



MaxDepth Aquatics, Inc.

**Bathymetry of Mirror Pond
From Newport Bridge to Galveston Bridge**

**Prepared for the
City of Bend**

By

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INTRODUCTION

Mirror Pond is an impounded reach of the Deschutes River located adjacent to downtown Bend, Oregon. The impoundment is created by a dam operated by PacifiCorp located immediately downstream of the Newport Bridge. Mirror Pond has a history of siltation and was dredged in August 1984 to remove some of the accumulated sediment.

However, upstream bank erosion continues to supply sediment to the impoundment and Mirror Pond has once again shown signs of excessive siltation. The City of Bend contracted with MaxDepth Aquatics, Inc. to develop an updated bathymetric map of Mirror Pond to allow city engineers to assess the magnitude of sediment accumulation in the impoundment. The purpose of this report is to document the methods used to collect the updated bathymetry data and to provide the City with the results of this new survey.

METHODS

Mirror Pond was mapped on June 2, 2005. The methods consisted of using hydroacoustic techniques linked with DGPS. The positional information was derived by using a Thales ZMax RTK system; the base station was placed on Pilot Butte (GIS 031) and the rover was attached over the transducer mount on the survey vessel. The hydroacoustic unit was a BioSonics DT-X equipped with a 200 KHz single-beam transducer with a 6 degree beam angle. The rate of acquisition was set to 10 pings per second and the boat was operated at a maximum speed of about 9 kph. The boat had a minimum operating depth of about 25 cm and the hydroacoustic unit required approximately 55 cm of water to minimize near-field effects. Consequently, the effective minimum depth of mapping was 55 cm. The extensive areas of the impoundment with very shallow water required us to abandon use of fixed-line transects in favor of a more opportunistically-based survey design. The survey tracks used to acquire bathymetric

data for Mirror Pond are shown in Figure 1. The shoreline for Mirror Pond was derived from a series of digital ortho-rectified aerial photographs provided by the City. The mapped surface was generated with 137,960 points using a kriging routine in Surfer® and the file used for the map preparation was a 0.5 m grid.

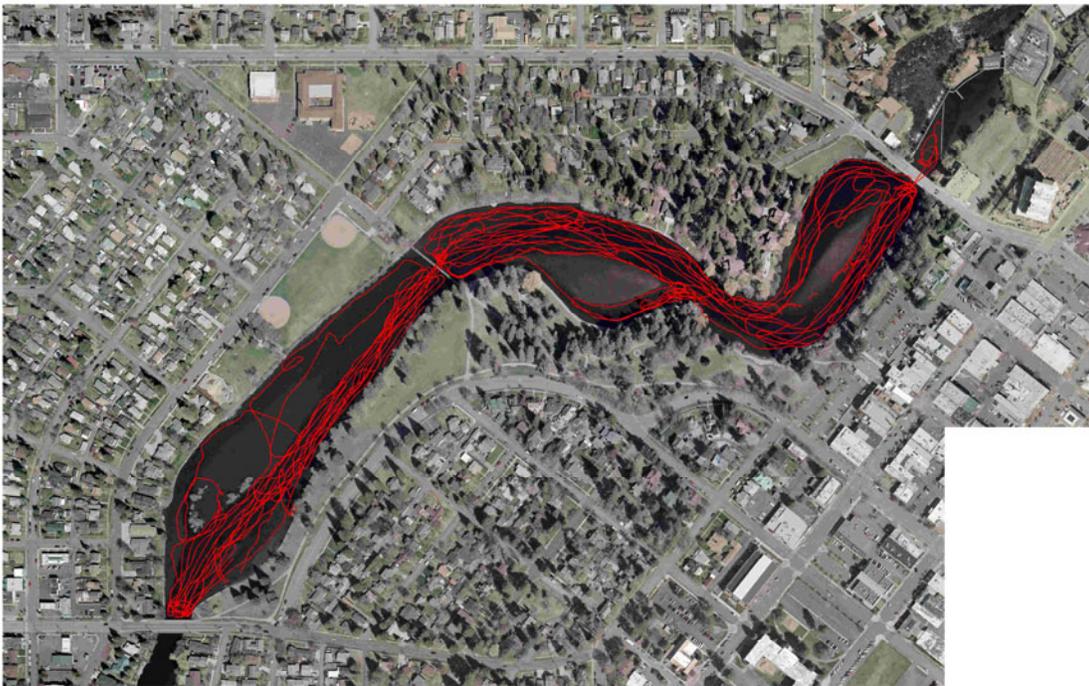


Figure 1. Boat tracks for surveying Mirror Pond, June 2005.

RESULTS

The bathymetric map of Mirror Pond for 2005 is shown in Figure 2. Morphometry of Mirror Pond derived from the bathymetric data is summarized in Table 1. Note that the bathymetric map has been prepared for purposes of evaluating sediment accumulation and no attempt has been made to identify navigational or recreational hazards present in the impoundment. For example, there are a series of metal pilings emerging above the sediment and below the lake surface located north of the foot bridge that could be viewed by some as problematic.

