These exceedances included 9 reports of Fecal Coliform and 2 reports of Total Suspended Solids.

Twelve landfills were identified within the Kickapoo Creek Subwatershed.

Biological Data

IEPA has completed several habitat and biological studies within the Embarras River Watershed. Within the Kickapoo Creek Subwatershed, no IEPA sites with biological data were available.

Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-27 summarized the modeling results for the Kickapoo Creek Subwatershed.

Table 9-27: Kickapoo Creek Subwatershed NPS Modeling Summary	
Parameter	Loading
Total Suspended Solids	0.48 ton/ac/yr
Nitrogen	4.26 lb/ac/yr
Phosphorus	0.90 lb/ac/yr
Fecal Coliform	2.13 CFU bill/ac/yr

Kickapoo Creek Subwatershed Implementation Plan

Figure 9-16: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

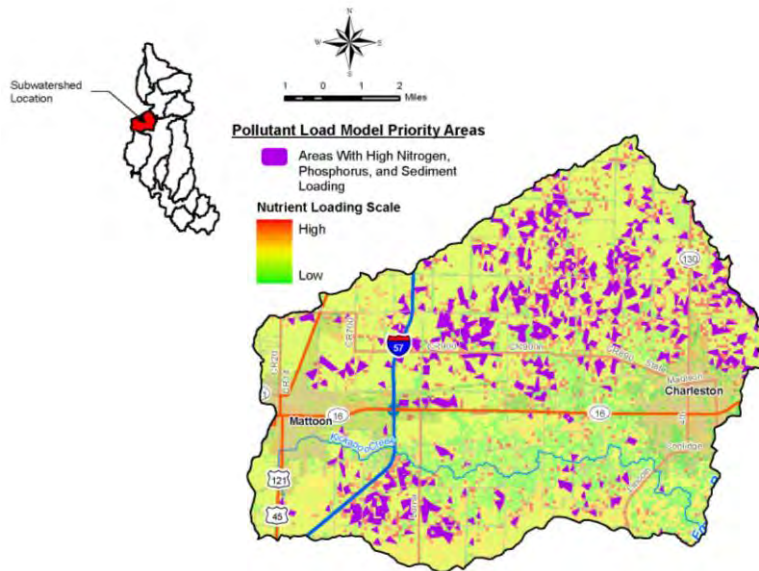


Table 9-28: Kickapoo Creek Subwatershed Pollutant Load Model Priority Areas		
Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	5,436	8.30%

Figure 9-17: Fecal Coliform Bacteria Project & Priority Areas

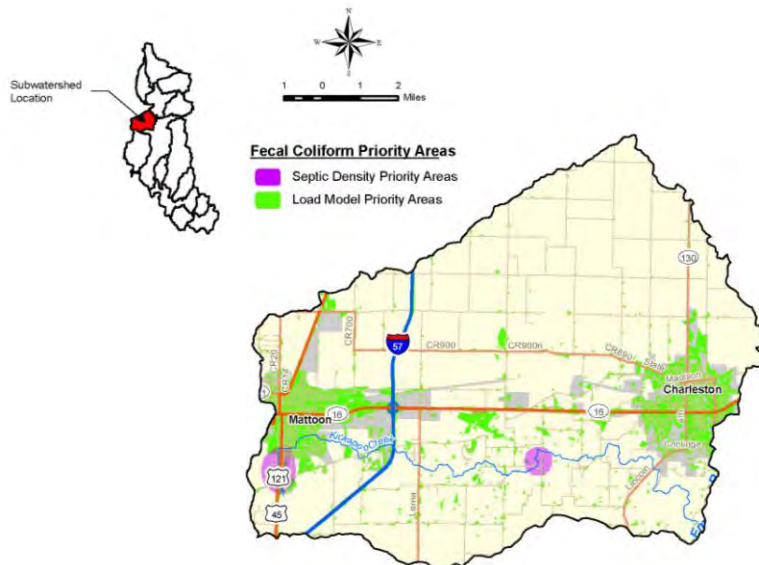


Table 9-29: Kickapoo Creek Subwatershed Fecal Coliform Bacteria Priority Areas		
Parameter	Acres	Percent in Watershed
Septic Density Priority Areas	863	1.32%
Load Model Priority Areas	8,422	12.87%

Figure 9-18: Highly Erodible Land Project & Priority Areas

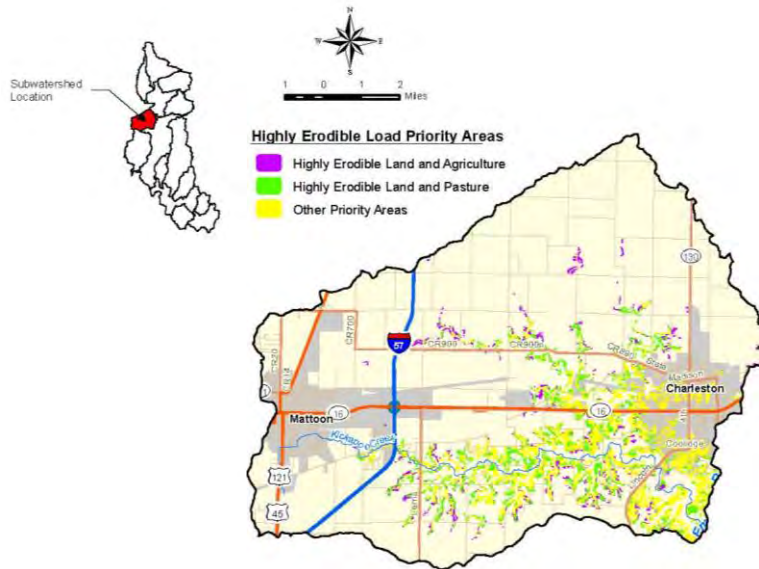


Table 9-30: Kickapoo Creek Subwatershed Highly Erodible Load Priority Areas

Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	348	0.53%
Highly Erodible Land and Pasture	778	1.19%
Other Priority Areas	4,101	6.26%

Figure 9-19: Wetland Restoration/Flood Mitigation Project & Priority Areas

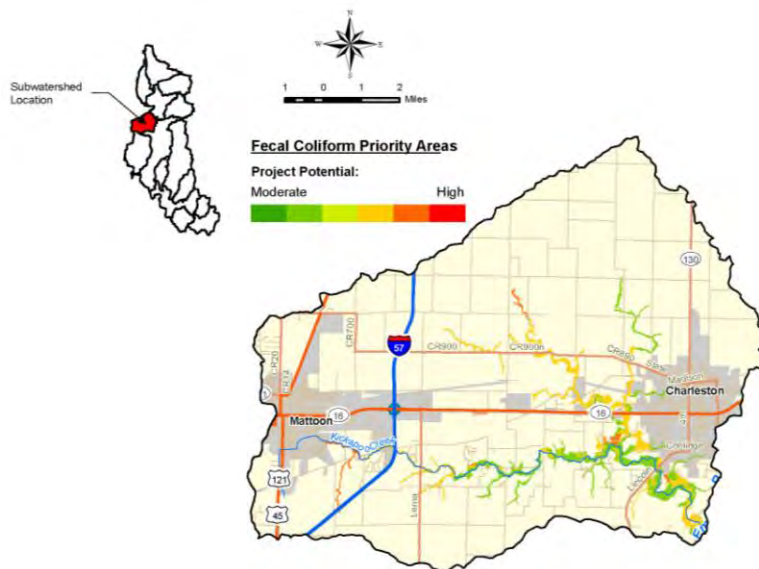


Figure 9-20: Stakeholder Identified Priority Projects

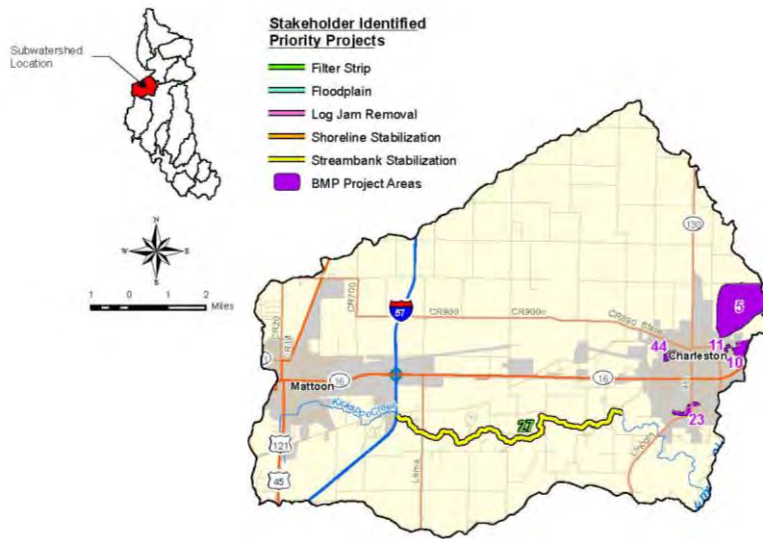


Table 9-31: Kickapoo Creek Subwatershed Estimated Load Reductions for Stakeholder Identified Priority Projects

Map ID	Project Type	Stakeholder	Length (ft)	Area (Acres)	Nitrogen (lbs)	Phosphorus (lbs)	Sediment (tons)	Fecal Coliform (bill fcu)	Project Details
5	Detention	City of Charleston		876	35,041	14,016	657	9,111	Detention in crop field; High Priority
10	Detention Basin	City of Charleston		86	3,459	1,384	65	899	Detention in crop ground to alleviate flooding
11	Detention Basin	City of Charleston		12	464	185	9	121	Detention or floodplain restoration
23	Stabilization/Detention	City of Charleston		59	2,368	947	44	616	1 Ravine - Install detention structures and stabilize ravine; Low Priority
44	Wetland/Floodplain Restoration	City of Charleston		46	2,551	742	83	482	Floodplain restoration including wetlands; city property
27	Streambank Stabilization	Coles SWCD/NRCS	42,102		37,891	15,157	6,315	9,852	Kickapoo Creek

Range Creek – Embarras River Subwatershed

Subwatershed Characteristics

Subwatershed Location

The Range Creek – Embarras River Subwatershed (HUC 10 – 0512011208) is located in portions of Edgar, Coles, Cumberland and Jasper Counties as shown in Exhibit 33. The subwatershed encompasses approximately 222,342 acres (14.3% of the watershed) and includes the Embarras River, Polecat Creek, Whetstone Creek, Indian Creek, Hurricane Creek, Lost Creek, Range Creek, Mink Creek and Turkey Creek.

The Embarras River flows for approximately 64.5 miles generally north to south through the subwatershed. Polecat Creek and Whetstone Creek flow east to west; Hurricane Creek, Lost Creek and Range Creek flow northeast to southwest; and Mink Creek, Turkey Creek and Indian Creek flow northwest to southeast through the watershed to their confluence with the Embarras River. Polecat Creek is approximately 18.1 miles, Whetstone Creek is approximately 8.1 miles, Indian Creek is approximately 2.9 miles, Hurricane Creek is approximately 17.0 miles, Lost Creek is approximately 10.9 miles, Range Creek is approximately 22.5 miles, Mink Creek is approximately 11.7 miles and Turkey Creek is approximately 4.9 miles long.

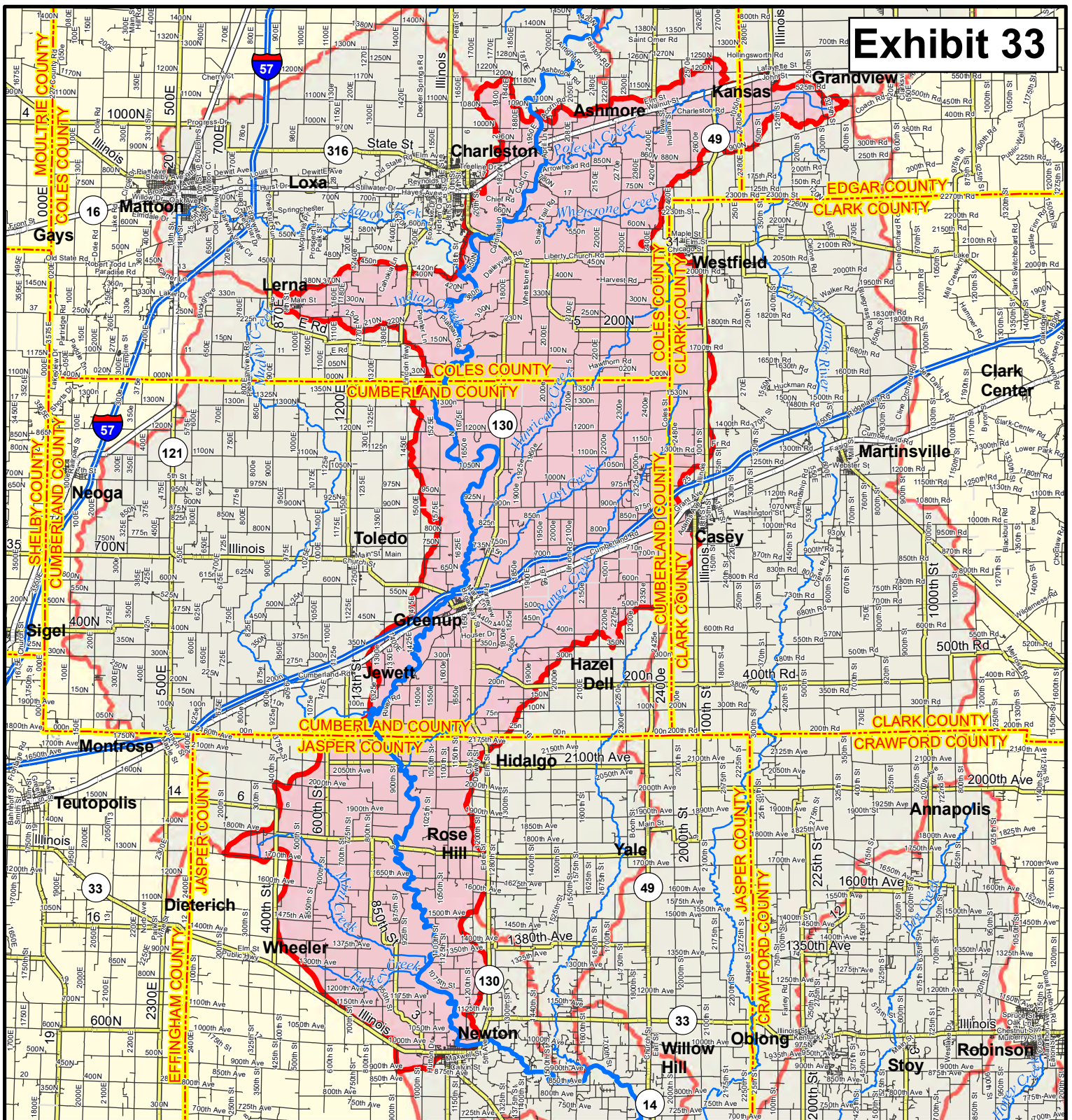
Population

According to the 1990 Census, the population within the Range Creek – Embarras River Subwatershed was approximately 14,052. In the 2000 Census, the population was approximately 17,436, an increase of 24.1%.

The majority of the subwatershed is relatively sparsely populated with population density averaging less than 0.1 people per acre. The most densely populated areas are located in the northwestern portion of the subwatershed associated with the City of Charleston, the east-central portion of the subwatershed associated with the City of Casey, and in the southern portion of the subwatershed associated with the City of Newton.

Land Cover

Land Use within the Range Creek – Embarras River Subwatershed was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 54.8% of the subwatershed covered by agriculture (Table 9-32), the Range Creek – Embarras River Subwatershed still remains primarily rural and agricultural. The developed areas (approximately 9.1%) are concentrated in the northwestern portion of the subwatershed associated with the City of Charleston, the east-central portion of the subwatershed associated with the City of Casey, and in the southern portion of the subwatershed associated with the City of Newton.



Range Creek-Embarras River

Subwatershed

HUC: 0512011208 Acres: 222,342

Embarras River Watershed Plan

Subwatershed Location

Map



2 0 2 4 Miles



Legend

- Urban Area
- Interstate
- Embarras River
- US Highway
- Embarras River Tributaries
- State Highway
- County Line
- Local Road
- Range Creek-Embarras River Subwatershed
- Minor Road
- Embarras Subwatersheds
- Other Road
- Ramp

Table 9-32: Range Creek – Embarras River Subwatershed Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	121,731	54.8%
Barren	102	0.1%
Developed	20,164	9.1%
Forest	55,997	25.2%
Grassland	22,744	10.2%
Open Water	1,515	0.7%
Wetlands	89	0.0%
Total	222,342	100.1%*
*Note – Percent totals do not add to 100% due to rounding		

Soil Characteristics

The soils within the Range Creek – Embarras River Subwatershed fall into 14 major associations (Table 9-33). Approximately 70.3% of the basin area is composed of five soil associations, with the remaining nine soil associations each comprising 0.2-6.6% of the subwatershed.

