

2010 Lake Maxinkuckee *E. coli* Sampling Report
Lake Maxinkuckee Environmental Council
Marshal County, Indiana

1.0 Introduction

JFNew was contracted by the Lake Maxinkuckee Environmental Council (LMEC) to collect *E. coli* samples during one storm flow and one base flow event at nine sampling sites within the Lake Maxinkuckee watershed. Storm flow conditions were defined as the flow resulting from a rain event that was equal to or greater than 0.75" of precipitation. Flow velocity data was not taken during any of the sampling events due to inadequate flow conditions present at the time of sampling.

2.0 Sampling

Sampling during one storm flow and one base flow event occurred at six sites within the Kline Ditch subwatershed and three sites within the Curtis Ditch subwatershed as determined by the LMEC within the Lake Maxinkuckee watershed. Sampling within the Kline Ditch drainage included: 1) 20 B Rd crossing; 2) Kline Wetland outfall; 3) Eastside of Kline Wetland; 4) North-end Kline wetland; 5) Channel adjacent to Marina; and 6) at the Northwest side Kline wetland (Figure 1). Sampling within the Curtis drainage included: 7) Queen Rd crossing; 8) West outlet Curtis wetland; and 9) the East Shore Dr. near outlet to Lake Maxinkuckee (Figure 2). Storm flow sampling at the Kline drainage occurred after a 0.81 inch rainfall event on 5/18/2010. Storm flow sampling at the Curtis drainage occurred after a 0.60 inch rainfall event on 9/22/2010. Base flow sampling occurred at all sites on 6/1/2010.

E. coli samples were collected at each site first using a glass beaker to extract a water sample from the sampling area. The water sample was then poured into a laboratory-prepared 100 ml sampling bottle. After each sampling site, the glass beaker was triple rinsed with distilled water to clean the beaker before the next sample was taken. All sampling bottles were placed into a cooler with ice to preserve the sample until the samples reached the lab. Water samples were taken immediately after sampling to Sherry Laboratories in Warsaw IN, for analysis.





3.0 Results

Storm flow sampling in Kline Drainage

E. coli concentrations sampled during storm flow at Site 3 and Site 4 within the Kline drainage exceeded Indiana's Administrative Code (IAC) state standard for recreational waterbodies (235 col/100 ml) while all other sites sampled fell below the state standard (Table 1). Site 4 had the highest *E. coli* concentrations within Kline Ditch at 3,650 col/100ml followed by Site 3 which was just above the state standard at 300 col/100ml. Sites 1, 2, 5, and 6 all had *E. coli* concentration below the state standard.

Storm flow sampling in Curtis Drainage

E. coli concentrations sampled during storm flow at Site 7 and Site 9 within the Curtis drainage exceeded Indiana's Administrative Code (IAC) state standard for recreational waterbodies (235 col/100 ml) while Site 8 fell below the state standard (Table 1). Site 9 had the highest *E. coli* concentrations within Curtis Ditch at 930 col/100ml followed by Site 7 at 480 col/100ml.

Table 1. Results of storm flow and base flow *E. coli* sampling (all sites).

Site	Location	Sampling Event	Sampling Date	<i>E. coli</i> concentration (col/100mL)
1	20 B Rd, Kline Ditch	Storm	5/18/2010	160
		Base	6/1/2010	480
2	Kline wetland outfall	Storm	5/18/2010	150
		Base	6/1/2010	150
3	Eastside of Kline wetland	Storm	5/18/2010	300
		Base	6/1/2010	70
4	North end of Kline wetland	Storm	5/18/2010	3,650
		Base	6/1/2010	1,300
5	Channel adjacent to Marina	Storm	5/18/2010	120
		Base	6/1/2010	<10
6	Northwest side of Kline wetland	Storm	5/18/2010	90
		Base	6/1/2010	40
7	Queen Rd, Curtis Ditch	Storm	9/22/2010	480
		Base	6/1/2010	1,050
8	West outlet Curtis wetland	Storm	2/22/2010	40
		Base	6/1/2010	120
9	East Shore Dr, Curtis Ditch	Storm	9/22/2010	930
		Base	6/1/2010	860

Base flow sampling in Kline Drainage

All sites sampled during base flow conditions showed a decrease in *E. coli* concentrations except for Site 1, which increased from 160 col/100 ml to 480 col/100 ml (Table 1). Site 4 had the highest *E. coli* concentration during base flow sampling at 1,300 col/100 ml followed by Site 1 (reported above) both of which exceeded the state standard. Site 2, 3, 5, and 6 sampled during base flow were within the Indiana state *E. coli* standard for recreational waterbodies (Table 1).

