

# **LAKE LEOPOLD**

## **BATHYMETRIC MAP REPORT**

**October 4, 2005**

Prepared For: Prairie Crossing HOA  
Attn: Mike Sands  
32400 North Harris Road  
Grayslake, IL 60030

Prepared By: Sandy Kubillus, Certified Lake Manager  
Senior Environmental Consultant  
Integrated Lakes Management  
83 Ambrogio Drive, Suite K  
Gurnee, IL 60031  
(847) 244-6662

# LAKE LEOPOLD

## BATHYMETRIC MAP REPORT

### INTRODUCTION

Integrated Lakes Management (ILM) visited Lake Leopold at the Prairie Crossing Subdivision on October 4, 2005 to map the water depths and sediment thickness. As part of this study, ILM staff members Sandy Kubillus and Chris Ryan probed 144 points on the lake with a 1.5 inch PVC pole graduated in tenths of a foot. The goal of this study was to determine the average water depth and sediment thickness. This information should be compared to future studies to determine if major changes have occurred.

### OBSERVATIONS

- The lake was 0.37 feet below normal water level as measured at the staff gage located at the outlet (0.55 ft measured, 0.92 ft = NWL). Due to the low water level the southernmost section of the lake could not be probed since it was inaccessible with a boat. The lake also had an extensive weed bed consisting almost entirely of Eurasian watermilfoil. The milfoil did not hamper the data collection although the boat motor had a difficult time in some areas.
- The maximum water depth found was 14.9 feet. This information is based on 144 points probed with a 1.5 inch PVC pole graduated in tenths of a foot. It is possible that deeper areas exist that were not encountered. The average depth was 6.5 feet.
- Sediment in the lake was quite minimal with an average thickness of 0.43 feet (5.2 inches). The thickest sediment deposit was 1.6 feet located in the narrow neck area. The majority of the sediment in Lake Leopold was located in the north bay, on the southwest side of the island and near the outlet. These are areas of calmer water where sediment can settle. The north bay may also accumulate sediment due to the number of culverts that deposit stormwater in this bay.
- Most of the lake had a mucky bottom, except near the beach where sand occurred. A small area of gravel was encountered by a culvert in the neck area by the north bay.

### RECOMMENDATIONS

- At this time the lake does not need to be dredged, but it is recommended that these maps be updated in 5 – 10 years. At that time dredging may be needed in the north bay, neck area, or at the outlet.

- **Bathymetric Survey Results:**

From probing 144 locations throughout the lake, ILM staff determined the following information:

Size of Lake Leopold:	21.8 acres
Average water depth:	6.5 feet
Maximum water depth:	14.9 feet
Water volume:	142.7 acre-feet
Average sediment thickness:	0.43 feet
Maximum sediment thickness:	1.6 feet
Sediment volume:	15,000 cubic yards
Sediment type:	Muck throughout. except by the beach was sand

More detailed information regarding the transect data is listed in the appendix.

## **METHODS**

The method utilized to determine the water depth and sediment thickness was based on 144 stations within 22 transects spaced throughout the lake. Transects were located approximately 100 feet apart depending on site conditions and location markers. Individual stations within each transect were placed closer near the shore and further apart in the open water (see transect map).

The water depth was probed using a 1.5-inch and a 1.5-inch PVC pole graduated in tenths of a foot. Measurements were made to the nearest tenth of a foot. Two measurements were recorded at each station. One was the depth to the top of the sediment (water depth), and the second was the total depth to firm substrate below the sediment (water depth + sediment thickness = total depth). The sediment depth was determined by subtracting the water depth from the total depth. Locations were determined with a Garmin etrex vista handheld GPS unit, with a backup handheld GPS loaned to ILM from the Liberty Prairie Foundation. The data was downloaded into ArcView GIS version 3.2.

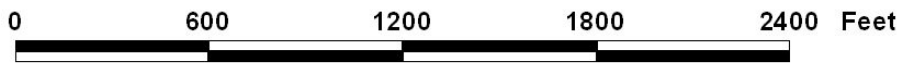
The base map used for the bathymetric and sediment thickness map was from recent aerial photograph enlarged to a scale of ~1 inch = 320 feet. Water depth contours were drawn at 2-foot intervals and sediment thickness contours were drawn at 0.5-foot intervals. The maps were generated by ArcView.