Table 9-33: Range Creek – Embarras River Subwatershed Soil Associations		
Association	Acres	Percentage
Oconee-Cowden-Piasa	23,578	10.6%
Hoyleton-Cisne-Huey	31,125	14.0%
Catlin-Flanagan-Drummer	8,910	4.0%
Plano-Proctor-Worthen	4,069	1.8%
Saybrook-Dana-Drummer	10,407	4.7%
Lawson-Sawmill-Darwin	6,844	3.1%
Hosmer-Stoy-Weir	13,450	6.0%
Ava-Bluford-Wynoose	41,986	18.9%
Birkbeck-Sabina-Sunbury	14,650	6.6%
St. Charles-Camden-Drury	5,620	2.5%
Dodge-Russell-Miami	29,209	13.1%
Oakville-Lamont-Alvin	1,754	0.8%
Haymond-Petrolia-Karnak	30,372	13.7%
Water	368	0.2%
Total	222,342	100.0%

Highly erodible soils comprise approximately 13,365 acres (6.0%) of the subwatershed, while hydric soils consist of 36.0% (79,964 acres) of the subwatershed.

Natural Resources

Illinois Natural Area Inventory Sites (INAI) are natural landscape features and communities of the highest quality still remaining in Illinois. In most cases, these sites are also where State and/or Federally listed Threatened and Endangered species have been found. Twelve INAI sites are located within the Range Creek – Embarras River Subwatershed: Center

School Geological Area, Embarras River, Embarras River Land and Water Reserve, Five-Mile Hill Prairie, Green Prairie, Hillside Marsh, Hutton Geological Area, Sargent's Woods, Stevens Hill Prairie, Warbler Woods, Water Works Hill Prairie, and Woodyard Memorial Conservation Area.

Approximately 2,523 acres of land within the watershed is identified as conservation or recreational land, while 11,965 acres are within the Conservation Reserve Program.

Wetland areas cover approximately 6,564 acres of the watershed with Bottomland Forest being the predominant type at 61.1%

The Illinois Department of Natural Resources was contacted to provide any Natural Heritage Data or related records for all listed threatened, endangered or rare species, high quality natural communities or natural areas documented within the Embarras River Watershed. Eleven species were located within the Range Creek – Embarras River Subwatershed including: Barn Owl, Bigeye Chub, Broomrape, Clubshell, Eastern Sand Darter, Fibrous-rooted Sedge, Harlequin Darter, Kirkland's Snake, Least Bittern, Loggerhead Shrike, and Swamp Metalmark.

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The 303(d) list indicates that approximately 36.3 miles of the Embarras River within the Range Creek – Embarras River Subwatershed was impaired at the time of the 2008 listing. It should be noted that if a stream is not listed on the 303(d) list it may be impaired; however the data (or lack thereof) does not indicate the impairment at the time of publication. The potential cause of the impairment is Fecal Coliform.

Available water quality data from the United States Geological Survey (USGS) and the Illinois Environmental Protection Agency (IEPA) was analyzed based on screened water quality parameters. There are four USGS water quality stations within the Range Creek – Embarras River Subwatershed, however only one of these stations (03344000) contains data on the screened parameters. Seven IEPA stations (RBC-1, RBC-2, RBC-3, RBH-1, RBH-2, RBH-3, and BE-09) are located within the subwatershed and have water quality data. Table 9-34 below summarizes the USGS and IEPA sampling mean value of each parameter screened and the corresponding water quality target.

Table 9-34: Range Creek – Embarras River Water Quality Sampling Summary				
Water Quality Parameter	USGS Mean Value	IEPA Mean Value	Water Quality Target	
Dissolved Oxygen	10.1 mg/L	Not available	between 4.0 and 12.0 mg/L	
Fecal Coliform	599 CFU/100mL	Not available	200 CFU/100mL	
Nitrate + Nitrite	6.4 mg/L	2.9 mg/L	1.8 mg/L	
Total Phosphorus	0.265 mg/L	0.147 mg/L	0.118 mg/L	
TSS	74.5 mg/L	32.0 mg/L	50.0 mg/L	

Based on the available water quality information, the Range Creek – Embarras River consistently tests higher than the water quality targets in Nitrate + Nitrite and Total Phosphorus. Fecal Coliform and TSS tested higher than the water quality target in the USGS

sampling however this data was not available for the IEPA station. Dissolved Oxygen falls within the acceptable ranges of the target; therefore it is not a concern for this subwatershed in general. The data does not represent the Charleston Side Channel Reservoir which has had documented dissolved oxygen concerns.

NPDES permits are also indicative of the land use and water quality within a subwatershed. Compliance records for the NPDES facilities within the watershed were analyzed for the past three years Effluent exceedances were noted based on the number of times in the past three years the permit allowed discharge was exceeded. The water quality parameters screened in this analysis included Dissolved Oxygen (DO), Total Suspended Solids (TSS), Nitrogen (N) and Fecal Coliform (FC). There are 9 NPDES permits active within the Range Creek – Embarras River Subwatershed. According to compliance records, there have been no formal enforcement actions within the last 5 years; however there have been several noted effluent exceedances within the last 3 years. These exceedances included 1 report of Total Suspended Solids and 4 reports of Nitrogen.

Six landfills were identified within the Range Creek – Embarras River Subwatershed.

Biological Data

IEPA has completed several habitat and biological studies within the Embarras River Watershed. Within the Range Creek – Embarras River Subwatershed, two IEPA site have biological information available. Sampling data was available from a July 2001 study and a July 2006 study. Table 9-35 summarizes the IEPA mean value for the Macroinvertebrate Index of Biotic Integrity (mIBI) and the Index of Biotic Integrity (IBI).

Table 9-35: Range Creek – Embarras River Subwatershed IEPA Biological Sampling Summary	
Habitat/Biological Parameter	IEPA Mean Value
mIBI	76.6
IBI	48

With a mIBI score of 76.6, the Range Creek – Embarras River Subwatershed shows no impairment for macroinvertebrate communities and an IBI score of 48 indicates that the fish community is fair.

Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-36 summarized the modeling results for the Range Creek- Embarras River Subwatershed.

Table 9-36: Range Creek – Embarras River Subwatershed NPS Modeling Summary

Parameter	Loading
Total Suspended Solids	0.42 ton/ac/yr
Nitrogen	4.24 lb/ac/yr
Phosphorus	0.86 lb/ac/yr
Fecal Coliform	1.96 CFU bill/ac/yr

Range Creek Subwatershed Implementation Plan

Figure 9-21: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

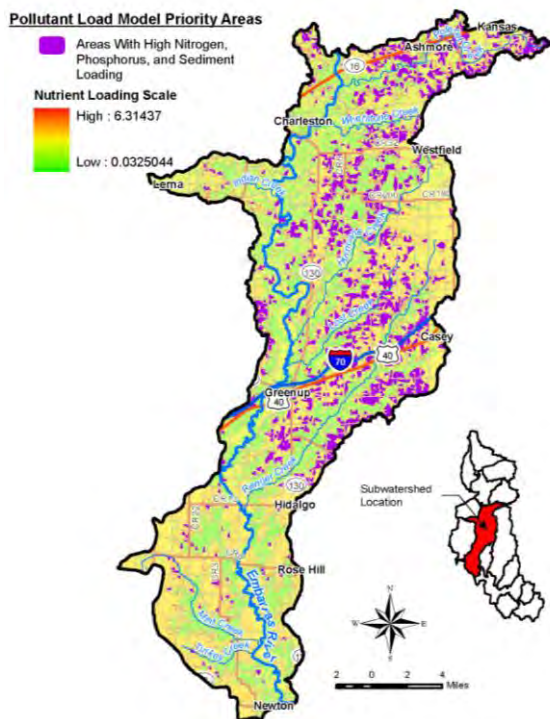


Table 9-37: Range Creek – Embarras River Subwatershed Pollutant Load Model Priority Areas

Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	17,834	8.02%

Figure 9-22: Fecal Coliform Bacteria Project & Priority Areas

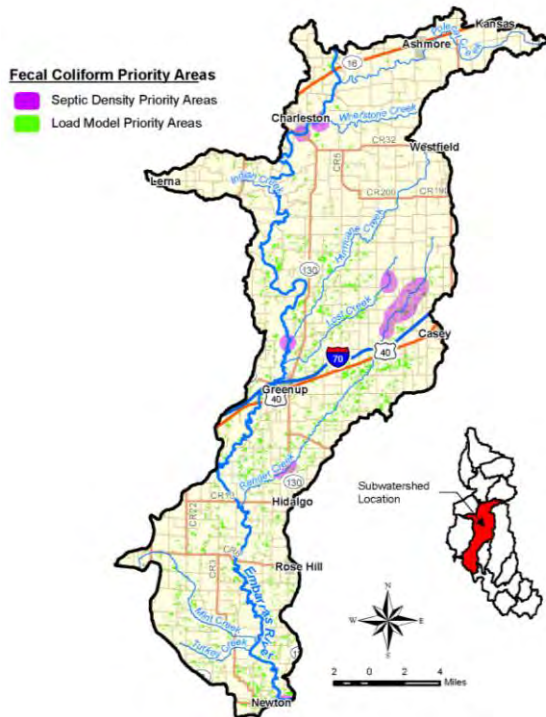


Table 9-38: Range Creek – Embarras River Subwatershed Fecal Coliform Bacteria Priority Areas

Parameter	Acres	Percent in Watershed
Septic Density Priority Areas	5,608	2.52%
Load Model Priority Areas	14,596	6.56%

Figure 9-23: Highly Erodible Land Project & Priority Areas

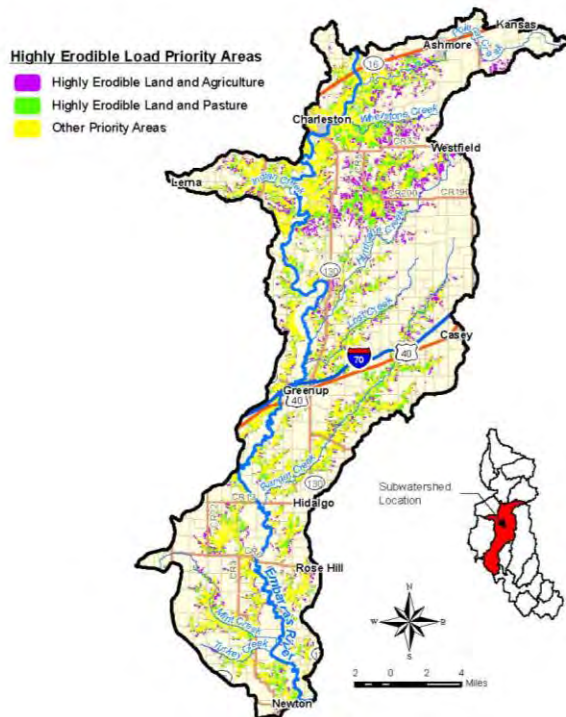


Table 9-39: Range Creek – Embarras River Subwatershed Highly Erodible Load Priority Areas		
Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	2,711	1.22%
Highly Erodible Land and Pasture	5,126	2.31%
Other Priority Areas	26,116	11.75%

Figure 9 – 24: Wetland Restoration/Flood Mitigation Project & Priority Areas

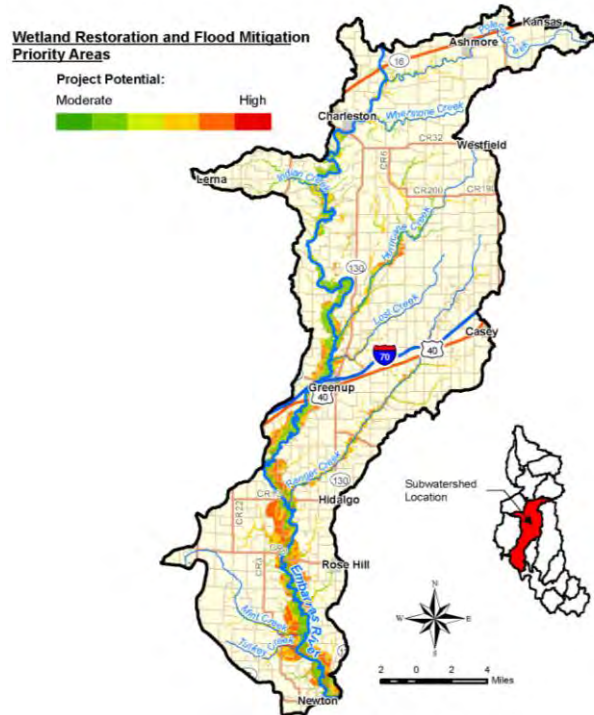


Figure 9-25: Stakeholder Identified Priority Projects

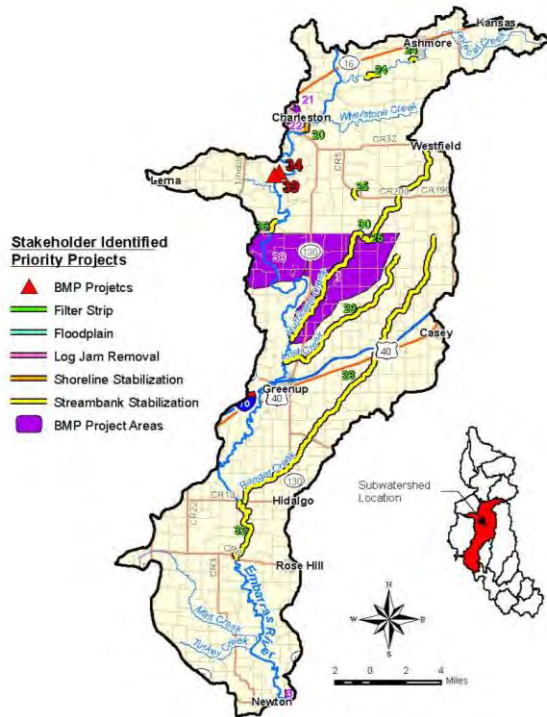


Table 9-40: Range Creek Subwatershed Estimated Load Reductions for Stakeholder Identified Priority Projects

Map ID	Project Type	Stakeholder	Length (ft)	Area (Acres)	Nitrogen (lbs)	Phosphorus (lbs)	Sediment (tons)	Fecal Coliform (bill fc)	Project Details
5	Detention	City of Charleston		0	7	3	0	2	Detention in crop field; High Priority
20	Shoreline Stabilization	City of Charleston	3,697		3,327	1,331	1,183	865	berm with wetlands to control bank erosion
21	Stabilization/ Detention	City of Charleston		113	4,520	1,808	85	1,175	2 Ravines - Install detention structures and stabilize ravines; INAI site - High Priority
22	Stabilization/ Detention	City of Charleston		102	4,093	1,637	77	1,064	4 Ravines - Install detention structures and stabilize ravines; High Priority
3	Acquisition/Wetland	City of Newton		170	9,326	2,713	305	1,764	Acquire property in floodplain and restore wetlands to mitigate flooding
24	Streambank Stabilization	Coles SWCD/NRCS	5,912		5,321	2,128	1,892	1,383	Polecat Creek
25	Streambank Stabilization	Coles SWCD/NRCS	3,038		2,734	1,094	972	711	Hurricane Creek
25	Streambank Stabilization	Coles SWCD/NRCS	3,038		2,734	1,094	972	711	Hurricane Creek
26	Streambank Stabilization	Coles SWCD/NRCS	4,342		3,908	1,563	1,389	1,016	Sand Pit
1	All BMPs	Cumberland SWCD/NRCS		12274	14,728	4,909	1,227	3,191	Priority shed for implementation; potential willing landowners
28	Streambank Stabilization	Cumberland SWCD/NRCS	118,300		106,470	42,588	17,745	27,682	Range Creek
29	Streambank Stabilization	Cumberland SWCD/NRCS	57,012		51,311	20,524	8,552	13,341	Lost Creek
30	Streambank Stabilization	Cumberland SWCD/NRCS	89,070		80,163	32,065	13,360	20,842	Hurricane Creek
30	Streambank Stabilization	Cumberland SWCD/NRCS	89,070		80,163	32,065	13,360	20,842	Hurricane Creek
38	WASCB/Water way	Cumberland SWCD/NRCS		5939	713	178	4,751	116	Target BMPs on B slopes and greater between A slopes and floodways
19	Sediment Control; Retention	Jasper SWCD/NRCS		3	122	49	5	32	Sam Parr Lake; watershed plan in place; sediment reduction and retention
32	Streambank Stabilization	Jasper SWCD/NRCS	26,846		24,162	9,665	4,027	6,282	Main Stem

Big Creek Subwatershed

Subwatershed Characteristics

Subwatershed Location

The Big Creek Subwatershed (HUC 10 – 0512011211) is located primarily in Crawford County with a smaller portion in Jasper County as shown in Exhibit 34. The subwatershed encompasses approximately 72,143 acres (4.6% of the watershed) and includes Big Creek.

