Silver Creek Adaptive Management Pilot Project March, 2014

Bill Hafs - NEW Water





NEW Water

26,059 Ibs Phosphorus (P) discharge per year.

8,710 lbs P reduction required by Total Maximum Daily Load (TMDL) Watershed Plan.

\$223 – \$394 million dollars estimated cost for additional treatment to reduce P to target.

\$25,602 - \$45,235 cost per pound.

8,710 lbs is less than 1% of P entering Green Bay every year from the Lower Fox River Basin.



NEW Water Wastewater Treatment Facility



Total Phosphorus Loadings

Source	Total Phosphorus (Ibs./yr.)	
Natural Background	5,609	Out fall of NEW Water
Agricultural	251,382	into Fox River
Urban (non-regulatory)	15,960	September 2013
Urban Regulated (MS4)	65,829	
Construction Sites	7,296	Martill Shares and
General Permits	2,041	
Industrial WWTFs	114,426	
Municipal WWTFs *	87,160	
Total In-Basin	549,703	1 9 Proventier Contraction
Lake Winnebago	716,954	
Total (In-Basin + Lake Winnebago	<u>1,266,657</u>	

Source of tables: Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay (March 2012)



Economics of Phosphorus (P)



Note: Brown County LWCD \$45 million dollars on all Agriculture BMP's, Staff, and Programs from 1983-2012.



Adaptive Management

- A voluntary option for point source facilities to comply with phosphorus limits in NR 217. (0.1mg/ L)
- Watershed approach where a point source can fund other point or nonpoint sources to control phosphorus.
- A strategy built on partnerships between point source facilities, municipalities, industry, landowners, private and public groups.



The Fox River Contributes 1/3 of All Nutrients to Lake Michigan



Photo credit: Steve Seilo (www.photodynamix.com)



Distinct Gradient of Water Pollution From Fox River to Water North of Little Sturgeon Bay





Priority Sub Watersheds





Phosphorus in the Basin





Sources of Phosphorus in Lower Fox River (LFR) Basin



(Data Source: Total Maximum Daily Load - **TMDL** Watershed Plan for Lower Fox River March 2012)



Sources of Total Suspended Solids in Lower Fox River Basin



(Data Source: Total Maximum Daily Load - **TMDL** Watershed Plan for Lower Fox River March 2012)



Storm water runoff management





Wet Pond at Commercial Site - DNR photo



Concrete pavers in parking lot-DNR photo Grass swales Constructed wetlands Infiltration basins Pervious streets and lots Bio retention



Infiltration Basin- DNR photo



Wastewater Treatment





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NEW Water Wastewater Treatment Facility

Agriculture Runoff



Brown County photos

Lower Fox River Challenges

15 Sub-watersheds in LFR basin.

20 Permitted Industrial WWTFs.

14 Permitted Municipal WWTFs.

42 units of government.

15 WPDES permitted CAFOs.

TMDL phosphorus reduction goal = 59%.

TMDL TSS reduction goal = 55%.



Reduced Cropland & Increased Livestock density.

NR151 and NR243 were developed before Water Quality Standards.





Land Use Trends

Brown County total land area is approximately 350,000 acres.

- YearLand in Farms*1954300,900 acres
- 1972 274,800 acres
- 1978 263,400 acres
- 1983 241,500 acres2008 162,000 acres2012 164,800 acres



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Urban Sprawl



Source: 1991 Brown County Farmland Preservation Plan; USDA National Agricultural Statistical Service



Hay Brown County

USDA National Agricultural Statistical Service

Acres		Crop	Corn
<u>Year</u> Dry Hay	<u>%</u>	<u>Acres</u>	<u>Acres (10 year ave.)</u>
1969 86,100	32%	270,000	1970's - 49,062 acres
1981 74,000	30%	250,000	1980's - 57,860 acres
1995 46,500	26%	180,000	1990's - 57,880 acres
2008 33,600	21%	162,000	2000's - 61,060 acres