Base flow sampling in Curtis Drainage

Site 7 and Site 8 both had higher *E. coli* concentrations during base flow than they did during storm flow. Site 9 had lower base flow than storm flow *E. coli* concentrations. Site 7 had the highest *E. coli* concentration during base flow sampling at 1,050 col/100 ml followed by Site 9 (reported above), both of which exceed the state standard. Site 8 sampled during base flow was within the Indiana state *E. coli* standard for recreational waterbodies (Table 1).

4.0 Summary

Results of the *E. coli* sampling indicate Sites 4, 7 and 9 exceeded the Indiana state standard for *E. coli* during both base and storm flow sampling. Special attention should be given to Site 9 because *E. coli* concentrations exceeded state standards in both flow scenarios and the site is at the point of discharge of Curtis ditch into Lake Maxinkuckee. Follow-up sampling of the immediate area out in the lake from the inlet at Site 9 should be considered during a storm flow event and during base flow. The *E. coli* concentration at the Kline wetland outfall (Site 2) were lower than the *E. coli* concentrations observed in 2009 and never exceeded state standards in 2010. The immediate area around Site 4 within the Kline wetland could be an area of concern as *E. coli* concentrations sampled during both base and storm flow exceeded state standards and was the highest observed for all sites.



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Analytical Report

(continuous)

WO#: 10051782

Date Reported: 5/20/2010

CLIENT: J. F. New Associates
Project: Lake Max. 0904065.01

Lab Order: 10051782

Lab ID: 10051782-001

Collection Date: 5/18/2010

Client Sample ID: Site 1

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	160	10.0		MPN/100ml	1	5/18/2010 3:30:00 PM

Lab ID: 10051782-002

Collection Date: 5/18/2010

Client Sample ID: Site 2

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	150	10.0		MPN/100ml	1	5/18/2010 3:30:00 PM

Lab ID: 10051782-003

Collection Date: 5/18/2010

Client Sample ID: Site 3

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	300	10.0		MPN/100ml	1	5/18/2010 3:30:00 PM

Qualifiers:
 */X Value exceeds Maximum Contaminant Level
 E Value above quantitation range
 M Manual Integration used to determine area response
 PL Permit Limit
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 ND Not Detected at the Reporting Limit
 RL Reporting Detection Limit



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Analytical Report

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WO#: 10051782

Date Reported: 5/20/2010

CLIENT: J. F. New Associates
Project: Lake Max. 0904065.01

Lab Order: 10051782

Lab ID: 10051782-004

Collection Date: 5/18/2010

Client Sample ID: Site 4

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B	Analyst: KRK	
E. Coli Bacteria	3,650	10.0		MPN/100ml	1	5/18/2010 3:30:00 PM

Lab ID: 10051782-005

Collection Date: 5/18/2010

Client Sample ID: Site 5

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B	Analyst: KRK	
E. Coli Bacteria	120	10.0		MPN/100ml	1	5/18/2010 3:30:00 PM

Lab ID: 10051782-006

Collection Date: 5/18/2010

Client Sample ID: Site 6

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B	Analyst: KRK	
E. Coli Bacteria	90.0	10.0		MPN/100ml	1	5/18/2010 3:30:00 PM

Qualifiers:
 *X Value exceeds Maximum Contaminant Level
 E Value above quantitation range
 M Manual Integration used to determine area response
 PL Permit Limit
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 ND Not Detected at the Reporting Limit
 RL Reporting Detection Limit



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Analytical Report

(continuous)

WO#: 10060060

Date Reported: 6/3/2010

CLIENT: J. F. New Associates **Lab Order:** 10060060
Project: Lake Max-0904065.01 E. coli

Lab ID: 10060060-001 **Collection Date:** 6/1/2010 11:45:00 AM
Client Sample ID: Site 1 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	480	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM

Lab ID: 10060060-002 **Collection Date:** 6/1/2010 12:00:00 PM
Client Sample ID: Site 2 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	150	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM

Lab ID: 10060060-003 **Collection Date:** 6/1/2010 12:15:00 PM
Client Sample ID: Site 3 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	70.0	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM

Qualifiers:	*X Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	E Value above quantitation range	H Holding times for preparation or analysis exceeded
	M Manual Integration used to determine area response	ND Not Detected at the Reporting Limit
	PL Permit Limit	RL Reporting Detection Limit
	S Spike Recovery outside accepted recovery limits	



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Analytical Report

(continuous)

WO#: 10060060

Date Reported: 6/3/2010

CLIENT: J. F. New Associates **Lab Order:** 10060060

Project: Lake Max-0904065.01 E. coli

Lab ID: 10060060-004 **Collection Date:** 6/1/2010 12:30:00 PM

Client Sample ID: Site 4 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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E COLI BACTERIA BY MPN **M9223B** **Analyst: KRK**

E. Coli Bacteria	1,300	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM
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Lab ID: 10060060-005 **Collection Date:** 6/1/2010 12:45:00 PM

Client Sample ID: Site 5 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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E COLI BACTERIA BY MPN **M9223B** **Analyst: KRK**

E. Coli Bacteria	< 10.0	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM
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Lab ID: 10060060-006 **Collection Date:** 6/1/2010 1:00:00 PM

Client Sample ID: Site 6 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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E COLI BACTERIA BY MPN **M9223B** **Analyst: KRK**

E. Coli Bacteria	40.0	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM
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Qualifiers:

- *X Value exceeds Maximum Contaminant Level
- E Value above quantitation range
- M Manual Integration used to determine area response
- PL Permit Limit
- S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit



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Analytical Report

(continuous)

WO#: 10060060

Date Reported: 6/3/2010

CLIENT: J. F. New Associates

Lab Order: 10060060

Project: Lake Max-0904065.01 E. coli

Lab ID: 10060060-007

Collection Date: 6/1/2010 11:15:00 AM

Client Sample ID: Site 7

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	1,050	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM

Lab ID: 10060060-008

Collection Date: 6/1/2010 11:00:00 AM

Client Sample ID: Site 8

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	120	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM

Lab ID: 10060060-009

Collection Date: 6/1/2010 10:30:00 AM

Client Sample ID: Site 9

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
E COLI BACTERIA BY MPN				M9223B		Analyst: KRK
E. Coli Bacteria	860	10.0		MPN/100ml	1	6/1/2010 4:00:00 PM

Qualifiers:
 *X Value exceeds Maximum Contaminant Level
 E Value above quantitation range
 M Manual Integration used to determine area response
 PL Permit Limit
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 ND Not Detected at the Reporting Limit
 RL Reporting Detection Limit



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Analytical Report

(continuous)

WO#: 10092416

Date Reported: 9/24/2010

CLIENT: J. F. New Associates

Lab Order: 10092416

Project: Ecoli Testing

Lab ID: 10092416-001

Collection Date: 9/22/2010 10:20:00 AM

Client Sample ID: Site 7

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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E COLI BACTERIA BY MPN

M9223B

Analyst: KRK

E. Coli Bacteria	480	10.0		MPN/100ml	1	9/22/2010 4:00:00 PM
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Lab ID: 10092416-002

Collection Date: 9/22/2010 10:40:00 AM

Client Sample ID: Site 8

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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E COLI BACTERIA BY MPN

M9223B

Analyst: KRK

E. Coli Bacteria	40.0	10.0		MPN/100ml	1	9/22/2010 4:00:00 PM
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Lab ID: 10092416-003

Collection Date: 9/22/2010 11:00:00 AM

Client Sample ID: Site 9

Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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E COLI BACTERIA BY MPN

M9223B

Analyst: KRK

E. Coli Bacteria	930	10.0		MPN/100ml	1	9/22/2010 4:00:00 PM
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Qualifiers:

- *X Value exceeds Maximum Contaminant Level
- E Value above quantitation range
- M Manual integration used to determine area response
- PL Permit Limit
- S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit