Oak Creek Watershed Restoration Plan

Stakeholder Meeting
March 8, 2018

Speakers

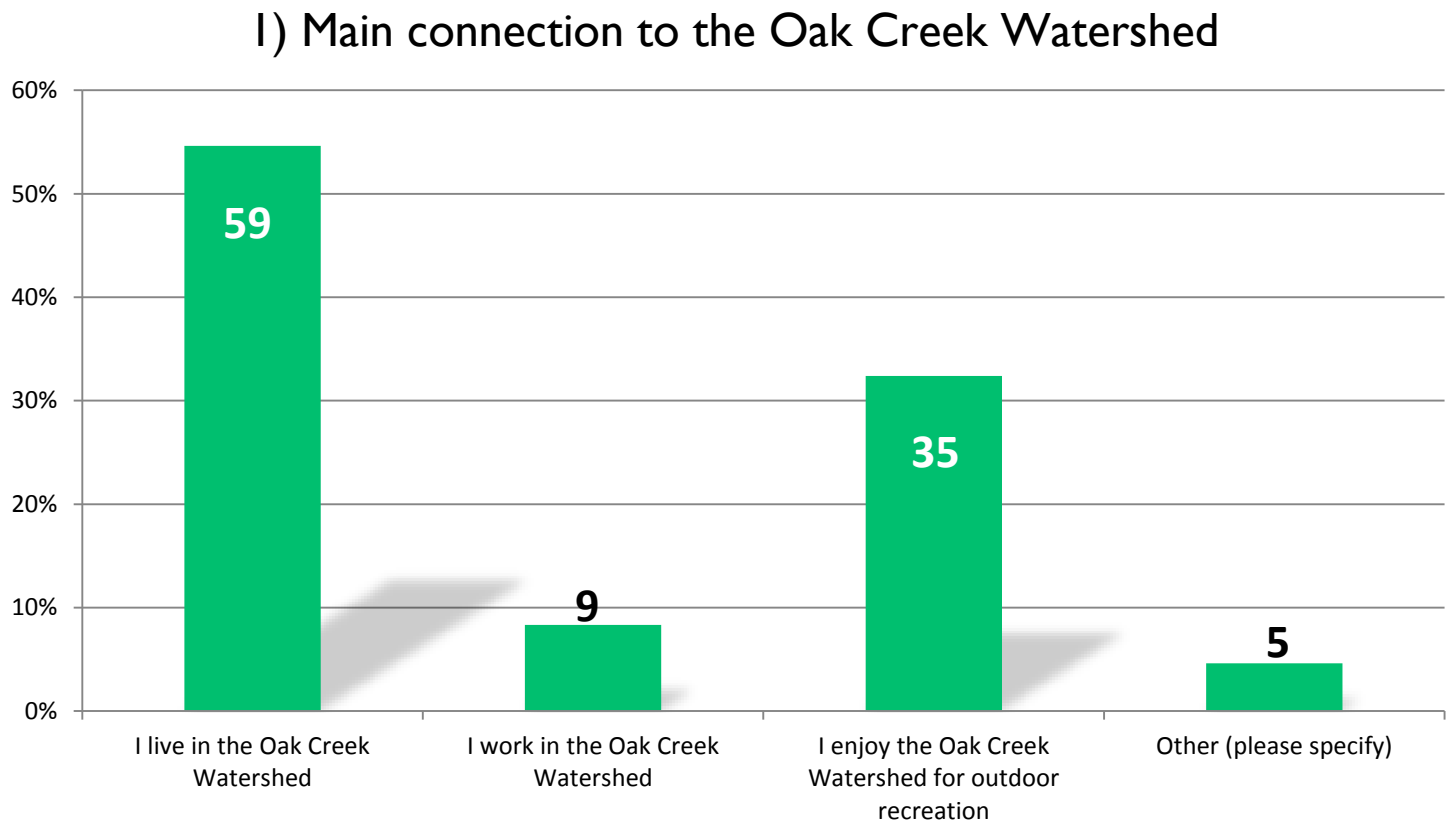
Laura Herrick, P.E. – Chief Environmental Engineer
Craig Helker – Wisconsin DNR
Aaron Owens – Planner
Megan Beauchaine – Research Analyst

Outline

- 2017 Online Survey Summary
- WDNR WQ Management Plan
- Photo Tour of Streams
- Draft Report Outline
- Schedule

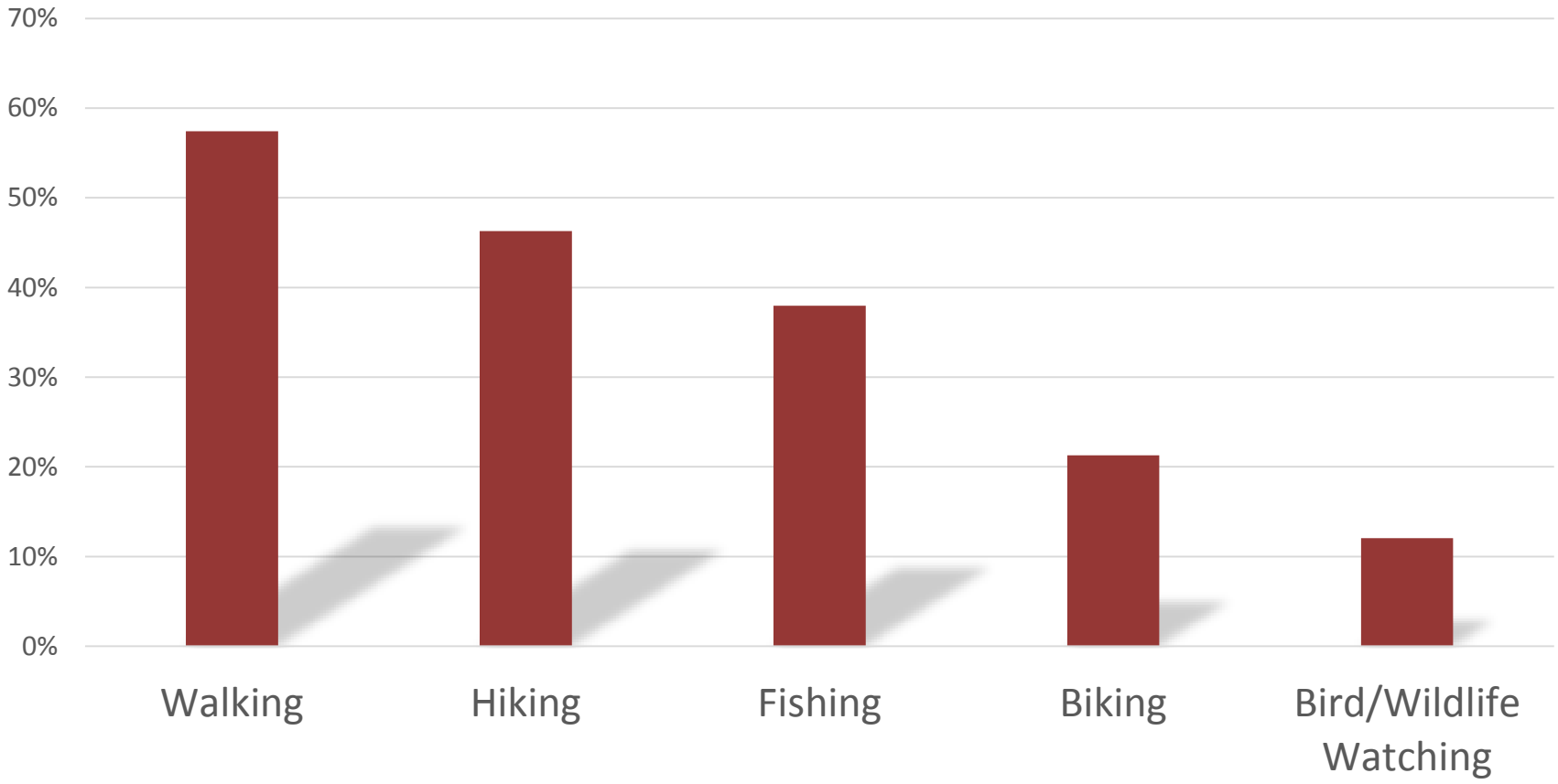
2017 Online Survey Summary

- Participation: 108 participants



2017 Online Survey Summary

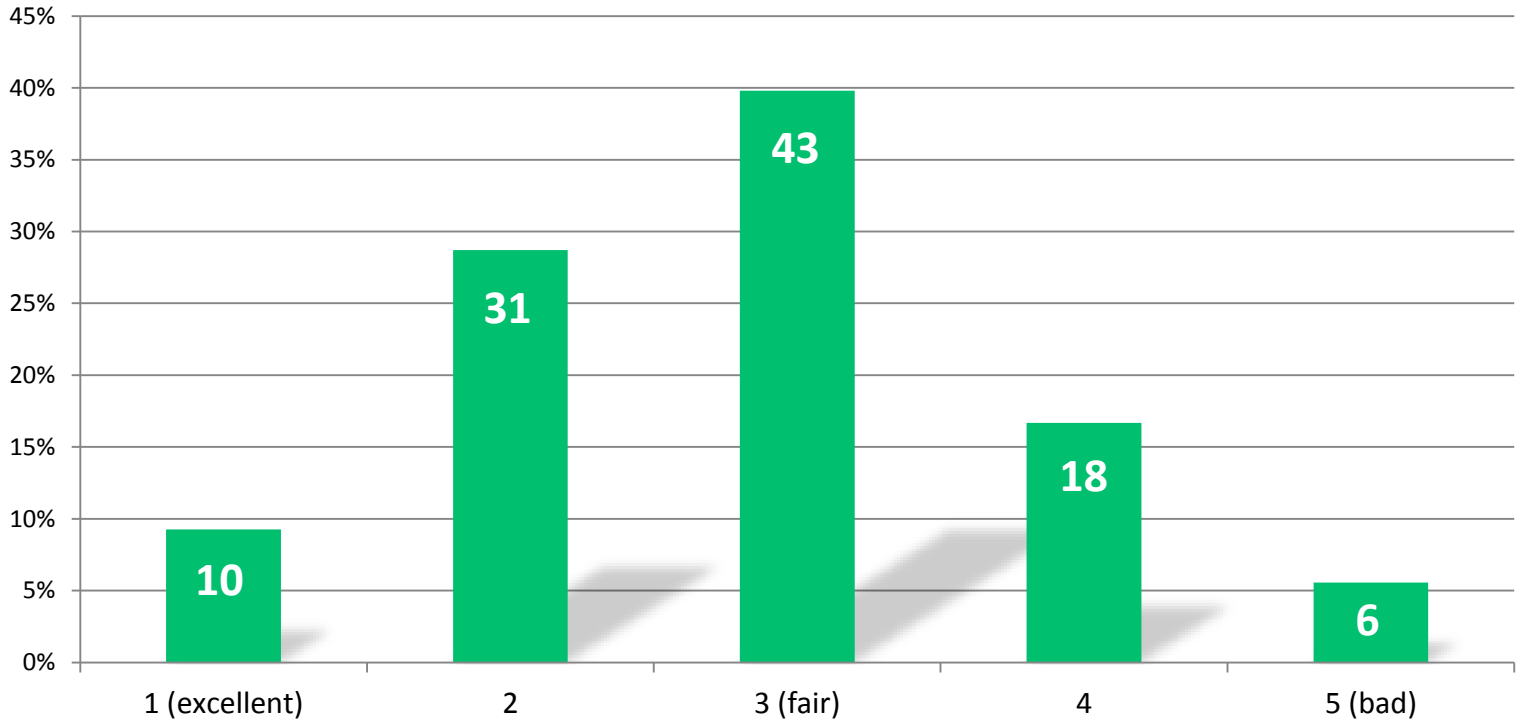
- Most common recreational activities among participants:



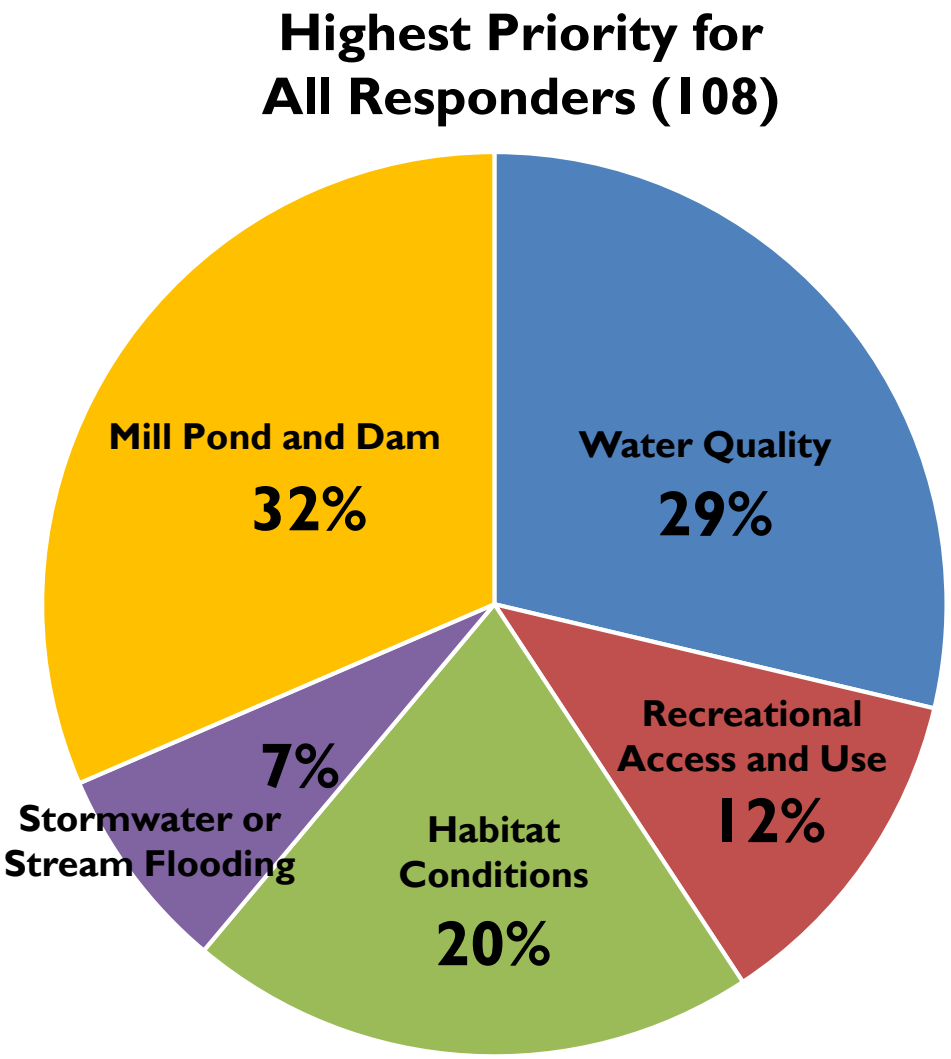
2017 Online Survey Summary

- Average rating of the watershed: 2.8

5) On a scale of 1 - 5, how would you rate the quality of your outdoor experience within the watershed (1 is excellent and 5 is bad)?

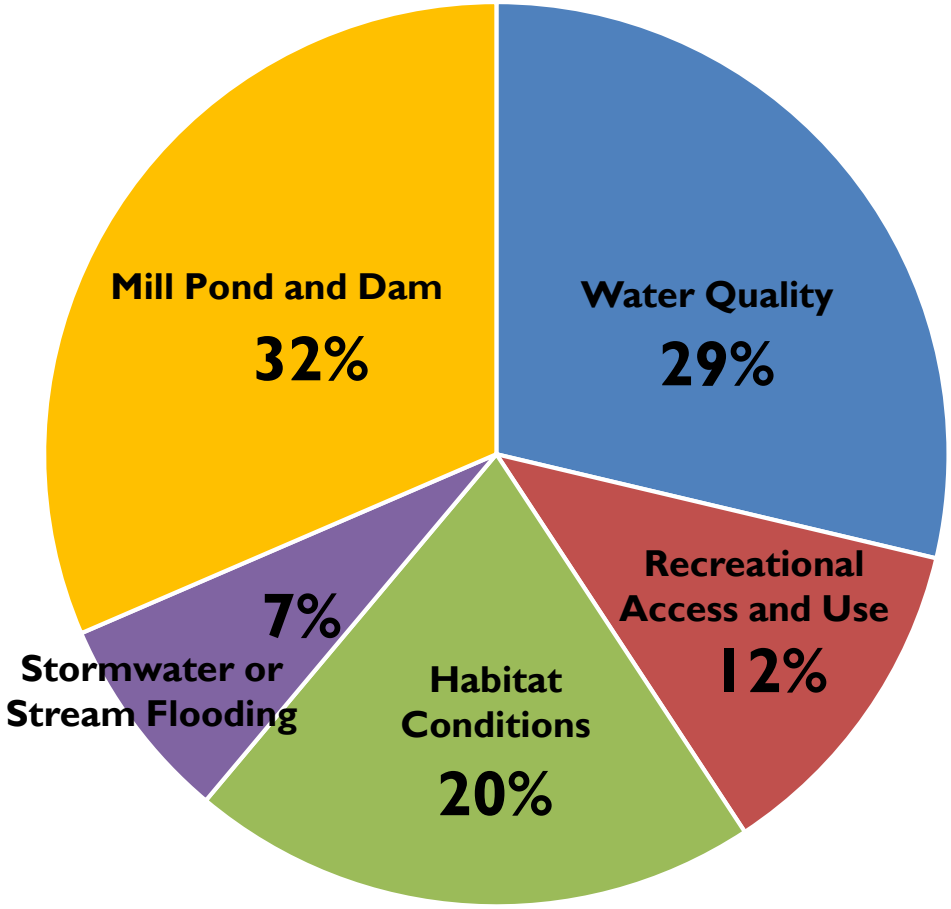


2017 Online Survey Summary

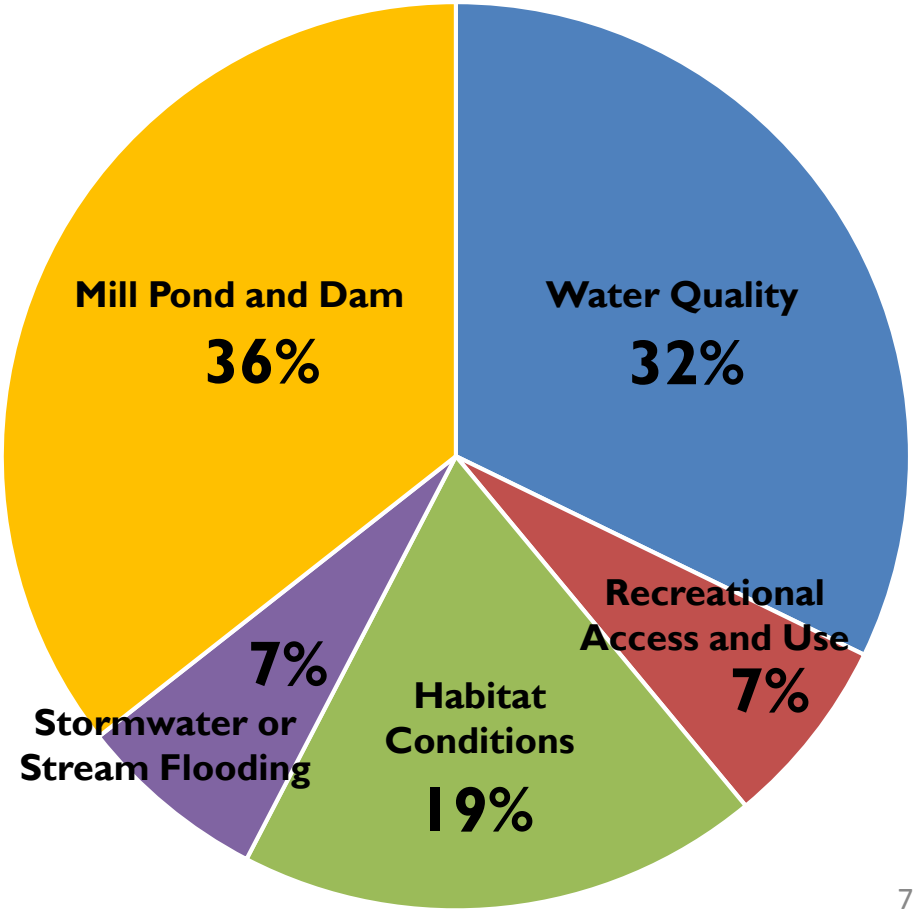


2017 Online Survey Summary

Highest Priority for All Responders (108)



Highest Priority for Residents (59)



2017 Online Survey Summary

- Common themes of open-ended responses:
- Mill Pond
  - **27** out of the 65 (41%) responders to this question expressed that they would like to see the Mill Pond dredged and restored so it can be used for ice skating, community events, etc.
  - **16** out of 65 (25%) responders to this question indicated that they would like to see the Mill Dam removed to restore it to a more natural state and to allow fish to travel upstream.