2010 - 2014: 67,650 acres



Livestock Concentration 1.54 Acres cropland / cow

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Source: Brown County

Farm Evaluations Spring 2012



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Source: Brown County



Farm Inspection Results

- 80 farms inspected in 2011/2012 to evaluate eligibility and compliance with NR 151 rules.
- Findings: Per 150 acres
- 3 acres grassed waterways needed.
- 3 acres Buffer strips needed.
- 2 acres of concentrated flow channels needed.
- Total 8 acres/150 = 5.33% of cropland acres needs Waterways, Buffers and concentrated flow channels. Source: Brown County

Silver Creek Pilot Project

Stream restoration in 5 years

- Evaluate Adaptive Management on small scale.
- Agreement with Oneida Tribe.
- Partnerships will be key.
- Evaluate phosphorus reduction in cost per pound.
- Is .075 mg/L in Silver Creek attainable



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Silver Creek Pilot Project

Silver Creek Watershed (LF05-8) a sub-watershed of the Lower Duck Creek (HUC12 040302040106



Watershed Area	4799.8 acres (7.50 mi2)		
MS4	346 acres (7.2% of watershed)		
Land cover	Agricultural	2296.4 acres (47.8%)	
2012 Cropland Data Layer	Forest	585.1 acres (12.2%)	
USDA NRCS	Grassland	12.3 acres (0.3%)	
	Pasture	1065 acres (22.2%)	
	Urban	503.9 acres (10.5%)	
	Water	64.5 acres (1.3%)	
	Wetlands	272.6 acres (5.7%)	
Stream Length	14.93 miles		
TMDL Phosphorus	3391 lbs . (0.71 lbs. per acre)		
Baseline Load			





Silver Creek Pilot Project – stream sediment delivery in Brown County





Silver Creek Pilot Project – Partnerships

Water

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Silver Creek Pilot Project – Segment of Silver Creek near Highway 172





Silver Creek Pilot Project - Goals



Silver Creek Pilot Project

- **2013 2018**
- USGS Monitoring Station.
- Technical Advisory Committee.
- Inventory of Silver Creek.
- Implementation.
- Project evaluation.





Silver Creek Pilot Project

Metropolitan Sewerage Distr

- Consultant as a general contractor.
- Coordinate multiple agencies, governments and conservation groups.
- 100% implementation of comprehensive conservation farm plans on all cropland.
- Biological assessment of Silver Creek before/ after implementation.
- Run Snap Plus on all fields before /after.

Pilot Project Goals / Questions

- Soil tests on 2.5 acre grids before/after.
- Collect and analyze 590 nutrient management data on all fields.
- Wetland restorations, buffer strips.
- Lower soil Phosphorus. 30 ppm.
- What % installation can we achieve?
- Web based GIS shared by partners.



Silver Creek Pilot Project

- How much land will need to be taken out of production?
- What is economic cost to Agriculture?
- Sustainable <u>permanent</u> decisions.
- Spend the least amount of dollars to accomplish the greatest water quality.
 Benefit our rate payers, community water quality.
- Build watershed partnerships: Industry, AG, Storm water, Wastewater.

Stream Before Buffer Strip Installation



Source: Brown County



Stream After Buffer Strip Installation



Source: Brown County



Before Buffer Strip Installation



Source: Brown County



After Buffer Strip Installation



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Source: Brown County

Before Buffer Strip Installation



Source: Brown County



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After Buffer Strip Installation



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Source: Brown County

Buffer Strip installation



Note: sediment and nutrients trapped in Buffer.



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Future Steps

- Fox P- Trade initiative & Farm Network Demonstration Project (Great Lakes Commission, USDA, USGS, County Governments).
- Credit for P and TSS contributions above the Lower Fox River Watershed Basin?
- Credit that will be allocated for stream legacy P and TSS?
- Seek funding partners for larger watershed implementation based upon Pilot Project.



Can We Protect Lake Michigan From Green Bay?







Questions?







Thank You

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