

**Bathymetric Survey of Owasco Lake
for the
Institute for the Application of Geospatial Technology (IAGT), Auburn, New York.**

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Finger Lakes Institute In-House Report
Hobart and William Smith Colleges
August, 2004**

The Finger Lakes Institute at Hobart and William Smith Colleges under the direction of Dr. John D Halfman was contracted for a bathymetric survey of Owasco Lake, Finger Lakes District of New York, to national mapping accuracy standards. This project was performed as a part of the programmatic and administrative mission of the Regional Application Center of the Northeast (RACNE). This report outlines the field and data analysis procedures to collect location (latitude/longitude) and water depth data (relative to mean lakes level) from the lake at a minimum of 30 meter postings.

Fieldwork: The fieldwork was performed on the *JB Snow* using a Trimble XP Pro differential global positioning system (DGPS) to provide uncorrected latitude and longitude each second of the survey (X, Y position for each point) interfaced with an Odom Hydrotrac surveying fathometer to provide the depth (Z coordinate). Latitude, longitude and GMT time from the Trimble was sent to the Odom each second of the survey as serial text and interfaced with Odom depth output (10-20 depths each second); the resulting serial data stream was captured by a laptop computer and saved as a text file of sequential lines of depth and location/time information using a terminal emulating program. The Odom Hydrotrac used a 200 kHz narrow beam transducer mounted approximately 0.5 meters below the lake's surface, assumed velocity of sound of 1430 meters per second (fresh 8°C water). Odom depth data was archived on thermal paper in real-time, and digitally saved to the nearest tenth of a meter. The Odom Hydrotrac depth was compared to triplicate lead line depths each day in approximately 10 meters of water. The lead line, on average was 0.0805 ± 0.199 meters deeper than the Odom depth. The offset was attributed to the depth of the transducer mount, and variability in lead line depths. Uncorrected Trimble data was also saved on TSCe logger, and these files are available for position corrections using a base station.

The survey followed East-West parallel tracks spaced 25 meters apart at approximately 12 to 15 km/hr, tied with a North-South reach down the deeper portion of the lake, and interfaced with a reach around the perimeter of the lake. For safety, a minimum survey depth of 3 meters was generally adhered to, and nearshore areas that were choked with macrophytes and other hazards to navigation were excluded from the survey. The largest areas not surveyed were the southeastern corner and some of the coves in the northern part of the lake. Approximately 640 East-West lines were collected, accumulating 3,420,600 lines of text with either individual position or depth data. Separate data files were saved for each day of the survey to segregate the data into manageable units.

Data Analysis: Processing reduced the volume of bathymetric data, corrected Odom depths in weedy and other areas, deleted "misfires" by the Odom/Trimble system, and tabulated the output

into <tab> delimited (and comma delimited) text files of latitude (decimal degrees), longitude (decimal degrees), GMT time (HHMMSS: HHours, MMinutes and SSeconds), the corrected depth relative to mean lake level (meters), and a flag (* or **). Specifically, the number of data points was reduced to one depth every 2 seconds of surveying, selecting the depth recorded closest to the position information. Odom depths were corrected for the transducer mounting depth using the average of the lead line tests (0.805 m), and the lake level each day of the survey using an average of the available lake level data on the USGS web site (USGS Station 04235396, Owasco Lake Site, near Auburn). The result was depths relative to a mean lake level of 712 feet. Depths shallower than 6 meters were flagged and corrected by hand for weed coverage, if required, using the paper records. This correction was typically 0.5 up to 2 meters. Each corrected depth was flagged with an "*" in the last column of the data file. Odom data were also corrected by hand using the paper records for any depth obviously shallower than the lake floor and Odom/Trimble "misfires". The problems encountered included echoes from fish, weed clump or other obstruction in the water column, obstructions (weeds) around the transducer, and satellite alignment problems. These corrections were also flagged with an "*". Data that lacked GPS positions due to satellite alignment problems were deleted from the data files and marked with a double asterisk "**". Hopefully we corrected all of the bad data as the data analysis and hand corrections took almost as many man-hours as the fieldwork but we might have missed one or two.