2017 Online Survey Summary

- Common themes of open-ended responses:
- Habitat
  - Common concerns:
    - Plant invasive species and fallen trees concerns along corridor
    - Sediment accumulation issues in stream, predominantly in downstream reaches and at mouth
  - Suggested solutions:
    - Increase native plant areas and remove invasives and downed trees – volunteer and governmental
    - Remove sediment, improve flow carrying capacity of stream, reduce sediment to stream

2017 Online Survey Summary

- Common themes of open-ended responses:
- Fishing
  - Common concerns:
    - Fewer fish coming to spawn, and only most tolerant fish surviving
    - Mill Pond is too shallow for fish to thrive
  - Suggested solutions:
    - Removing barriers such as fallen trees/debris, and deepening the mouth of the creek
    - Generally improve water quality

WDNR Presentation

Photo Tour

Report Outline

1. Introduction
2. Prior and Ongoing Studies, Plans, Projects, and Programs
3. Characterization of the Watershed
4. Inventory Findings
5. Watershed Goals and Management Objectives
6. Plan Recommendations

Schedule

We anticipate the next Stakeholder meeting to take place by the end of 2018 to review completed Plan Chapter work.

Website and Contact Information

- Communication
  - SEWRPC website for Draft documents and comments

    http://www.sewrpc.org/SEWRPC/Environment/Restoration-Plan-Oak-Creek-Watershed.htm

- Contact
  - Laura Herrick – Chief Environmental Engineer
    262-953-3224 or lherrick@sewrpc.org

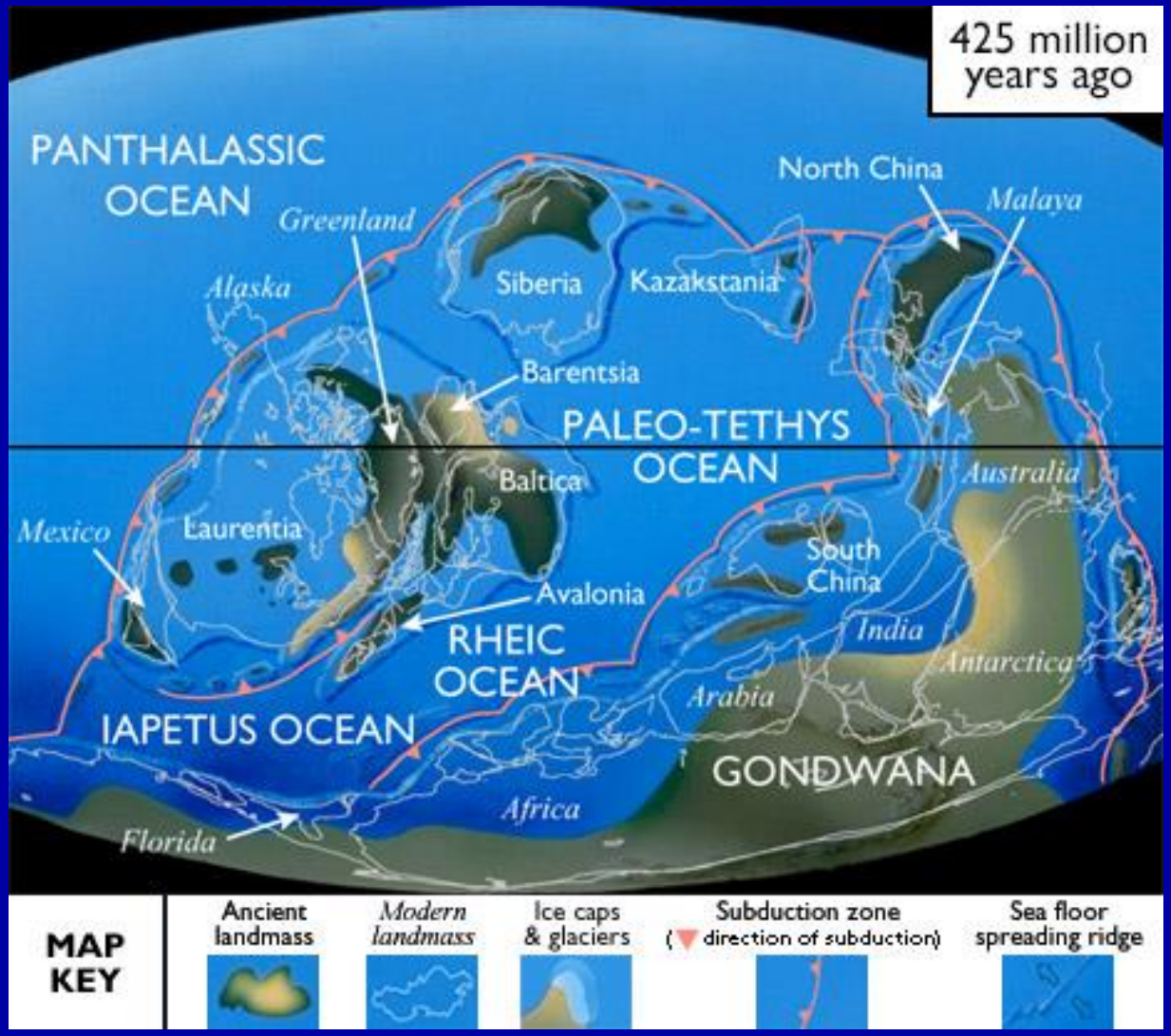
Oak Creek

Craig Helker

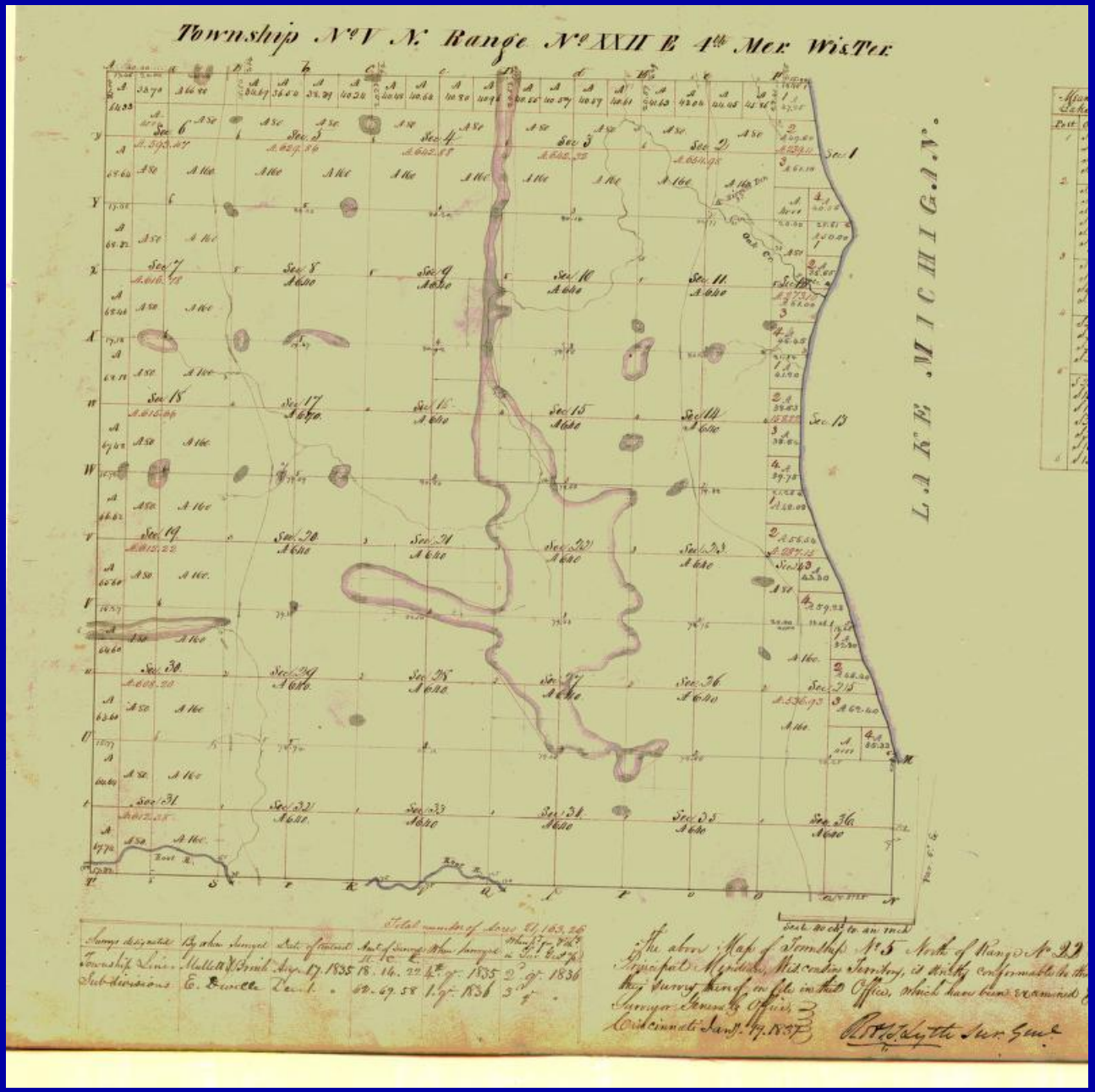
Water Resources Biologist

WDNR

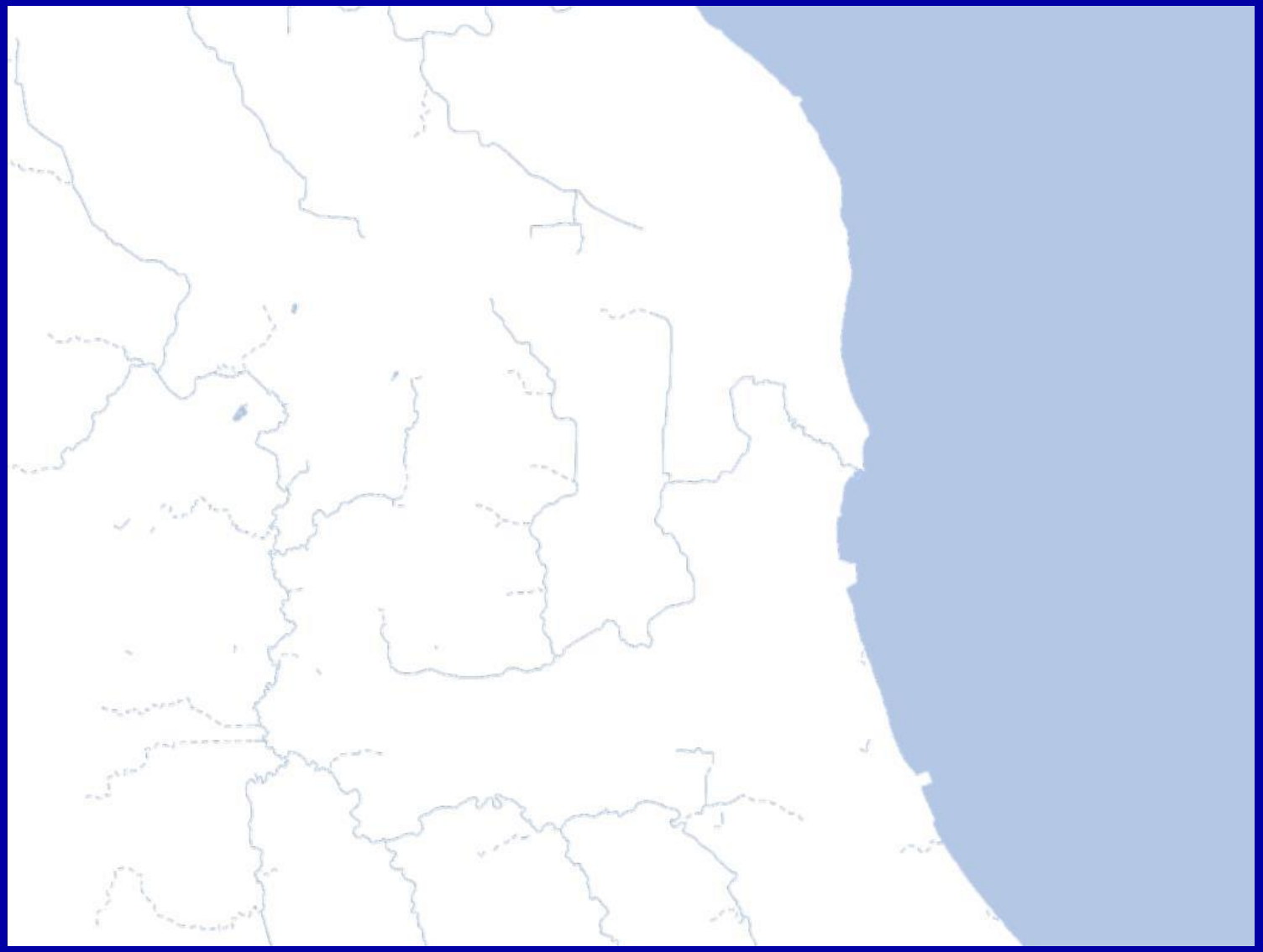
Then

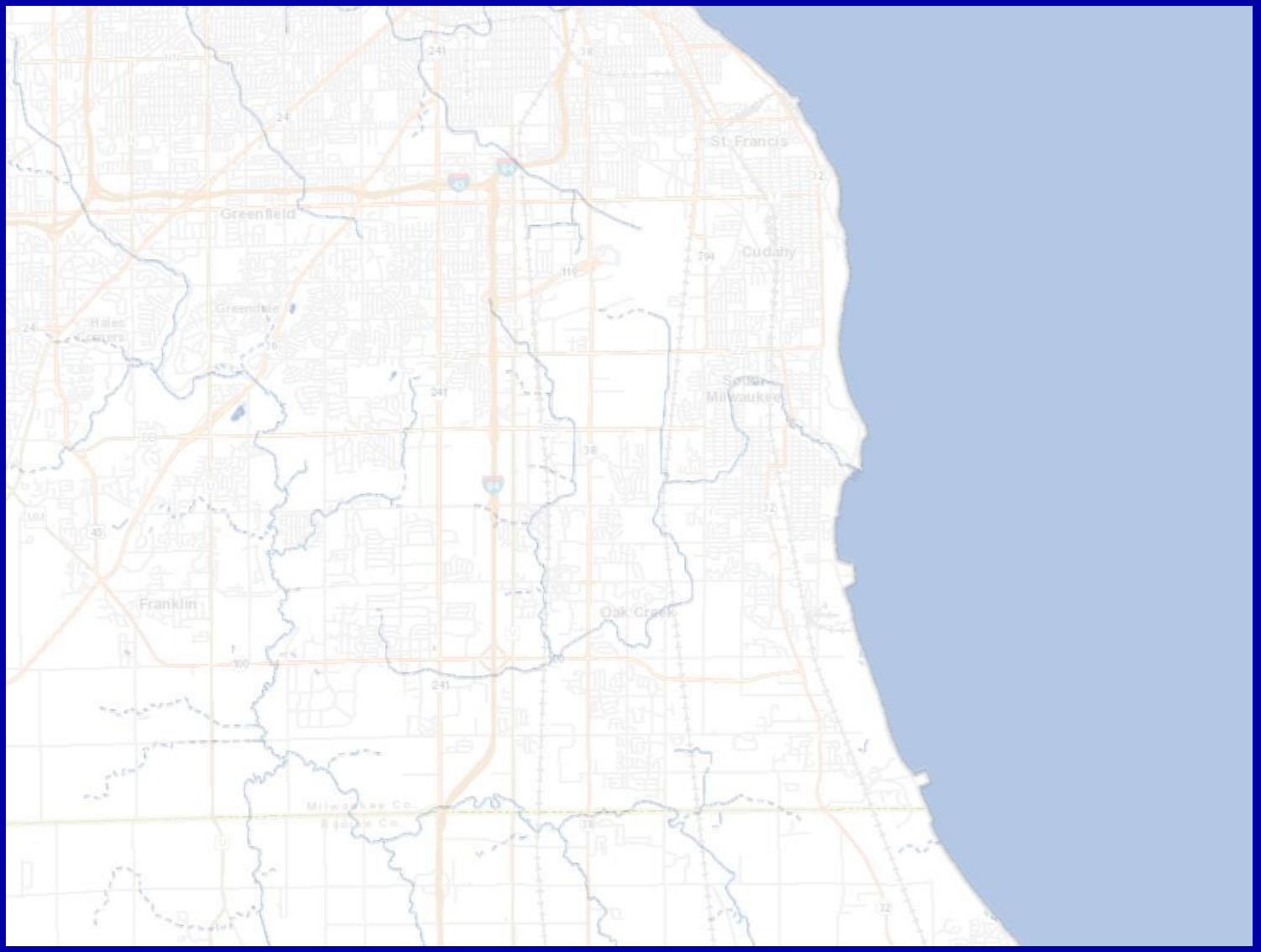

425 million years ago
PANTHALASSIC OCEAN
Greenland
Alaska
Siberia
Kazakstania
North China
Malaya
Barentsia
PALEO-TETHYS OCEAN
Baltica
Australia
Mexico
Laurentia
South China
Avalonia
India
RHEIC OCEAN
Antarctica
Arabia
IAPETUS OCEAN
GONDWANA
Africa
Florida
MAP KEY
Ancient landmass
Modern landmass
Ice caps & glaciers
Subduction zone (direction of subduction)
Sea floor spreading ridge

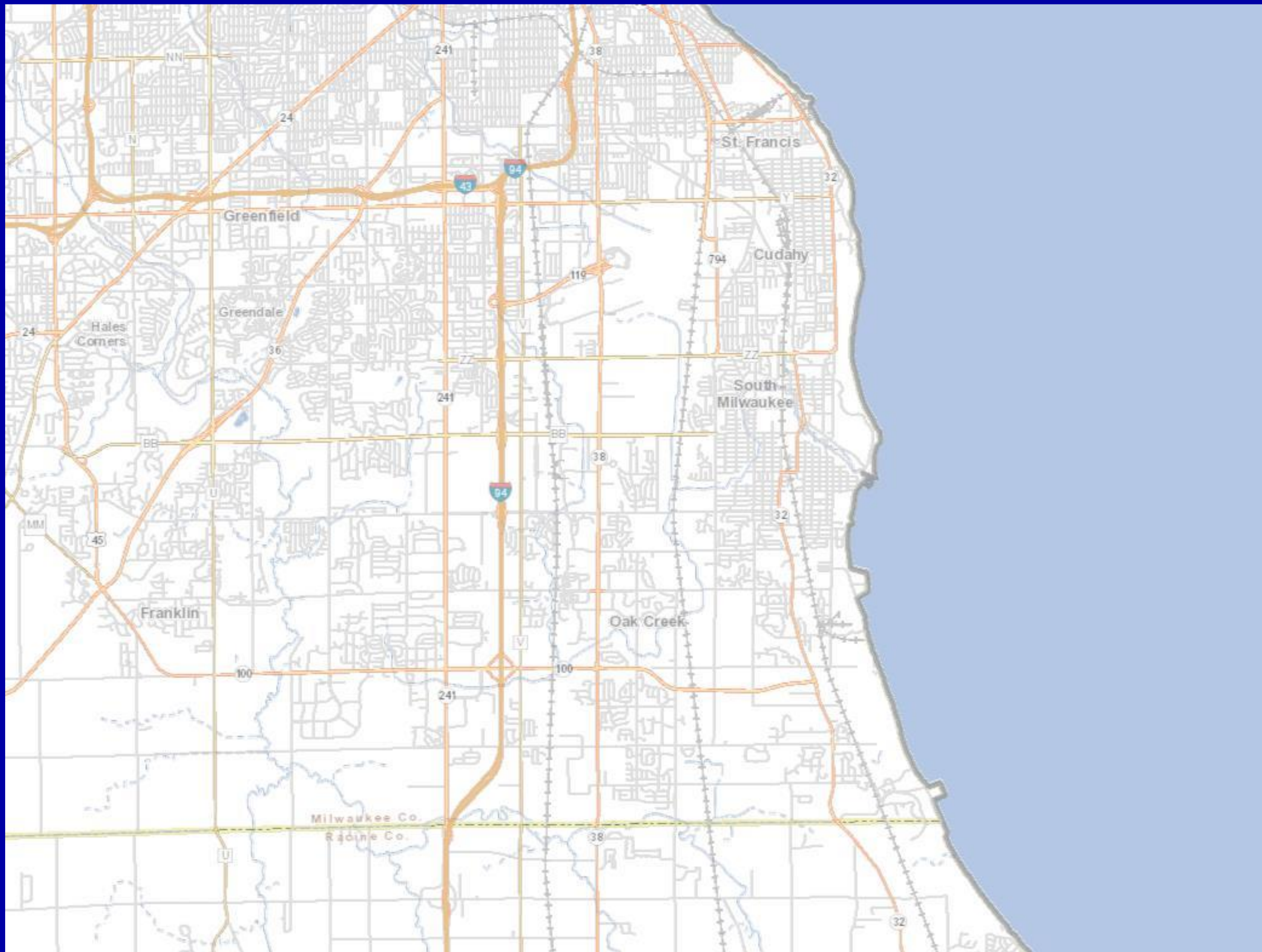
Glaciation


Township No V N. Range No XXII E 4th Mer. Wis Ter.
LAKE MICHIGAN.

