CMAP

Chicago Metropolitan
Agency for Planning

WATERSHED PLANNING AND WATER QUALITY MODELING

BLACKBERRY CREEK WATERSHED

Megan Elberts, E.I., CFM

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Why?

- EPA 9 Minimum Elements
  - Estimate pollutant reduction loads expected from implementation of plan recommendations

- Additional/Optional Regional Criterion
  - Set target pollutant-load reductions for impaired waters taking into account both point and nonpoint source pollution

How Do We Start?

Evaluate Current Water Quality Conditions

Methods

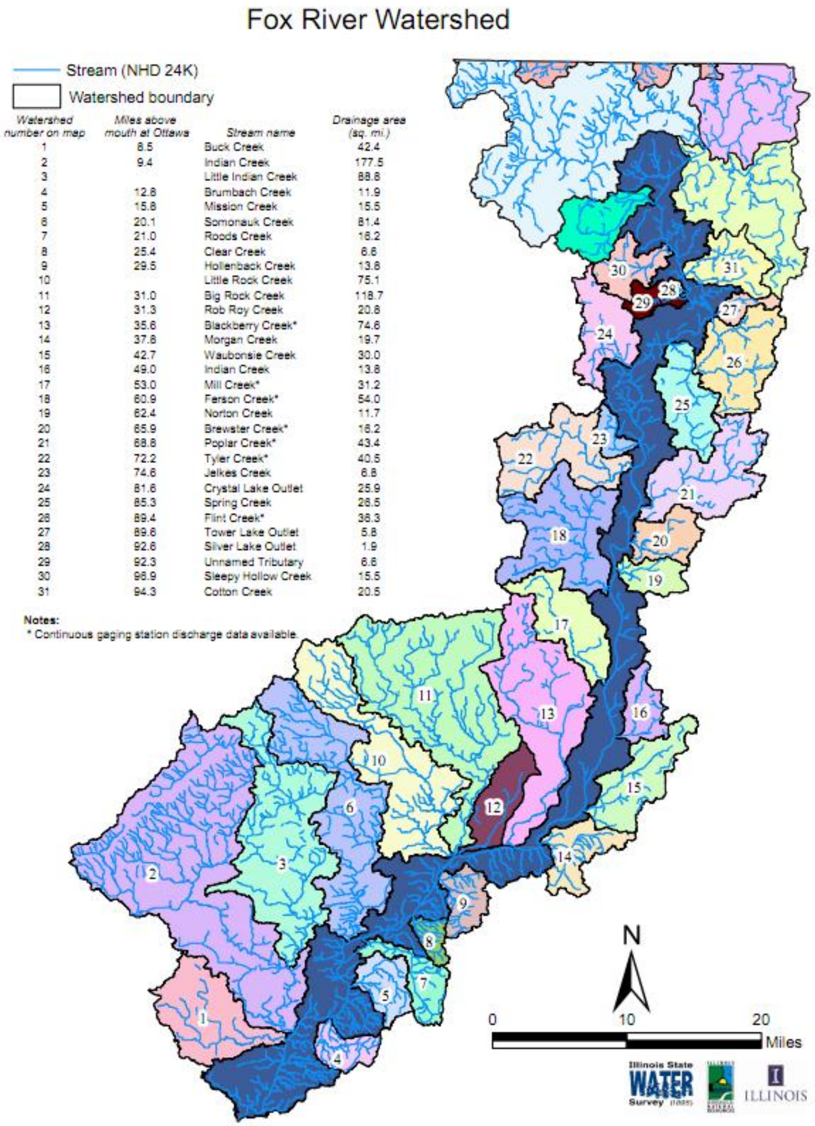
- Currently considering a combination of tools:
  - Hydrological Simulation Program - Fortran (HSPF)
  - Spreadsheet Tool for Estimating Pollutant Load (STEPL)
  - Long Term Hydrologic Impact Assessment Tool (L-THIA)

What will we be modeling?