Water volume in the lake was determined by measuring the area within each of the contour lines and multiplying by the average depth. Sediment volume was also calculated this way. Both water depth and sediment thickness estimates are based on ILM's interpolation of the data points. The accuracy of this interpolation is +/- 20%.

The temperature at the time of the survey was 85°F. The weather on October 4<sup>th</sup> was sunny with winds from 10 – 15 mph.

The Lake level was 0.37 feet below normal water level as measured at the gage located at the outfall culvert. All measurements were adjusted to normal water conditions.

# Lake Leopold Bathymetric Map October 4, 2005



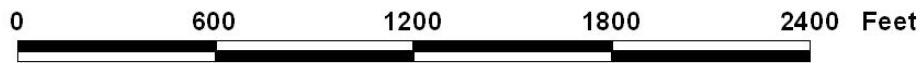
See report and charts for detailed information.

 Leopold.shp  
 Transects.shp








  
**Integrated Lakes  
Management, Inc.**  
**847-244-6662**



# Lake Leopold Bathymetric Map October 4, 2005



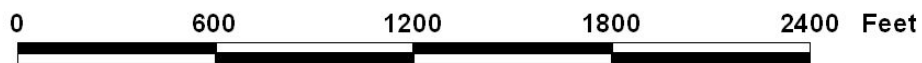
Isopleths based on interpretation between points probed with a 1.5 inch diameter PVC pole graduated in tenths of a foot. Map is based on 144 data points and should be regarded with some margin of error.

-  14 ft isopleth.shp
-  12 ft isopleth.shp
-  10 ft isopleth.shp
-  8 ft isopleth.shp
-  6 ft isopleth.shp
-  4 ft isopleth.shp
-  2 ft isopleth.shp

  
Integrated Lakes  
Management, Inc.  
847-244-6662



# Lake Leopold Sediment Thickness Map October 4, 2005



Sediment thickness is based on interpolation between points probed with a 1.5 inch diameter PVC pole graduated in tenths of a foot. Map is based on 144 data points and should be regarded with some margin of error.

1 ft sediment.shp  
Half ft sediment.shp



## Lake Leopold Bathymetric Data (10/4/05)

Transect #	Location	GPS Point	GPS N	GPS W	Distance from far shore (ft)	Measured Water Depth (ft)	Depth Adjusted to NWL (ft)	Total Depth Water + Sediment (ft)	Sediment Thickness (ft)	Soil Type
1	1	500	42.32607	-88.01039	399	0.4	0.8	0.6	0.2	muck
	2	501	42.326137	-88.010729	324	0.7	1.1	0.8	0.1	muck
	3	502	42.326140	-88.011173	231	0.9	1.3	1.3	0.4	muck
	4	503	42.326198	-88.011813	165	0.8	1.2	0.75	0.1	muck
	5	504	42.326194	-88.011807	125	0.6	1.0	0.85	0.3	muck
	6	505	42.326289	-88.012180	78	0.6	1.0	0.8	0.2	muck
2	1	506	42.326625	-88.012525	720	0.5	0.9	0.9	0.4	muck
	2	507	42.326499	-88.012055	573	4.6	5.0	5.7	1.1	muck
	3	508	42.326435	-88.011695	471	5.4	5.8	6.6	1.2	muck
	4	509	42.326383	-88.011300	351	5.9	6.3	6.4	0.5	muck
	5	510	42.326375	-88.011016	294	5.8	6.2	6.3	0.5	muck
	6	511	42.326347	-88.010723	204	5.8	6.2	6.45	0.7	muck
	7	512	42.326280	-88.010486	123	5.0	5.4	6.0	1.0	muck
	8	513	42.326227	-88.010086	15	1.5	1.9	2.4	0.9	muck
Outlet		514	42.326090	-88.008351	10	1.0	1.4	2.0	1.0	muck
3	1	515	42.326236	-88.008424	40	1.2	1.6	2.2	1.0	muck
	2	516	42.326206	-88.008442	25	2.5	2.9	3.4	0.9	muck
	3	517	42.326192	-88.008518	10	1.3	1.7	2.15	0.9	muck
4	1	518	42.326345	-88.008462	54	0.8	1.2	2.3	1.5	muck
	2	519	42.326322	-88.008500	30	2.0	2.4	2.6	0.6	muck
	3	520	42.326286	-88.008598	10	1.4	1.8	2.0	0.6	muck
5	1	521	42.326453	-88.008498	849	1.3	1.6	2.6	1.4	muck
	2	522	42.326497	-88.008704	789	5.5	5.9	5.9	0.4	muck
	3	523	42.326581	-88.008950	717	5.8	6.2	6.1	0.3	muck
	4	524	42.326579	-88.009345	612	5.7	6.1	6.1	0.4	muck
	5	525	42.326574	-88.009714	507	5.6	6.0	5.7	0.1	muck
	6	526	42.326550	-88.009971	141	8.9	9.3	9.3	0.4	muck
	7	527	42.326579	-88.010236	375	9.9	10.3	10.2	0.3	muck
	8	528	42.326583	-88.010597	270	11.6	12.0	11.9	0.3	muck
	9	529	42.326594	-88.010885	183	11.6	12.0	11.8	0.2	muck
	10	530	42.326631	-88.011206	105	10.5	10.9	10.7	0.2	muck
	11	531	42.326589	-88.011565	20	1.9	2.3	2.0	0.1	muck