Now




St. Francis
Greenfield
Cudahy
Hales Corners
Greendale
South Milwaukee
Franklin
Oak Creek
Milwaukee Co.


St. Francis
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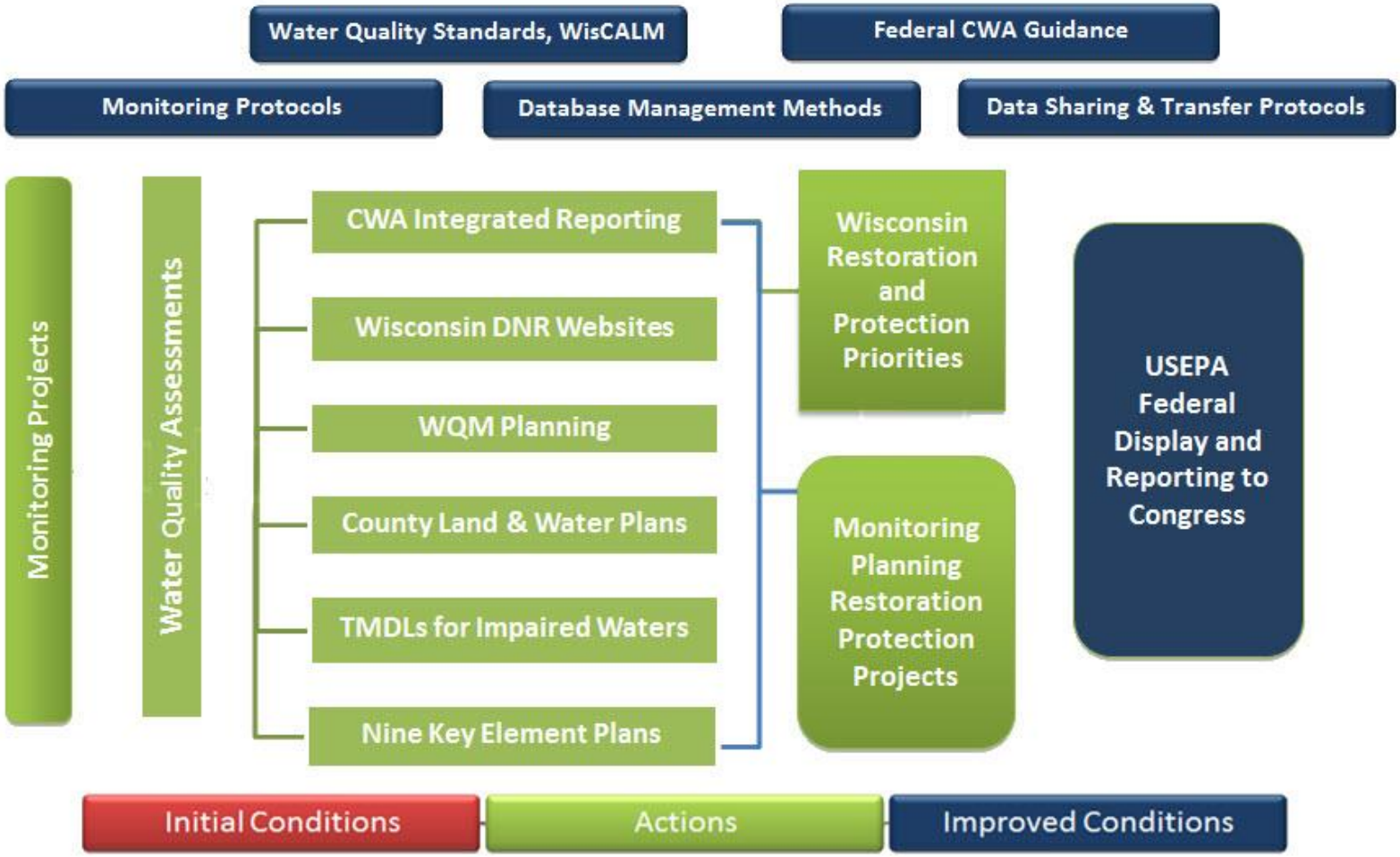
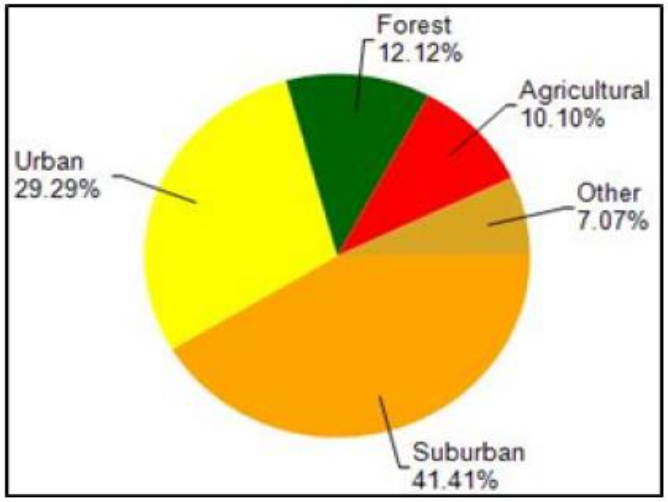
Hales
Corners
South
Milwaukee
Franklin
Oak Creek
Milwaukee Co.
Racine Co.

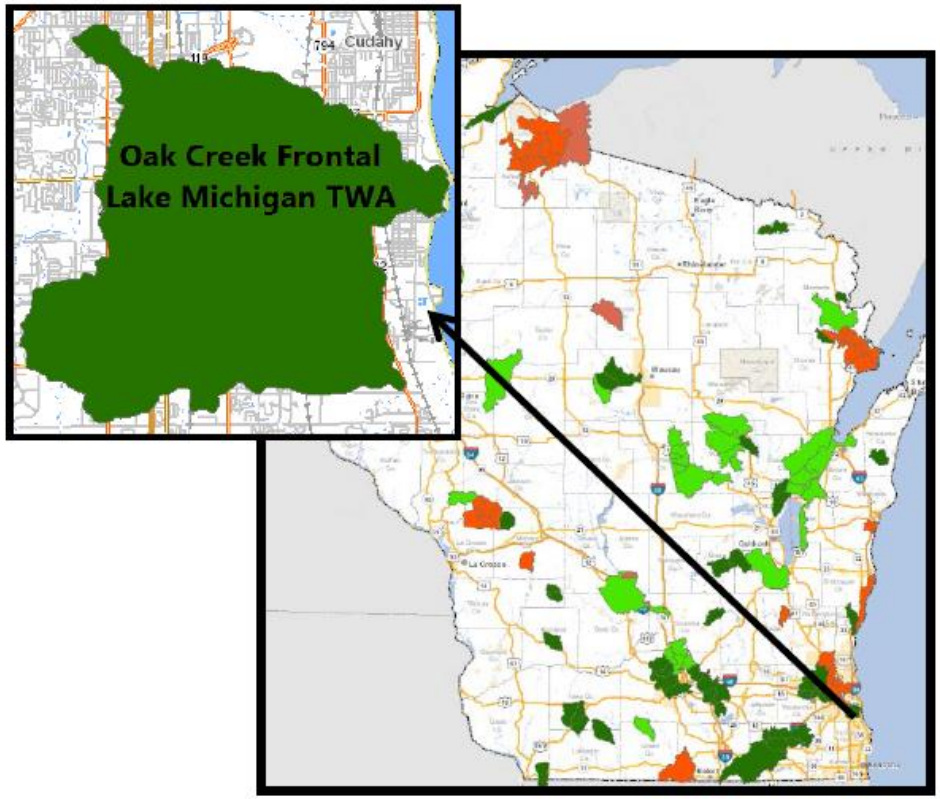
DNR Planning


Water Quality Standards, WisCALM
Federal CWA Guidance
Monitoring Protocols
Database Management Methods
Data Sharing & Transfer Protocols
Monitoring Projects
Water Quality Assessments
CWA Integrated Reporting
Wisconsin DNR Websites
WQM Planning
County Land & Water Plans
TMDLs for Impaired Waters
Nine Key Element Plans
Wisconsin Restoration and Protection Priorities
Monitoring Planning Restoration Protection Projects
USEPA Federal Display and Reporting to Congress
Initial Conditions
Actions
Improved Conditions

Oak Creek Frontal Lake Michigan TWA Project Location and Land Use

The Oak Creek watershed is 26.19 mi². This watershed has 48.46 stream miles, 28.09 lake acres and 440.81 wetland acres.

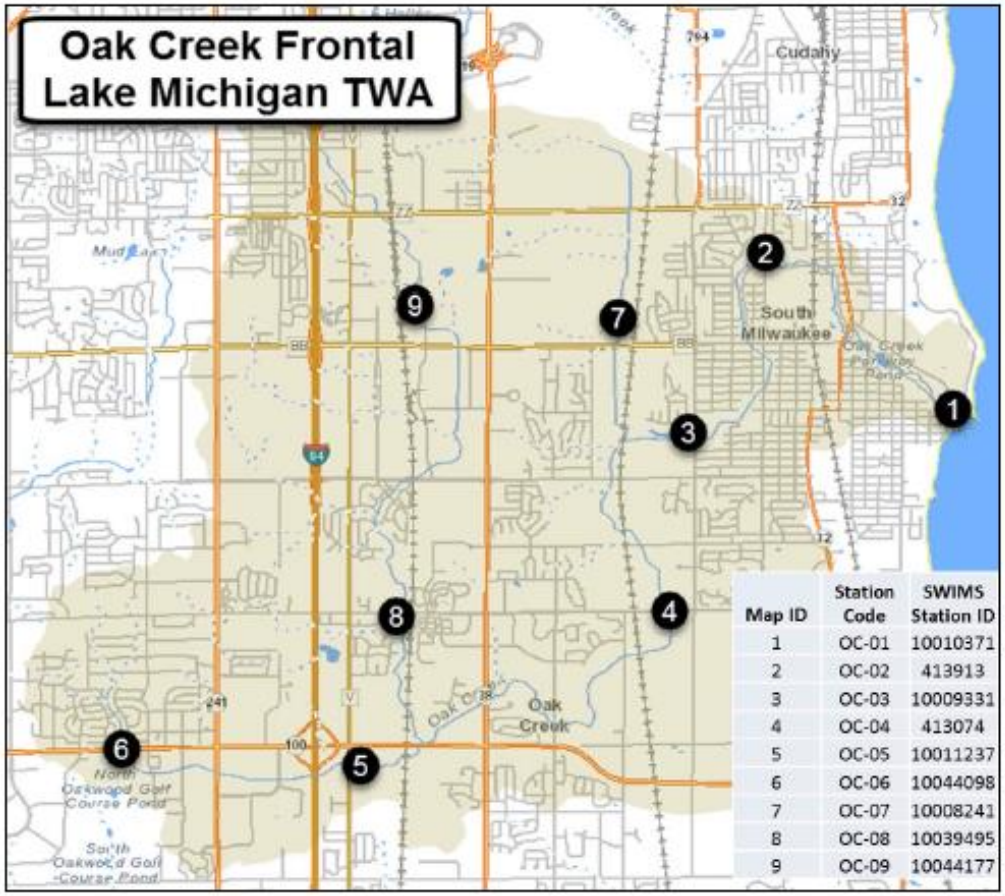




Purpose

The Oak Creek – Frontal Lake Michigan Watershed was monitored to provide information for the Restoration Plan for the Oak Creek Watershed.

Fish assemblage, macroinvertebrates, chemistry, and habitat were monitored at nine sites and phosphorus at the pour point of the watershed.



Map ID	Station Code	SWIMS Station ID
1	OC-01	10010371
2	OC-02	413913
3	OC-03	10009331
4	OC-04	413074
5	OC-05	10011237
6	OC-06	10044098
7	OC-07	10008241
8	OC-08	10039495
9	OC-09	10044177

Study Results – Water Chemistry

- Total phosphorus concentrations ranged from 0.03mg/l at OC-06 to 0.172 mg/L at OC-05.

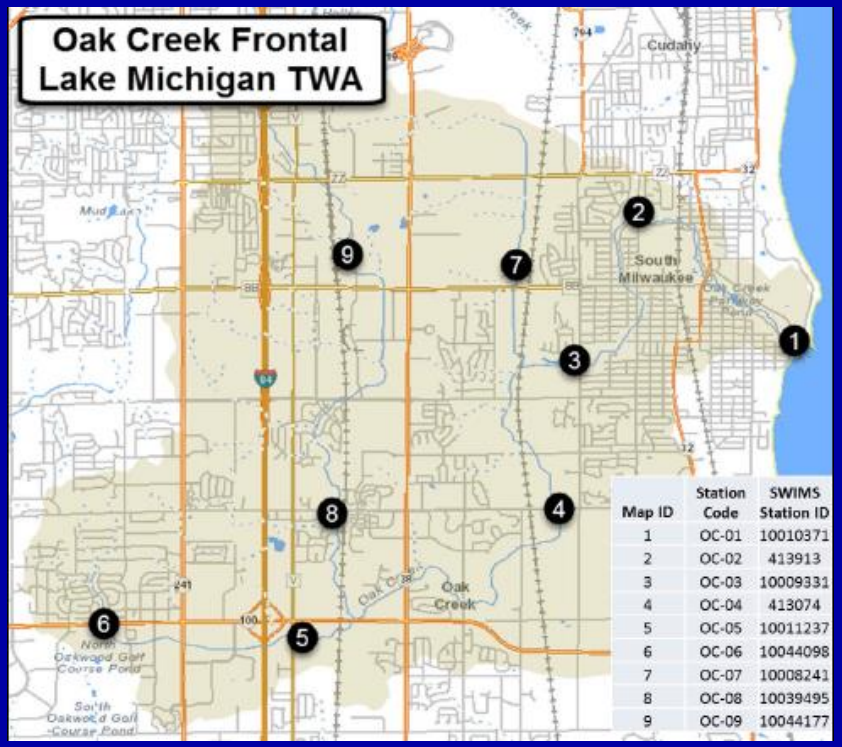
- Dissolved oxygen was taken once at each of the monitoring stations during 2015 and ranged from 4.1mg/L (OC-09) to 13.0mg/L (OC-04) (Table 5)

Station Code	Total Phosphorus (TP) (mg/L)	Dissolved Oxygen (DO) (mg/L)
OC-01	0.051	7.29
	0.065	
	0.123	
	0.089	
	0.042	
OC-02	0.106	5.9
OC-03	0.097	6.0
OC-04	0.066	13.0
OC-05	0.172	8.0
OC-06	0.03	5.71
OC-07	0.150	4.6
OC-08	0.089	12.21
OC-09	0.160	4.1

Study Results – Macroinvertebrates and Habitat

- The Hilsenhoff Biotic Index ranged Poor with a score 7.98 (OC-09) to Good with a score of 5.304 (SC-01).

- The Macroinvertebrate IBI (MIBI) score ranged from 1.358 to 5.26. The MIBI scores in this watershed suggest challenging conditions resulting from watershed inputs and overall degraded channel conditions.



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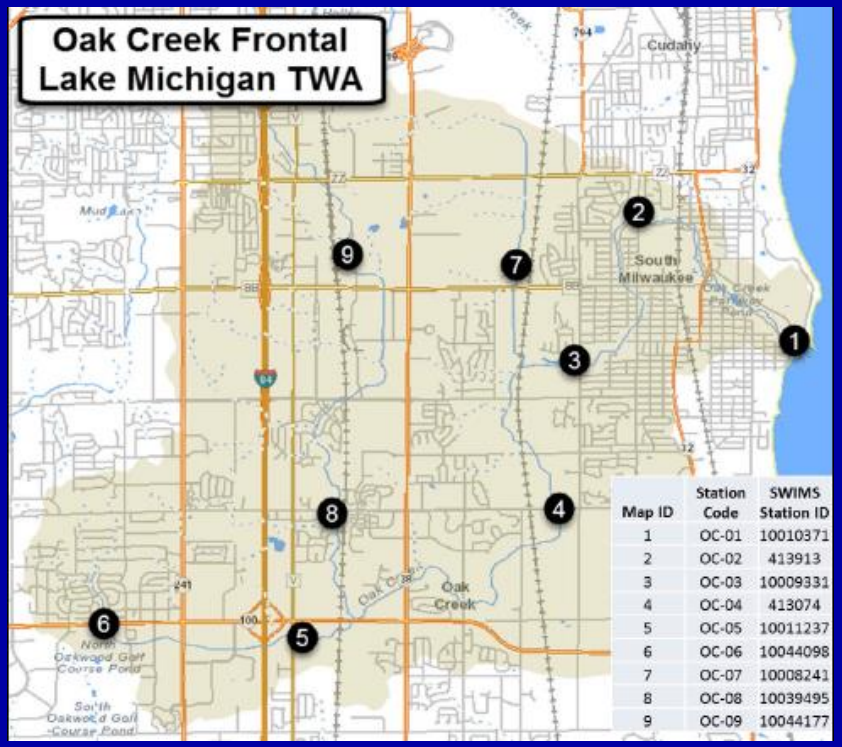
7	OC-07	10008241
8	OC-08	10039495
9	OC-09	10044177

Fish	OC-1	OC-2	OC-3	OC-4	OC-5	OC-6	OC-7	OC-8	OC-9
Black Bullhead	2		1						
Bluegill			1						
Brook Stickleback		14	3	69	2	7	7	152	12
Central Mudminnow		21	15	523		7	1		
Creek Chub	21	157	103	28	5	25	29	732	26
Common Carp		1							
Fathead Minnow	3	7	4	12		4	12	80	5
Goldfish			3						
Green Sunfish	12	21	20	3	1	3		3	8
Iowa Darter			40	49		3			
Johnny Darter		2	23	32		14			
Pumkinseed Sunfish		1							
Rainbow Trout	4								
Round Goby	62								
White Crappie	4								
White Sucker	16	194	128	41			1		



Fish	OC-1	OC-2	OC-3	OC-4	OC-5	OC-6	OC-7	OC-8	OC-9
Black Bullhead	50 Good	0 Poor	30 Fair	40 Fair	20 Poor	50 Good	20 Poor	20 Poor	20 Poor
Bluegill									
Brook Stickleback									
Central Mudminnow		21	15	523		7	1		
Creek Chub	21	157	103	28	5	25	29	732	26
Common Carp		1							
Fathead Minnow	3	7	4	12		4	12	80	5
Goldfish			3						
Green Sunfish	12	21	20	3	1	3		3	8
Iowa Darter			40	49		3			
Johnny Darter		2	23	32		14			
Pumkinseed Sunfish		1							
Rainbow Trout	4								
Round Goby	62								
White Crappie	4								
White Sucker	16	194	128	41			1		

Creek Chub

Green Sunfish

White Sucker

Fathead Minnow

Central Mudminnow

Iowa Darter

Study Results – Natural Community

In the study the thermal composition of species (cold, warm, or transitional) indicated the sampled stream sites resemble *cool-warm systems*, with the exception of Mitchell Field Drainage Ditch.