- Fecal Coliform
- Total Nitrogen
- Total Phosphorus
- Total Suspended Sediment/Solids

HSPF Model

- ☐ Fox River Study Group
- ☐ Illinois State Water Survey
- ☐ Simulates watershed hydrology and water quality



Fox River Watershed

Stream (NHD 24K)

Watershed boundary

Watershed number on map	Miles above mouth at Ottawa	Stream name	Drainage area (sq. mi.)
1	8.5	Buck Creek	42.4
2	9.4	Indian Creek	177.5
3		Little Indian Creek	88.8
4	12.8	Brumbach Creek	11.9
5	15.8	Mission Creek	15.5
6	20.1	Somonauk Creek	81.4
7	21.0	Roods Creek	16.2
8	25.4	Clear Creek	6.6
9	29.5	Hollenback Creek	13.8
10		Little Rock Creek	75.1
11	31.0	Big Rock Creek	118.7
12	31.3	Rob Roy Creek	20.8
13	35.6	Blackberry Creek*	74.6
14	37.8	Morgan Creek	19.7
15	42.7	Waubonsie Creek	30.0
16	49.0	Indian Creek	13.8
17	53.0	Mill Creek*	31.2
18	60.9	Ferson Creek*	54.0
19	62.4	Norton Creek	11.7
20	65.9	Brewster Creek*	16.2
21	68.8	Poplar Creek*	43.4
22	72.2	Tyler Creek*	40.5
23	74.6	Jelkes Creek	6.8
24	81.6	Crystal Lake Outlet	25.9
25	85.3	Spring Creek	26.5
26	89.4	Flint Creek*	38.3
27	89.6	Tower Lake Outlet	5.8
28	92.6	Silver Lake Outlet	1.9
29	92.3	Unnamed Tributary	6.6
30	96.9	Sleepy Hollow Creek	15.5
31	94.3	Cotton Creek	20.5

Notes:
* Continuous gaging station discharge data available.

STEPL

- Annual nutrient loading is simulated based on:
  - Runoff volume
  - Pollutant concentrations
    - Land use distribution
    - Management practices
- The annual sediment load is estimated based on:
  - Universal Soil Loss Equation (USLE)
  - Sediment delivery ratio

L-THIA

- Purpose of the model:
  - Estimate water quality impacts from land use change

- Uses land use and soil data to estimate:
  - Runoff
  - Nonpoint source pollution

