



Hydrographic Survey Program

Texas Water Development Board

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Texas Water Development Board

The logo for the Texas Water Development Board features the words "Texas Water" in a light blue, sans-serif font, with "Development Board" in a bold, black, sans-serif font below it. To the right of the text is a stylized graphic of three curved, overlapping lines in a light blue color, resembling a wave or a fan.

The following presentation is based upon professional research and analysis within the scope of the Texas Water Development Board's statutory responsibilities and priorities but, unless specifically noted, does not necessarily reflect official Board positions or decisions.

TWDB's Hydrographic Survey Program Overview

- **1991 – authorized by state legislature**
- **1992 – conducted first volumetric survey**
- **2003 – conducted first sedimentation survey**
 - **Identify pre-impoundment surface to establish baseline**
- **185 – number of completed surveys, to date**

Purpose of the Program

- **Update current reservoir storage capacities**
- **Determine sediment volume and location**
- **Primarily a planning tool**
 - **Calculate rate of sedimentation**
 - **Determine yeild and yield projections**
 - **Dredging feasibility**
 - **Placement of diversions structures**

Figure 10

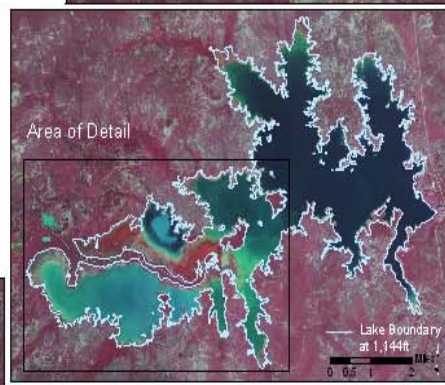
Lake Kemp

Delta Progression in Lake Kemp

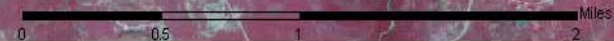
Date of Photographs: 2004

Water Surface Elevation at
time of photographs: 1,138ft

Conservation Pool Elevation: 1,144ft

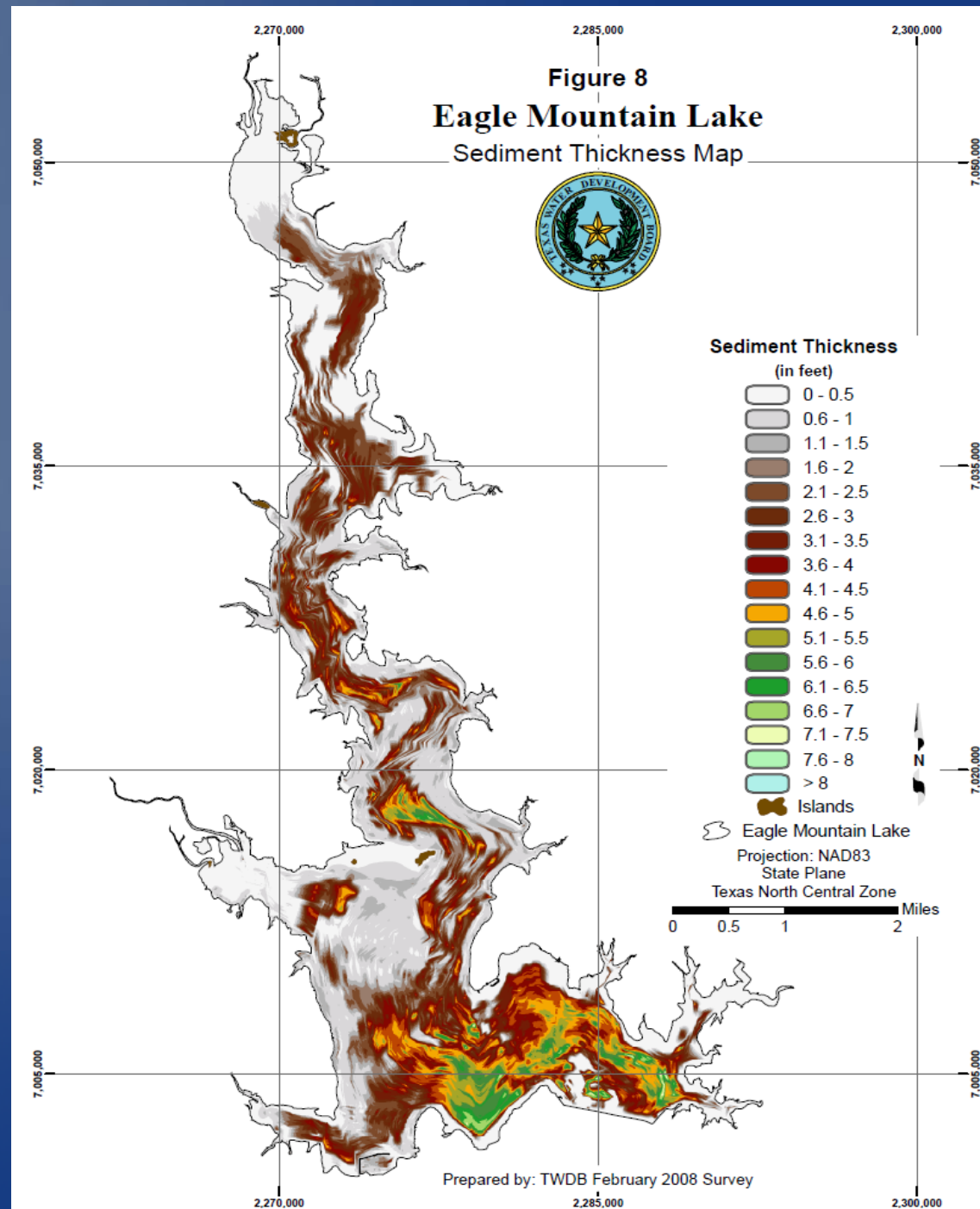


Texas: 90,000 ac-ft of sediment per year = 0.28%
Over 50 years = 14% statewide capacity reduction