Fish species I this drainage ditch indicated a cool-warm community but historical manipulations may have changed this to a warmer community from a previously cool-cold community.

Overall Watershed Condition

Overall, the water quality of Oak Creek and tributaries ranges from good to poor.

Across the watershed, stream habitat is a limiting factor.

Stream channelization, along with associated sedimentation from runoff and bank erosion impairs fish & macroinvertebrate populations.

Recommendations

Management Priorities

- Identify areas throughout the watershed where stream habitat can be restored and connectivity improved. Seek funds and programs to support these efforts.
- Identify the primary sources of phosphorus and chlorides in the watershed and pursue local runoff management and river/stream grants to reduce phosphorous and chloride inputs into local water resources.
- Identify potential partners and stakeholders to participate in an overall awareness and behavioral change program in the watershed that could result in reduced erosion and phosphorus inputs.

Restoration Goals

- Work with partners and through grant programs to reduce overall nutrient loads to the watershed to protect existing conditions and reduce impacts to impaired or nearly impaired waters.
- Expand aquatic life passage within the watershed.
- Improve fish and aquatic life habitat.
- Expand and improve existing wetlands.

Questions?

INSTREAM SURVEY RECAP

Stream Channel Conditions, Habitat Assessment, Inventory

Aaron Owens
Planner

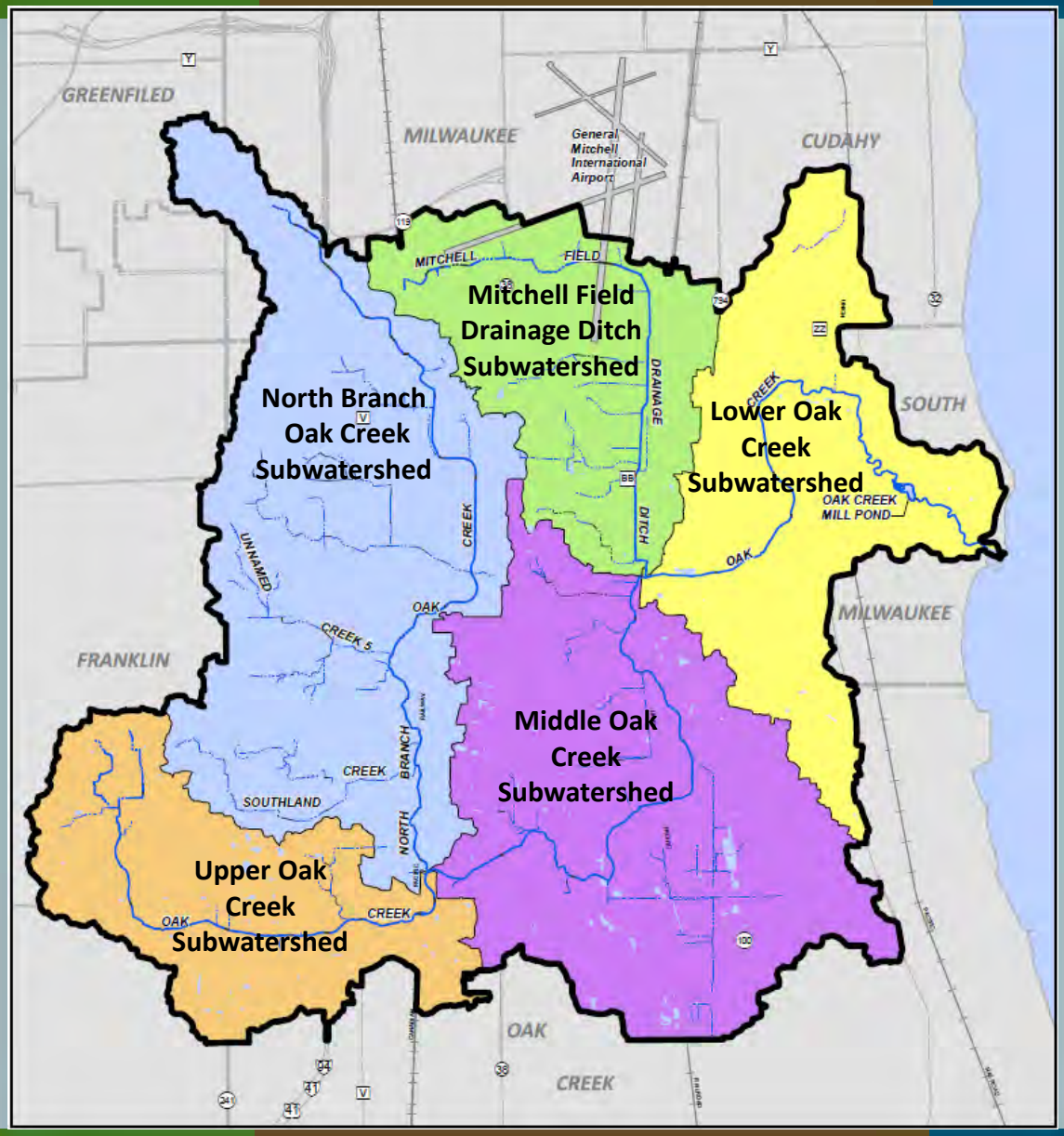
Megan Beauchaine
Research Analyst

Southeastern Wisconsin Regional Planning Commission

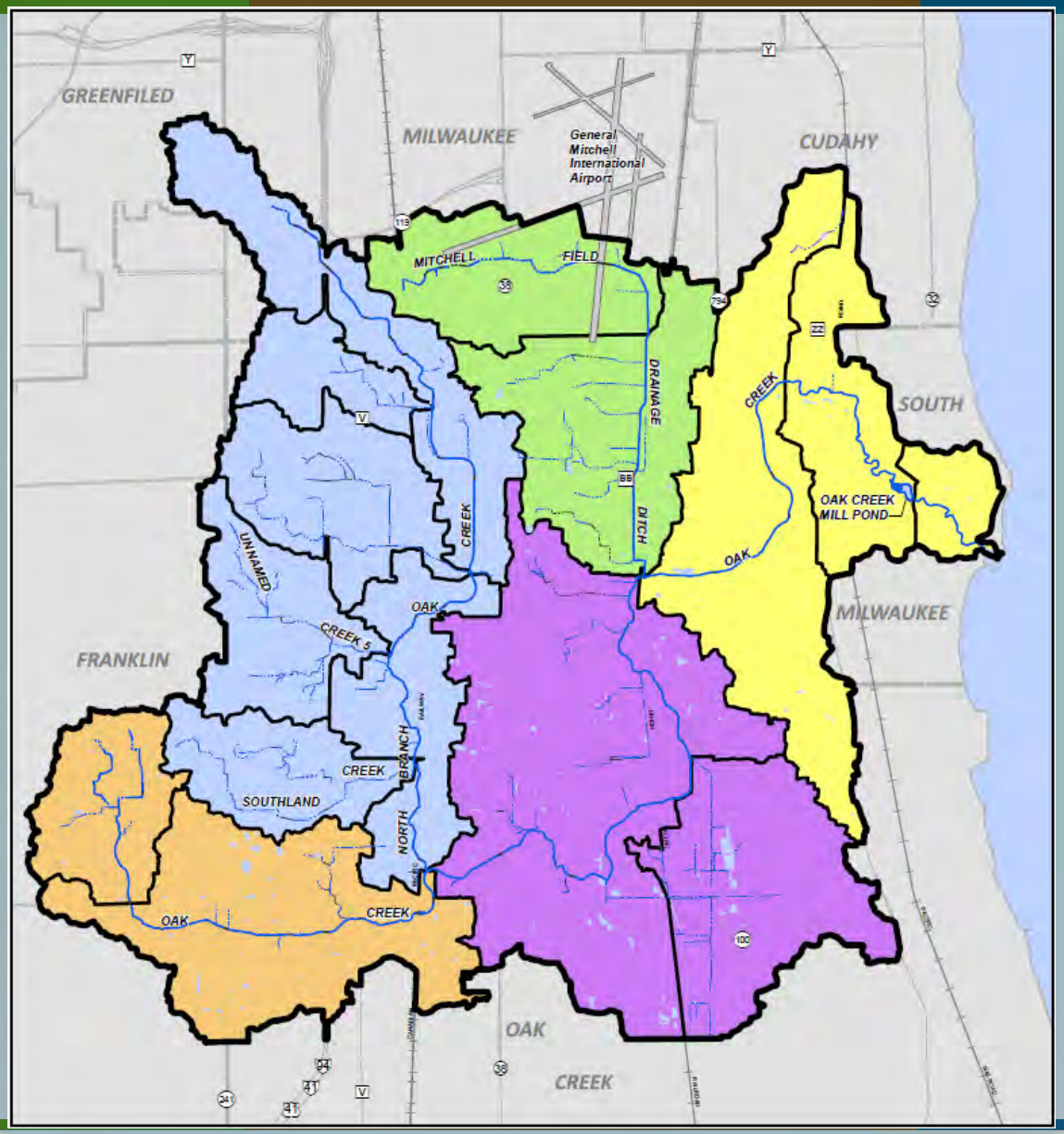
Outline

- Explanation of Assessment Areas
- What's Involved in an Instream Survey
- Photo Tour of Assessment Areas

Subwatersheds—Oak Creek Watershed

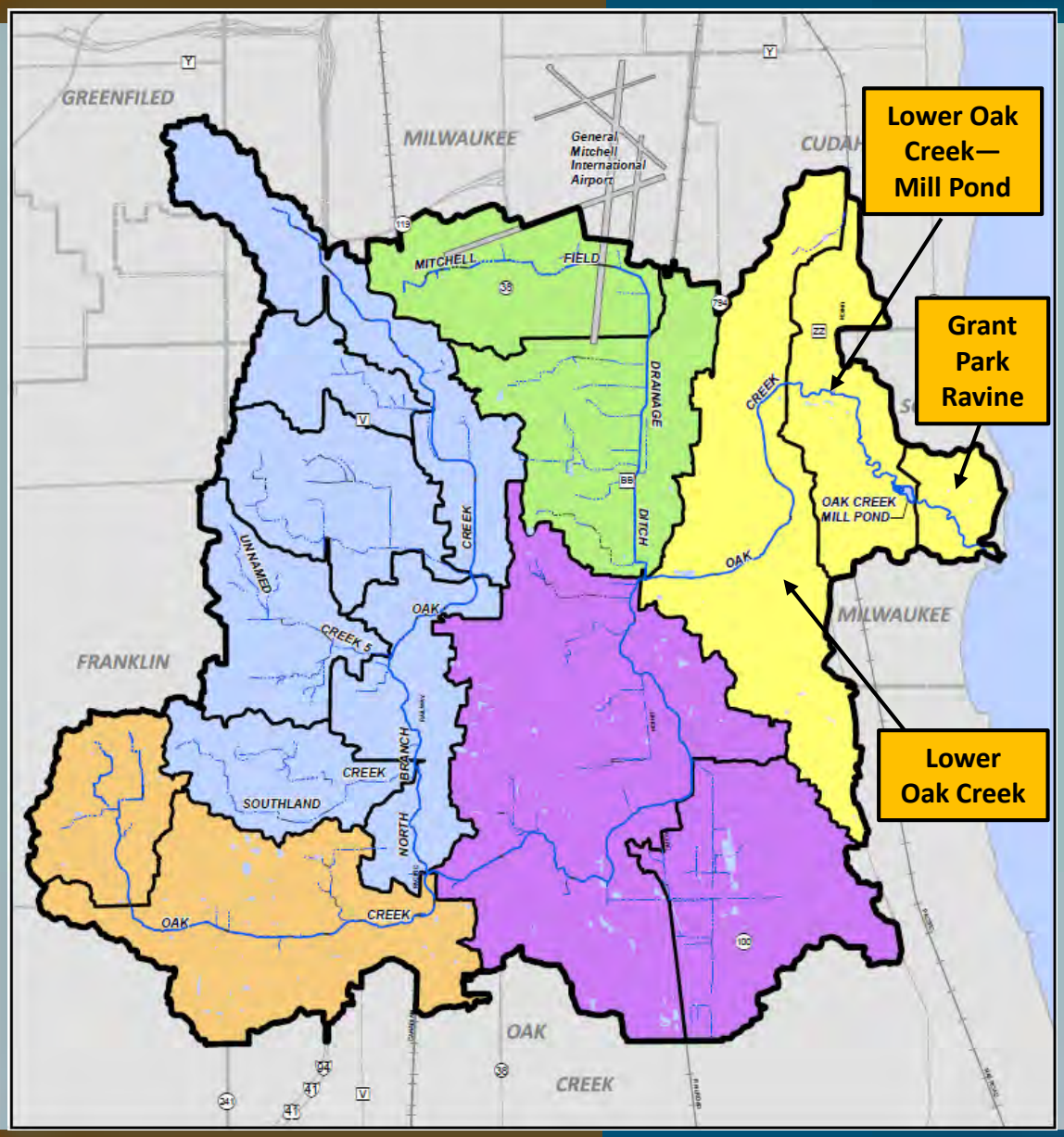


Assessment Areas—Oak Creek Watershed



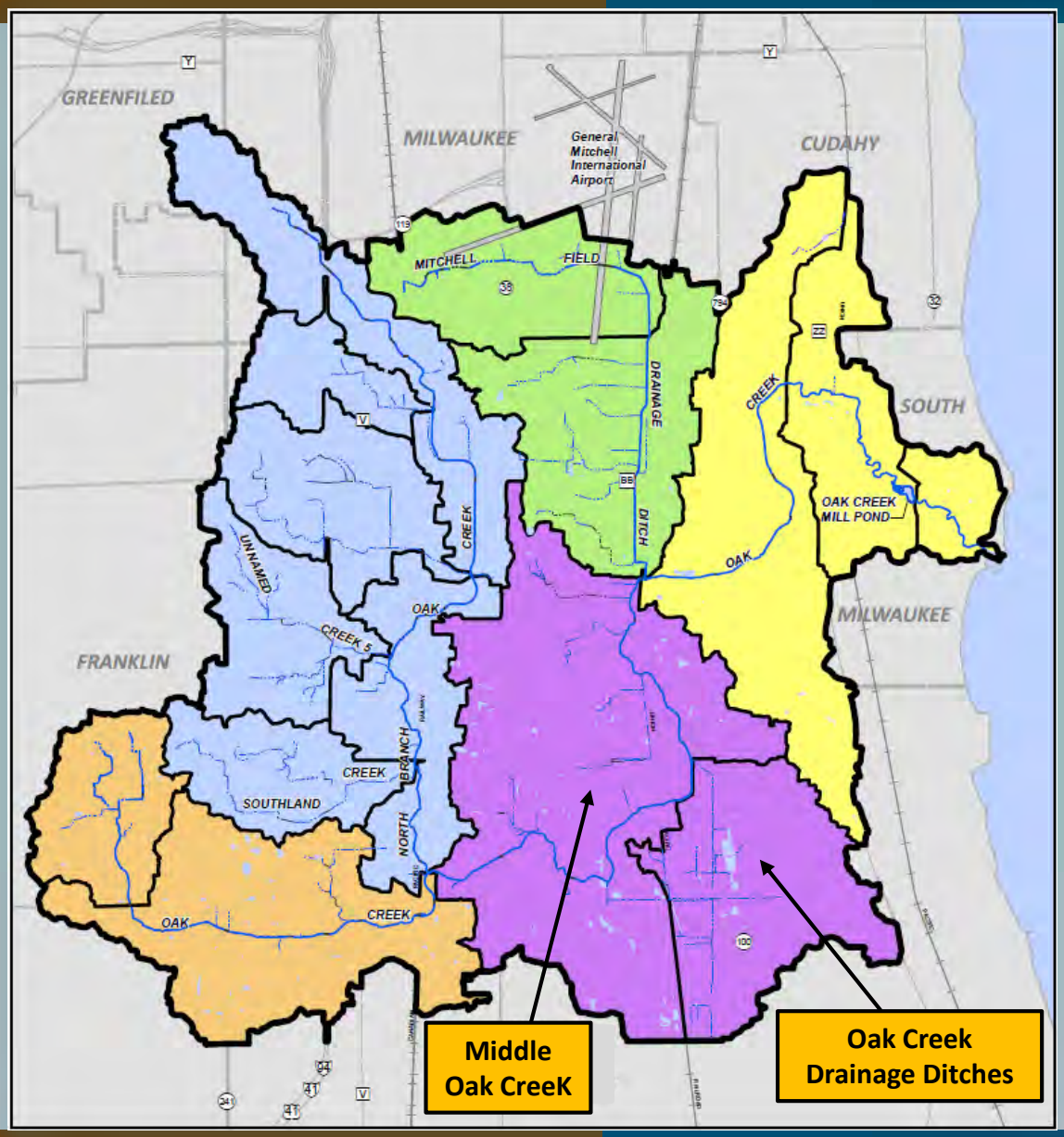
Assessment Areas—Lower Oak Creek Subwatershed

- Grant Park Ravine
- Lower Oak Creek-Mill Pond
- Lower Oak Creek



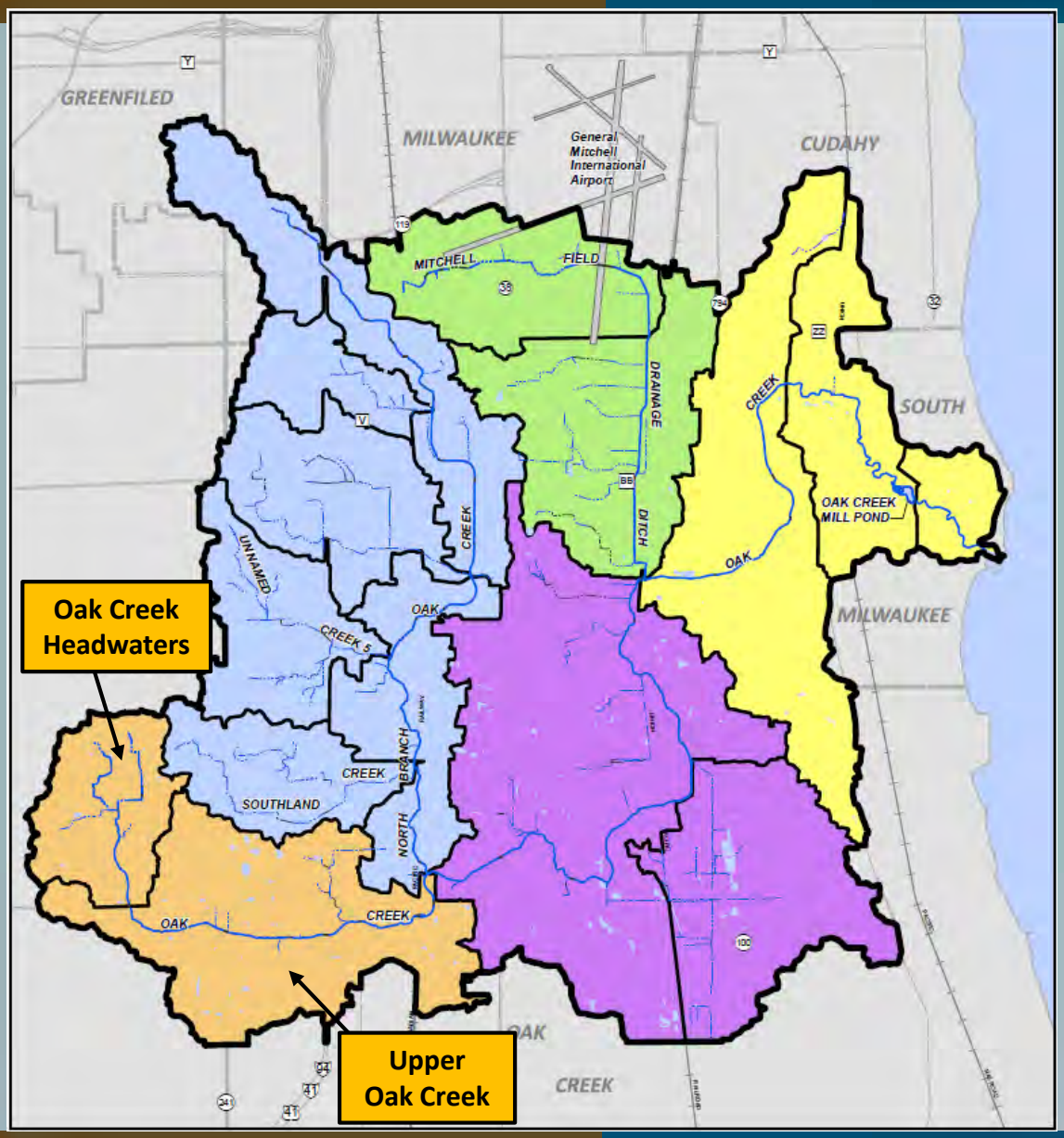
Assessment Areas—Middle Oak Creek Subwatershed

