## Monitoring Efforts in Wonder Lake and the Upper Nippersink Creek Watershed: A pre-dredging update

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### Nippersink Creek Watershed

202 square mile watershed, draining to the Fox River, with Wonder Lake, an 830 acre impoundment





Nippersink Creek is listed by IEPA as "impaired" for fecal coliform from an unknown source

#### Watershed Plan Protection Objectives:



www.nippersink.org

#### **Objective 17:**

Provide multiple opportunities for assessing measurable watershed plan implementation milestones, such as whether pollutant loading reductions are being achieved over time; evaluating the effectiveness of proactive watershed protection measures; and whether social behavior has changed because of the implementation of the plan.



#### General Watershed Plan Recommendation:



www.nippersink.org

GWR-1

Implement an expanded water quality and biological monitoring program throughout the Nippersink Creek Watershed.

#### Water Quality of Nippersink Creek and Wonder Lake Study (2004)



In cooperation with the McHenry County Soil and Water Conservation District

Water Quality of Nippersink Creek and Wonder Lake, McHenry County, Illinois, 1994-2001



Scientific Investigations Report 2004-5085 U.S. Department of the Interior U.S. Geological Survey

- Watershed planning efforts over a 15 year period reduced the annual sediment load from Nippersink Creek to Wonder Lake from 33,000 to 12,000 cubic yards per year.
- Lake sediment core samples show no elevated levels of regulated contaminants.

#### **Existing Water Quality Monitoring Sites**



## Expanded Wonder Lake Monitoring





### Ecolipalooza <sup>TM</sup>



#### Wonder Lake Dredging Project

A \$5.9 million Special Service Area (SSA) funded project to remove up to 1 million cubic yards of accumulated sediment.



### **USGS Monitoring/Synoptic Surveys**

- (2009-Present) Monitoring of discharge and suspended sediment in Nippersink Creek above Wonder Lake
- (2010) Pre-dredging synoptic water quality, water velocity, and bathymetric survey of Wonder Lake
  - Targeted August 2010 based on past water quality data
- (2015?) Post-dredging synoptic survey





## **Survey Missions**

#### Wonder Lake (Illinois) August 2010

#### EcoMapper Data Sets\*

- WL\_South\_EM\_QWDataPoints
- WL\_Middle\_EM\_QWDataPoints
- WL\_North\_EM\_QWDataPoints



Wonder Lake (Illinois) August 2010

Sample Hour

"Surface Water (Approx. 0.5 ft depth)

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"Surface Water (Approx. 0.5 ft depth)

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### Bathymetry

#### Tributaries Sampled Aug. 13, 2010





Water Velocity











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### Water Quality Profiles

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## Water Quality Profiles

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### Surface Water Quality Distributions (North Basin) Boat Wake

Wonder Lake (Illinois) August 2010

Water Temperature\* (deg. C)

26.42 - 26.53
26.53 - 26.63
26.63 - 26.74
26.74 - 26.84
26.84 - 26.95
26.95 - 27.06
27.06 - 27.16
27.16 - 27.27
27.27 - 27.37
27.37 - 27.48
27.48 - 27.59
27.59 - 27.69
27.69 - 27.8
27.8 - 27.9
27.9 - 28.01
28.01 - 28.12
28.12 - 28.22
28.22 - 28.33
28.33 - 28.43
28.43 - 28.54

\*Surface Water (Approx. 0.5 It depth)

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#### Wonder Lake (Illinois) August 2010

Specific Conductance\* (mS/cm)

	0.552 - 0.555
	0.555 - 0.559
1	0.559-0.562
	0.562 - 0.565
	0.565-0.569
	0.569-0.572
	0.572 - 0.575
	0.575-0.578
	0.578-0.582
	0.582 - 0.585
	0.585 - 0.588
	0.588 - 0.592
	0.592 - 0.595
	0.595 - 0.598
	0.598 - 0.602
4	0.602 - 0.605
4	0.605 - 0.608
	0.608 - 0.611
	0.611 - 0.615
	0.615 - 0.618

"Surface Water (Approx. 0.5 ft depth)

han Male Sathan Davidus During Survey 400.173 (42-008) The later fast adjust to revision



# Surface Water Quality Distributions (North Basin)

pH\*

Wonder Lake (Illinois) August 2010

Dissolved Oxygen\* (mg/L)



\*Surface Water (Approx. 0.5 ft depth)

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and they adopt to revise

Wonder Lake (Illinois) August 2010

8.37 - 8.4
8.4 - 8.42
8.42 - 8.45
8.45 - 8.48
8.48 - 8.51
8.51 - 8.54
8.54 - 8.56
8.58 - 8.59
8.59 - 8.62
8.62 - 8.64
8.64 - 8.67
8.67 - 8.7
8.7 - 8.73
8.73 - 8.75
8.75 - 8.78
8.78 - 8.81
8.81 - 8.84
8.84 - 8.87
8.87 - 8.89
8.89 - 8.92

\*Surface Water (Approx. 0.5 ft depth)

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# Surface Water Quality Distributions (North Basin)

Wonder Lake (Illinois) August 2010

Chlorophyll A\* (ug/L)