Transect #	Location	GPS Point	GPS N	GPS W	Distance from far shore (ft)	Measured Water Depth (ft)	Depth Adjusted to NWL (ft)	Total Depth Water + Sediment (ft)	Sediment Thickness (ft)	Soil Type
5a W of island	1	532	42.326794	-88.012229	150	1.7	2.1	2.1	0.4	muck
	2	533	42.326803	-88.012352	100	5.2	5.6	6.5	1.3	muck
	3	534	42.326797	-88.012491	54	0.9	1.3	1.1	0.2	muck
	4	535	42.326846	-88.012526	25	0.6	1.0	0.9	0.3	muck
6	1	536	42.327164	-88.012410	1010	1.0	1.4	1.25	0.3	muck
	2	537	42.327171	-88.012224	926	5.3	5.7	6.1	0.8	muck
	3	538	42.327127	-88.011944	863	7.5	7.9	8	0.5	muck
	4	539	42.327058	-88.011636	702	9.8	10.2	10.1	0.3	muck
	5	540	42.326969	-88.011174	603	12.0	12.4	12.1	0.1	muck
	6	541	42.326966	-88.010677	483	12.0	12.4	12.2	0.2	muck
	7	542	42.326897	-88.010620	315	10.0	10.4	10	0.0	muck
	8	543	42.326957	-88.009804	192	9.7	10.1	9.9	0.2	muck
	9	544	42.326951	-88.009199	99	7.0	7.4	7.1	0.1	muck
	10	545	42.326900	-88.009071	66	5.6	6.0	6.1	0.5	muck
	11	546	42.326882	-88.008856	10	0.9	1.3	1.9	1.0	muck
7 near Sonde	1	547	42.327245	-88.009467	819	1.8	2.2	1.8	0.0	sand
	2	548	42.327197	-88.009735	737	1.6	2.0	1.6	0.0	sand
	3	549	42.326970	-88.010201	swim float	9.9	10.3	9.9	0.0	sand
	4	550	42.327151	-88.010052	585	6.1	6.5	6.3	0.2	sand
	5	551	42.327188	-88.010285	522	5.9	6.3	6.1	0.2	muck
8	6	552	42.327146	-88.010717	432	10.5	10.9	10.9	0.4	muck
	7	553	42.327143	-88.011143	339	11.3	11.7	11.5	0.2	muck
	8	554	42.327117	-88.011692	168	9.9	10.3	10.1	0.2	muck
9	1	555	42.327551	-88.012085	459	1.0	1.4	1.15	0.2	muck
	2	556	42.327587	-88.011935	411	6.1	6.5	6.7	0.6	muck
	3	557	42.327565	-88.011710	360	9.7	10.1	9.9	0.2	muck
	4	558	42.327541	-88.011423	291	14.2	14.6	14.5	0.3	muck
	5	559	42.327447	-88.011131	192	14.3	14.7	14.6	0.3	muck
	6	560	42.327410	-88.010799	126	9.9	10.3	10.3	0.4	muck sand & gravel
	7	561	42.327467	-88.010531	63	5.9	6.3	6.0	0.1	sand
	8	562	42.327452	-88.010326	10	0.7	1.1	0.7	0.0	sand
9	1	563	42.327815	-88.012010	363	0.9	1.3	1.1	0.2	muck
	2	564	42.327797	-88.011790	303	5.1	5.5	5.7	0.6	muck
	3	565	42.327796	-88.011668	219	9.4	9.8	9.7	0.3	muck
	4	566	42.327725	-88.011296	177	14.1	14.5	14.2	0.1	muck
	5	567	42.327718	-88.011062	111	9.7	10.1	10.1	0.4	muck
	6	568	42.327662	-88.010818	54	5.8	6.2	6.2	0.4	muck
	7	569	42.327666	-88.010610	10	1.6	2.0	2.6	1.0	muck