Big Creek flows generally north to south through the subwatershed to its confluence with the Embarras River. Big Creek is approximately 23.7 miles long.

Population

According to the 1990 Census, the population within the Big Creek Subwatershed was approximately 5,089. In the 2000 Census, the population was approximately 4,603, a decrease of 9.5%.

The majority of the subwatershed is relatively sparsely populated with population density averaging less than 0.1 people per acre. The most densely populated areas are located in the eastern portion of the subwatershed and are associated with the City of Robinson.

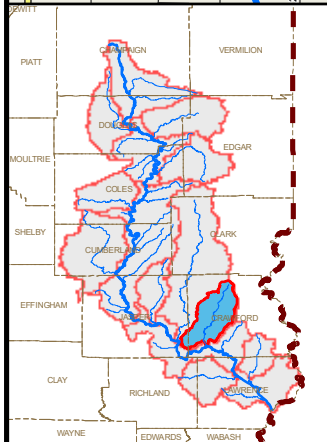
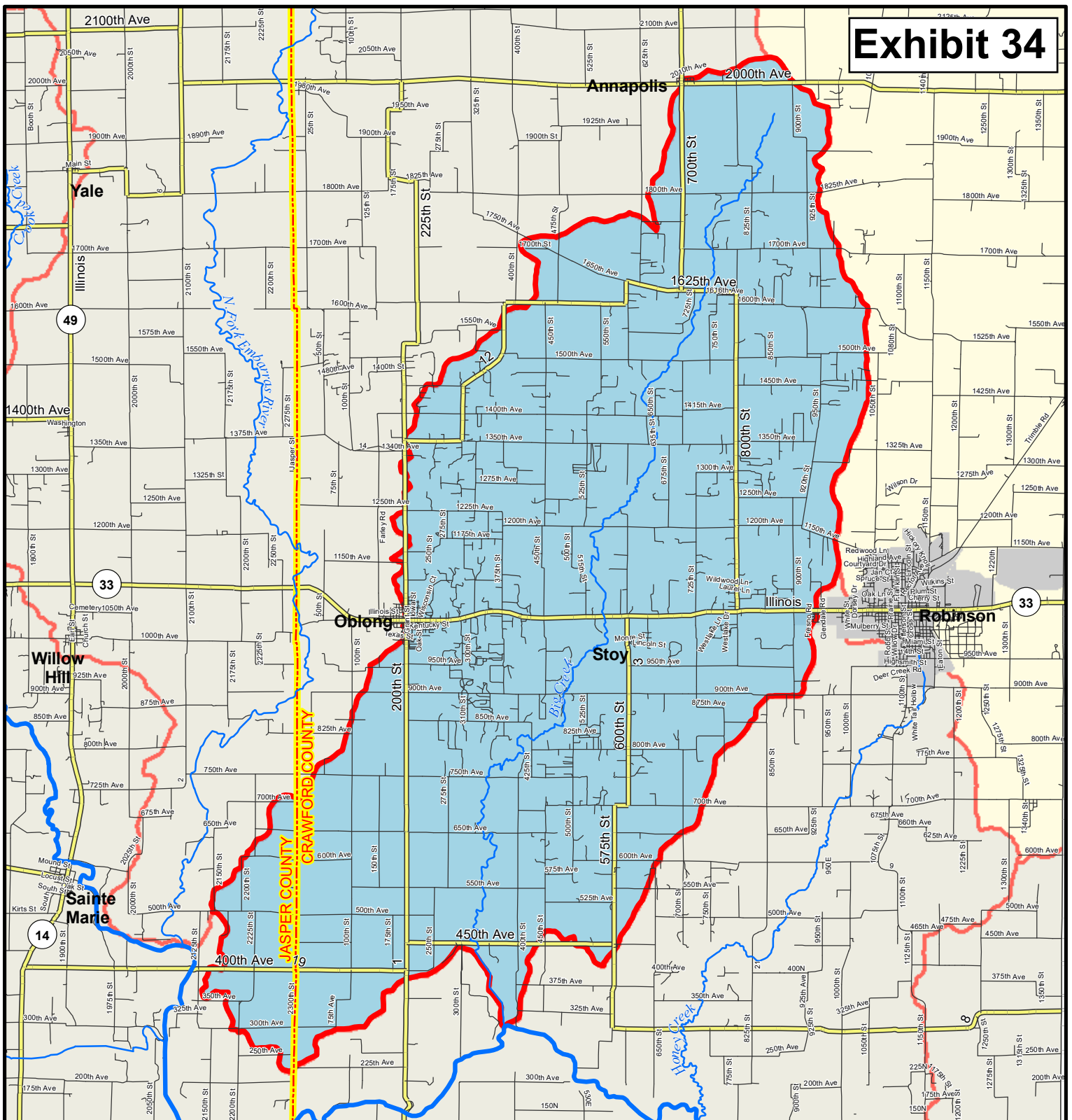
Land Cover

Land Use within the Big Creek Subwatershed was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 61.6% of the subwatershed covered by agriculture (Table 9-41) and approximately 26.7% covered by grassland or forest, the Big Creek Subwatershed still remains primarily rural and agricultural. The developed areas (approximately 11.2%) are concentrated primarily in the eastern portion of the subwatershed and are associated with the City of Robinson.

Table 9-41: Big Creek Subwatershed Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	44,417	61.6%
Barren	3	0.0%
Developed	8,095	11.2%
Forest	14,440	20.0%
Grassland	4,806	6.7%
Open Water	173	0.2%
Wetlands	210	0.3%
Total	72,144	100.0%

Soil Characteristics

The soils within the Big Creek Subwatershed fall into six major associations (Table 9-42). Over half of the subwatershed falls within the Ava-Bluford-Wynoose association (54.9%).



Big Creek Subwatershed

HUC: 0512011211 Acres: 72,143

Embarras River Watershed Plan

Subwatershed Location Map

Legend

	Urban Area		Interstate
	Embarras River		US Highway
	Embarras River Tributaries		State Highway
	County Line		Local Road
	Big Creek Subwatershed		Minor Road
	Embarras Subwatersheds		Other Road
			Ramp

Table 9-42: Big Creek Subwatershed Soil Associations		
Association	Acres	Percentage
Hoyleton-Cisne-Huey	26,570	36.8%
Lawson-Sawmill-Darwin	1,195	1.7%
Hosmer-Stoy-Weir	17	0.0%
Ava-Bluford-Wynoose	39,588	54.9%
Oakville-Lamont-Alvin	14	0.0%
Haymond-Petrolia-Karnak	4,759	6.6%
Total	72,143	100.0%

Highly erodible soils comprise approximately 6,752 acres (9.4%) of the subwatershed, while hydric soils consist of 46.2% (33,347 acres) of the subwatershed.

Natural Resources

Illinois Natural Area Inventory Sites (INAI) are natural landscape features and communities of the highest quality still remaining in Illinois. In most cases, these sites are also where State and/or Federally listed Threatened and Endangered species have been found. One INAI site is located within the Big Creek Subwatershed: Edward V. Price Woods.

No land within the watershed is identified as conservation or recreational land; however 2,020 acres are within the Conservation Reserve Program.

Wetland areas cover approximately 2,836 acres of the watershed with Bottomland Forest being the predominant type at 88.2%

The Illinois Department of Natural Resources was contacted to provide any Natural Heritage Data or related records for all listed threatened, endangered or rare species, high quality natural communities or natural areas documented within the Embarras River Watershed. Two species were located within the Big Creek Subwatershed including: Eastern Ribbon Snake and Storax.

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The 303(d) list indicates that none of the streams within the Big Creek Subwatershed were impaired at the time of the 2008 listing. It should be noted that if a stream is not listed on the 303(d) list it may be impaired; however the data (or lack thereof) does not indicate the impairment at the time of publication.

Available water quality data from the United States Geological Survey (USGS) and the Illinois Environmental Protection Agency (IEPA) was analyzed based on screened water quality parameters. There is one USGS water quality station within the Big Creek Subwatershed and no IEPA stations. Table 9-43 below summarizes the USGS and IEPA sampling mean value of each parameter screened and the corresponding water quality target.

Table 9-43: Big Creek Water Quality Sampling Summary			
Water Quality Parameter	USGS Mean Value	IEPA Mean Value	Water Quality Target
Dissolved Oxygen	6.4 mg/L	Not available	between 4.0 and 12.0 mg/L
Fecal Coliform	Not available	Not available	200 CFU/100mL
Nitrate + Nitrite	Not available	Not available	1.8 mg/L
Total Phosphorus	Not available	Not available	0.118 mg/L
TSS	Not available	Not available	50.0 mg/L

Based on the available water quality information, Dissolved Oxygen falls within the acceptable range of the target therefore it is not a concern for this subwatershed. No other water quality data was available.

NPDES permits are also indicative of the land use and water quality within a subwatershed. Compliance records for the NPDES facilities within the watershed were analyzed for the past three years Effluent exceedances were noted based on the number of times in the past three years the permit allowed discharge was exceeded. The water quality parameters screened in this analysis included Dissolved Oxygen (DO), Total Suspended Solids (TSS), Nitrogen (N) and Fecal Coliform (FC). There are 2 NPDES permits active within the Big Creek Subwatershed. According to compliance records, there have been no formal enforcement actions within the last 5 years; however there have been several noted effluent exceedances within the last 3 years. These exceedances included 3 reports of Total Suspended Solids.

Three landfills were identified within the Big Creek Subwatershed.

Biological Data

IEPA has completed several habitat and biological studies within the Embarras River Watershed. Within the Big Creek Subwatershed, no IEPA sites with biological data were available.

Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-44 summarized the modeling results for the Big Creek Subwatershed.

Table 9-44: Big Creek Subwatershed NPS Modeling Summary	
Parameter	Loading
Total Suspended Solids	0.38 ton/ac/yr
Nitrogen	4.54 lb/ac/yr
Phosphorus	0.90 lb/ac/yr
Fecal Coliform	2.16 CFU bill/ac/yr

Big Creek Subwatershed Implementation Plan

Figure 9-26: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

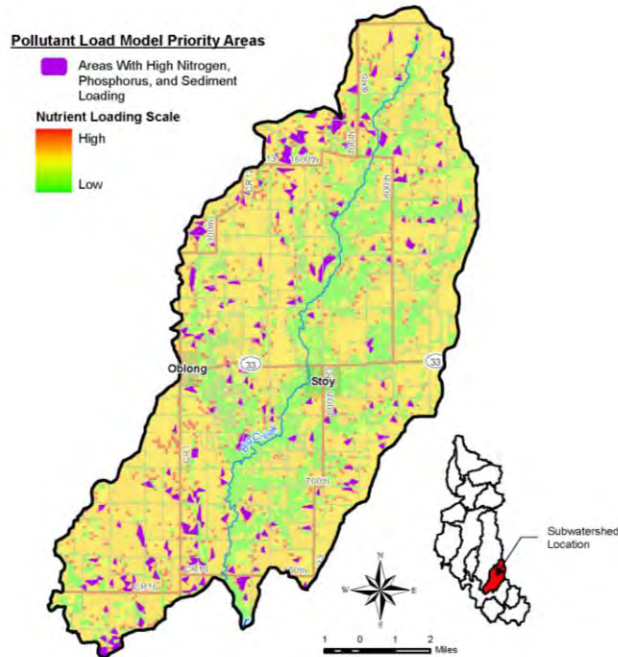


Table 9-45: Big Creek Subwatershed Pollutant Load Model Priority Areas

Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	2,113	2.93%

Figure 9-27: Fecal Coliform Bacteria Project & Priority Areas

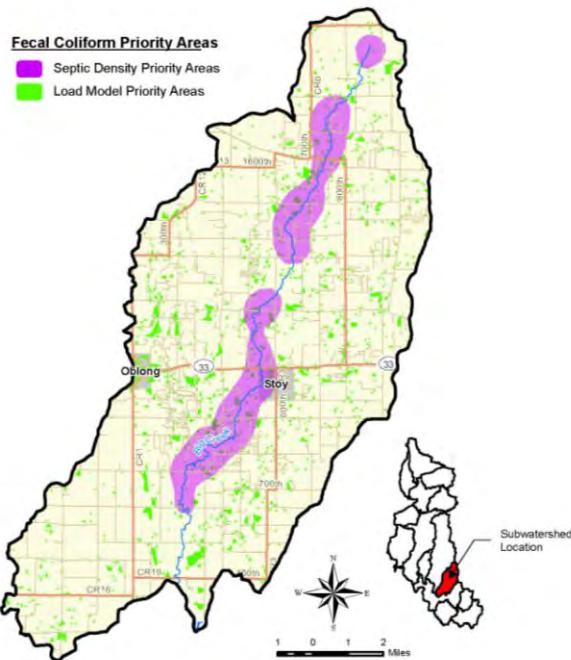


Table 9-46: Big Creek Subwatershed Fecal Coliform Bacteria Priority Areas

Parameter	Acres	Percent in Watershed
Septic Density Priority Areas	7,599	10.53%
Load Model Priority Areas	4,132	5.73%

Figure 9-28: Highly Erodible Land Project & Priority Areas

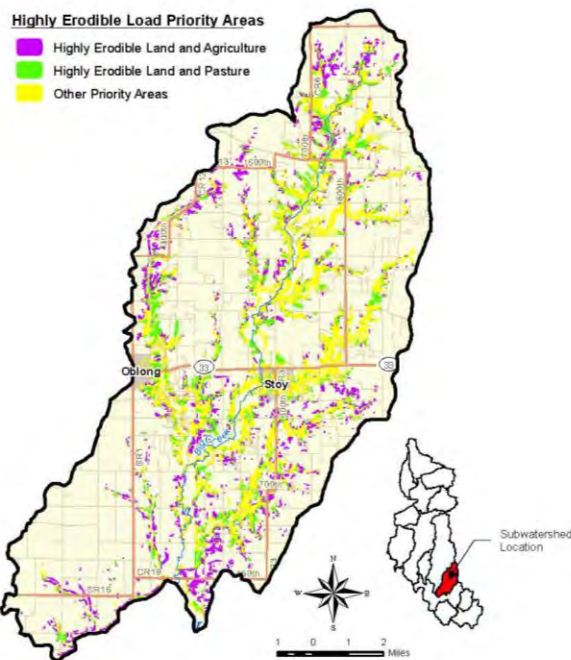


Table 9-47: Big Creek Subwatershed Highly Erodible Load Priority Areas		
Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	1,979	2.74%
Highly Erodible Land and Pasture	1,453	2.01%
Other Priority Areas	9,770	13.54%

Figure 9-29: Wetland Restoration/Flood Mitigation Project & Priority Areas

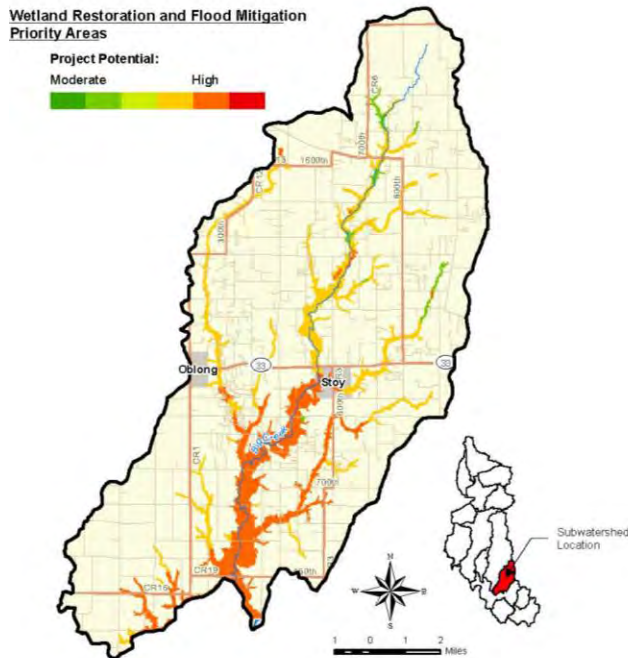


Figure 9-30: Stakeholder Identified Priority Projects

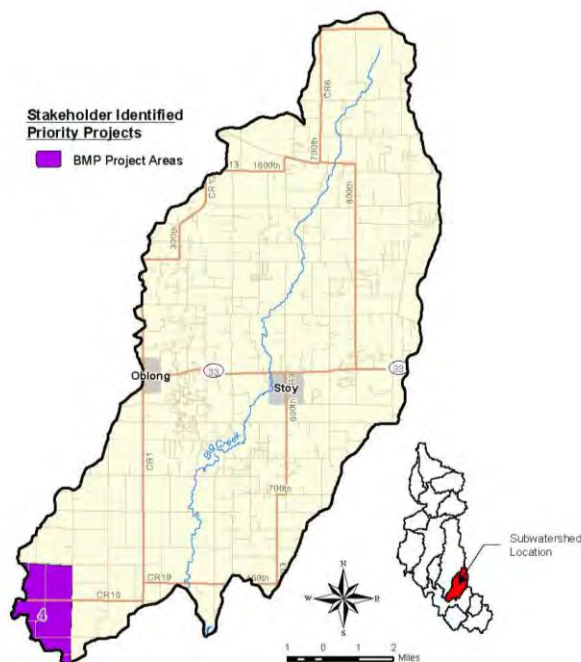


Table 9-48: Big Creek Subwatershed Estimated Load Reductions for Stakeholder Identified Priority Projects								
Map ID	Project Type	Stakeholder	Area (Acres)	Nitrogen (lbs)	Phosphorus (lbs)	Sediment (tons)	Fecal Coliform (bill fcu)	Project Details
37	WASCB/Retention	Crawford SWCD/NRCS	18	2	1	14	0	Focus work in this subwatershed
4	CNMP/Waste Utilization	Jasper SWCDD/NRCS	2060	2,884	989	247	643	High Concentration of confined swine opps within 5mi radius of Ste. Marie; CNMPs

Honey Creek – Embarras River Subwatershed

Subwatershed Characteristics

Subwatershed Location

The Honey Creek – Embarras River Subwatershed (HUC 10 – 0512011212) is located in portions of Jasper, Crawford, Richland and Lawrence Counties as shown in Exhibit 35. The subwatershed encompasses approximately 130,554 acres (8.4% of the watershed) and includes the Embarras River, Pond Grove Creek, Calfkiller Creek and Honey Creek.