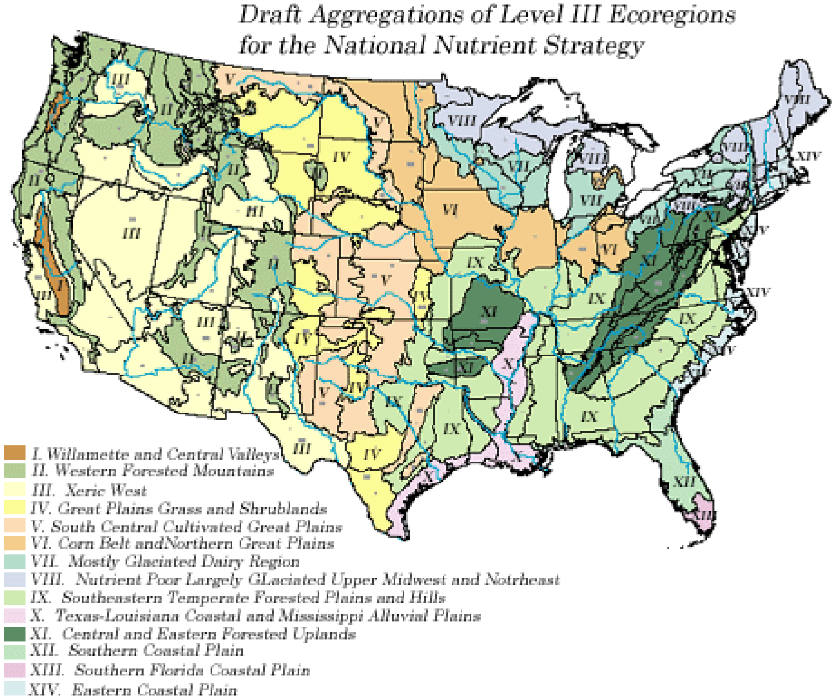
- Does model Fecal Coliform

Regional Criterion # 2

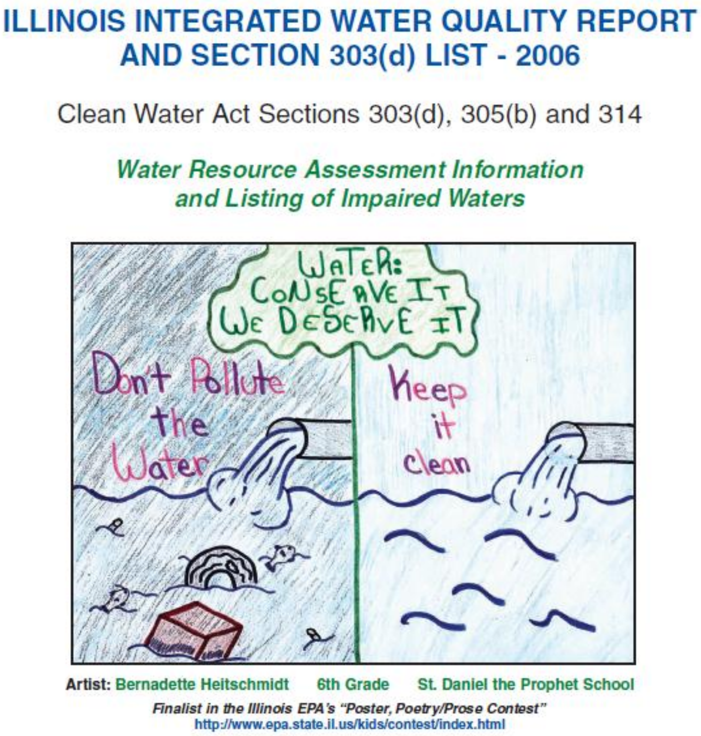
Set target pollutant-load reductions for impaired waters taking into account both point and nonpoint source pollution

US EPA Ecoregion Nutrient Recommendations

Nutrient Parameter	Ecoregion Recommendation (mg/L)
Total Phosphorus	0.0725
Total Nitrogen	2.461


Draft Aggregations of Level III Ecoregions for the National Nutrient Strategy

Illinois EPA 2006



ILLINOIS INTEGRATED WATER QUALITY REPORT
AND SECTION 303(d) LIST - 2006

Clean Water Act Sections 303(d), 305(b) and 314

Water Resource Assessment Information
and Listing of Impaired Waters

Artist: Bernadette Heitschmidt 6th Grade St. Daniel the Prophet School

Finalist in the Illinois EPA's "Poster, Poetry/Prose Contest"
http://www.epa.state.il.us/kids/contest/index.html

Guidelines for Identifying Potential Causes of Impairment of Aquatic Life Use in Illinois Streams

Parameter	**Statistical Guidelines (mg/L)**
Total Phosphorus	0.61
Total Nitrogen	7.8
Total Suspended Solids	116

Illinois Water Quality Standards

Parameter	**General Use Standard**	**Calculation**
Fecal Coliform	200 (count/100 mL)	Geometric mean based on a minimum of 5 samples taken over not more than a 30-day period.
Fecal Coliform	400 (count/100 mL)	Not to be exceeded by more than 10% of samples in any 30-day period.