Summary: The resulting tab-delimited text files of bathymetric data, one file for each survey day, provides 154,235 depths and the data are summarized in Figure 1. Only 15% of the depths were corrected and flagged. Almost 70% of the corrected depths were in shallow water and due to weed problems, and strongly suggests future surveys should be restricted to the early spring before the growth of weeds. Table 1 summarizes the amount of data collected, corrected, maximum water depths, lead line test results (difference between Odom and lead line depths), weather conditions, and average lake levels for each field day.

We look forward to see your end product.

Data Files on CD:

All data files use following naming convention. OWMMDYYa.XXX.

OW	Owasco Lake
MMDDYY	Date Survey: MMonth, DDay & YYear
a	Unused
XXX	Type of File
*.txt	Original field data
*.out	Isolated & adjusted depth for every second of survey
*.par	Parameters used in the adjustment
*.flg	Isolated depth for every 2 seconds of survey
*.cor.csv	Corrected depths, part 1
*.cor.xls	Corrected depths, part 2
*.fin.csv	Final product, comma delimited
*.fin.txt	Final product, tab delimited

Folders

Import Ready Files

*.fin.csv & *.fin.txt files

Depth Data Processing

*.out, *.pas, *.flg, *.cor.csv, *.cor.xls files

RawOdomOutput

*.txt files

RawTrimbleOutput

Files saved by Trimble, each in separate folder for each day of survey

Other Files:

OwascoLakeProcedures.doc

This report

SurveySummary.xls

Table 1.

BWMap.jpg

Figure 1.

USGSAverageLakeLevel.xls

Data from USGS site, averaging the lake level for each day of survey. Raw data can be viewed at this temporary web site. C:\Documents and Settings\halfman\Local Settings\Temporary Internet Files\OLK8C\owlaketable.htm