The Embarras River flows for approximately 46.4 miles generally northwest to southeast through the subwatershed. Pond Grove Creek flows northwest to southeast, Calfkiller Creek flows southwest to northeast, and Honey Creek flows northeast to southwest through the watershed to their confluence with the Embarras River. Pond Grove Creek is approximately 7.2 miles long, Calfkiller Creek is approximately 7.5 miles, and Honey Creek is approximately 13.8 miles long.

Population

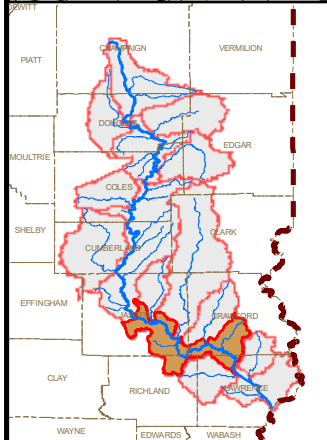
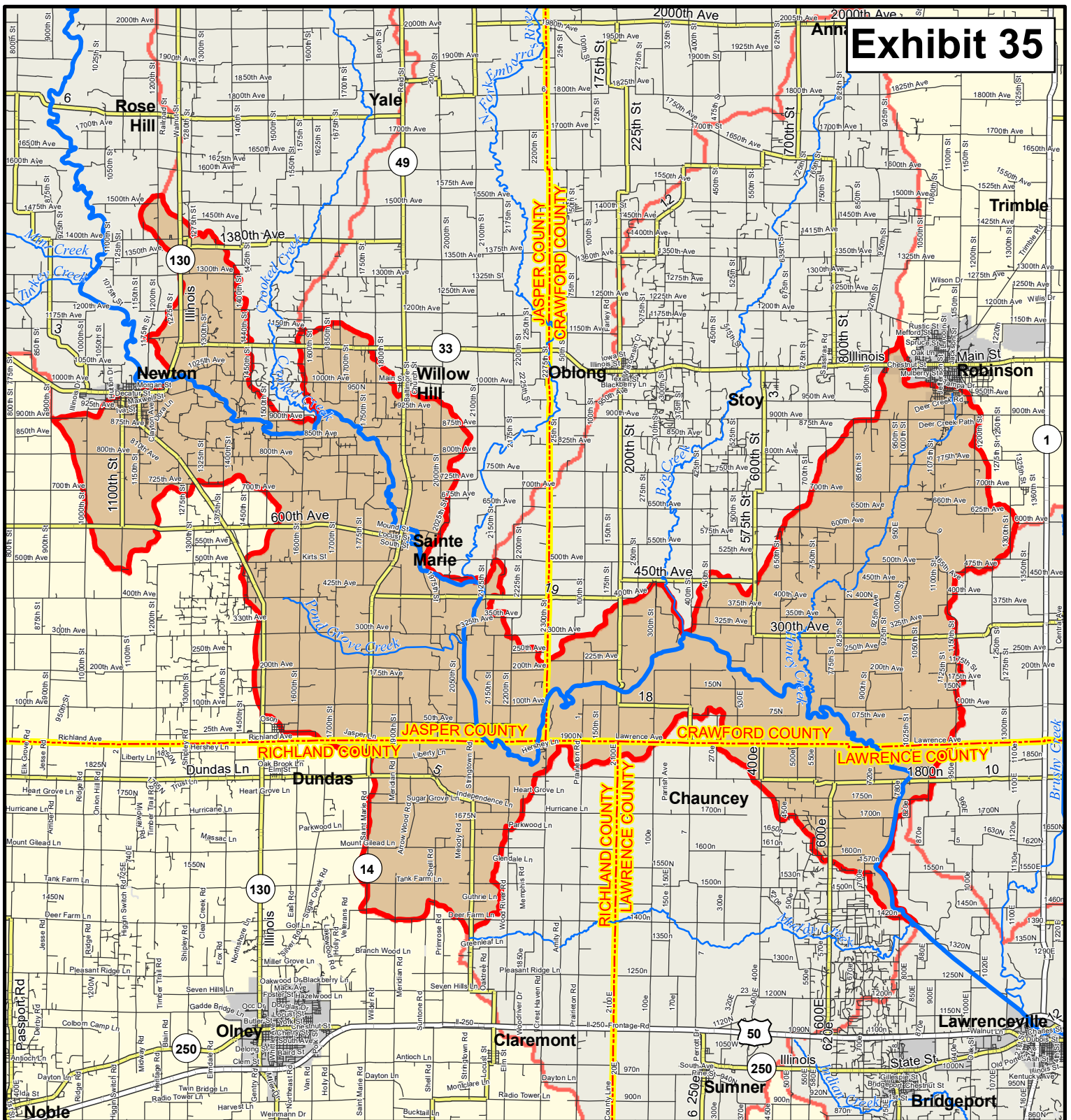
According to the 1990 Census, the population within the Honey Creek – Embarras River Subwatershed was approximately 8,408. In the 2000 Census, the population was approximately 7,605, a decrease of 9.6%.

The majority of the subwatershed is relatively sparsely populated with population density averaging less than 0.1 people per acre. The most densely populated areas are located in the eastern portion of the subwatershed associated with the City of Newton and in the western portion associated with the City of Robinson.

Land Cover

Land Use within the Honey Creek – Embarras River Subwatershed was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 58.3% of the subwatershed covered by agriculture (Table 9-49) and approximately 31.5% covered by grassland or forest, the Honey Creek – Embarras River Subwatershed still remains primarily rural and agricultural. The developed areas (approximately 9.1%) are concentrated primarily in the eastern portion of the subwatershed associated with the City of Newton and in the western portion associated with the City of Robinson.

Table 9-49: Honey Creek – Embarras River Subwatershed Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	76,168	58.3%
Barren	1	0.0%
Developed	11,919	9.1%
Forest	28,800	22.1%
Grassland	12,269	9.4%
Open Water	986	0.8%
Wetlands	411	0.3%
Total	130,554	100.0%



Honey Creek-Embarras River Subwatershed

HUC: 0512011212 Acres: 130,554

Embarras River Watershed Plan

Subwatershed Location Map

- ### Legend
- Urban Area
 - Embarras River
 - Embarras River Tributaries
 - County Line
 - Honey Creek-Embarras River Subwatershed
 - Embarras Subwatersheds
 - Interstate
 - US Highway
 - State Highway
 - Local Road
 - Minor Road
 - Other Road
 - Ramp

Soil Characteristics

The soils within the Honey Creek – Embarras River Subwatershed fall into eight major associations (Table 9-50). Approximately 81.4% of the basin area is composed of three soil associations, with the remaining five soil associations each comprising 1.1-9.8% of the subwatershed.

Table 9-50: Honey Creek – Embarras River Subwatershed Soil Associations		
Association	Acres	Percentage
Hoyleton-Cisne-Huey	31,116	23.8%
Harco-Patton-Montgomery	2,374	1.8%
Lawson-Sawmill-Darwin	21,807	16.7%
Hosmer-Stoy-Weir	1,468	1.1%
Ava-Bluford-Wynoose	53,395	40.9%
St. Charles-Camden-Drury	2,954	2.3%
Oakville-Lamont-Alvin	4,673	3.6%
Haymond-Petrolia-Karnak	12,767	9.8%
Total	130,554	100.0%

Highly erodible soils comprise approximately 9,032 acres (6.9%) of the subwatershed, while hydric soils consist of 37.5% (48,970 acres) of the subwatershed.

Natural Resources

Illinois Natural Area Inventory Sites (INAI) are natural landscape features and communities of the highest quality still remaining in Illinois. In most cases, these sites are also where State and/or Federally listed Threatened and Endangered species have been found. Three INAI sites are located within the Honey Creek – Embarras River Subwatershed: Chauncey Marsh, Edward V. Price Woods, and Prairie Ridge-Jasper County.

Approximately 1,930 acres of land within the watershed is identified as conservation or recreational land, while 6,434 acres are within the Conservation Reserve Program.

Wetland areas cover approximately 6,887 acres of the watershed with Bottomland Forest being the predominant type at 69.6%

The Illinois Department of Natural Resources was contacted to provide any Natural Heritage Data or related records for all listed threatened, endangered or rare species, high quality natural communities or natural areas documented within the Honey Creek – Embarras River Watershed. Twelve species were located within the Honey Creek – Embarras River Subwatershed including: American Bittern, Cerulean Warbler, Copperbelly Water Snake, Eastern Ribbon Snake, Eastern Sand Darter, Greater Prairie-Chicken, Loggerhead Shrike, Northern Harrier, Ornate Box Turtle, Prairie Rose Gentian, Royal Catchfly, and Upland Sandpiper.

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The 303(d) list indicates that approximately 26.5 miles of the Embarras River within the Honey Creek – Embarras River Subwatershed was impaired at the time of the 2008 listing. It should be noted that if a stream is not listed on the 303(d) list it may be impaired; however the data (or lack thereof) does not indicate the impairment at the time of publication. The potential cause of the impairment includes Fecal Coliform.

Available water quality data from the United States Geological Survey (USGS) and the Illinois Environmental Protection Agency (IEPA) was analyzed based on screened water quality parameters. There are two USGS water quality stations within the Honey Creek – Embarras River Subwatershed, however only one of these stations (03345500) contains data on the screened parameters. Only one IEPA station (BE-01) is located within the subwatershed. Table 9-51 below summarizes the USGS and IEPA sampling mean value of each parameter screened and the corresponding water quality target.

Table 9-51: Honey Creek – Embarras River Water Quality Sampling Summary				
Water Quality Parameter	USGS Mean Value	IEPA Mean Value	Water Quality Target	
Dissolved Oxygen	9.9 mg/L	Not available	between 4.0 and 12.0 mg/L	
Fecal Coliform	1029 CFU/100mL	Not available	200 CFU/100mL	
Nitrate + Nitrite	4.5 mg/L	0.2 mg/L	1.8 mg/L	
Total Phosphorus	0.245 mg/L	0.196 mg/L	0.118 mg/L	
TSS	118.0 mg/L	38.0 mg/L	50.0 mg/L	

Based on the available water quality information, the Honey Creek – Embarras River consistently tests higher than the water quality targets in Total Phosphorus. Fecal Coliform tested higher than the water quality target in the USGS sampling however Fecal Coliform data was not available for the IEPA station. Nitrate +Nitrite and TSS tested higher than the water quality target in the USGS sampling however these parameters tested lower than the water quality targets in the IEPA station. Dissolved Oxygen falls within the acceptable ranges of the water quality target; therefore it is not a concern for this subwatershed.

NPDES permits are also indicative of the land use and water quality within a subwatershed. Compliance records for the NPDES facilities within the watershed were analyzed for the past three years Effluent exceedances were noted based on the number of times in the past three years the permit allowed discharge was exceeded. The water quality parameters screened in this analysis included Dissolved Oxygen (DO), Total Suspended Solids (TSS), Nitrogen (N) and Fecal Coliform (FC). There are 2 NPDES permits active within the Honey Creek – Embarras River Subwatershed. According to compliance records, there have been no formal enforcement actions within the last 5 years; however there have been several noted effluent exceedances within the last 3 years. These exceedances included 5 reports of Total Suspended Solids.

Two landfills were identified within the Honey Creek – Embarras River Subwatershed.

Biological Data

IEPA has completed several habitat and biological studies within the Embarras River Watershed. Within the Honey Creek – Embarras River Subwatershed, one IEPA site has biological information available. Sampling data was available from an August 2001 study and an August 2006 study. Table 9-52 summarizes the IEPA mean value for the Macroinvertebrate Index of Biotic Integrity (mIBI) and the Index of Biotic Integrity (IBI).

Table 9-52: Honey Creek – Embarras River Subwatershed IEPA Biological Sampling Summary	
Habitat/Biological Parameter	IEPA Mean Value
mIBI	40.5
IBI	51

With a mIBI score of 40.5, the Honey Creek – Embarras River Subwatershed shows no impairment for macroinvertebrate communities and an IBI score of 51 indicates that the fish community is fair.

Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-53 summarized the modeling results for the Honey Creek – Embarras River Subwatershed.

Table 9-53: Honey Creek – Embarras River Subwatershed NPS Modeling Summary	
Parameter	Loading
Total Suspended Solids	0.37 ton/ac/yr
Nitrogen	4.46 lb/ac/yr
Phosphorus	0.87 lb/ac/yr
Fecal Coliform	2.17 CFU bill/ac/yr

Honey Creek Subwatershed Implementation Plan

Figure 9-31: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

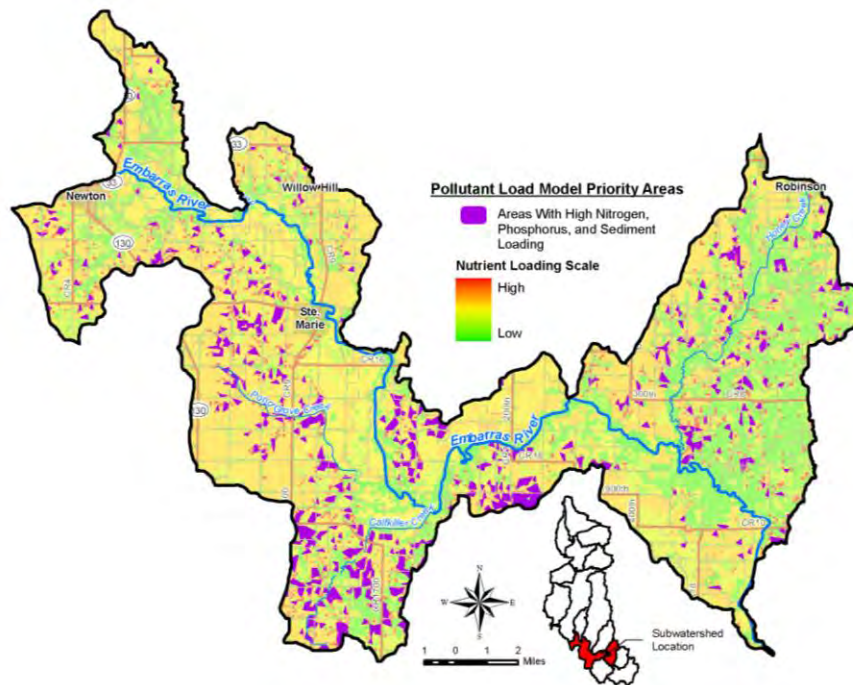


Table 9-54: Honey Creek – Embarras River Subwatershed Pollutant Load Model Priority Areas

Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	6,332	4.85%

Parameter	Acres	Percent in Watershed
Septic Density Priority Areas	7,001	5.36%
Load Model Priority Areas	10,473	8.02%

[illegible]

Table 9-56: Honey Creek – Embarras River Subwatershed Highly Erodible Load Priority Areas		
Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	3,634	2.78%
Highly Erodible Land and Pasture	3,081	2.36%
Other Priority Areas	17,215	13.19%

Figure 9-34: Wetland Restoration/Flood Mitigation Project & Priority Areas

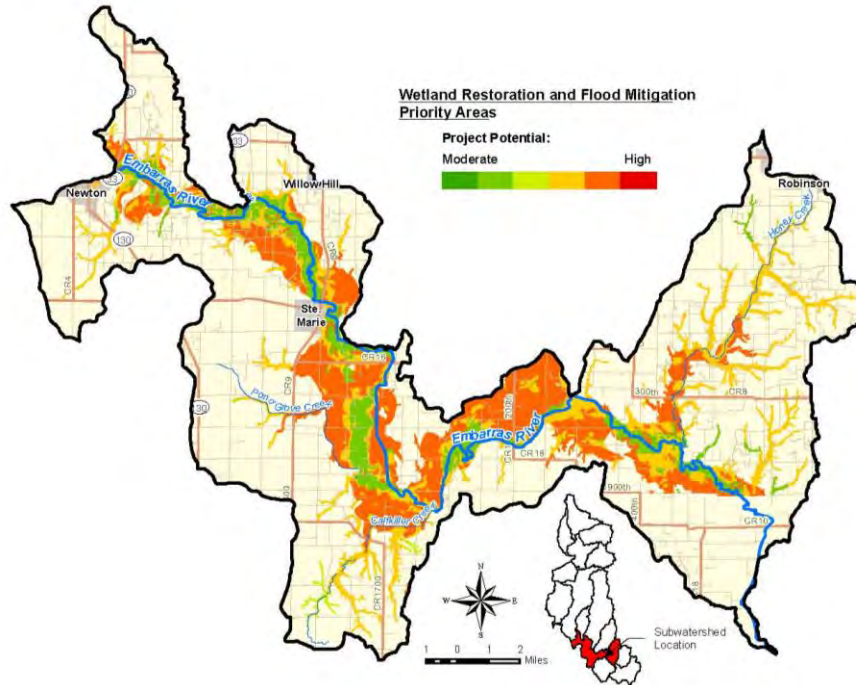


Figure 9-35: Stakeholder Identified Priority Projects

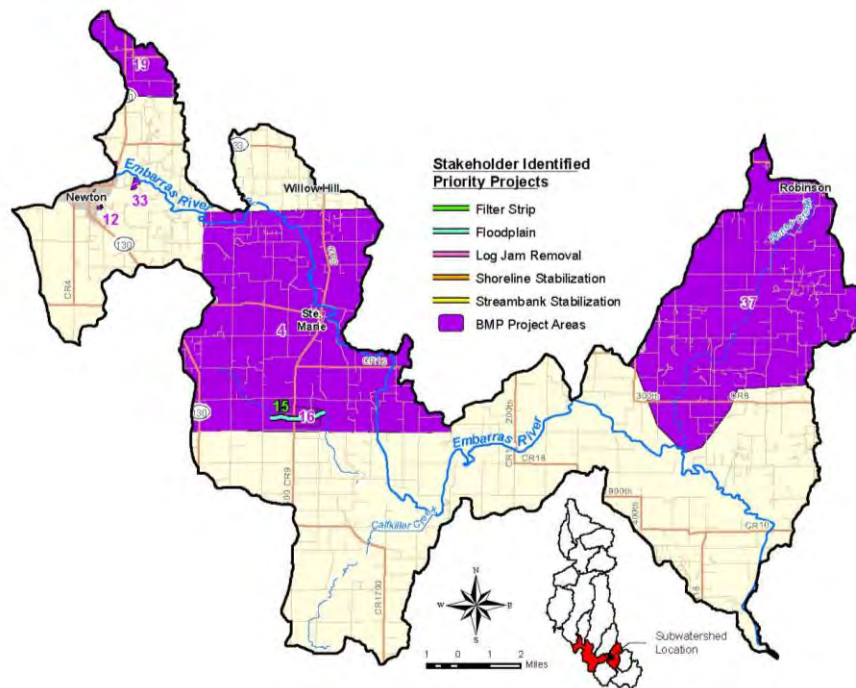


Table 9-57: Honey Creek – Embarras River Subwatershed Estimated Load Reductions for Stakeholder Identified Priority Projects

Map ID	Project Type	Stakeholder	Length (ft)	Area (Acres)	Nitrogen (lbs)	Phosphorus (lbs)	Sediment (tons)	Fecal Coliform (bill fcu)	Project Details
3	Acquisition/Wetland	City of Newton		21	1,139	331	37	215	Acquire property in floodplain and restore wetlands to mitigate flooding
12	Detention/Bio Swale	City of Newton		19	748	299	14	194	Retention system of water flowing through city; filter strips in between detention areas
33	Streambank Stabilization/retention	City of Newton		42	38	15	14	10	Stabilize bend in river; develop wetland or retention areas to mitigate flooding
37	WASCB/Retention	Crawford SWCD/NRCS		23678	2,841	710	18,942	462	Focus work in this subwatershed
15	Floodplain	Jasper SWCD/NRCS	9,306		29,781	15,542	5,119	10,102	Floodplain Management; flooding Pond Grove Creek
16	Floodplain Easement	Jasper SWCD/NRCS		299	16,440	4,782	538	3,109	Easement/Wetland in Floodplain
19	Sediment Control; Retention	Jasper SWCD/NRCS		2216	7,090	3,700	222	2,405	Sam Parr Lake; watershed plan in place; sediment reduction and retention
4	CNMP/Waste Utilization	Jasper SWCDD/NRCS		299	418	143	36	93	High Concentration of confined swine opps within 5mi radius of Ste. Marie; CNMPs
4	CNMP/Waste Utilization	Jasper SWCDD/NRCS		26315	36,841	12,631	3,158	8,210	High Concentration of confined swine opps within 5mi radius of Ste. Marie; CNMPs

Paul Creek-Muddy River Subwatershed

Subwatershed Characteristics

Subwatershed Location

The Paul Creek – Muddy River Subwatershed (HUC 13 – 0512011213) is located in portions of Lawrence, Richland, and Robinson Counties as shown in Exhibit 36. The subwatershed encompasses approximately 63,468 acres (4.1% of the watershed) and includes Muddy Creek South.

Muddy Creek South flows generally south to northeast through the subwatershed to its confluence with the Embarras River. Muddy Creek South is approximately 15.6 miles long.

Population

According to the 1990 Census, the population within the Paul Creek – Muddy River Subwatershed was approximately 2,188. In the 2000 Census, the population was approximately 2,102, a decrease of 3.9%.

The majority of the subwatershed is relatively sparsely populated with population density averaging less than 0.1 people per acre.

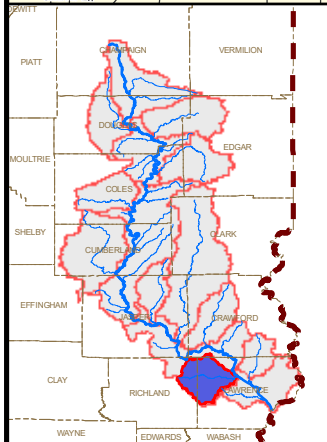
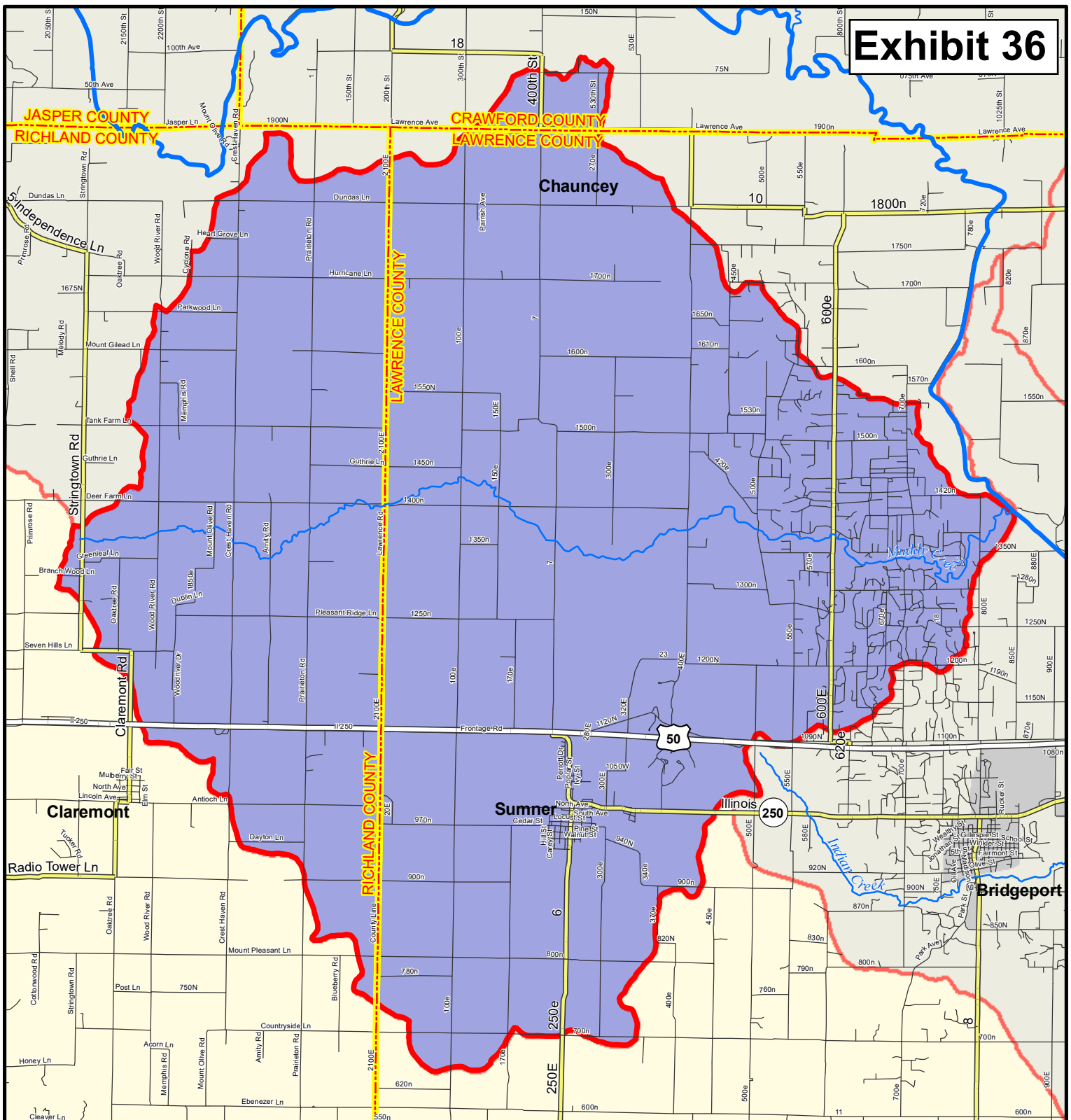
Land Cover

Land Use within the Paul Creek-Muddy River Subwatershed was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 63.9% of the subwatershed covered by agriculture (Table 9-58) and approximately 25.5% covered by grassland or forest, the Paul Creek – Muddy River Subwatershed still remains primarily rural and agricultural.

Table 9-58: Paul Creek – Muddy River Subwatershed Watershed Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	40,563	63.9%
Barren	2	0.0%
Developed	6,259	9.9%
Forest	11,198	17.6%
Grassland	5,003	7.9%
Open Water	166	0.3%
Wetlands	277	0.4%
Total	63,468	100.0%

Soil Characteristics

The soils within the Paul Creek – Muddy River Subwatershed fall into six major associations (Table 9-59). Over half of the basin area (56.7%) is composed of one soil association: Ava-Bluford-Wynoose.



Paul Creek-Muddy River Subwatershed

HUC: 0512011213 Acres: 63,468

Embarras River Watershed Plan

Subwatershed Location Map



0.5 0 0.5 1
Miles



Legend

- | | |
|-------------------------------------|---------------|
| Urban Area | Interstate |
| Embarras River | US Highway |
| Embarras River Tributaries | State Highway |
| County Line | Local Road |
| Paul Creek-Muddy River Subwatershed | Minor Road |
| Embarras Subwatersheds | Other Road |
| | Ramp |

Table 9-59: Paul Creek – Muddy River Subwatershed Soil Associations		
Association	Acres	Percentage
Hoyleton-Cisne-Huey	15,957	25.1%
Harco-Patton-Montgomery	3,219	5.1%
Lawson-Sawmill-Darwin	15	0.0%
Ava-Bluford-Wynoose	36,002	56.7%
St. Charles-Camden-Drury	987	1.6%
Haymond-Petrolia-Karnak	7,288	11.5%
Total	63,468	100.0%

Highly erodible soils comprise approximately 4,362 acres (6.9%) of the subwatershed, while hydric soils consist of 29.4% (18,668 acres) of the subwatershed.

Natural Resources

Illinois Natural Area Inventory Sites (INAI) are natural landscape features and communities of the highest quality still remaining in Illinois. In most cases, these sites are also where State and/or Federally listed Threatened and Endangered species have been found. Three INAI sites are located within the Paul Creek – Muddy River Subwatershed: Red Hills Seep Springs, Red Hills Woods, and Thacker- Pauly Marsh.

Approximately 979 acres of land within the watershed is identified as conservation or recreational land, while 2,209 acres are within the Conservation Reserve Program.

Wetland areas cover approximately 2,694 acres of the watershed with Bottomland Forest being the predominant type at 85.7%

The Illinois Department of Natural Resources was contacted to provide any Natural Heritage Data or related records for all listed threatened, endangered or rare species, high quality natural communities or natural areas documented within the Paul Creek – Muddy River Watershed. Seven species were located within the Subwatershed including: Cerulean Warbler, Drooping Sedge, Four-toed Salamander, Halbred-leaved Tearthumb, Running Pine, Sedge, and Storax.

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The 303(d) list indicates that none of the streams within the Paul Creek – Muddy River Subwatershed were impaired at the time of the 2008 listing. It should be noted that if a stream is not listed on the 303(d) list it may be impaired; however the data (or lack thereof) does not indicate the impairment at the time of publication.

Available water quality data from the United States Geological Survey (USGS) and the Illinois Environmental Protection Agency (IEPA) was analyzed based on screened water quality parameters. No USGS or IEPA stations are located with Paul Creek – Muddy River Subwatershed.

NPDES permits are also indicative of the land use and water quality within a subwatershed. Compliance records for the NPDES facilities within the watershed were analyzed for the past three years. Effluent exceedances were noted based on the number of times in the past three years the permit allowed discharge was exceeded. The water quality parameters screened in this analysis included Dissolved Oxygen (DO), Total Suspended Solids (TSS), Nitrogen (N) and Fecal Coliform (FC). There are 4 NPDES permits active within the Paul Creek – Muddy River Subwatershed. According to compliance records, there have been no formal enforcement actions within the last 5 years; however there have been several noted effluent exceedances within the last 3 years. These exceedances included 12 reports of Total Suspended Solids and 13 reports of Nitrogen.

One landfill was identified within the Paul Creek – Muddy River Subwatershed.

Biological Data

IEPA has completed several habitat and biological studies within the Embarras River Watershed. Within the Paul Creek – Muddy River Subwatershed, no IEPA sites with biological data were available.

Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-60 summarized the modeling results for the Paul Creek – Muddy River Subwatershed.