Illinois EPA 2010

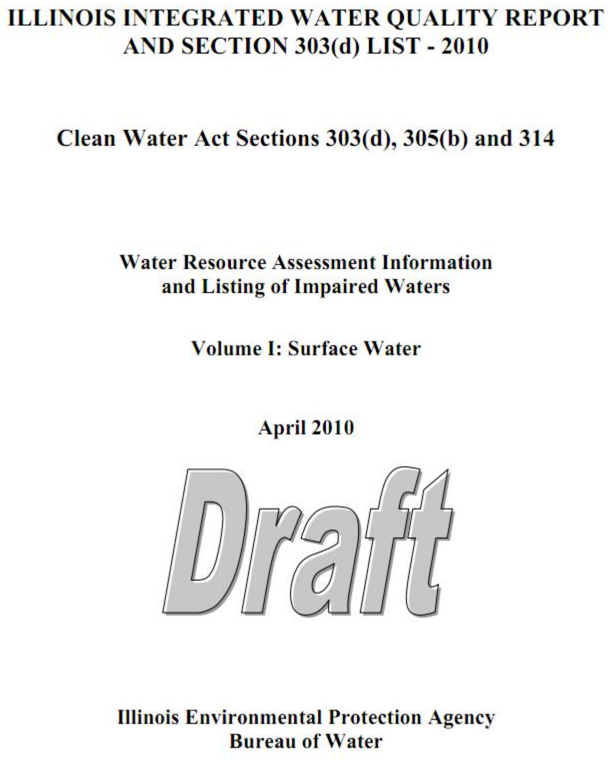
Guidelines for Identifying Potential Causes of Impairment of Aquatic Life Use in Illinois Streams

Parameter	**Non-Standards Based Criteria (mg/L)**
Total Phosphorous	0.61
Total Suspended Solids	116

Illinois Acute and Chronic General Use Water Quality Standards

Parameter	**Acute Standard** (mg/L)	**Chronic Standard** (mg/L)
Total Ammonia Nitrogen	15.0	37.5

*Fecal Coliform is the same standard as in 2006



ILLINOIS INTEGRATED WATER QUALITY REPORT AND SECTION 303(d) LIST - 2010

Clean Water Act Sections 303(d), 305(b) and 314

Water Resource Assessment Information and Listing of Impaired Waters

Volume I: Surface Water

April 2010

Draft

Illinois Environmental Protection Agency
Bureau of Water

Summary Table

Source	**Total Nitrogen Guidelines/ Recommendations (mg/L)**	**Total Phosphorus Guidelines/ Recommendations (mg/L)**	**Fecal Coliform Standards (cfu/100 mL)**	**Total Suspended Solids Guidelines (mg/L)**
US EPA	2.461[1]	0.0725[1]	N/A	N/A
Illinois EPA	7.8[2]	0.61[2]	200-400[3]	116[2]
Lower DuPage Watershed Draft	3.2[1]	0.0763[1]	200[3]	75[4]
Hickory Creek Watershed Draft	2.461[1]	0.61[2]	400[3]	116[2]
CMAP Recommendations	**2.46[1]**	**0.61[2]**	**400[3]**	**116[2]**

[1] US EPA Ecoregion Recommendation
[2] Illinois EPA Guideline
[3] Illinois EPA Standard
[4] US EPA Fisheries Recommendation

Chicago Metropolitan
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What does this Mean?

BLACKBERRY CREEK DRAFT

Load Reduction Required from Current Conditions		
Parameter	**HSPF % Reduction**	**L-THIA % Reduction**
Total Nitrogen (lb./year)	95 %	20%
Total Phosphorus (lb./year)	99%	30%
Total Sediment (lb./year)	3%	0%
Fecal Coliform (10^6 colonies/year)	90%	15%

How will we meet reduction goals?

IMPLEMENT THE WATERSHED PLAN!

EPA Criterion # 2

Estimate pollutant reduction loads expected from implementation of plan recommendations

For More Information…

- HSPF Model

http://ilrdss.sws.uiuc.edu/fox/

- STEPL Model

http://it.tetratech-ffx.com/steplweb/

- L-THIA

https://engineering.purdue.edu/~lthia/

- USEPA Ecoregion Nutrient Criteria

http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/ecoregions_index.cfm

- Illinois EPA Water Quality Standards

http://www.epa.state.il.us/water/tmdl/303d-list.html

Questions or Comments?

Megan Elberts, E.I., CFM

melberts@cmap.illinois.gov

312-386-8794