\*Surface Water (Approx. 0.5 ft depth) Estimated using YSI 6025 Chlorophyll sensor post-calibrated using Chlorophyll A lab sample

New York: Surface Elevators During Survey, ACC 17 & HOUTER Thereaster bling adapts to reveale



# Surface Water Quality Distributions (Middle Basin)

Wonder Lake (Illinois) August 2010

Water Temperature\* (deg. C)



\*Surface Water (Approx. 0.5 ft depth)

ner Surban Dienstein During Survey A02.17 ± H24528 Thurbanist data subject to reveale



Wonder Lake (Illinois) August 2010

Specific Conductance\* (mS/cm)

0.567 - 0.58
0.58 - 0.589
0.589 - 0.595
0.595 - 0.599
0.599 - 0.602
0.602 - 0.603
0.603 - 0.605
0.605 - 0.605
0.605 - 0.607
0.607 - 0.608
0.608 - 0.611
0.611 - 0.615
0.615 - 0.621
0.621 - 0.63
0.63 - 0.643
0.643 - 0.662
0.662 - 0.691
0.691 - 0.735
0.735 - 0.799
0.799 - 0.895

\*Surface Water (Approx. 0.5 ft depth)

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# Surface Water Quality Distributions (Middle Basin)

pH\*

Wonder Lake (Illinois) August 2010

Dissolved Oxygen\* (mg/L)



\*Surface Water (Approx. 0.5 ft depth)

e Surface Disaton During Survey AGLIT & HOUSE Transmise and adaptive investor



Wonder Lake (Illinois) August 2010

7.83 - 7.9
7.9 - 7.96
7.96 - 8.03
8.03 - 8.09
8.09 - 8.16
8.16 - 8.22
8.22 - 8.29
8.29 - 8.35
8.35 - 8.42
8.42 - 8.48
8.48 - 8.54
8.54 - 8.61
8.61 - 8.68
8.68 - 8.74
8.74 - 8.8
8.8 - 8.87
8.87 - 8.94
8.94 - 9
9 - 9.07
9.07 - 9.13

"Surface Water (Approx. 0.5 ft depth)

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# Surface Water Quality Distributions (Middle Basin)

Wonder Lake (Illinois) August 2010

Chlorophyll A\* (ug/L)



\*Surface Water (Approx. 0.5 ft depth) Estimated using YSi 6025 Chlorophyll sensor post-calibrated using Chlorophyll A lab sample

New York Surface Devices During Survey ALL 17 & HOUSE Thermody and adaptive review



Wonder Lake (Illinois) August 2010

Blue-Green Algae\* (cells/mL)

460 - 7,772
7,772 - 13,120
13,120 - 17,040
17,040 - 19,900
19,900 - 21,990
21,990 - 23,530
23,530 - 24,650
24,650 - 25,470
25,470 - 26,070
26,070 - 26,510
26,510 - 26,830
26,830 - 27,070
27.070 - 27.390
27,390 - 27,830
27,830 - 28,430
28,430 - 29,250
29,250 - 30,370
30,370 - 31,900
31,900 - 34,000
34,000 - 36,860

"Surface Water (Approx. 0.5 ft depth) Estimated using YSI 6131 Phydocyanin sensor calibrated using DI water (zeropoint calibration for relative concentrations)

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#### Surface Water Quality Distributions (South Basin)

(mS/cm)



\*Surface Water (Approx. 0.5 ft depth)

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#### Surface Water Quality Distributions (South Basin)



(mg/L)18 - 18.3

# Surface Water Quality Distributions (South Basin)

Wonder Lake (Illinois) August 2010

Chlorophyll A\* (ug/L)



\*Surface Water (Approx. 0.5 ft depth) Estimated using YSI 6025 Chiorophyll sensor post-calibrated using Chiorophyll A lab sample

Mean Yolan Surface Davidson During Survey Ald. 17 & HOVELEY Thereased a bits adapted to revealer



Wonder Lake (Illinois) August 2010

Blue-Green Algae\*

(cells/mL)

10,790 - 13,410
13,410 - 15,410
15,410 - 16,950
16,950 - 18,140
18,140 - 19,040
19.040 - 19.740
19,740 - 20,270
20,270 - 20,680
20,680 - 20,990
20,990 - 21,230
21,230 - 21,480
21,480 - 21,790
21,790 - 22,200
22,200 - 22,730
22,730 - 23,430
23,430 - 24,330
24,330 - 25,520
25,520 - 27,060
27,060 - 29,060
29,060 - 31,680

"Surface Water (Approx. 0.5 ft depth) Estimated using YSI 6131 Phycocyanin sensor calibrated using DI water (zeropoint calibration for relative concentrations)

New York Surface Similar During Survey ALL 17 1 H2452 The second data subject to revision





### The Next Step

- Compare and contrast USGS synoptic data with Ecolipalooza<sup>™</sup>, IEPA, VLMP, and MCDH data to better understand the system
- Compare synoptic data with long-term monitoring data
  - Do distributions explain variations seen between sampling sites?
- Assess data gaps and fill if necessary



#### Questions?

#### Contact Information:

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#### Randy Stowe

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### **Survey Missions**

South



Mid

North