Table 9-60: Paul Creek – Muddy River Subwatershed NPS Modeling Summary	
Parameter	Loading
Total Suspended Solids	0.52 ton/ac/yr
Nitrogen	4.87 lb/ac/yr
Phosphorus	1.02 lb/ac/yr
Fecal Coliform	2.18 CFU bill/ac/yr

Paul Creek-Muddy River Subwatershed Implementation Plan

Figure 9-36: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

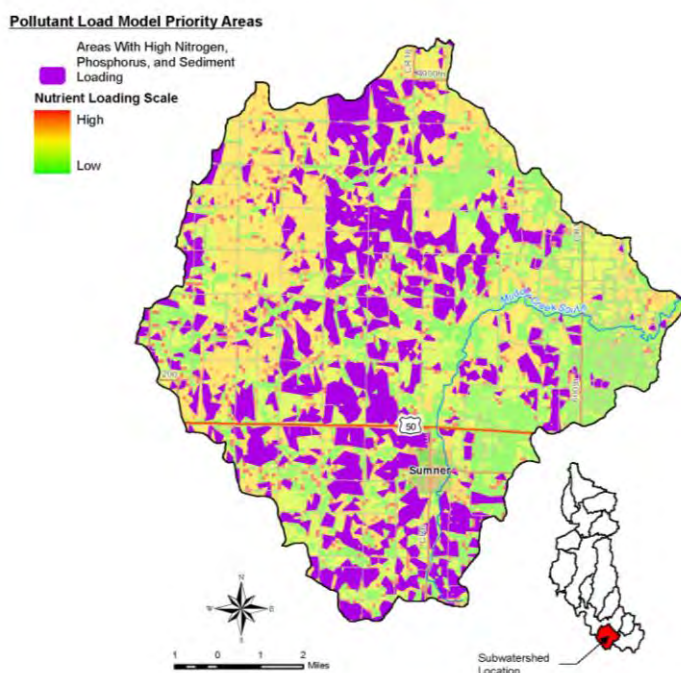


Table 9-61: Paul Creek – Muddy River Subwatershed Pollutant Load Model Priority Areas

Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	14,532	22.90%

Figure 9-37: Fecal Coliform Bacteria Project & Priority Areas

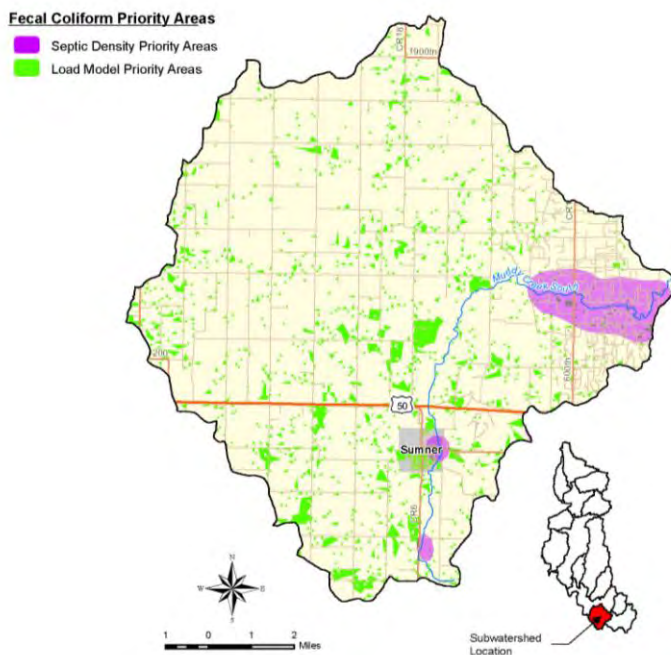


Table 9-62: Paul Creek – Muddy River Subwatershed Fecal Coliform Bacteria Priority Areas		
Parameter	Acres	Percent in Watershed
Septic Density Priority Areas	2,772	4.37%
Load Model Priority Areas	4,959	7.81%

Figure 9-38: Highly Erodible Land Project & Priority Areas

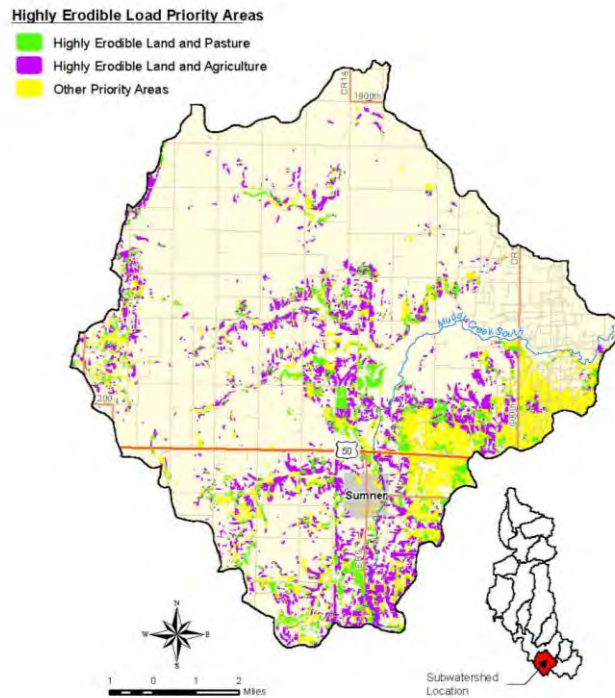
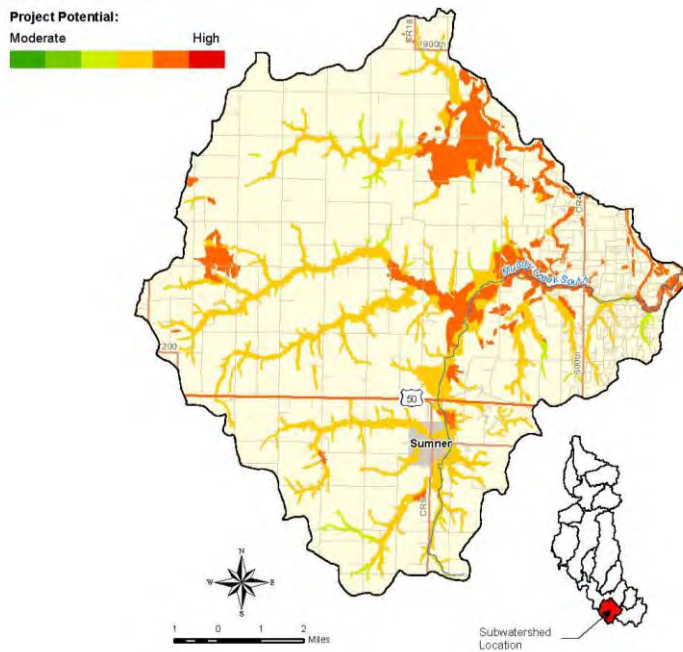


Table 9-63: Paul Creek – Muddy River Subwatershed Highly Erodible Load Priority Areas		
Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	3,298	5.20%
Highly Erodible Land and Pasture	1,432	2.26%
Other Priority Areas	9,439	14.87%

Figure 9-39: Wetland Restoration/Flood Mitigation Project & Priority Areas

**Wetland Restoration and Flood Mitigation
Priority Areas**



Charleston Side Channel Reservoir Drainage Area

Subwatershed Characteristics

Subwatershed Location

The Charleston Side Channel Reservoir (CSCR) a water supply and recreational reservoir is located approximately 2 miles south of the city of Charleston (as shown in Exhibit 37), and it is the sole drinking water source for the city's residents. The reservoir drainage area encompasses approximately 1,284 acres (0.1% of the watershed) and is included within the Range Creek – Embarras River Subwatershed.

The CSCR was created in 1981 when Lake Charleston, an impoundment on the Embarras River, was divided by the building of a dike. Water from the Embarras River is now pumped into the CSCR for eventual intake to the Charleston drinking water treatment plant.

Population

According to the 1990 Census, the population within the Charleston Side Channel Reservoir Drainage Area was approximately 1,771. In the 2000 Census, the population was approximately 2,112, an increase of 1.9%.

The majority of the drainage area is relatively densely populated compared to the rest of the watershed with population density averaging approximately 1.6 people per acre.

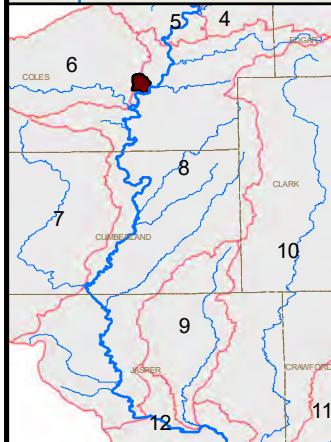
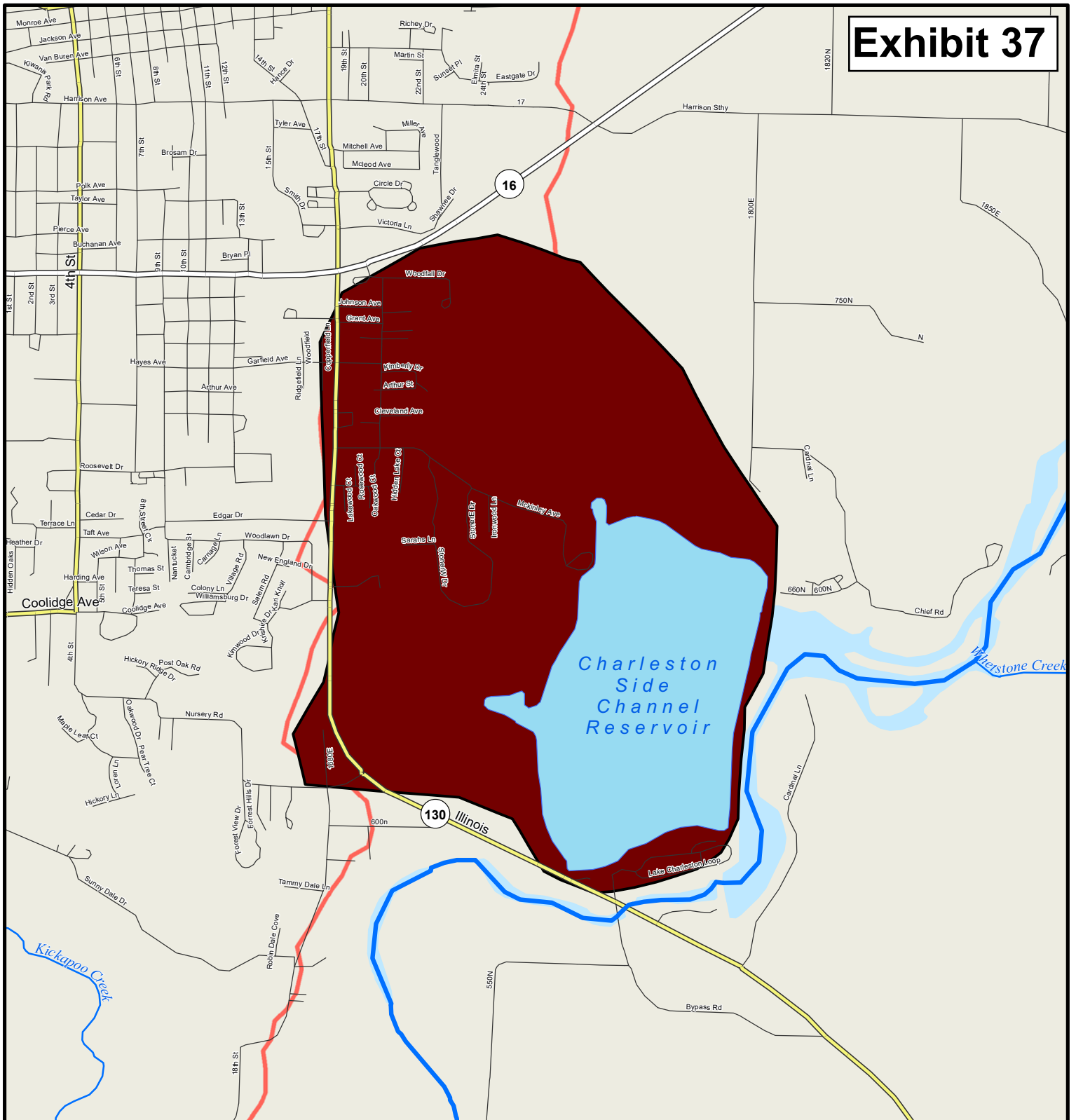
Land Cover

Land Use within the Charleston Side Channel Reservoir Drainage Area was analyzed based on the 2007 Cropland Data Layer (CDL) for Illinois published by the United State Department of Agriculture, National Agriculture Statistics Service (USDA-NASS). With approximately 44.6% of the drainage area covered by forest (Table 9-64) and approximately 26.8% covered by open water, the Charleston Side Channel Reservoir Drainage Area still remains primarily rural.

Table 9-64: Charleston Side Channel Reservoir Drainage Area Land Cover		
Landuse Classification	Acres	Percentage
Agricultural	92	7.2%
Barren	2	0.1%
Developed	243	18.9%
Forest	572	44.6%
Grassland	31	2.4%
Open Water	344	26.8%
Wetlands	1	0.0%
Total	1,284	100.0%

Soil Characteristics

The soils within the Charleston Side Channel Reservoir Drainage Area fall into six major associations (Table 9-65). Over half of the basin area is composed of soil association Saybrook-Dana-Drummer (26.8%) and water (20.8%).

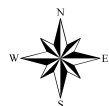


Charleston Side Channel Reservoir Drainage Area

Acres: 1,284

Embarras River Watershed Plan

Drainage Area Location Map



600 0 600 1,200 Feet



Legend

- | | | | |
|--|---|--|---------------|
| | Urban Area | | Interstate |
| | Embarras River | | US Highway |
| | Embarras River Tributaries | | State Highway |
| | County Line | | Local Road |
| | Embarras Subwatersheds | | Minor Road |
| | Charleston Side Channel Reservoir Drainage Area | | Other Road |
| | | | Ramp |

Table 9-65: Charleston Side Channel Reservoir Subwatershed Soil Associations		
Association	Acres	Percentage
Catlin-Flanagan-Drummer	59	4.6%
Saybrook-Dana-Drummer	344	26.8%
Lawson-Sawmill-Darwin	193	15.0%
Birkbeck-Sabina-Sunbury	188	14.7%
Dodge-Russell-Miami	233	18.1%
Water	267	20.8%
Total	1,284	100.0%

Highly erodible soils comprise approximately 253 acres (19.7%) of the subwatershed, while hydric soils consist of 5.1% (65 acres) of the reservoir drainage area.

Natural Resources

Approximately 157 acres of land within the watershed are identified as conservation or recreational land, while none are within the Conservation Reserve Program.

Wetland areas cover approximately 345 acres of the reservoir drainage area with Deepwater Lake being the predominant type at 93.6%

Analysis of Subwatershed Data

Water Quality Data and Identified Problems

The land that drains directly into the Charleston Side Channel Reservoir is only approximately 1,284 acres. However, water from the Embarras River is also pumped directly into the reservoir; therefore the entire contributing watershed of the Embarras River affects the water quality of the lake and is a significant resource concern to the City of Charleston and its residents.

As part of the Section 303(d) listing process, the IEPA has identified the Charleston Side Channel Reservoir as impaired water. The potential causes of impairment are phosphorus, nitrogen, total suspended solids (TSS), and excessive algal growth/chlorophyll a (Illinois EPA, 2001). These impairments result in the reservoir's being in partial support of its primary contact (swimming) and secondary contact (recreation) designated uses and in partial support of its aquatic life designated use. The drinking water supply and fish consumption designated uses of the reservoir are not impaired.

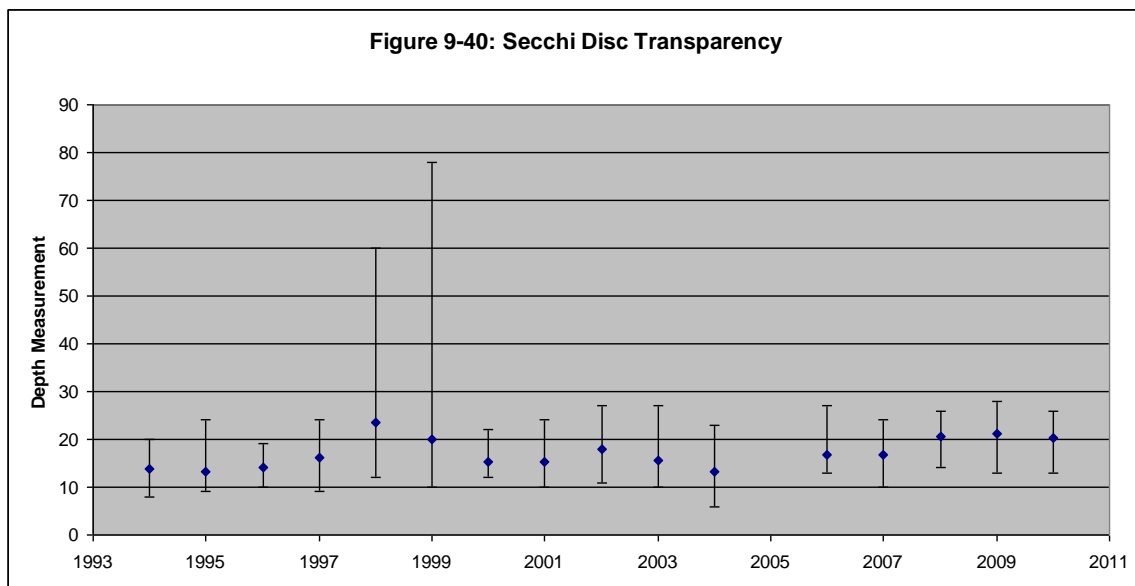
A TMDL report was developed by Tetra Tech for the Charleston Side Channel Reservoir to investigate the causes of impairments and make recommendations to improve water quality. The body of this report is included in Appendix E.

Since 1981, citizen volunteers, the Illinois EPA, and area-wide planning commissions have been working to monitor the quality of Illinois lakes through the Illinois Volunteer Lake Monitoring Program (VLMP). This cooperative effort provides information on many more lakes than could be otherwise monitored by the state agency staff. As part of the VLMP,

water quality samples of Charleston Side Channel Reservoir were taken in 1994-2010. The data collected during these samplings included the Secchi disk transparency of the reservoir.

Secchi disk transparency refers to the depth to which the black and white disk can be seen in the lake water. Water clarity, as determined by a Secchi disk, is affected by two primary factors: algae and suspended particulate matter. Particulates (soil or dead leaves) may be introduced into the water by either runoff or sediments already on the bottom of the lake. Erosion from construction sites, agricultural lands, and riverbanks all lead to increased particulate content.

