

November 20, 2018

Mr. Frank Hoisl
Amston Lake District
P.O. Box 95
Amston, CT 06231

Dear Frank:

AER is pleased to provide you the following report on the bathymetric survey of Amston Lake and map package for review. The report includes our methodology, the Amston Lake hypsographic curve, and hypsographic dataset which will be important for future initiatives.

Because of its size, the map package entitled *Amston Bathymetry Booklet Final* can be accessed at a Dropbox site at the address below.

https://www.dropbox.com/s/gz1pidjzu702vqo/Amston_Bathymetry_Booklet_Final.pdf?dl=0

Please do not hesitate to contact us with questions you may have with the report or with any issues that you may have downloading the Bathymetry Booklet. We look forward to hearing from you following your review.

Sincerely,

AQUATIC ECOSYSTEM RESEARCH



Mark June-Wells, Ph.D.
NALMS Certified Lake Manager
ESA Certified Lake Manager

INTRODUCTION

Lake Features

Amston Lake (41°37'32.86"N, 72°19'42.425"W) is located in Hebron and Lebanon, Connecticut and has a surface area of approximately 194 acres. This natural lake has a maximum depth of just less than 8 meters (7.9 m), a mean depth of 2.7 meters and contains approximately 2.1×10^6 cubic meters of water. Wetlands and three small streams feed the lake; surface waters enter the lake primarily from the south. The lake spills over a small dam into a tributary that drains in to Raymond Brook. Raymond Brook in turn flows into the Jeremy River, which flows to the Salmon River. Amston Lake is located in the Raymond Brook sub region of the Salmon River watershed. The local watershed is approximately 700 acres, which is partially urbanized, and the watershed ratio is 3.6.

STUDY PURPOSE

Aquatic Ecosystem Research was contracted by The Amston Lake Association to conduct a bathymetric survey of the lake in 2018. Historic surveys created rough maps of the lake's morphometry but their limited data collection initiatives have led to a need for additional bathymetric data, which will be used in the planning of future lake management initiatives.

METHODOLOGY

Data Collection

Amston Lake depth data were collected during a site visit that occurred on 10/08/18. Data were collected using a variety of geospatial techniques. A sonar unit with GPS tracking was utilized to collect the majority of the data set. Sounding data from a sonar unit were collected in concert with GPS coordinates and then stored in an onboard database. Those sounding data were collected by motoring north-south and east-west transects with ~30 meter spacing. In areas where more specific measurements were required or access was limited, individual points were taken using a stadia rod and handheld GPS unit. To ensure an accurate shoreline to process the data, readings were taken in areas of high tree cover with the stadia rod/GPS setup to augment satellite imagery. In total, over 6,000 data points were collected and processed into a bathymetric dataset.

For future comparison, a benchmark was collected at the Amston Lake dam. A measurement was taken from the southeast corner of the spillway, down to the lip of the dam. The measurement was taken on the side of the dam which faces the lake and the water level was recorded as being 6 cm above the spillway elevation following the completion of the survey on 10/08/18.



Data Processing

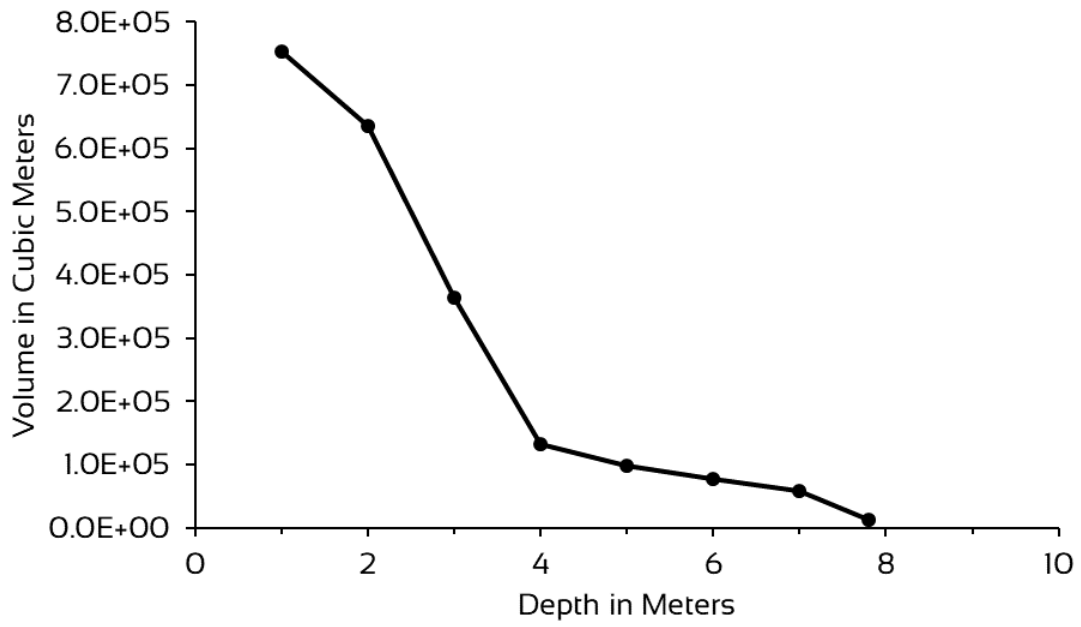
Bathymetric data were loaded into GIS software for analysis. A shoreline dataset was created using the points collected along the shore of the lake; to supplement those data, additional shoreline data were identified from the 2016 leaf-off CT Orthophotography. Quality control of all sonar data was conducted by visually examining the sonar logs and inspecting how data were displayed on an interactive map in the GIS software to ensure that no data were erroneously logged outside of the lake boundaries. Data were then interpolated within the confines of the lake's identified shoreline. The interpolation technique iteratively added points to the developing model and weighted those in relationship to their nearest point to develop the inter-point coefficients. Those coefficients were used in the spatial model to develop the bathymetric maps and hypsographic curve.

RESULTS

The survey data points and subsequent data processing suggest that the average depth of the lake is 2.7m and that the maximum depth of the lake is 7.9m. Furthermore, our data suggest that 65% of the water volume exists within the 1-2m strata and 35% of the water volume is within the remaining 5.9m of lake depth. Finally, the survey that was conducted on October 8th 2018 resulted in the production of various bathymetric maps that are presented in the document entitled "*Amston_Bathymetric_Booklet_Final*" and a hypsographic curve including associated data, which are presented in the attached appendix.

APPENDIX

Hypsographic Curve - Amston Lake



Hypsographic Dataset - Amston Lake

<u>Depth</u> <u>(m)</u>	<u>Volume</u> <u>(cubic m)</u>	<u>Cumulative Volume</u> <u>(cubic m)</u>	<u>Volume</u> <u>(gallons)</u>	<u>Cumulative Volume</u> <u>(gallons)</u>	<u>Surface Area</u> <u>(acres)</u>
0	0	0	0	0	194.00
1	752,750.00	752,750.00	198,853,967.50	198,853,967.50	177.81
2	635,824.00	1,388,574.00	167,965,626.08	366,819,593.58	134.29
3	363,477.00	1,752,051.00	96,019,719.09	462,839,312.67	43.81
4	132,784.00	1,884,835.00	35,077,549.28	497,916,861.95	27.83
5	98,077.00	1,982,912.00	25,909,001.09	523,825,863.04	20.99
6	77,138.00	2,060,050.00	20,377,545.46	544,203,408.50	17.23
7	57,597.00	2,117,647.00	15,215,399.49	559,418,807.99	9.76
7.5	13,064.00	2,130,711.00	3,451,116.88	562,869,924.87	NA