Transect #	Location	GPS Point	GPS N	GPS W	Distance from far shore (ft)	Measured Water Depth (ft)	Depth Adjusted to NWL (ft)	Total Depth Water + Sediment (ft)	Sediment Thickness (ft)	Soil Type
10	1	570	42.328128	-88.010801	327	1.1	1.5	1.1	0.0	gravel
	2	571	42.328131	-88.010952	279	5.7	6.1	6.0	0.3	muck
	3	572	42.328140	-88.011115	237	9.5	9.9	10	0.5	muck
	4	573	42.328212	-88.011405	180	14.1	14.5	14.4	0.3	muck
	5	574	42.328247	-88.011638	126	10.0	10.4	10.4	0.4	muck
	6	575	42.328237	-88.011834	54	5.6	6.0	5.9	0.3	muck
	7	576	42.328283	-88.012079	15	0.9	1.3	1.1	0.2	muck
11	1	577	42.328415	-88.010723	425	1.5	1.9	2.6	1.1	muck
	2	578	42.328406	-88.010918	366	5.8	6.2	5.9	0.1	muck
	3	579	42.328425	-88.011034	315	10.2	10.6	10.4	0.2	muck
	4	580	42.328500	-88.011392	246	14.3	14.7	14.4	0.1	muck
	5	581	42.328539	-88.011620	174	14.2	14.6	14.5	0.3	muck
	6	582	42.328596	-88.011935	96	9.6	10.0	10.0	0.4	muck
	7	583	42.328668	-88.012074	45	5.1	5.5	6.0	0.9	muck
	8	584	42.328729	-88.012238	20	0.7	1.1	0.8	0.1	muck
12	1	585	42.328612	-88.010317	504	1.7	2.1	2.2	0.5	muck
	2	586	42.328605	-88.010515	450	3.6	4.0	3.7	0.0	muck
	3	587	42.328558	-88.010854	363	7.7	8.1	8.0	0.3	muck
	4	588	42.328658	-88.011261	270	14.3	14.7	14.5	0.2	muck
	5	589	42.328757	-88.011622	171	12.4	12.8	12.6	0.2	muck
	6	590	42.328749	-88.011909	102	10.3	10.7	10.5	0.2	muck
	7	591	42.328782	-88.012062	66	5.9	6.3	6.1	0.2	muck
	8	592	42.328826	-88.012201	20	2.6	3.0	3.7	1.1	muck
13	1	593	42.328852	-88.009858	567	2.3	2.7	2.4	0.1	muck
	2	594	42.328863	-88.010134	507	5.6	6.0	5.8	0.2	muck
	3	595	42.328917	-88.010367	450	7.4	7.8	7.6	0.2	muck
	4	596	42.328979	-88.010712	363	14.5	14.9	14.8	0.3	muck
	5	597	42.329021	-88.011011	282	14.2	14.6	14.4	0.2	muck
	6	598	42.329049	-88.011268	216	9.7	10.1	9.9	0.2	muck
	7	599	42.329102	-88.011586	144	6.0	6.4	6.4	0.4	muck
	8	600	42.329116	-88.011782	93	5.6	6.0	6.0	0.4	muck
	9	601	42.329118	-88.011911	54	1.0	1.4	1.1	0.1	muck
14	1	602	42.329232	-88.010189	378	1.8	2.2	2.0	0.2	muck
	2	603	42.329262	-88.010382	315	7.5	7.9	7.7	0.2	muck
	3	604	42.329310	-88.010528	285	10.0	10.4	10.1	0.1	muck
	4	605	42.329368	-88.010770	210	8.7	9.1	8.9	0.2	muck
	5	606	42.329427	-88.010977	168	6.2	6.6	6.5	0.3	muck
	6	607	42.329433	-88.011286	90	2.0	2.4	2.6	0.6	muck
	7	608	42.329428	-88.011406	63	0.6	1.0	0.8	0.2	muck
15	1	609	42.329567	-88.010969	228	1.1	1.5	2.3	1.2	muck
	2	610	42.329588	-88.010690	156	1.7	2.1	2.7	1.0	muck
	3	611	42.329564	-88.010476	108	3.0	3.4	3.8	0.8	muck
	4	612	42.329609	-88.010280	57	6.3	6.7	6.6	0.3	muck
	5	613	42.329561	-88.010179	45	4.9	5.3	5.7	0.8	muck
	6	614	42.329558	-88.010086	8	2.4	2.8	3.2	0.8	muck