- Middle Oak Creek
- Oak Creek Drainage Ditches



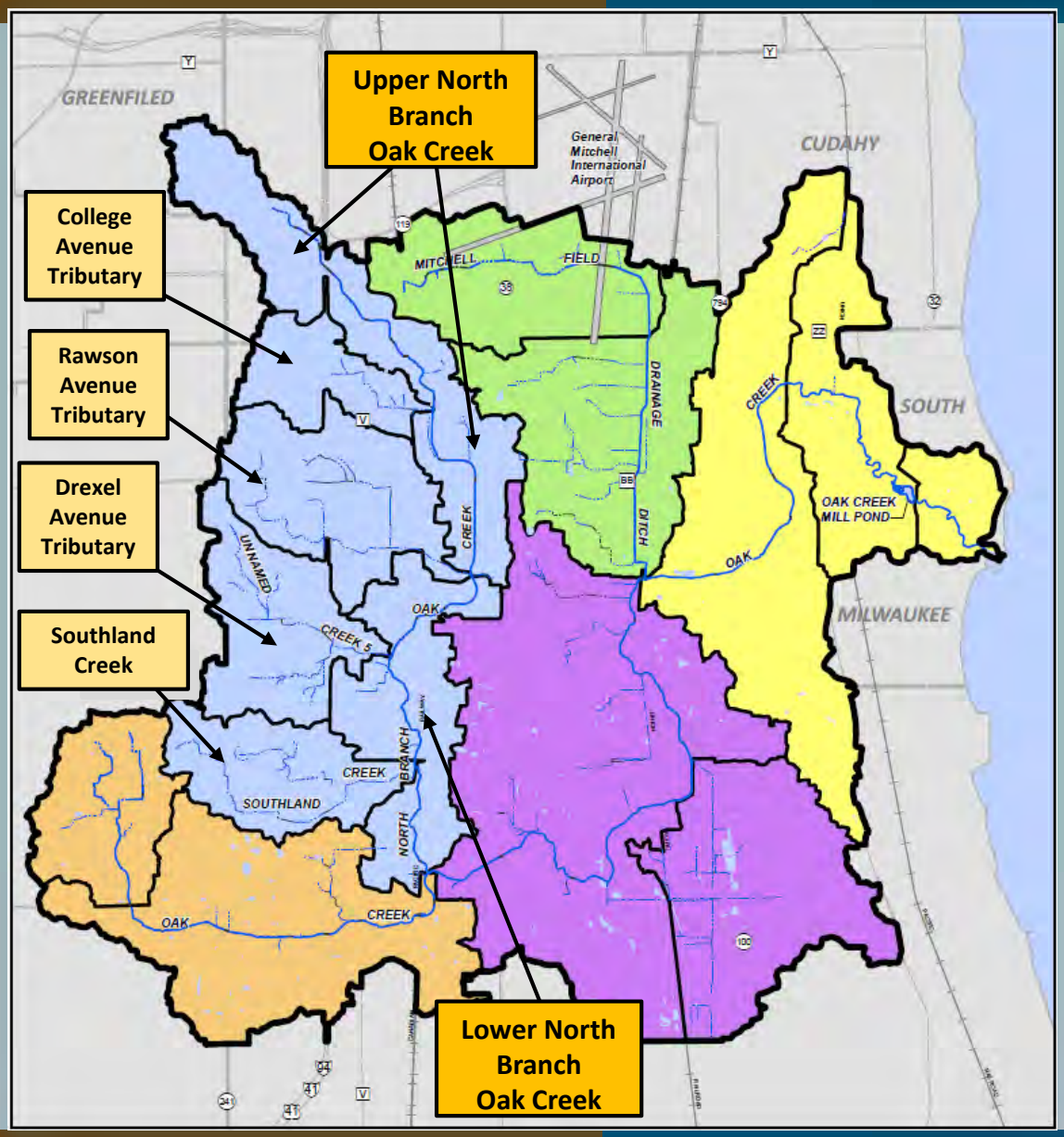
Assessment Areas—Upper Oak Creek Subwatershed

- Upper Oak Creek
- Oak Creek Headwaters



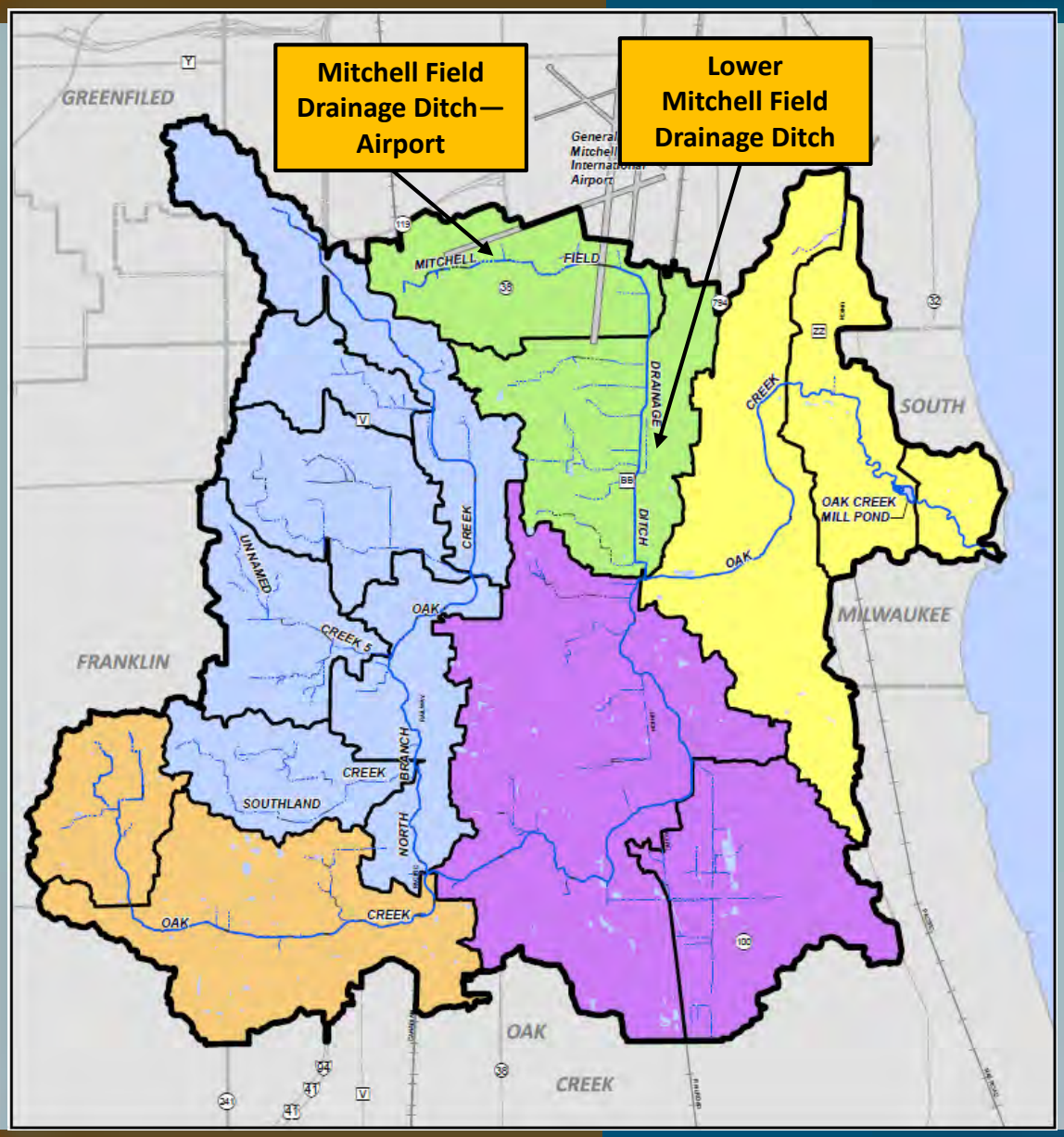
Assessment Areas—North Branch Oak Creek Subwatershed

- Lower North Branch Oak Creek
  - Southland Creek
  - Drexel Avenue Tributary
  - Rawson Avenue Tributary
- Upper North Branch Oak Creek
  - College Avenue Tributary

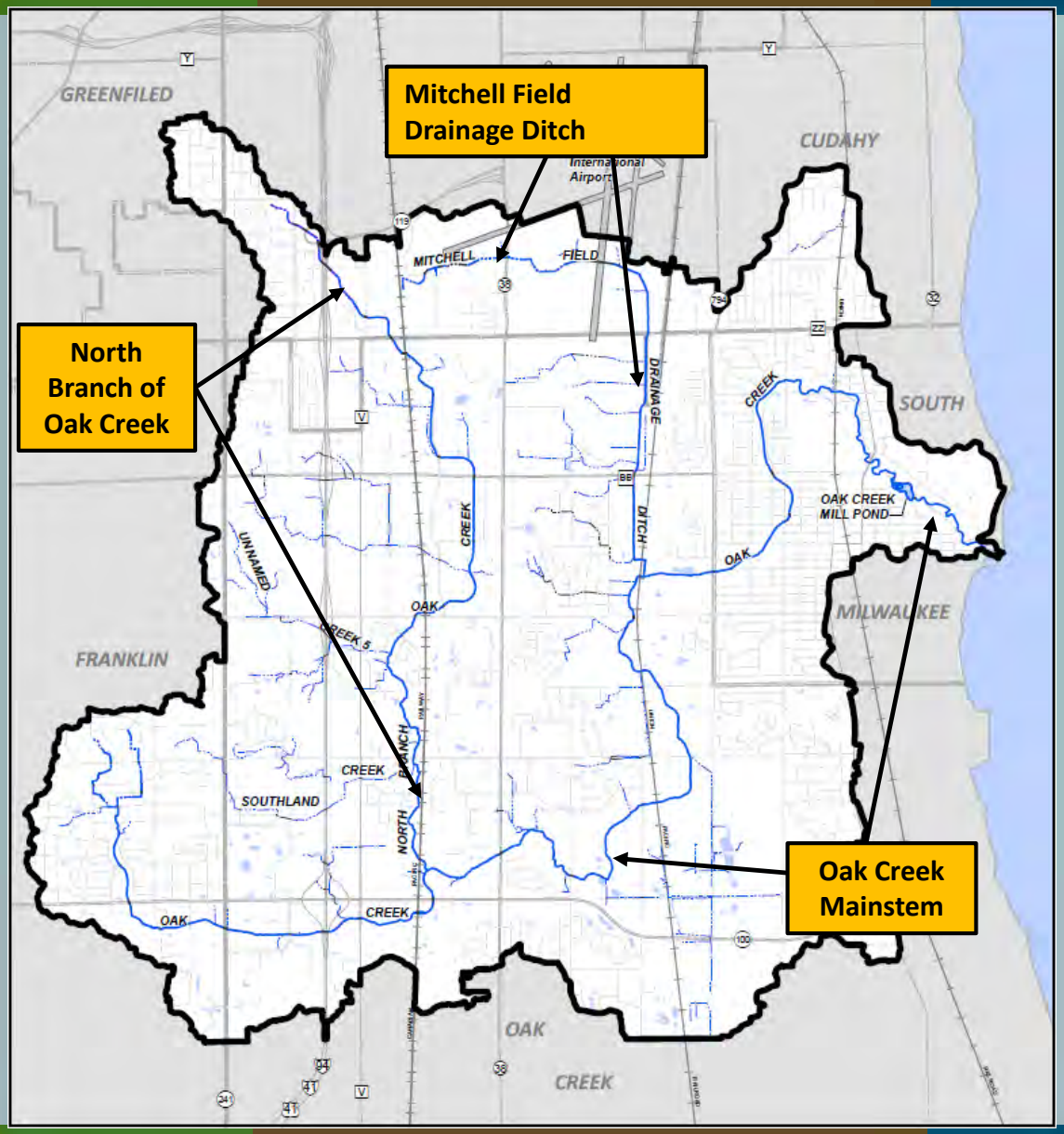


Assessment Areas—Mitchell Field Drainage Ditch Subwatershed

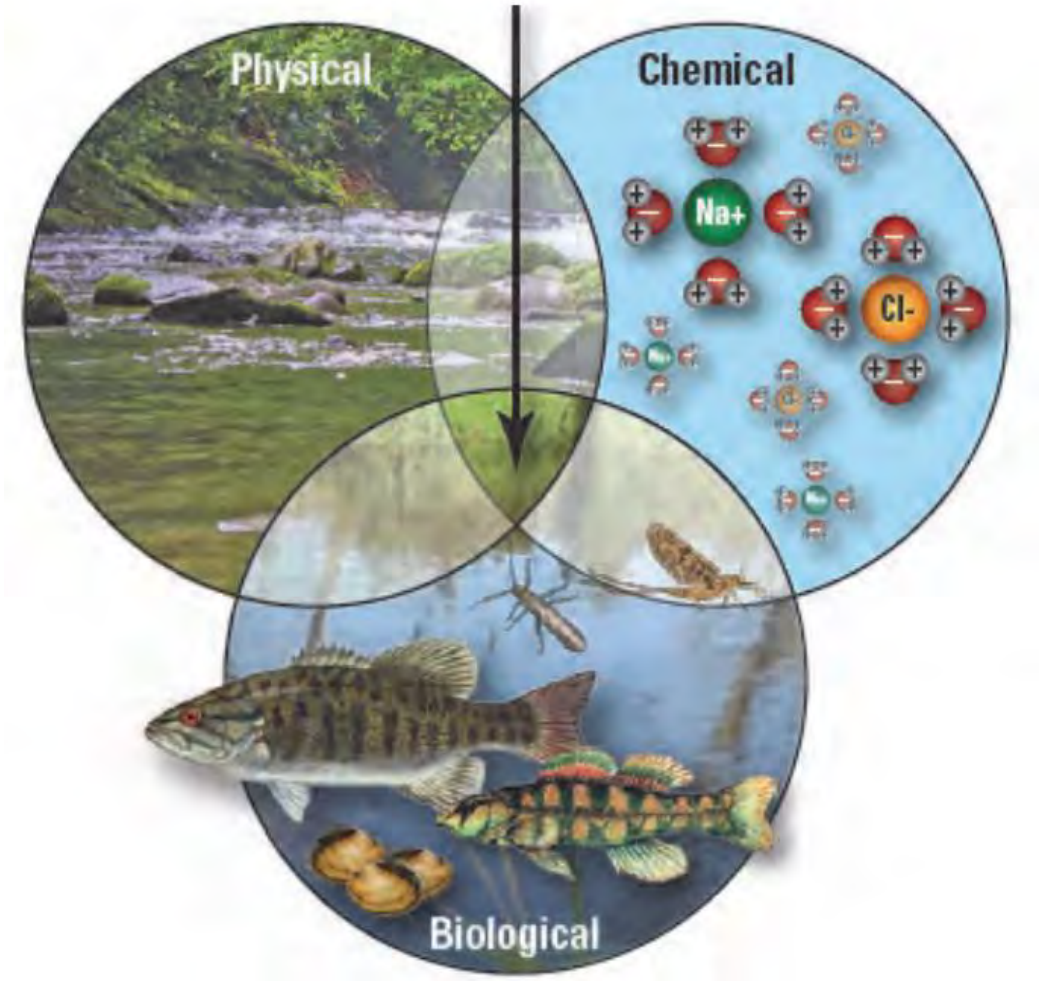
- Lower Mitchell Field Drainage Ditch
- Mitchell Field Drainage Ditch--Airport



Major Streams Surveyed



Ecological Stream Heath



Instream Survey and Inventory

- Instream Survey Includes:
  - Habitat Assessment
    - Cross Section Survey
    - Identify Locations of Deep Pool and Riffle Habitats
  - Stream Inventory
    - Locate and Assess Infrastructure
      - Road Crossings, Stormwater Outfalls, Drain Tiles
    - Locate Areas of Bank Erosion
    - Locate Large Woody Debris Jams
    - Locate Large Trash Items in the Channel
    - Locate Important Biological, Hydrological, and Geomorphic Features

Cross Section Survey—Habitat Assessment

- Quantifies Available Habitat for Critters (pools, riffles, runs, substrates, cover, woody debris, shading)
- Gives Insight Regarding Physical Process and Channel Change Over Time (Natural and Human Induced)

- Defines the Range of Flow Variation (Baseflow, Bankfull, Flood Flow)
- Identifies Problem Areas
- Provides a Baseline of Information to Compare to Future Studies

Cross Section Survey—Continued

For Each Cross Section We Measure:

- Bankfull Width
- Bank Height/Slope (Shape), Undercut Measurements
- Channelized Height/Width
- Water Width
- Fish & Macroinvertebrate Cover Types & Amount
- Stream Shading

At 5 Points Along the Cross Section We Measure:

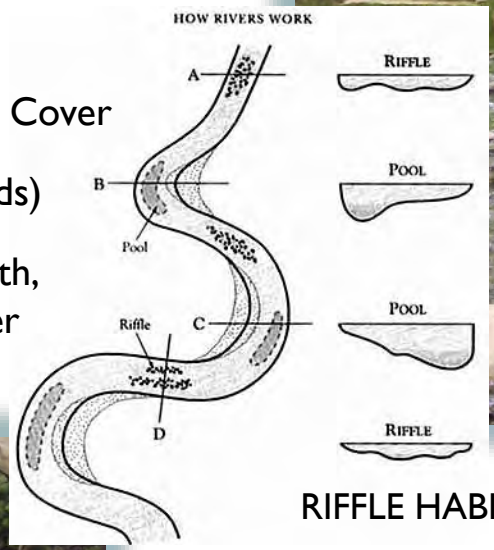
- Bankfull Depth
- Current Water and Sediment Depths
- Substrate Composition
  - Clay, Silt, Sand, Gravel, Cobble, Boulders

- Cross Section Surveys Were Conducted at 163 Sites Along Oak Creek Mainstem, North Branch, and Mitchell Field Drainage Ditch

Locate Pool & Riffle Habitats

POOL HABITATS:

- Slower Water Velocities
- Deeper Water
- Used by Fish for Resting, Feeding, and Cover
- Typically Finer Substrates (Silts & Sands)
- Collect Measurements of Depth, Width, Substrates, and Amount/Type of Cover
- 467 Pool Habitats Recorded



RIFFLE HABITATS:

- Faster Water Velocities/Aerates Water
- Shallow Water
- Spawning Sites for Some Fish Species
- Provides Cover for Macroinvertebrates
- Collect Measurements of Depth and Width
- 342 Riffle Habitats Recorded