Figure 9-40 below shows the average and range of the Secchi disk readings from all sample events.



Pollution Load Analysis

Nonpoint source modeling was completed for four water quality parameters including Total Suspended Solids (TSS), Total Nitrogen (N), Total Phosphorus (P), and Fecal Coliform. Table 9-66 summarized the modeling results for the Charleston Side Channel Reservoir Drainage Area.

Table 9-66: Charleston Side Channel Reservoir Drainage Area NPS Modeling Summary	
Parameter	Loading
Total Suspended Solids	0.43 ton/ac/yr
Nitrogen	4.59 lb/ac/yr
Phosphorus	1.14 lb/ac/yr
Fecal Coliform	1.58 CFU bill/ac/yr

Charleston Side Channel Reservoir Drainage Area Implementation Plan

Figure 9-41: Non Point Source Pollutant Load Priority Areas (Nitrogen, Phosphorus, Sediment)

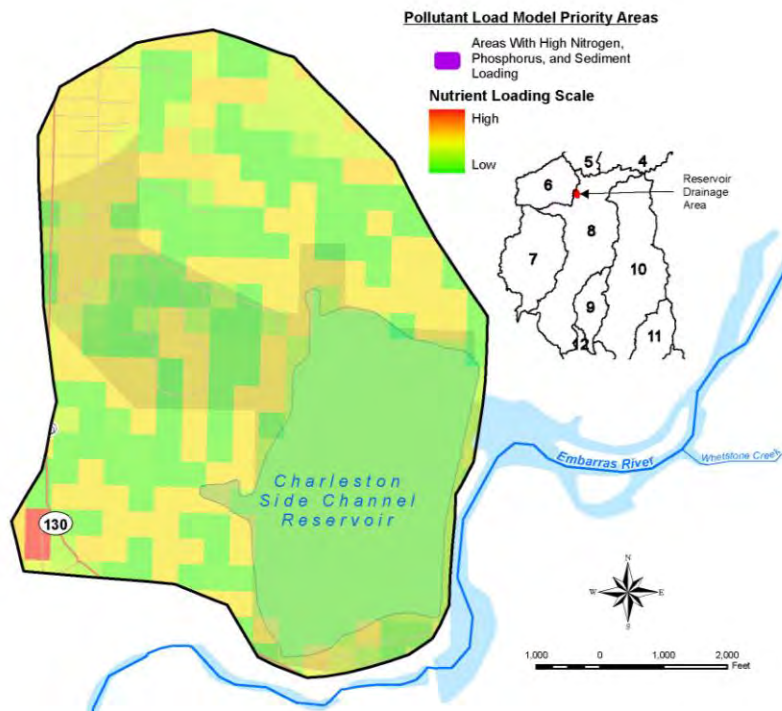


Table 9-67: Charleston Side Channel Reservoir Drainage Area Pollutant Load Model Priority Areas

Parameter	Acres	Percent in Watershed
Areas With High Nitrogen, Phosphorus, and Sediment Loading	0	0%

Figure 9-42: Fecal Coliform Bacteria Project & Priority Areas

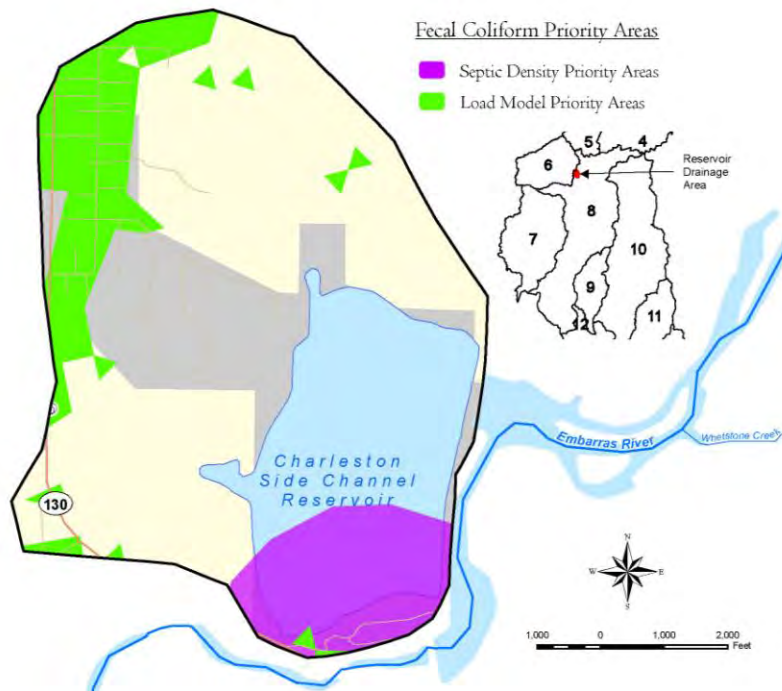


Table 9-68: Charleston Side Channel Reservoir Drainage Area Fecal Coliform Bacteria Priority Areas

Parameter	Acres	Percent in Reservoir Drainage Area
Septic Density Priority Areas	145	11.30%
Load Model Priority Areas	162	12.62%

Figure 9-43: Highly Erodible Land Project & Priority Areas

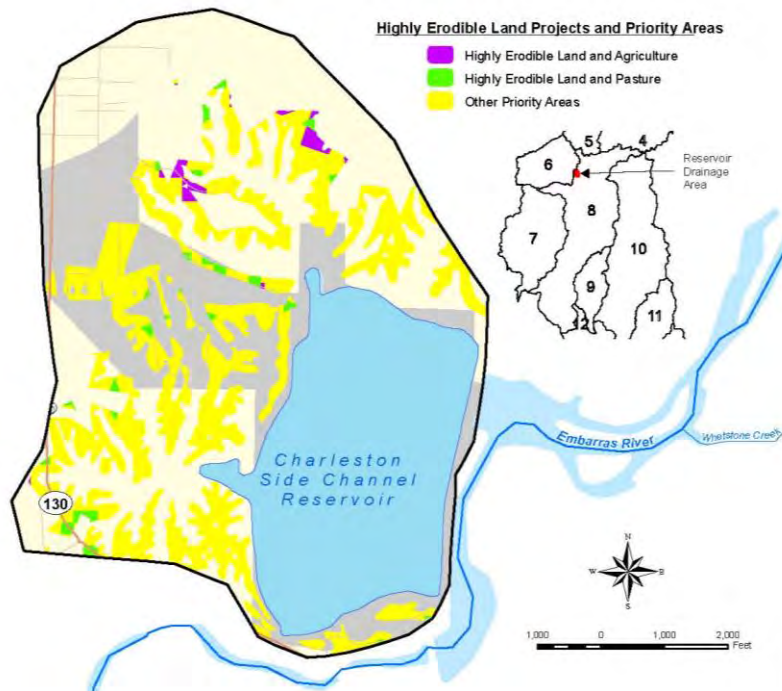


Table 9-69: Charleston Side Channel Reservoir Drainage Area Highly Erodible Load Priority Areas

Parameter	Acres	Percent in Watershed
Highly Erodible Land and Agriculture	5	0.39%
Highly Erodible Land and Pasture	8	0.64%
Other Priority Areas	253	19.68%

Figure 9-44: Wetland Restoration/Flood Mitigation Project & Priority Areas

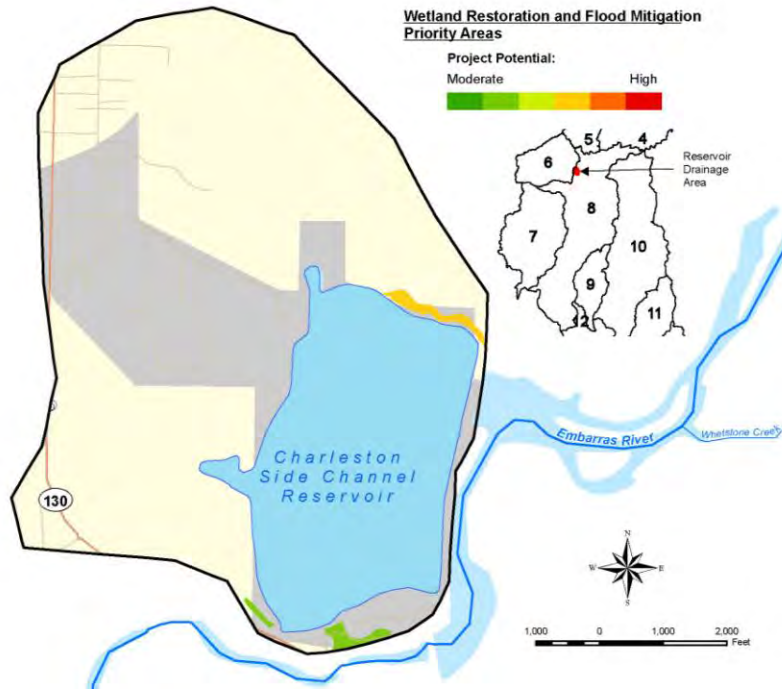


Figure 9-45: Stakeholder Identified Priority Projects

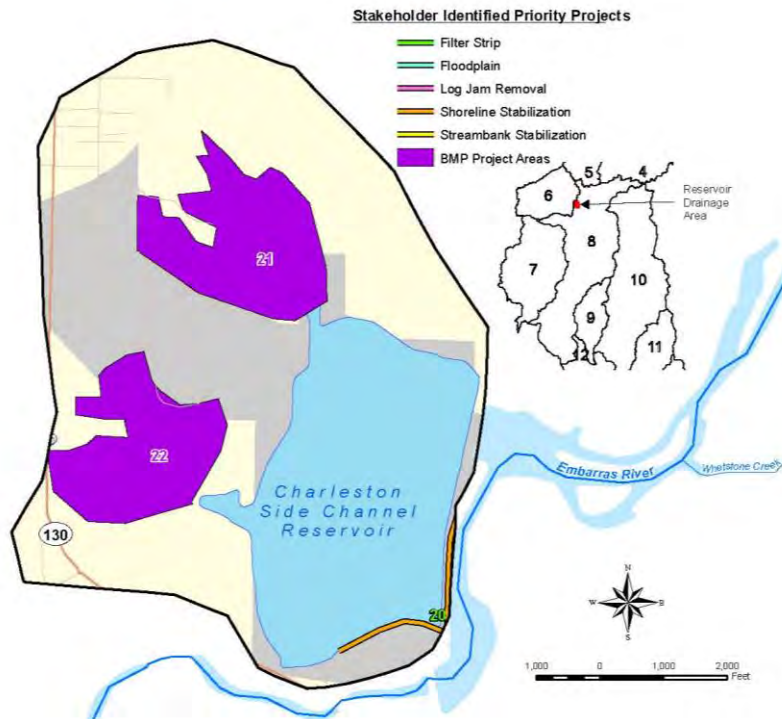


Table 9-70: Charleston Side Channel Reservoir Drainage Area Estimated Load Reductions for Stakeholder Identified Priority Projects

Map ID	Project Type	Stakeholder	Length (ft)	Area (Acres)	Nitrogen (lbs)	Phosphorus (lbs)	Sediment (tons)	Fecal Coliform (bill fcu)	Project Details
5	Detention	City of Charleston		0	7	3	0	2	Detention in crop field; High Priority
20	Shoreline Stabilization	City of Charleston	3,697		3,327	1,331	1,183	865	Berm with wetlands to control bank erosion
21	Stabilization/ Detention	City of Charleston		113	4,520	1,808	85	1,175	2 Ravines - Install detention structures and stabilize ravines; INAI site - High Priority
22	Stabilization/ Detention	City of Charleston		102	4,093	1,637	77	1,064	4 Ravines - Install detention structures and stabilize ravines; High Priority



November 22, 2021

Adrienne L. Marino
Water Quality Program Manager
The Nature Conservancy in Illinois
240 SW Jefferson Ave, Ste 301
Peoria, IL 61602

Re: West Branch of Hurricane Creek ACPF modeling results and deliverables

Dear Adrienne,

Environmental Solutions AQ (ENSOAQ) is pleased to submit the ACPF modeling results and outputs for the West Branch of Hurricane Creek (WBHC). WBHC watershed is located in Coles and Clark Counties IL, just south of the Village of Westfield in east central Illinois. There are no significant developments within the WBHC watershed.

ACPF modeling for the WBHC watershed was conducted in November 2021. The LiDAR DEM layers were downloaded from the Illinois State Geological Survey Data Portal. No issues were encountered during the data gathering, data processing or ACPF modeling. Two tables (Attachment 1) were compiled summarizing the general field data, ACPF runoff risk summary, and ACPF conservation practices opportunities. Attachment 2 presents five maps: ACPF Agricultural Runoff Risk Map, ACPF Agricultural Runoff Control Map, ACPF Tile Drainage Treatment Map, ACPF Water Retention and Storage Map, and ACPF Riparian Management Map. In addition, the shapefiles and geodatabase files for this project are zipped and to be delivered via Google Shared Drive. Please note that the ACPF for WBHC was modeled using ArcGIS 10.7 and 10.8 but the files are also saved for the compatible format for ArcGIS 10.5.

While reviewing the results on the Water Retention and Storage Map, it was noted that a depression in approximately 57 acres in size exists in the east central portion of the watershed between E 1900 Road and E 1800 Road. ENSOAQ recommends reviewing the historical land use data and National Wetland Inventory, and performing field evaluations, if possible, to determine the wetland status. This can be a significant potential conservation opportunity for

WBHC. Furthermore, there are optional parameters that can be further explored for the ponds and grass waterways in the WBHC. We will present these options at the December 7 meeting.

We look forward to discussing these outputs with you and your team on December 7, 2021. If you have any questions, please don't hesitate to contact Monica Rakovan at 513-593-1310 or Agnes Marchlewska at 513-839-8272.

Sincerely,

A handwritten signature in black ink, appearing to read "Monica J. Rakovan". The signature is fluid and cursive, with a long horizontal stroke at the end.

Monica Rakovan, PhD CPG
Environmental Solutions AQ

Attachment 1
West Branch Hurricane Creek Watershed (HUC 12: 051201120803)
ACPF Conservation Practice Opportunities Summary
November 2021

Watershed Area: 17765.5 Acres

649 Field Evaluated by ACPF

Table. 1 – Runoff Risk Summary Table & Fields Evaluation at WBHC HUC 12 Determined by the ACPF

Fields	Number of Fields	Total Area (Acres)	Average Area (Acres)
Crops	299	1656.3	55.4
Pasture	21	665.7	31.7
Non-Agricultural	329	4317.5	13.1
ACPF Tile Drainage Classification			
Tiled	249	14109.7	58.3
Not Tiled	78	3118.7	39.9
ACPF Runoff Risk Classification			
Very High Runoff Risk	19	818.9	43.1
High Runoff Risk	53	2756.4	52
Moderate Runoff Risk	92	5039.7	54.8
Low Runoff Risk	131	7107.4	54.2

ACPF: Agricultural Conservation Planning Framework



Table. 2 Conservation Practices at WBHC HUC12 suggested by the ACPF

Practices	Unit	Length (mile)	Average Length (feet)	Total Area (acre)	Average Area (acre)	Storage (acre-feet)
In fields						
Grassed Waterways	631 sites	72.4	605	263*	0.42*	NA
Contoured Buffer Strips	135 sites	30	1,172	26	0.21	NA
Tile Drainage Management	126 sites	NA	NA	5,285	42	NA
Depressions (potential wetland restoration sites)	29 depressions	NA	NA	645** Surface Area: 104.8	3.5	336
Below Fields						
Nutrient Removal Wetlands	11 wetlands	NA	NA	Catchment: 2,556** Pools: 25 Buffers: 40	Pool: 2.27 Buffer: 33.6	Pools: 79 Buffers: 212
WASCOBs	66 sites	NA	NA	722***	10.9**	No Data
Denitrifying Bioreactors	54 sites	NA	NA	2,649**	0.24****	NA
Farm Ponds	36 sites	NA	NA	988.9*** Pond Surface: 33.9	0.9	189
Riparian Zone						
High Nutrient Sensitive Buffers	NA	0.9	NA	NA	NA	NA
Riparian Buffers Filters (various plants)	NA	41.4	NA	NA	NA	NA
Stream Bank Stabilization	NA	51.9	NA	NA	NA	NA