Transect #	Location	GPS Point	GPS N	GPS W	Distance from far shore (ft)	Measured Water Depth (ft)	Depth Adjusted to NWL (ft)	Total Depth Water + Sediment (ft)	Sediment Thickness (ft)	Soil Type
16	1	615	42.329664	-88.009983	81	1.0	1.4	1.0	0.0	gravel
	2	616	42.329660	-88.010201	54	6.7	7.1	6.0	0.7	muck
	3	617	42.329693	-88.010245	30	5.7	6.1	6.3	0.6	muck
	4	618	42.329710	-88.010329	10	1.5	1.9	2.5	1.0	muck
17	1	619	42.329925	-88.010112	54	1.7	2.1	3.3	1.6	muck
	2	620	42.329889	-88.010078	30	5.8	6.2	6.3	0.5	muck
	3	621	42.329855	-88.009919	10	2.0	2.4	2.9	0.9	muck
18	1	622	42.330028	-88.009753	108	2.4	2.8	3.2	0.8	muck
	2	623	42.330082	-88.009840	66	6.5	6.9	7.1	0.6	muck
	3	624	42.330153	-88.009923	39	6.7	7.1	7.1	0.4	muck
	4	625	42.330232	-88.010067	10	1.9	2.3	2.7	0.8	muck
19	1	626	42.330191	-88.009867	114	6.7	7.1	7.1	0.4	muck
	2	627	42.330191	-88.009690	69	6.9	7.3	7.2	0.3	muck
	3	628	42.330159	-88.009565	33	4.3	4.7	4.6	0.3	muck
	4	629	42.330158	-88.009411	10	2.0	2.4	3.1	1.1	muck
20	1	630	42.330214	-88.009106	231	2.7	3.1	3.3	0.6	muck
	2	631	42.330226	-88.009241	192	6.1	6.5	6.7	0.6	muck
	3	632	42.330306	-88.009529	126	9.6	10.0	10.7	1.1	muck
	4	633	42.330410	-88.004620	72	10.0	10.4	10.9	0.9	muck
	5	634	42.330380	-88.009800	39	6.2	6.6	6.8	0.6	muck
	6	635	42.330380	-88.009910	10	2.3	2.7	3.0	0.7	muck
21	1	636	42.330520	-88.009790	201	2.2	2.6	3.0	0.8	muck
	2	637	42.330500	-88.009620	153	6.3	6.7	7.0	0.7	muck
	3	638	42.330460	-88.009410	108	6.2	6.6	6.7	0.5	muck
	4	639	42.330380	-88.009200	48	6.3	6.7	6.9	0.6	muck
	5	640	42.330380	-88.008990	10	2.4	2.8	3.4	1.0	muck
22	1	641	42.330490	-88.009200	123	2.2	2.6	3.3	1.1	muck
	2	642	42.330530	-88.009430	60	6.3	6.7	6.7	0.4	muck
	3	643	42.330590	-88.009650	10	2.0	2.4	3.4	1.4	muck

<b>Average =</b>	<b>5.9</b>	<b>0.47</b>
------------------	------------	-------------