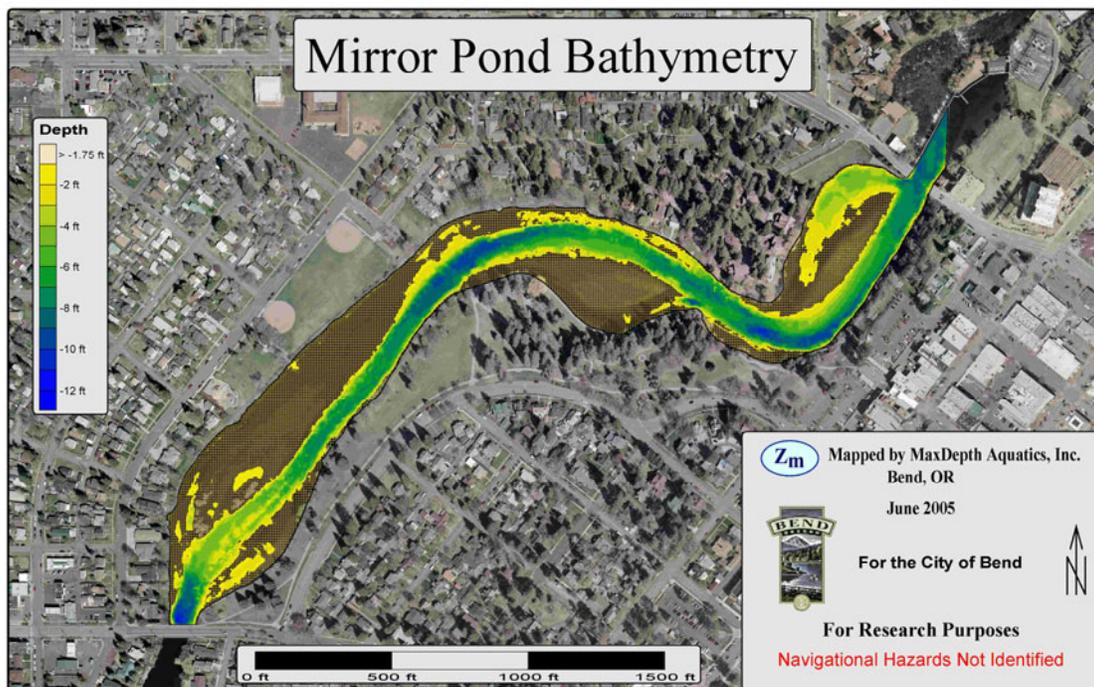


Figure 2. Bathymetric map of Mirror Pond, June 2005. Units are in feet.

Table 1. Morphometric characteristics of Mirror Pond, Oregon

Parameter	English	Metric
Lake Area (Log Boom to Galveston Bridge)	26.7 ac	10.8 ha
Maximum Depth	11.8 ft	3.61 m
Mean Depth ^a	2.9 ft	0.88 m
Volume ^a	77.8 ac-ft	95,704 m ³

^a All shallow areas that could not be surveyed (depths less than 0.53 m) were set to a depth of 30 cm for estimating mean depth and volume. Thus actual mean depth and volume may differ slight from these reported values.

The map shows presence of a well-defined channel that extends through the impoundment and extensive areas of shoaling. The deepest areas were located immediately downstream of the Galveston Bridge indicating that current velocities remain sufficiently high to prevent sediment deposition in this area. Substrate classification was not a component of this study. However, echograms of the substrate suggest that a substantial proportion of the accumulated sediment was sand, with fine (silt to mud) in some of the very shallow areas and coarse (gravel to cobble) material in the thalweg and portions of some shorelines (Figure 3).

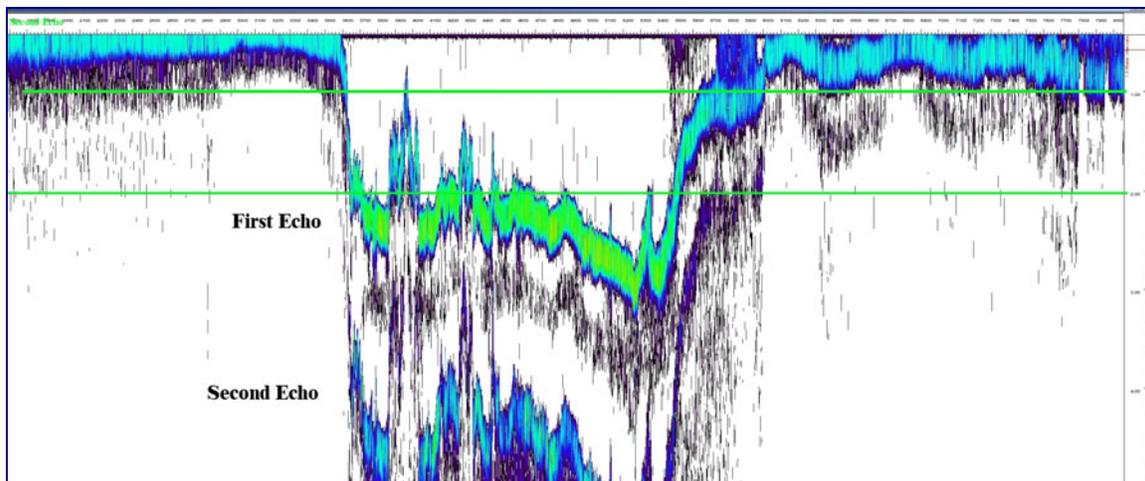


Figure 3. Echogram of a cross-section across Mirror Pond showing the rapid transition into the channel. The second set of echoes below the channel indicates a harder substrate. The two horizontal lines show the 1 m and 2 m depths.

ACKNOWLEDGEMENTS

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