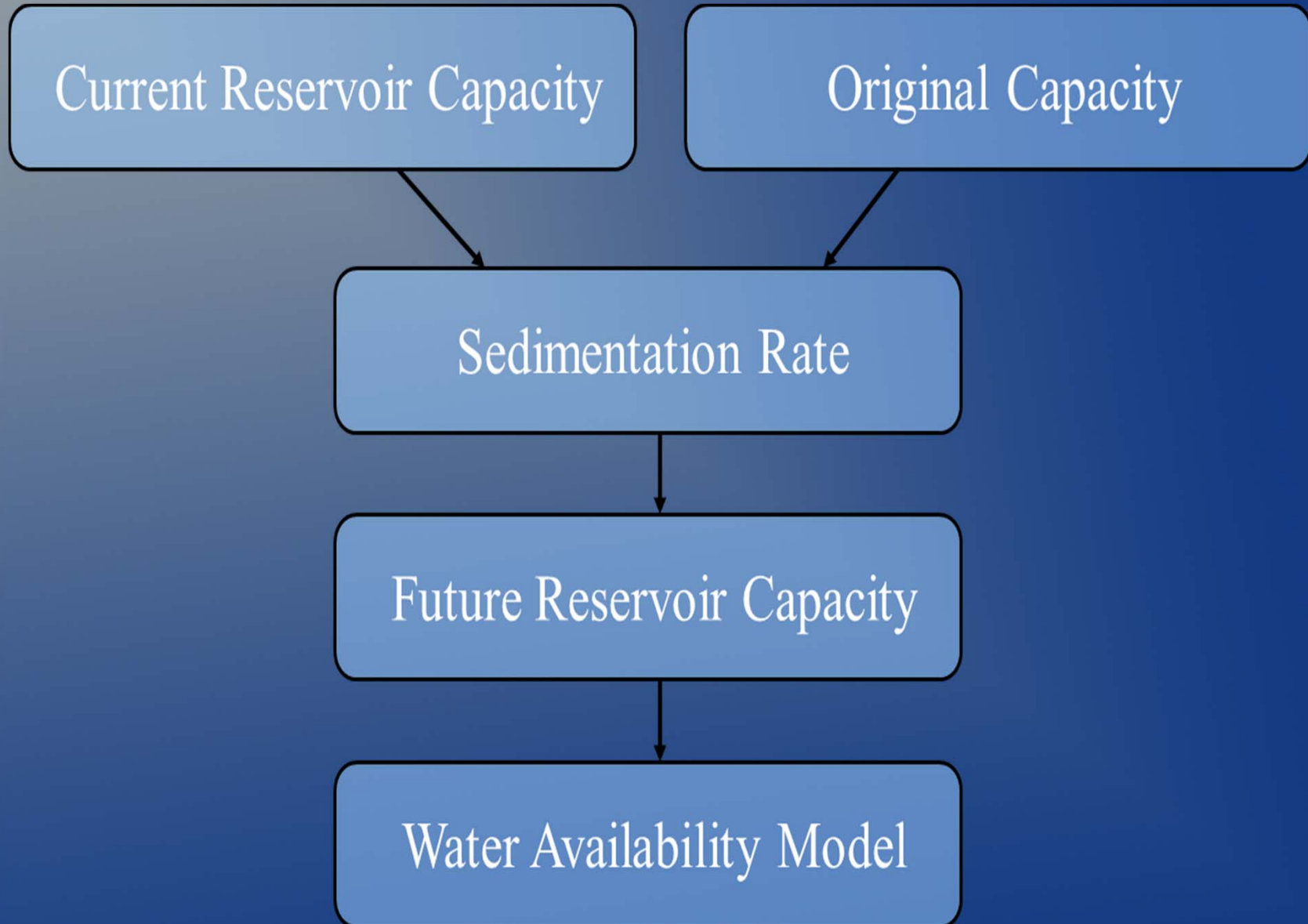


Survey Deliverables

- Elevation-area and elevation-capacity tables and curves
- TIN model and elevation contours
