LAKE FOREST MAPPING STUDY
ANALYSIS OF SHOALING AND POOL VOLUMES

Bret M. Webb, PhD, PE, DCE
August 18, 2016

Mobile Bay National Estuary Program
Project Implementation Committee Meeting
Lake Forest Mapping

I. Background
I. Background

Study Purpose

How much sediment?

Shoaling Locations/Depths

Sediment Yield

Sediment Characteristics

Flood Storage

How much of this ends up in the Lake Forest reservoir?

Photo Courtesy: Ben Raines
I. Background

Study Area

Lake Forest
Lake Forest Subdivision
Bridgehead
D’Olive Watershed
Tiawasee & D’Olive

August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting

Photo Courtesy: AL.com
I. Background

History

Aerial Photography
I. Background

History

Aerial Photography
I. Background

History

Aerial Photography
I. Background

History

Aerial Photography
I. Background

History

Aerial Photography
I. Background

History

Aerial Photography
I. Background

Prior Work

Lake Forest
D’Olive WMP (2010)
Isphording (1981)
Douglass (1994)
Cook (2010)
Cook & Moss (2008)

Projects: Joe’s Branch, Tiawasee, D’Olive, etc.

Photo Courtesy: Lake Forest POA
Lake Forest Mapping

II. Methods
II. Methods
Mapping

Elevations
RTK GPS Spot Elevations
Bathymetric Elevations
- JagSki
- JagYak

Over 12,000 Points

August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting
II. Methods

Sediment Sampling

Grain Size and Sorting

Shallow Push Cores

8 Locations

1 @ Tom's Cove
4 @ D'Olive Creek
3 @ Tiawasee Creek

August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting
II. Methods
II. Methods

GIS

Digitizing

Referencing Map

Bridgehead Quad

Google Earth
Lake Forest Mapping

III. Results
III. Results

Current Conditions

19

2016 Elevations

Alabama State Plane
NAVD88

August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting
III. Results

Pre-Construction Conditions

201958 Elevations
Alabama State Plane
NAVD88

August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting
III. Results

Bed Elevation Change

2016 – 1958 Elevations

+ means shoaling

- means deepening

August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting
III. Results

Current Depths

2016 Depths Relative to +19 FT NAVD88

August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting

Legend

- Depth (ft)
  - -2
  - 0
  - 2
  - 4
  - 6
  - 8
  - 10
  - 12

- 2 ft Contours

CRS: Alabama State Plane West, FIPS 0102 (feet)
Elevations: n/a
III. Results

Shoaling Areas

By Depth Relative to +19 FT NAVD88

August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting
III. Results

**Sediment Yield**

*Above 1958 Surface*

- \(\approx 310,000\) CY
- \(\approx 700,000\) tons
- \(\approx 16,000\) tons/yr

*Based on 2016 survey data*
III. Results

Sediment Yield

By Elevation

+1 MCY !!!

Not Advisable

*Based on 2016 survey data
III. Results

Pool Volume

Capacity

Reduced 45% - 60%

1974: ~500 acre-ft

2016: ~200 acre-ft

90 yrs of sediment storage???

Uncertainty
III. Results

Sediment Analysis

27 August 18, 2016 – Lake Forest Mapping Study | MBNEP PIC Meeting

Grain Size & Sorting

8 samples (7 shown)

Oven Dried

Sieve Analysis

Coarse Sediments

Well Sorted

<2% fines
Key Points

Data Collection

+12,000 New Spot Elevations
Sediment Characterization

Sediment Shoaling

~80% of Lake Area has Shoaled
+310,000 CY of (new) Sediment

Lake Capacity

~200 acre-ft of Capacity Remaining
Maybe 90 yrs of Sediment Storage
Soapbox

While we are focused on the problems within this (and other) watershed(s), are we ignoring some obvious problems that exist downstream? If so, should we address these downstream impacts in our WMPs?