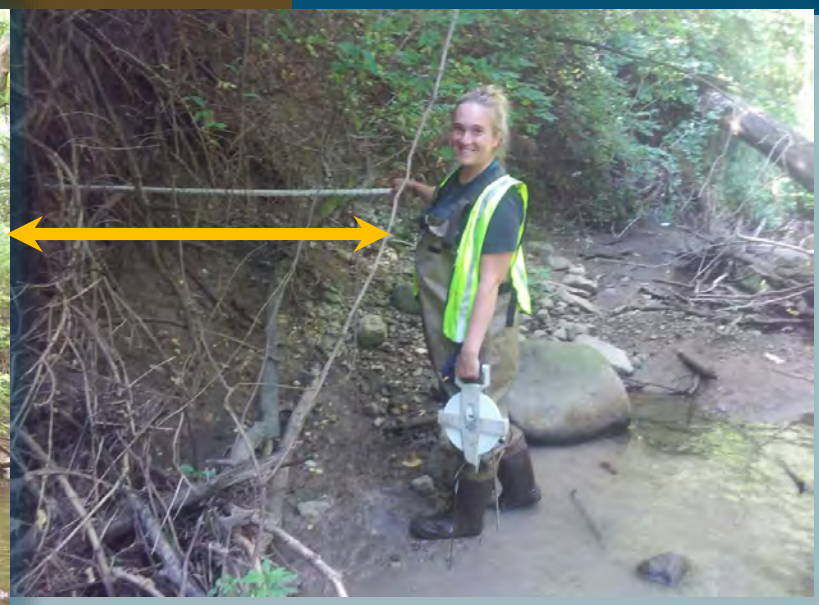
Stream Crossing Surveys / Fish Passage Assessment

- Type of Crossing
- Number of Cells
- Shape
- Material
- Structure Measurements
- General Condition
- Stream Flow Characteristics
- Cell Blockage? Plugged with Sediment?
- Preliminary Recommendations

Locate/Assess Stormwater Outfalls & Drain Tiles

- Geolocate & Photograph
- Assess Condition (Failed?)
- Note Current Effluent Flow
  - Flows During Dry Period of Weather May Indicate Cross Connections
- Recommend Treatments If Needed

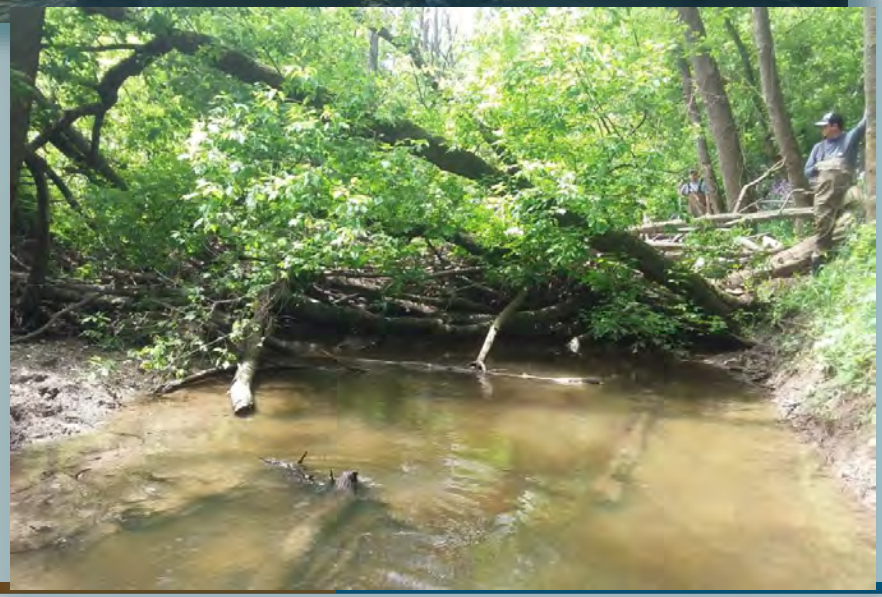
Streambank Erosion, Gully Erosion



- Digitally Map Locations of Erosion
- Measure: Length, Height, Depth of Erosion Sites
- Measurements Allow for Estimate of Sediment and Attached Nutrients Entering Stream Due to Bank Erosion

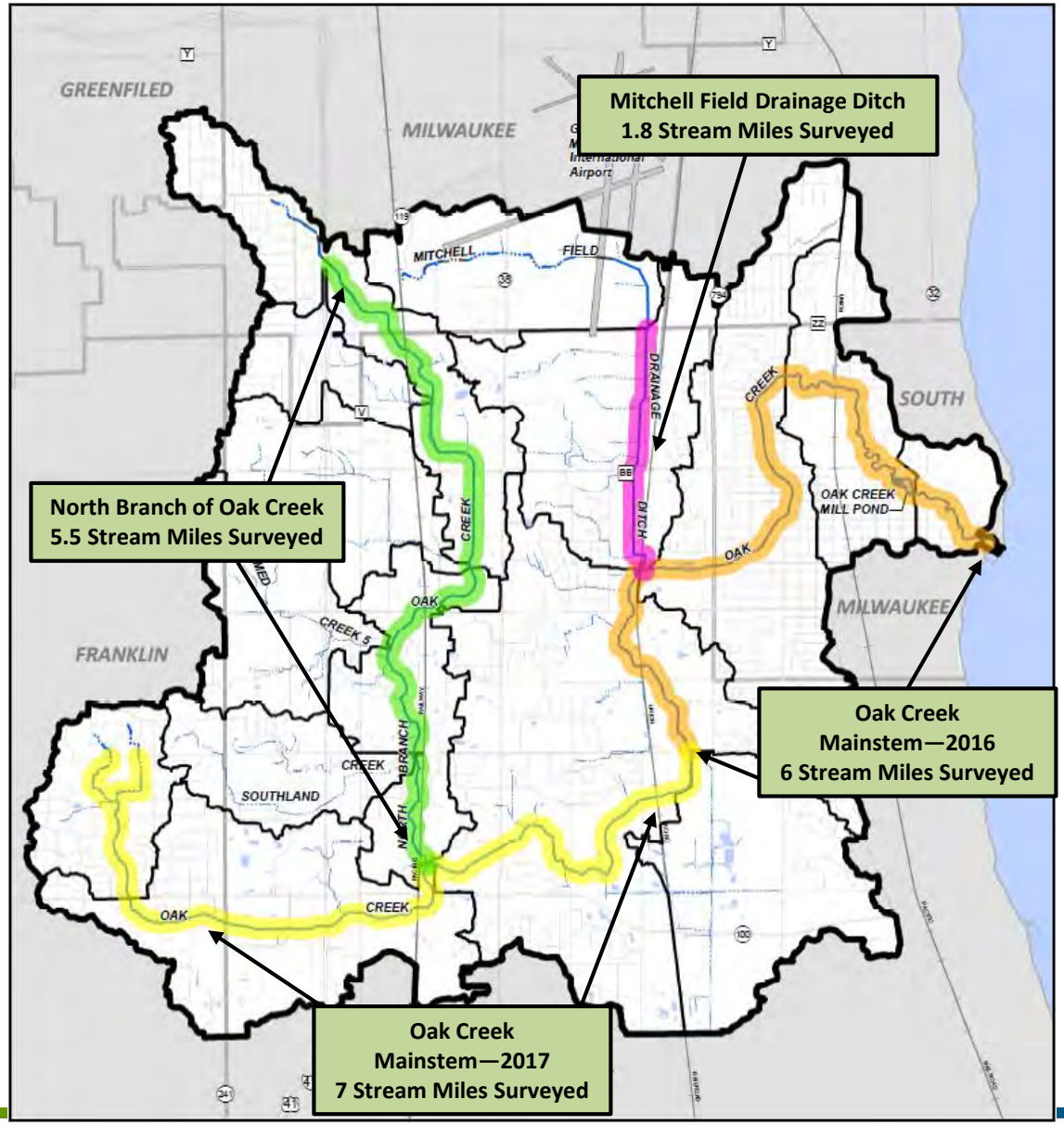
Important Biological, Hydrologic, and Geomorphic Features

Large Woody Debris Jams and Beaver Dams



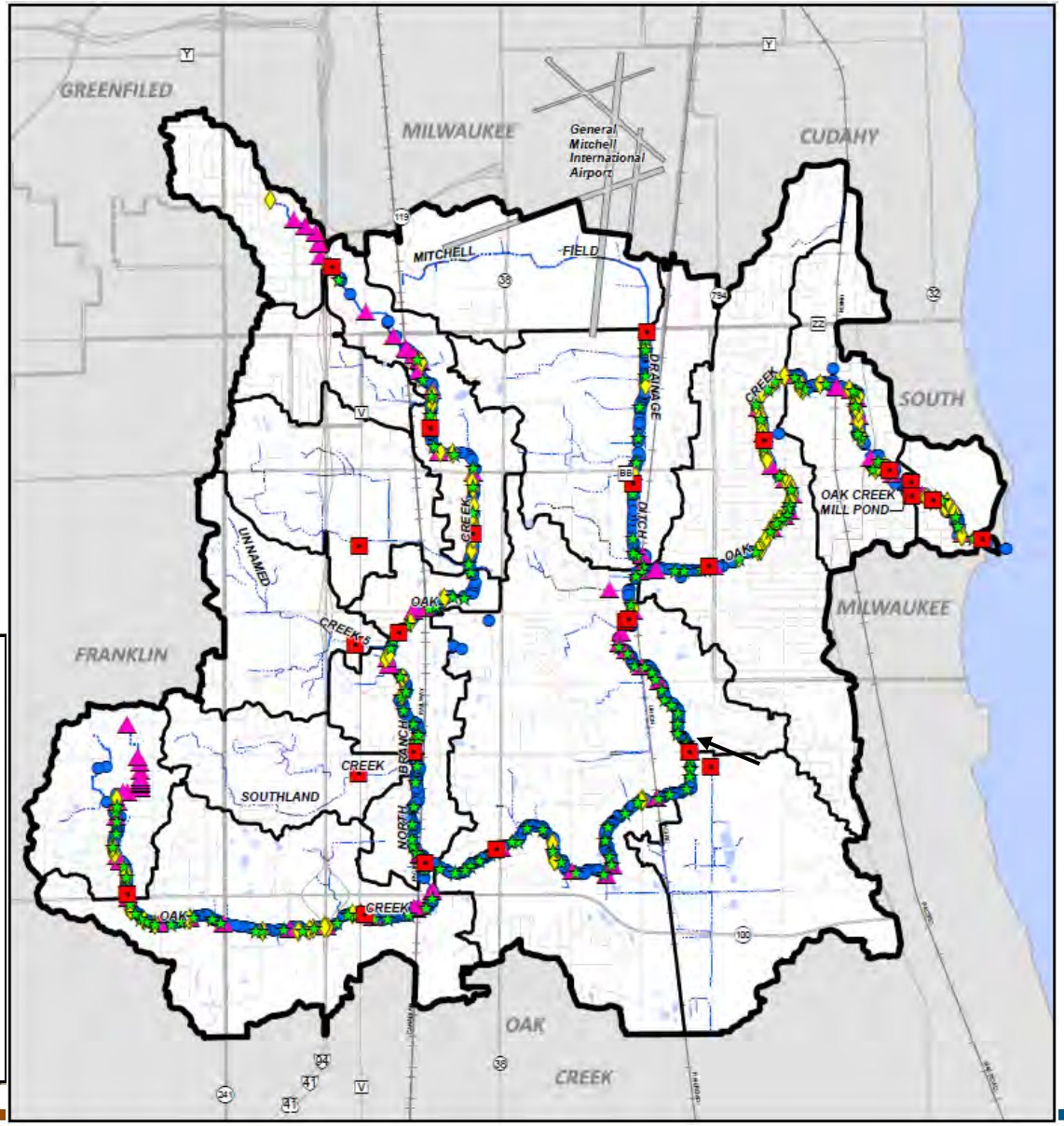
Large Trash Items In Stream Channel

2016-17 Instream Field Survey Progress



2016-17 Instream Field Survey Progress

- 20.3 Stream Miles Surveyed in Total
- Over 2,000 Individual Points of Interest Geolocated, Recorded, and Photographed



Continuous Water Temperature Logger

Habitat Cross Section Survey

Stormwater Outfall Surveyed

Bridge/Culvert Surveyed

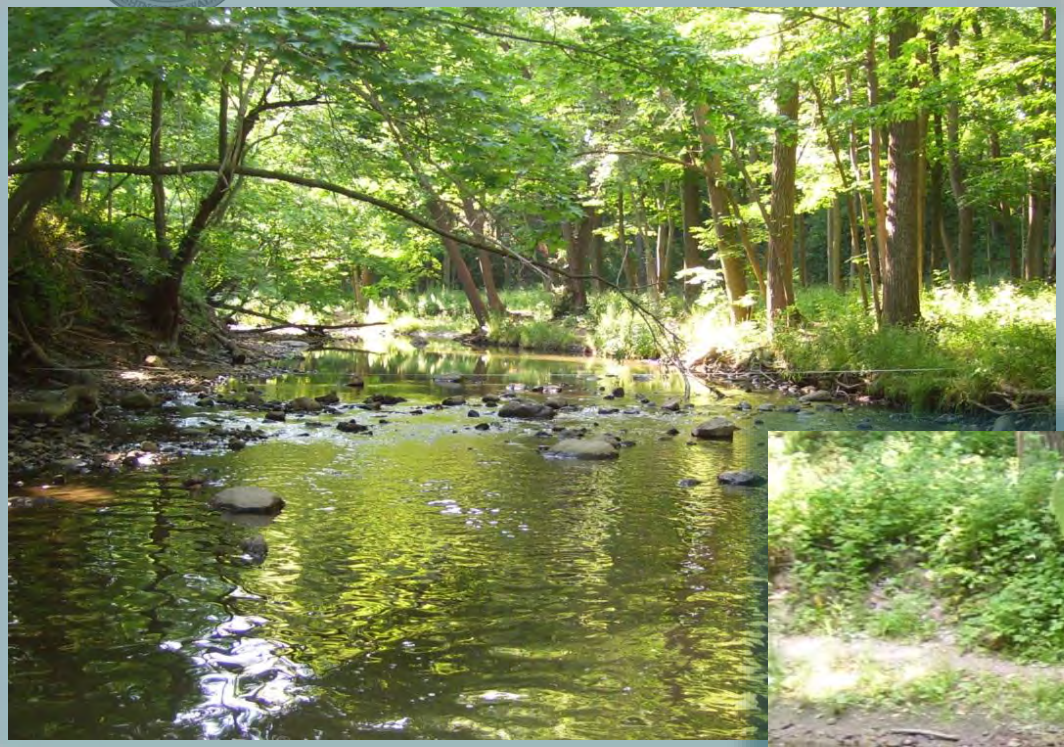
Pools, Riffles, and Other Significant Sites

Lower Oak Creek—Grant Park Ravine Assessment Area

- 0.8 Stream Miles
- Steep Channel Slopes Compared to other Assessment Areas
- Well Buffered
- One of the Most "Recreationally Used" Reaches of Stream within Watershed
- Fishing, Hiking, Biking is Prevalent

Grant Park Ravine Assessment Area

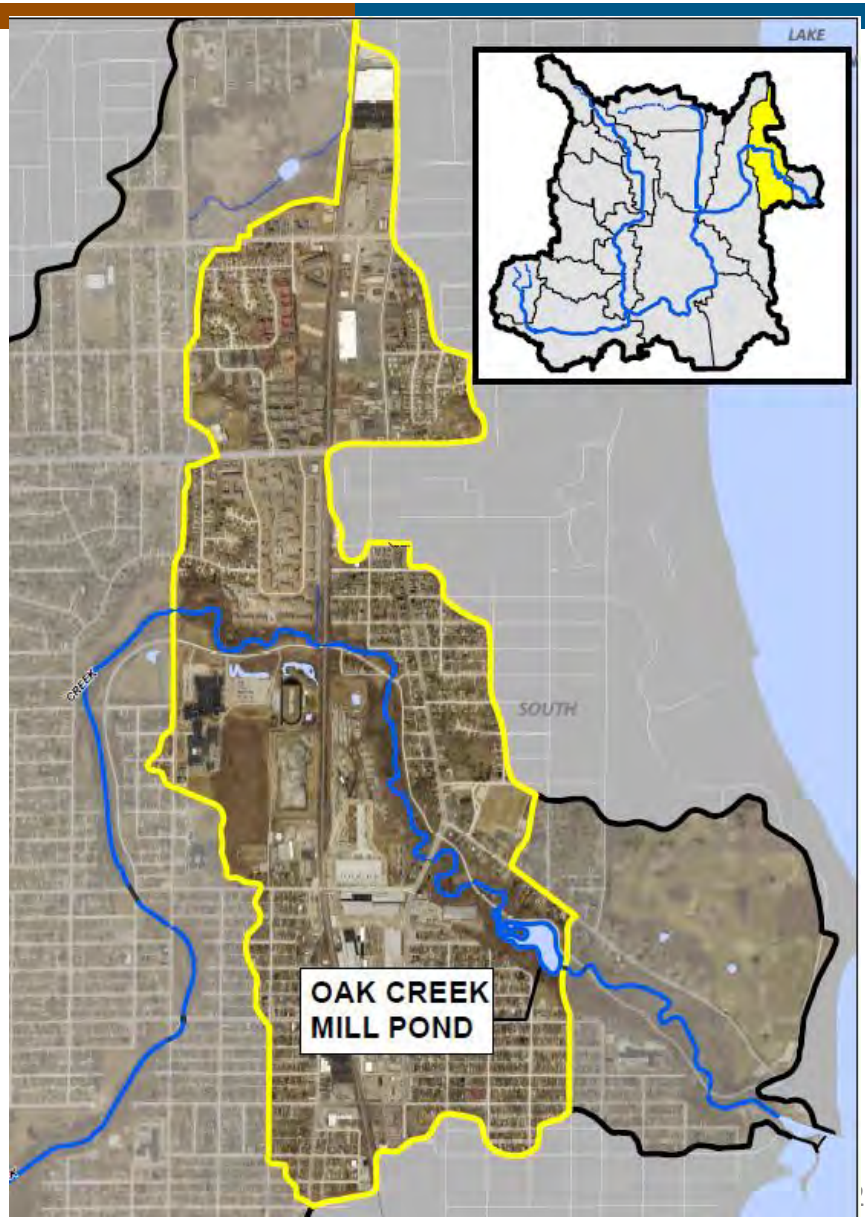
Grant Park Ravine Assessment Area



Grant Park Ravine Assessment Area—Erosion

Lower Oak Creek—Mill Pond Assessment Area

- 2.25 Stream Miles
- Mill Pond and Dam
- High Density Residential and Industrial Land Use
- Stream is Well Buffered—Milwaukee County Parkway System
- Includes USGS Gaging Station at 15th Avenue
- Fairly Visible Reach to Public—Heavily Used Oak Creek Parkway for Biking/Run/Walking