*Assuming 30 feet wide

** Total potentially treated area

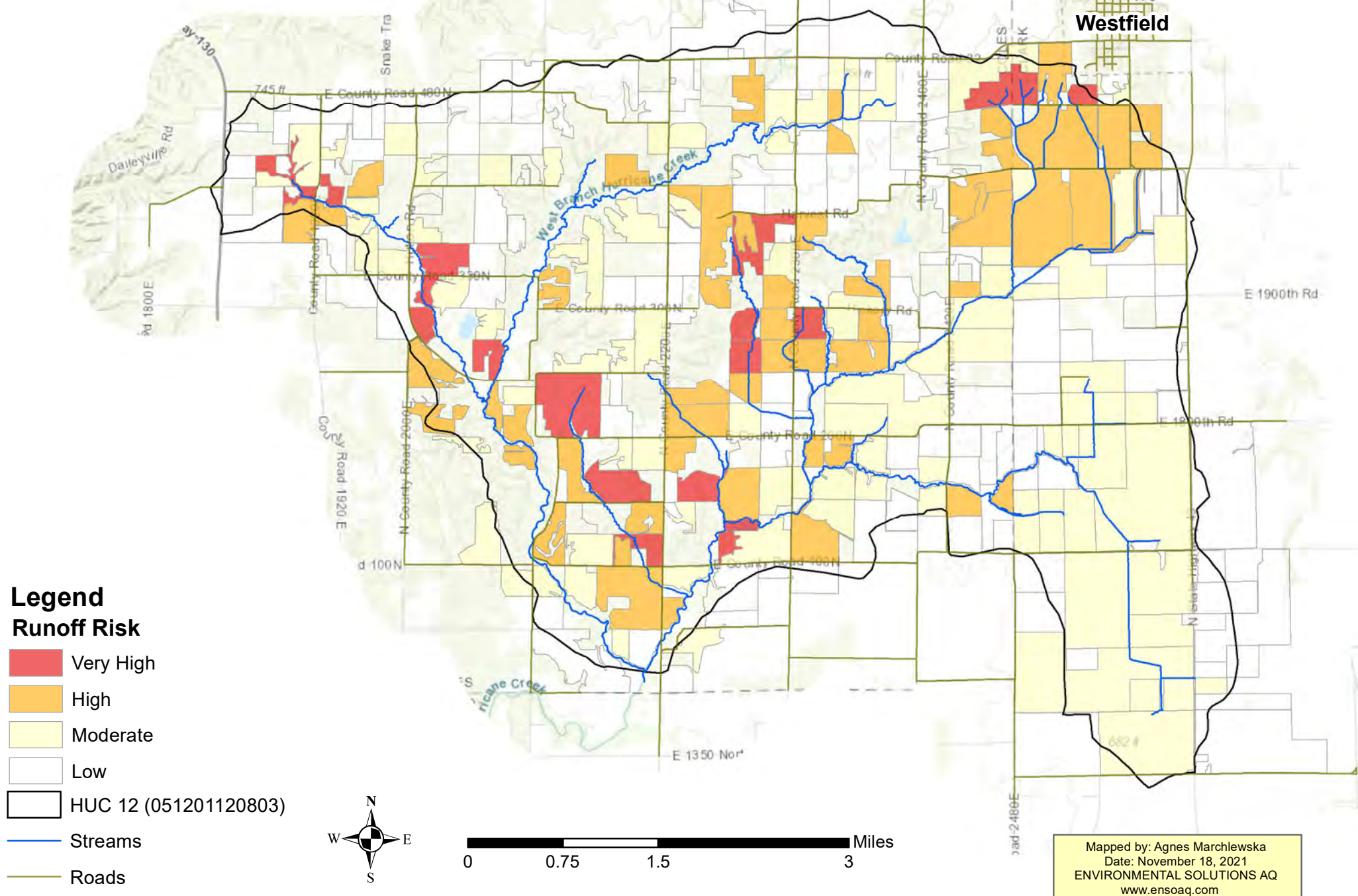
*** Contributing area

**** Average surface area of potential bioreactor

NA – Not applicable



ACPF Conservation Opportunities in WBHC Agricultural Runoff Risk Map



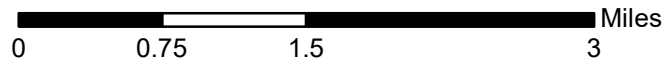
ACPF Conservation Opportunities in WBHC Agricultural Runoff Control Map



- Grassed Waterways
- Contour Buffer Strips
- WASCObS

Agricultural Fields

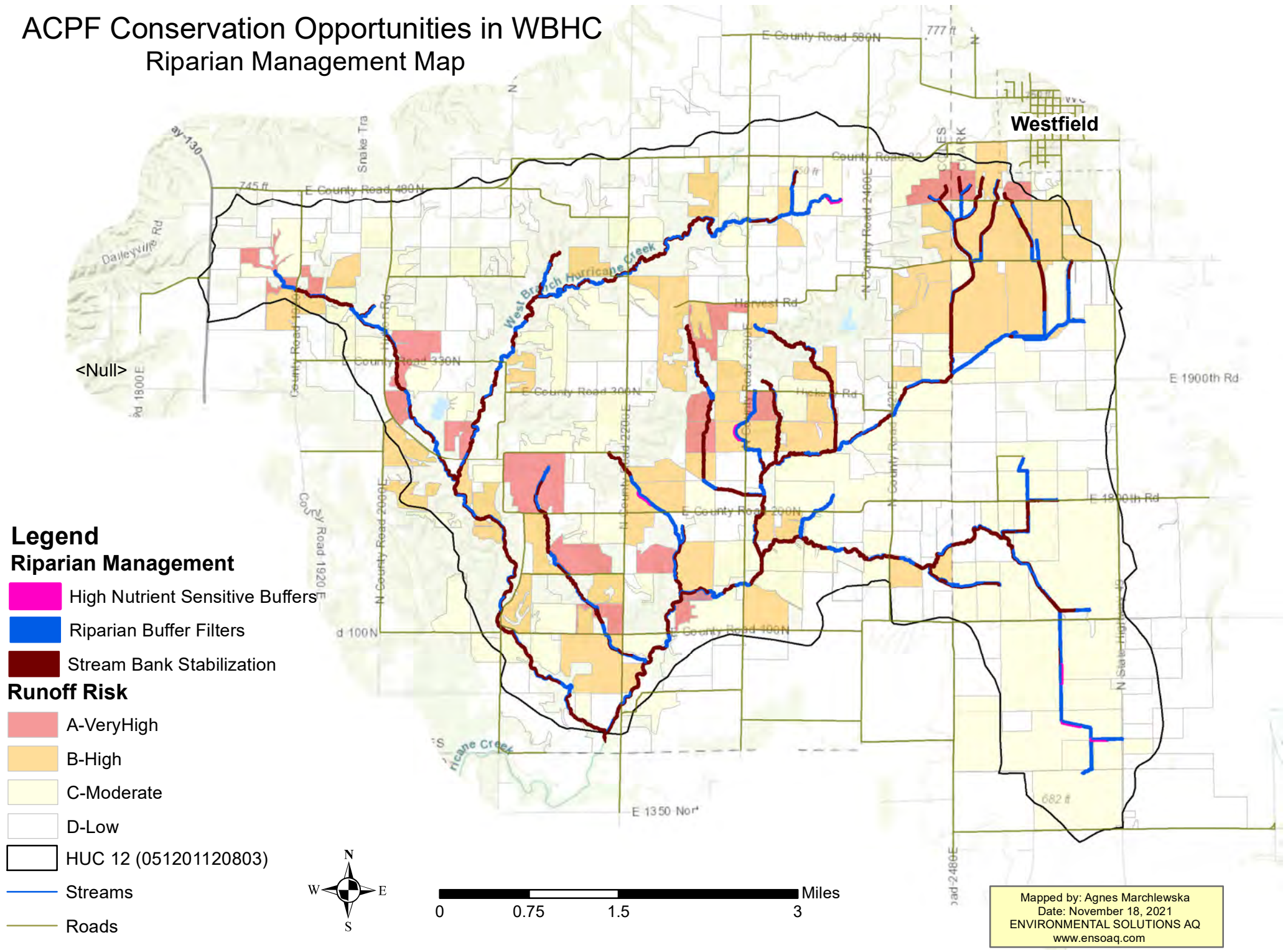
NonAg
Crops
Pasture
HUC 12 (051201120803)
Streams
Roads



Mapped by: Agnes Marchlewska
Date: November 18, 2021
ENVIRONMENTAL SOLUTIONS AQ
www.ensoaq.com

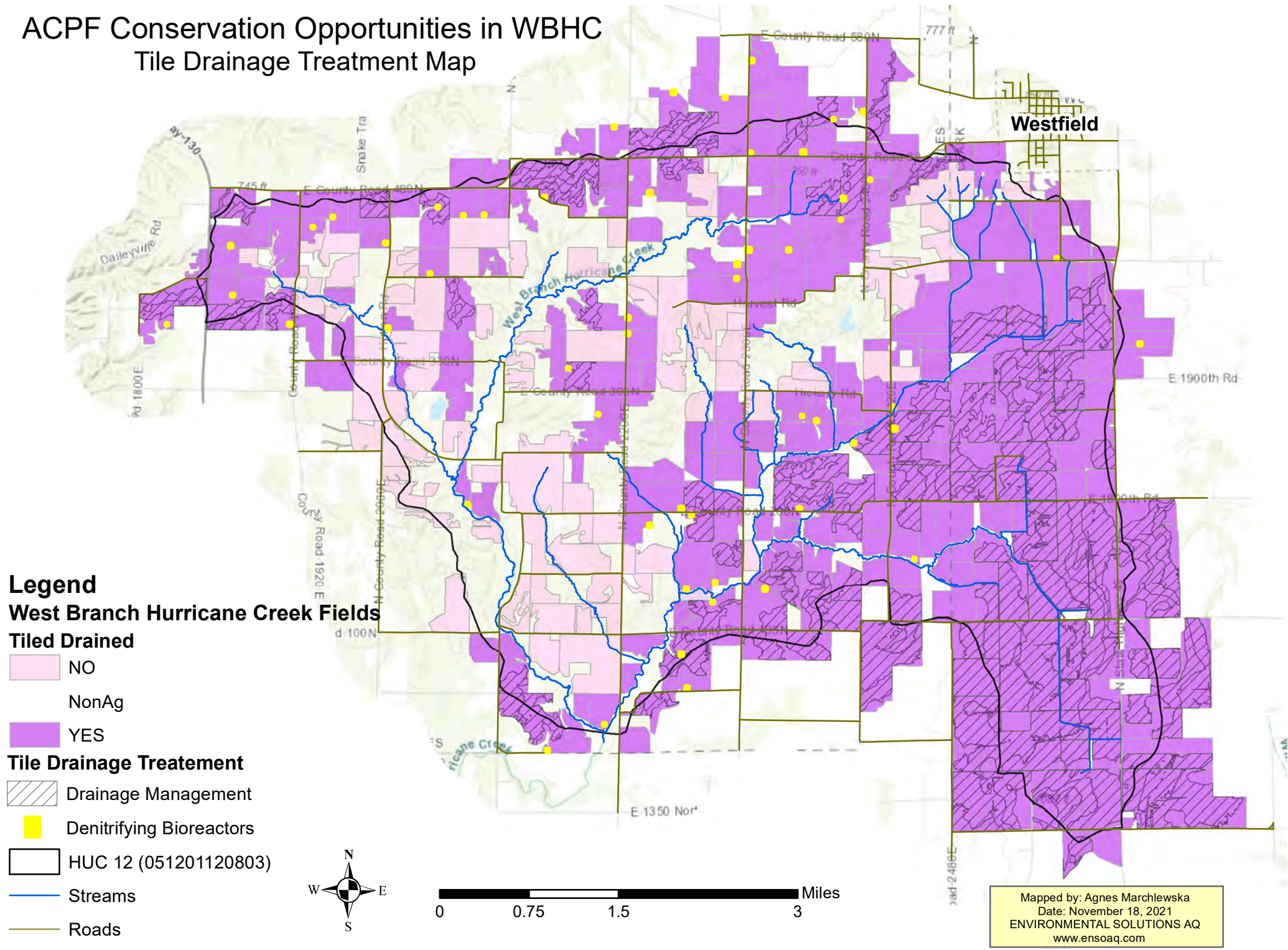
ACPF Conservation Opportunities in WBHC

Riparian Management Map



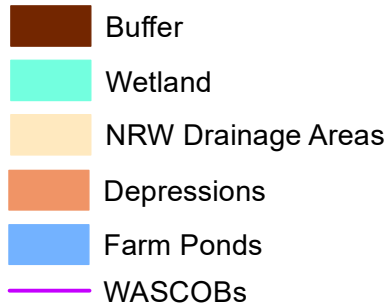
ACPF Conservation Opportunities in WBHC

Tile Drainage Treatment Map

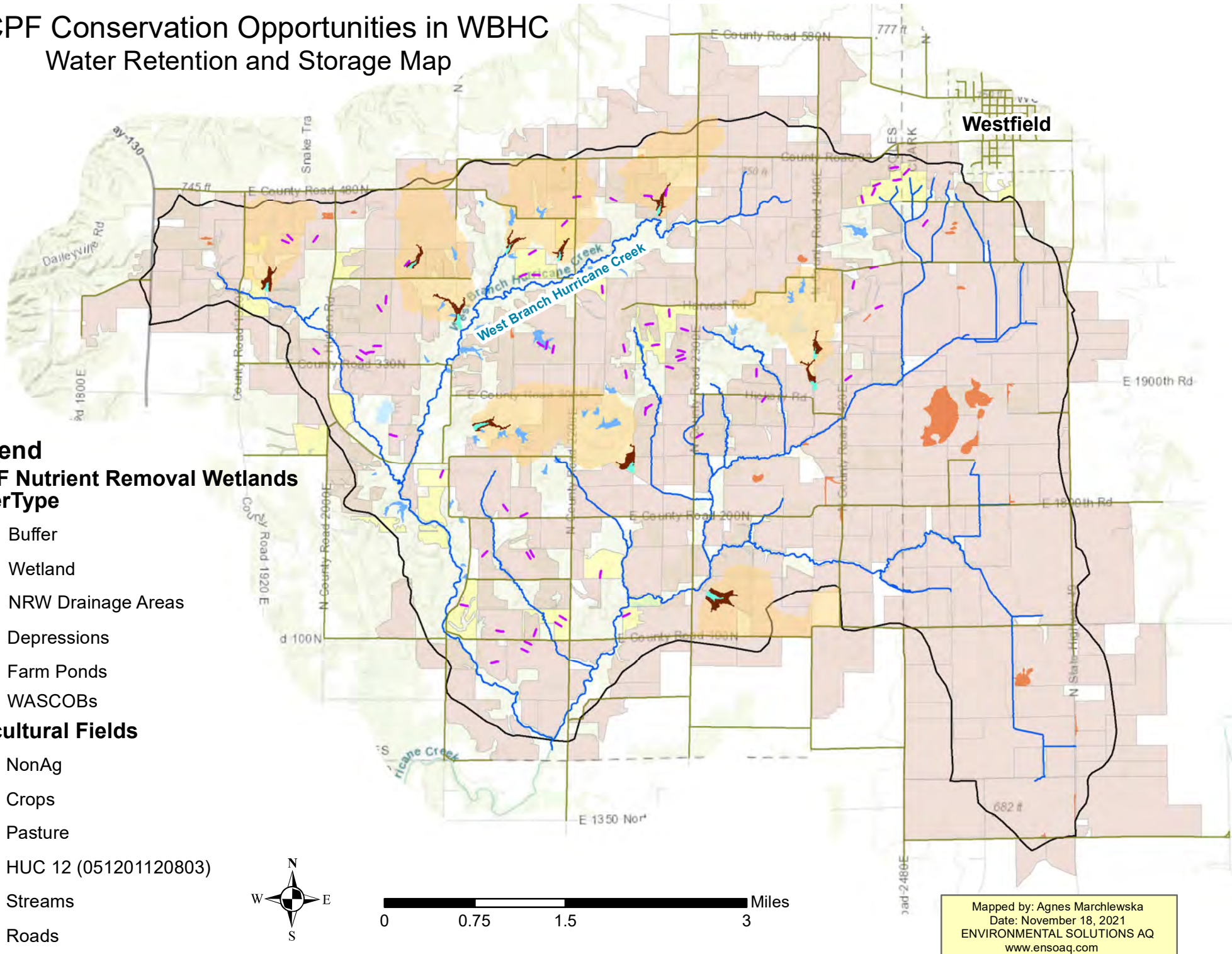
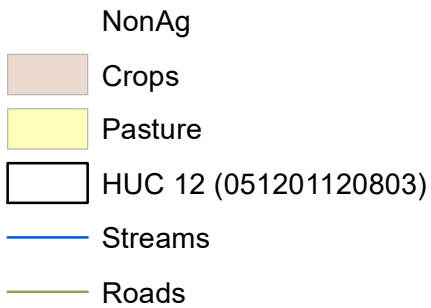


Mapped by: Agnes Marchlewska
Date: November 18, 2021
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ACPF Conservation Opportunities in WBHC Water Retention and Storage Map



Agricultural Fields



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Date: November 18, 2021
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ACPF Conservation Opportunities in WBHC Denitrifying Practices Map