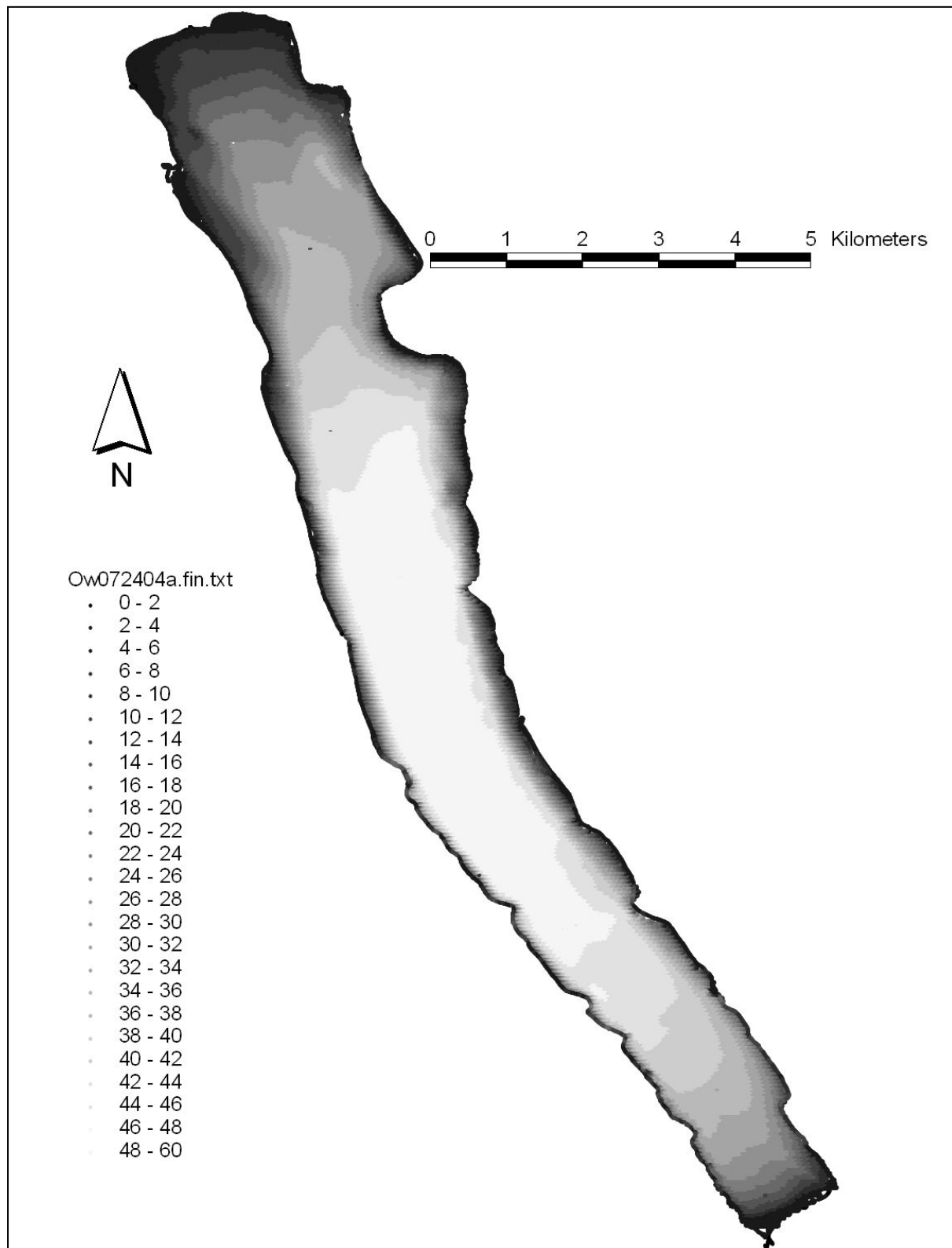


Figure 1. Bathymetric Results.

Table 1. Survey Summary.

Survey Date MM/DD/YY	Lines Data		Number Depths		All Corrected Depths		Corrected Depths < 10 m	
	Before Processing	After Processing	Number	%	Number	%	Number	%
07/24/04	276,588	11085	1941	17.5	1594	81.9		
07/25/04	286,387	14651	880	6.0	136	15.5		
07/26/04	257,563	13541	980	7.2	237	24.2		
07/28/04	299,571	15868	1274	8.0	241	18.9		
07/29/04	420,726	14507	6821	47.0	6746	98.9		
07/30/04	309,805	15291	2805	18.3	1050	37.4		
07/31/04	37,629	1268	804	63.4	791	98.4		
08/01/04	304,079	15851	1352	8.5	396	29.3		
08/02/04	306,948	14439	1187	8.2	557	46.9		
08/03/04	349,973	14582	1045	7.2	697	66.7		
08/04/04	348,016	13766	1054	7.7	728	69.1		
08/05/04	223,315	8371	2284	27.3	1961	85.9		
Total	3,420,600	153220	22427		15134			
Average	285,050	12768.3	1868.9	14.6	1261.2	67.5		

Survey Date MM/DD/YY	Maximum Depth meters	Lead Line Test difference meters	Weather Conditions wind/clouds	Average Lake Level feet above MSL
07/24/04	38.1	0.6	Windy/Sunny	712.89
07/25/04	50.9	1.0	Calm/Overcast	712.87
07/26/04	50.6	0.8	Light/Drizzle	712.87
07/28/04	50.8	0.8	Light/Overcast	713.16
07/29/04	23.2	1.0	Light/Sunny	712.92
07/30/04	51.3	0.8	Windy/Sunny	712.81
07/31/04	45.7	0.7	Windy/Rain	712.67
08/01/04	51.1	1.0	Calm/Sunny	712.58
08/02/04	47.9	0.7	Windy/Overcast	712.67
08/03/04	40	0.7	Light/Sunny	712.72
08/04/04	47.5	0.8	Light/Sunny	712.73
08/05/04	50.5	0.8	Wind/Sunny	712.70
Maximum / Average ± StDev	51.3	0.805 ± 0.136		