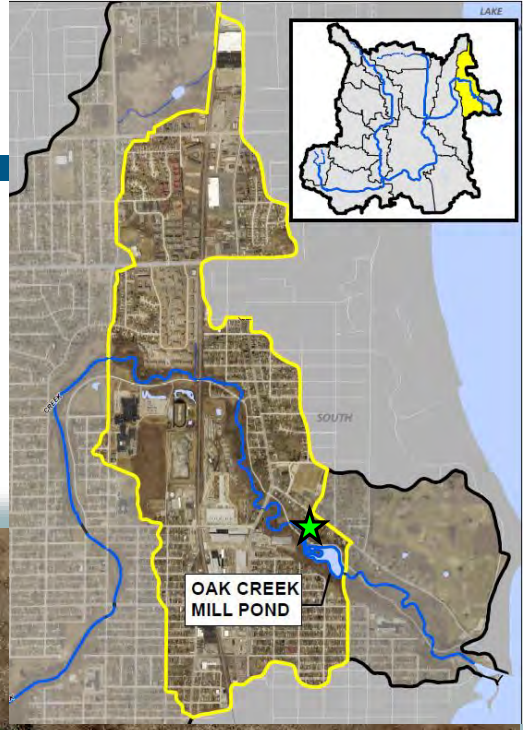


Lower Oak Creek—Mill Pond Assessment Area

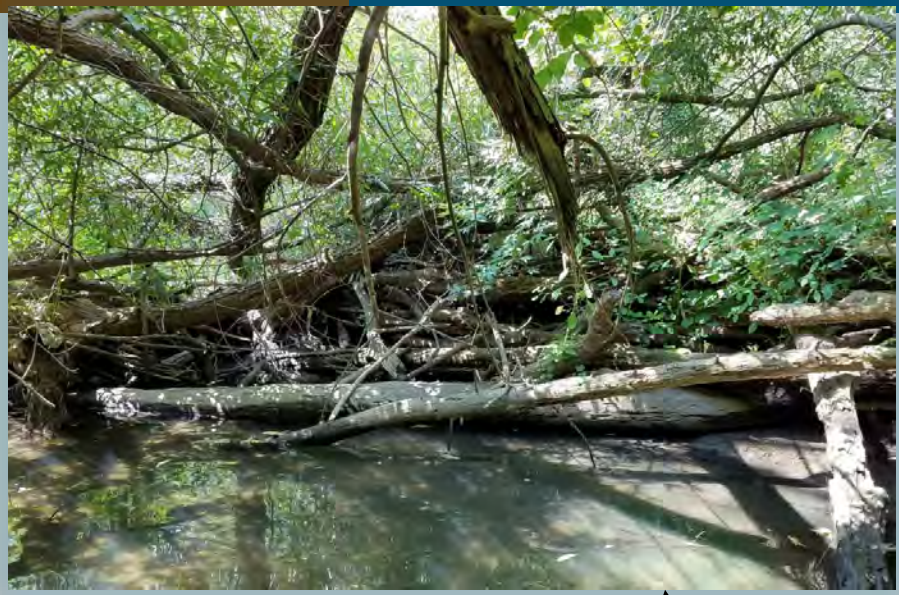
Lower Oak Creek—Mill Pond

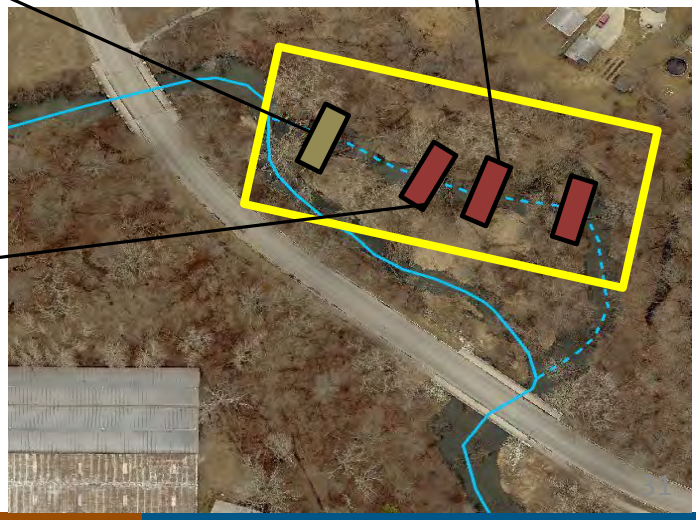
Year: 2005

Year: 2015



Lower Oak Creek—Mill Pond Assessment Area





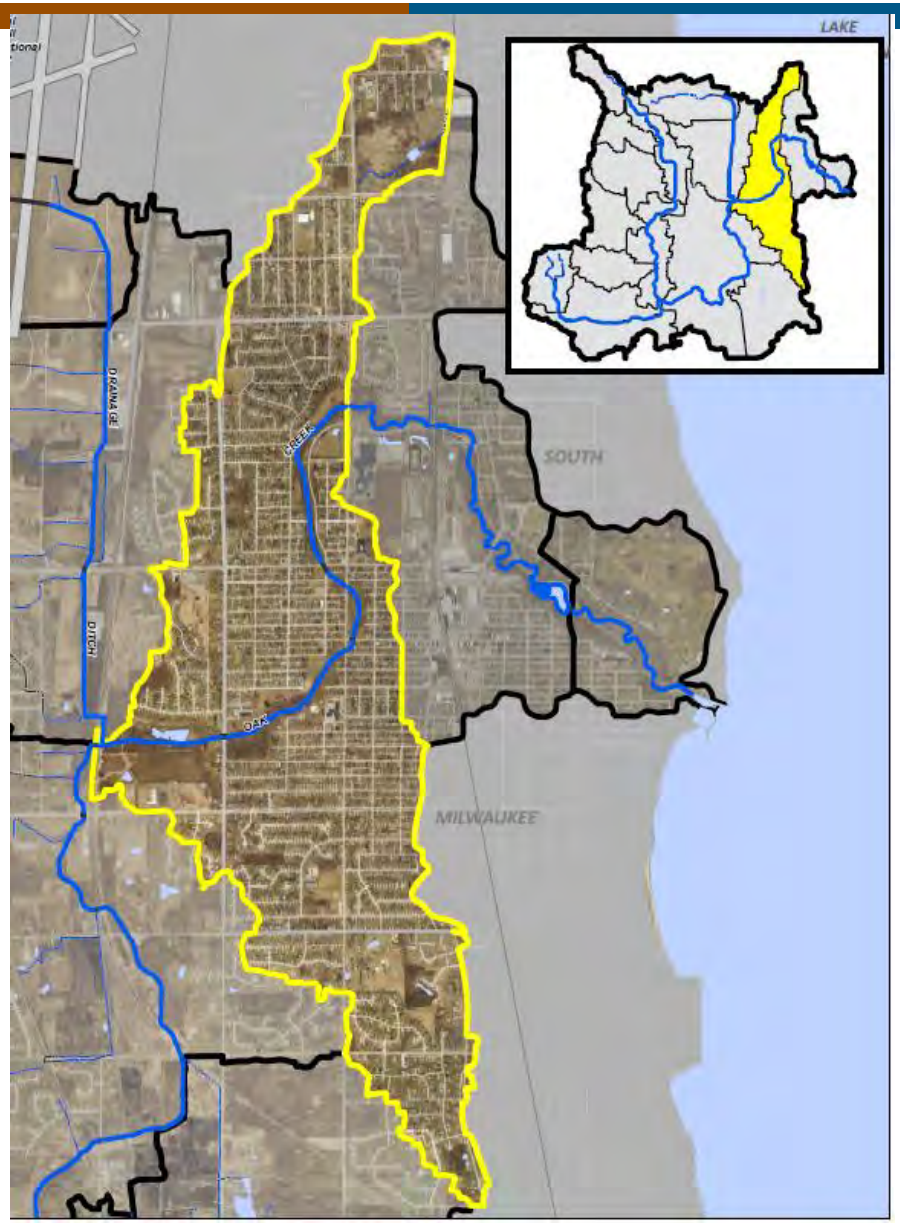
Lower Oak Creek—Mill Pond Assessment Area

Lower Oak Creek—Mill Pond Assessment Area

Lower Oak Creek—Mill Pond Assessment Area

Lower Oak Creek Assessment Area

- 2.4 River Miles
- High Density Residential Land Use
- Stream is Well Buffered—Milwaukee County Parkway System
- Riparian Buffers Are More Confined Due to the Dense Residential Area
- Channelization More Pronounced
- Disconnected From Floodplain
- Areas of Concrete Lined Channel
- Mitchell Field Drainage Ditch Flows Into this Assessment Area at Upstream End



Lower Oak Creek Assessment Area

Lower Oak Creek Assessment Area

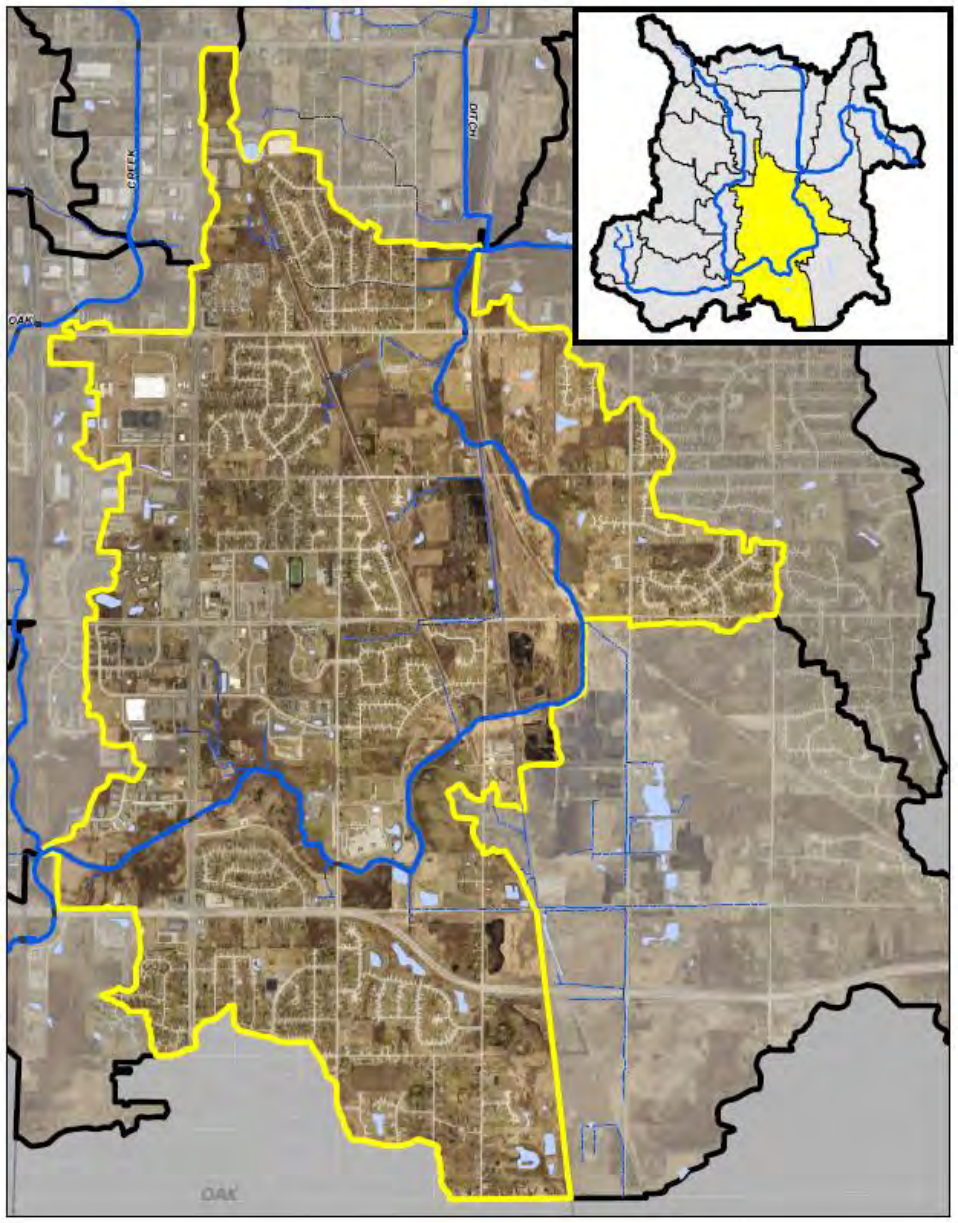
Lower Oak Creek Assessment Area

Lower Oak Creek Assessment Area

Lower Oak Creek Assessment Area

Middle Oak Creek Assessment Area

- 4.6 Stream Miles
- Low Gradient Stream
- Less Pool/Riffle Structure
- Less Urbanized than Downstream Areas
- Some Agricultural Land Uses, Mostly Residential
- More Silt and Sand Substrates/Increased Sediment Depths
- Channelized and Disconnected Floodplain
- Fragmented Riparian Buffer

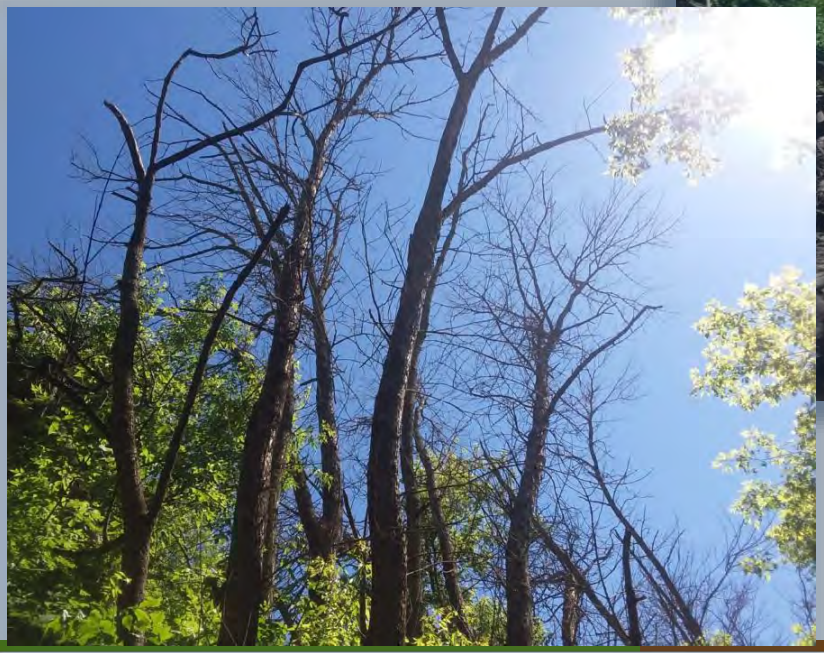


Middle Oak Creek Assessment Area

Middle Oak Creek Assessment Area

Middle Oak Creek Assessment Area

- Dead Ash Trees Lining This Reach of Oak Creek

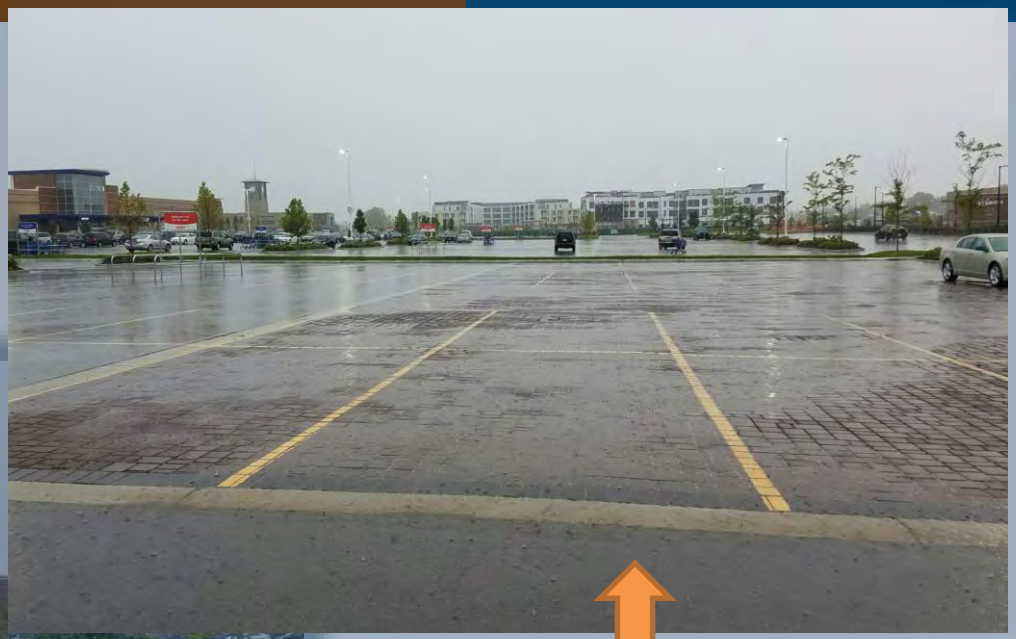


Middle Oak Creek Assessment Area

Middle Oak Creek Assessment Area

- Drexel Town Square Green Infrastructure

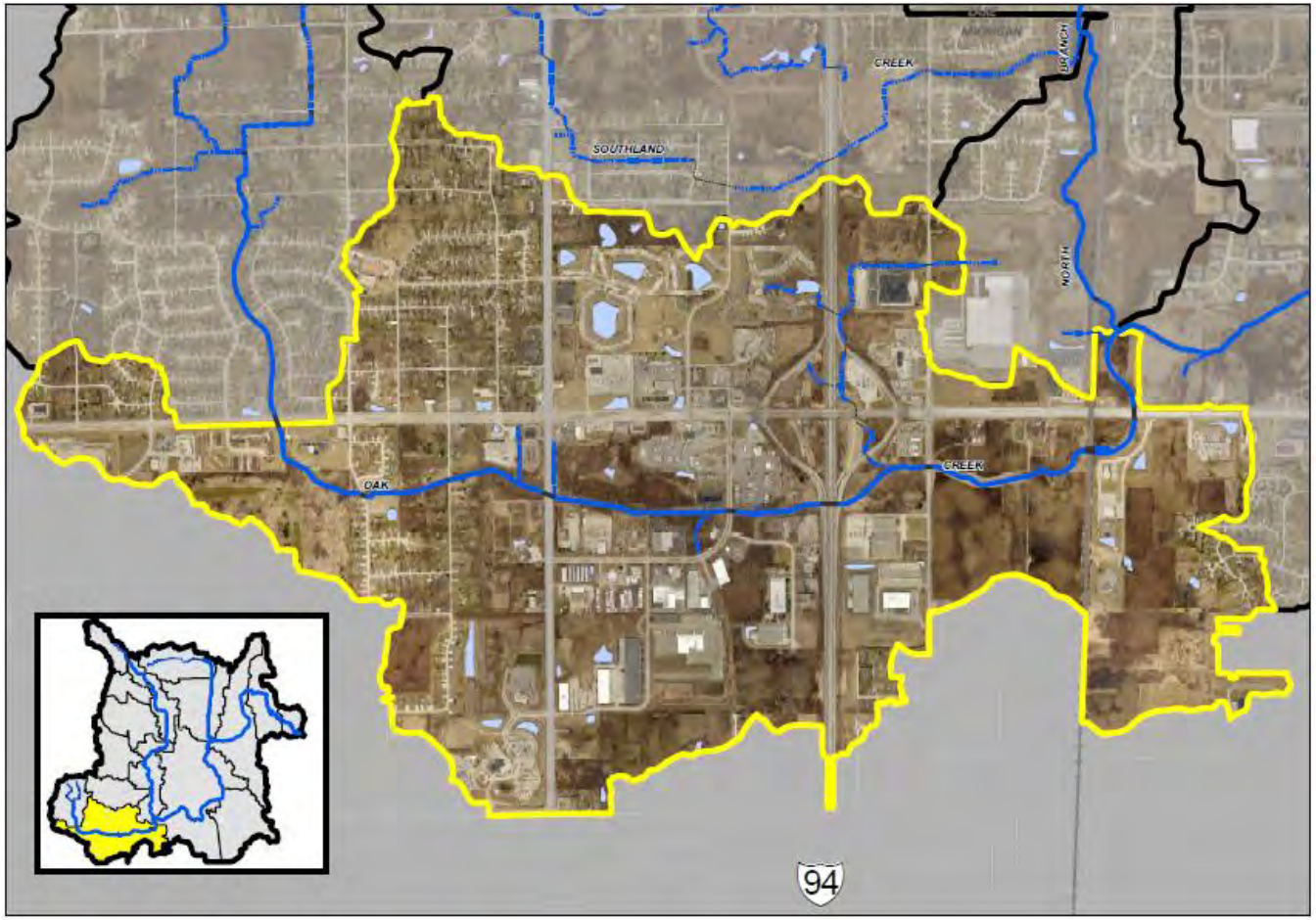
Bioswale



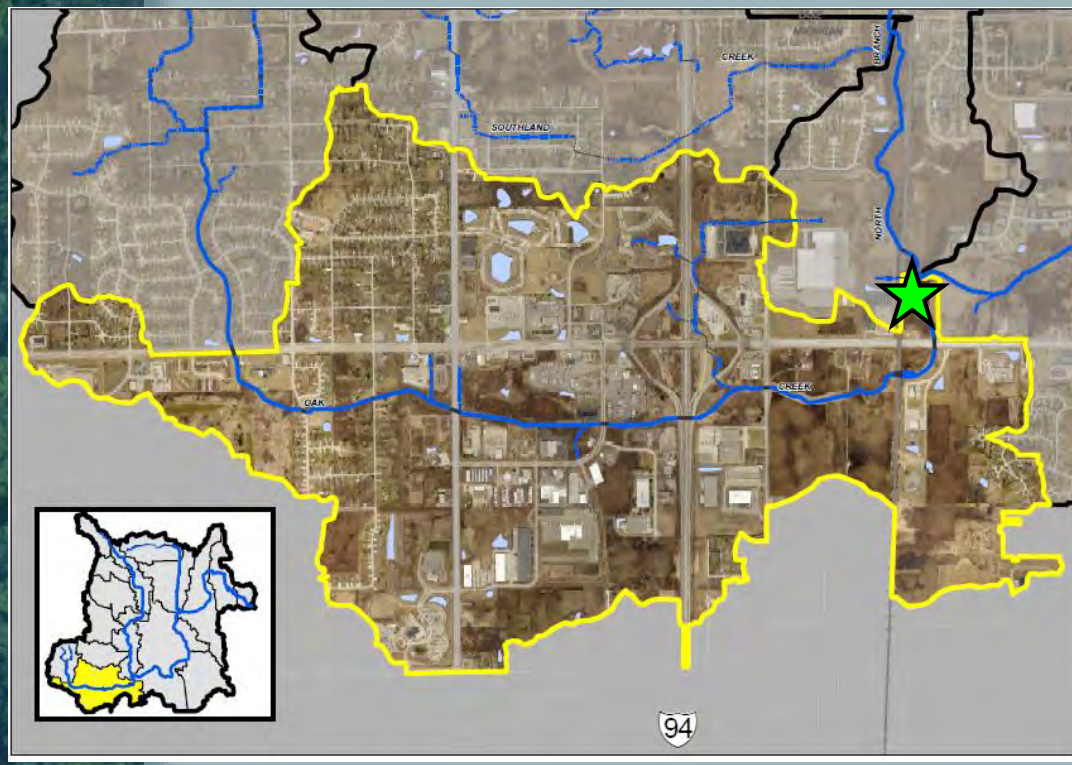
Porous Pavement

Upper Oak Creek Assessment Area

- 2.8 Stream Miles
- Mix of Agricultural, Industrial, and Residential Land Uses
- Areas of Deep Silt Accumulation
- Smaller Stream Widths



Upper Oak Creek Assessment Area



Upper Oak Creek Assessment Area

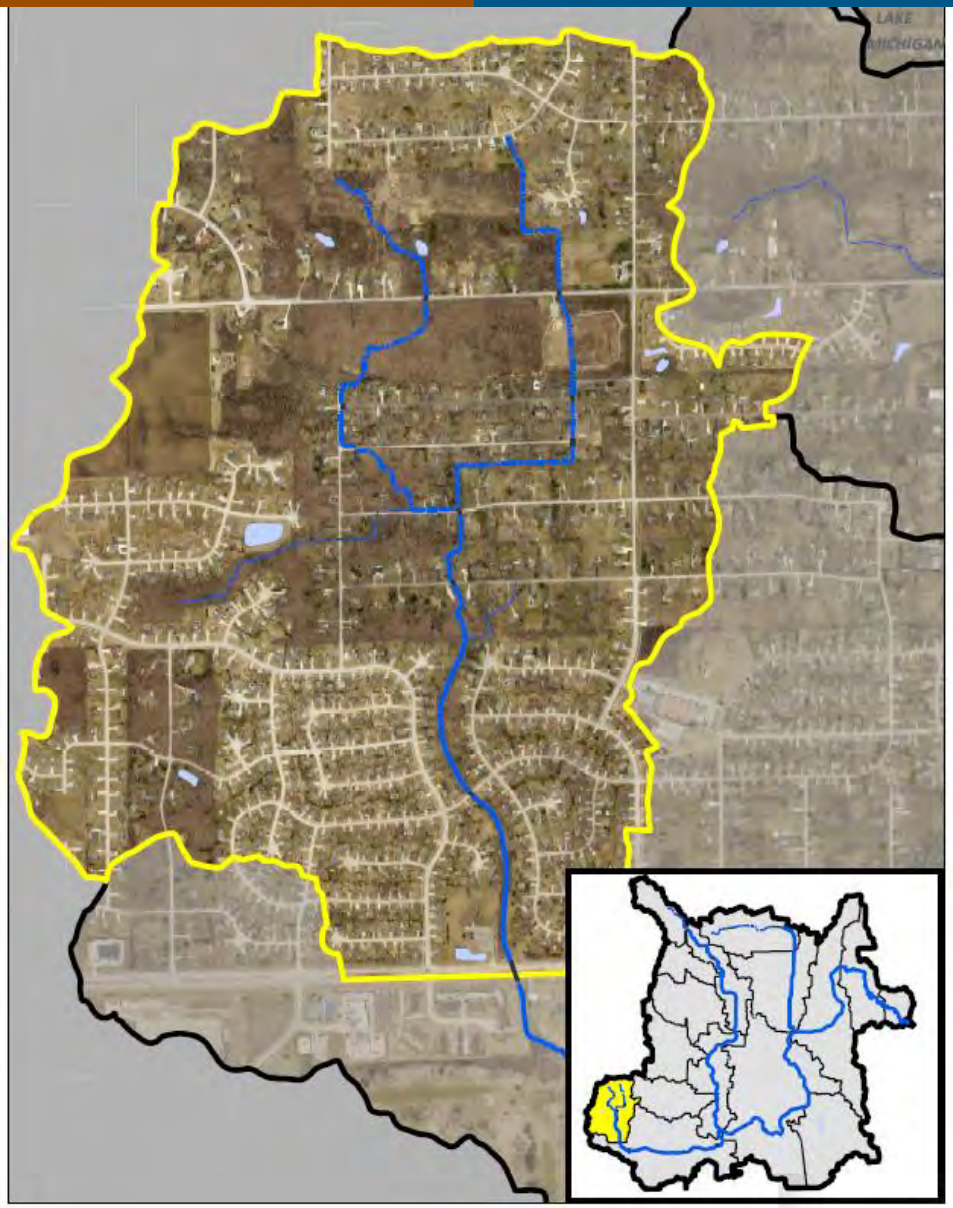
Upper Oak Creek Assessment Area

UPSTREAM END OF CULVERT

DOWNSTREAM END OF CULVERT

Oak Creek Headwaters Assessment Area

- 2.3 River Miles
- Stream Becomes Intermittent at Southland Drive
- Several Drop Structures Create Barrier to Fish Passage



Oak Creek Headwaters Assessment Area

Oak Creek Headwaters Assessment Area

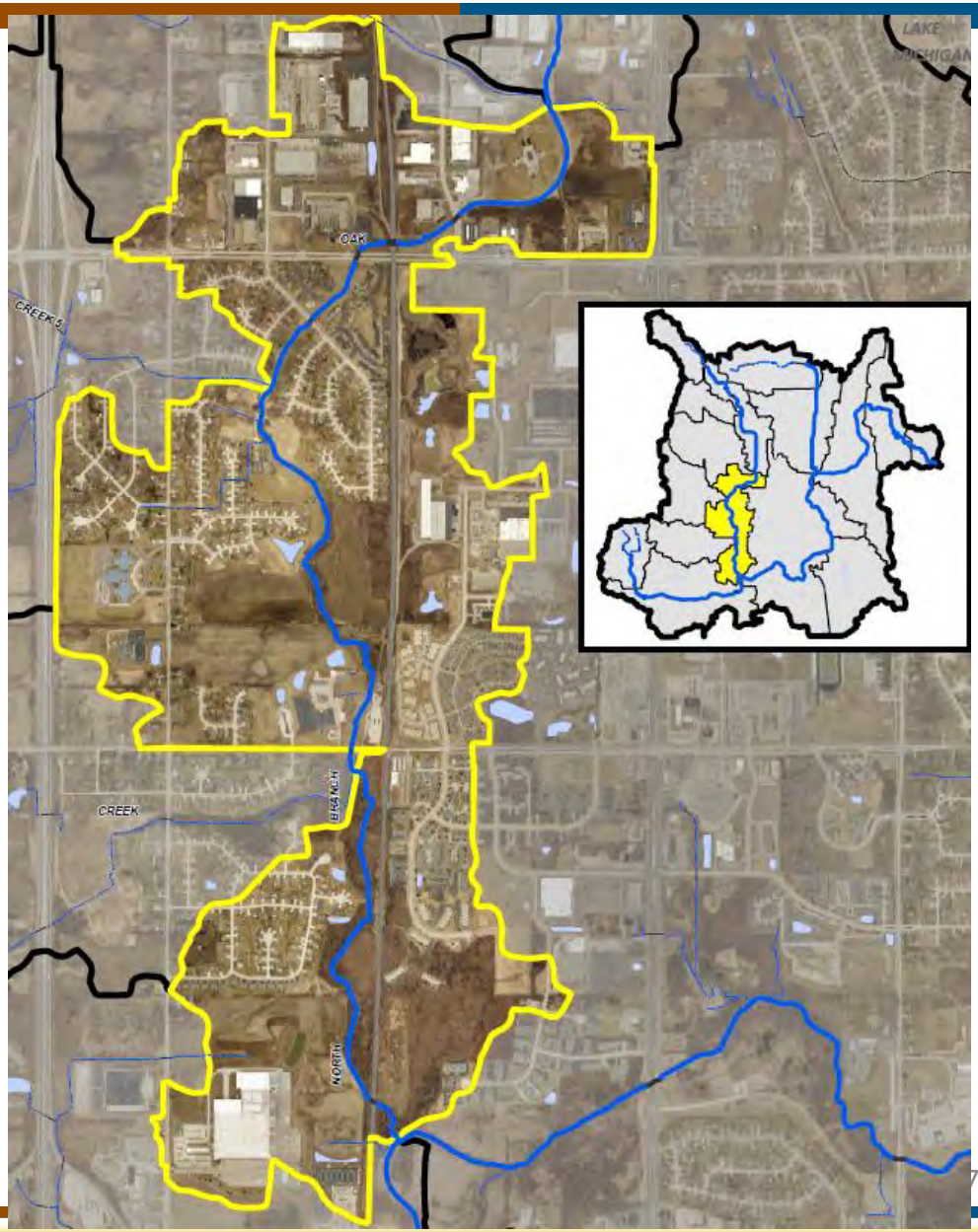
Oak Creek Headwaters Assessment Area

Oak Creek Headwaters Assessment Area

Oak Creek Headwaters

Lower North Branch Oak Creek Assessment Area

- 2.8 River Miles
- Mostly Residential Land Use and Industrial Land Use
- Downstream Areas Have Good Pool/Riffle Structure and Habitat
- Frequent Stretches with Little or No Riparian Buffer Protection
- Increased Channelization As We Moved Upstream



Lower North Branch Oak Creek Assessment Area

Lower North Branch Oak Creek Assessment Area

Lower North Branch Oak Creek Assessment Area

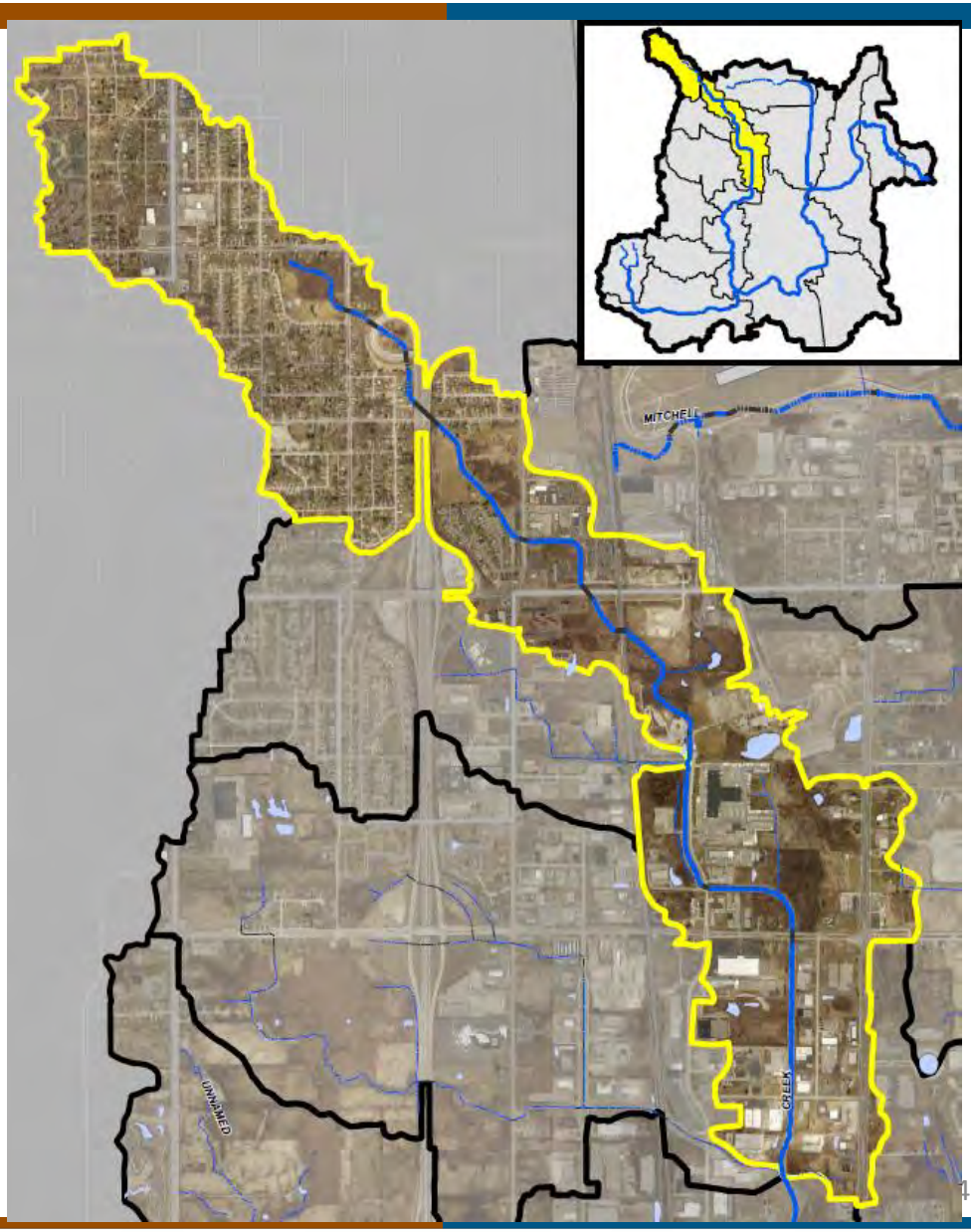
Lower North Branch Oak Creek Assessment Area

Lower North Branch Oak Creek Assessment Area

Lower North Branch Oak Creek Assessment Area

Upper North Branch Oak Creek

- 3.5 River Miles
- Industrial and Residential Land Uses
- Very Channelized
- Lower Stretches with Little Riparian Buffer Protection
- Stagnant Slow Moving Water
- Little Defined Pool/Riffle Structures



Upper North Branch Oak Creek

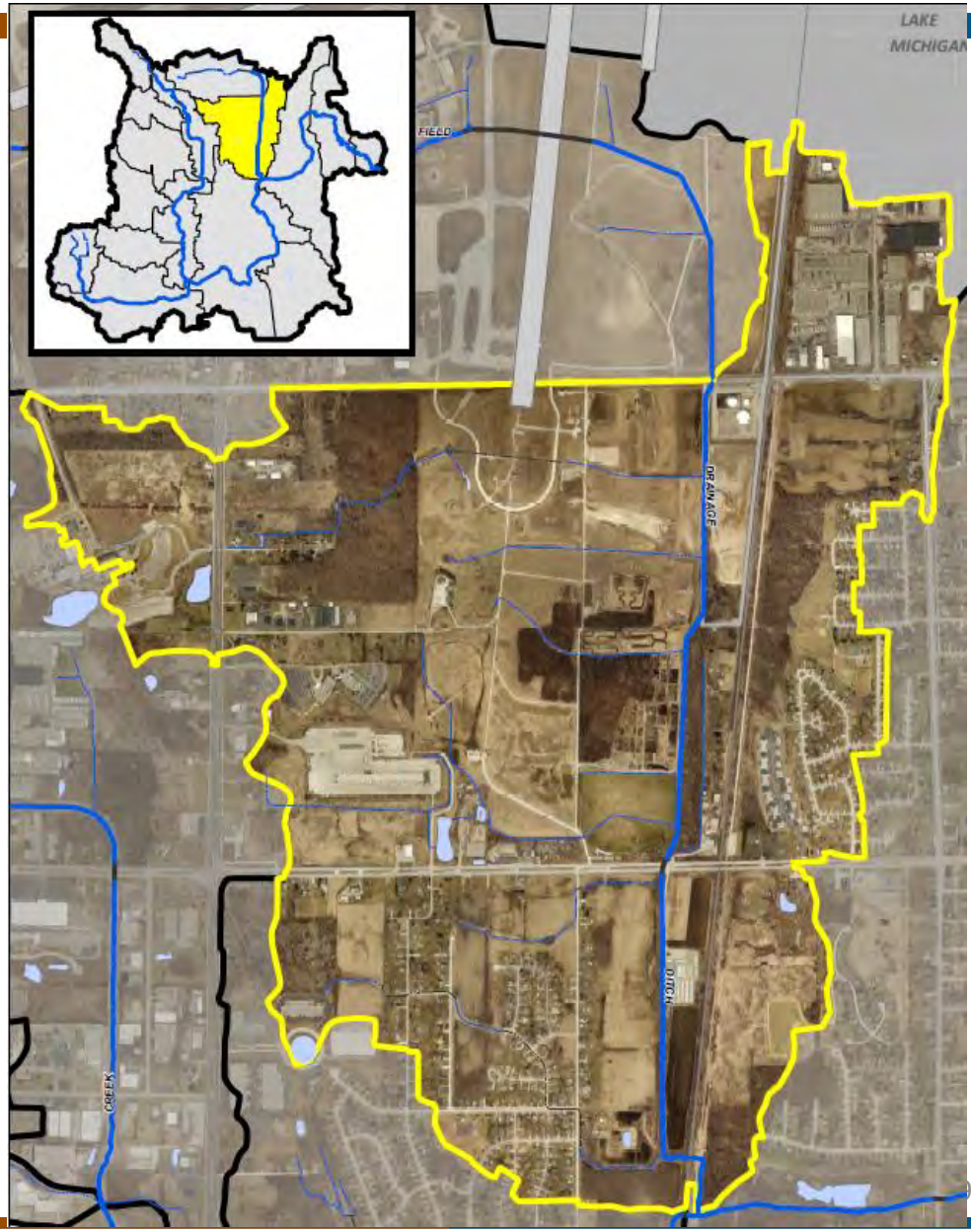
Upper North Branch Oak Creek

Upper North Branch Oak Creek

Upper North Branch Oak Creek

Lower Mitchell Field Drainage Ditch Assessment Area

- 1.8 River Miles
- Very Channelized
- Some Areas of Riparian Buffer Protection with Some Encroachment



Lower Mitchell Field Drainage Ditch Assessment Area

Lower Mitchell Field Drainage Ditch Assessment Area

Lower Mitchell Field Drainage Ditch Assessment Area

Lower Mitchell Field Drainage Ditch Assessment Area

Instream Survey—Summary

- Variety of Stream Conditions
  - Some Relatively "Healthy" Areas
    - Good Pool/Riffle Habitat
    - Good Riparian Buffer Protection in Many Areas
  - Some Very Altered Reaches
    - Channelization and Disconnected Floodplain
    - Some Severe Erosion
    - Riparian Corridor Encroachment
    - Poor Habitat Quality
    - Fish/Aquatic Organism Passage Obstructions
- Many Opportunities for Improvement

Survey Staff

- HUGE THANKS TO STAFF!
  - Megan Beauchaine, Ron Scerbicke, Emma Weiss-Burns, Zijia Li, Julia Orlowski, and Anna Cisar

Next Steps…

- Have Begun to "Crunch" Data Collected
- Characterize the "Health" of Stream Reaches and Assessment Areas
- Identify Potential Projects and Strategies to Improve Stream and Watershed Health