- Total sediment accumulation and deposition patterns



Water Resources Planning



Benefits to the Public

Water Data
for Texas



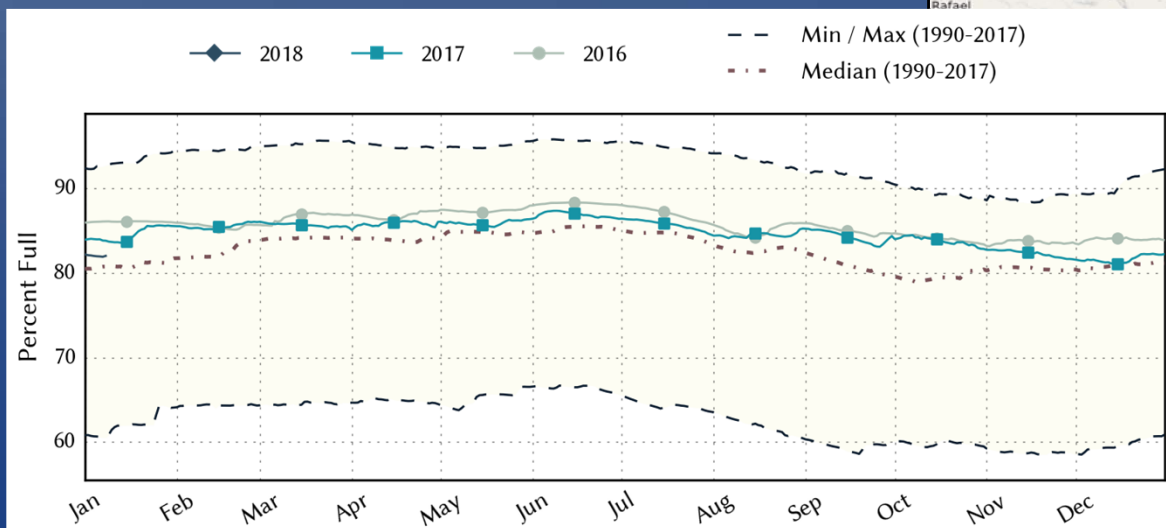
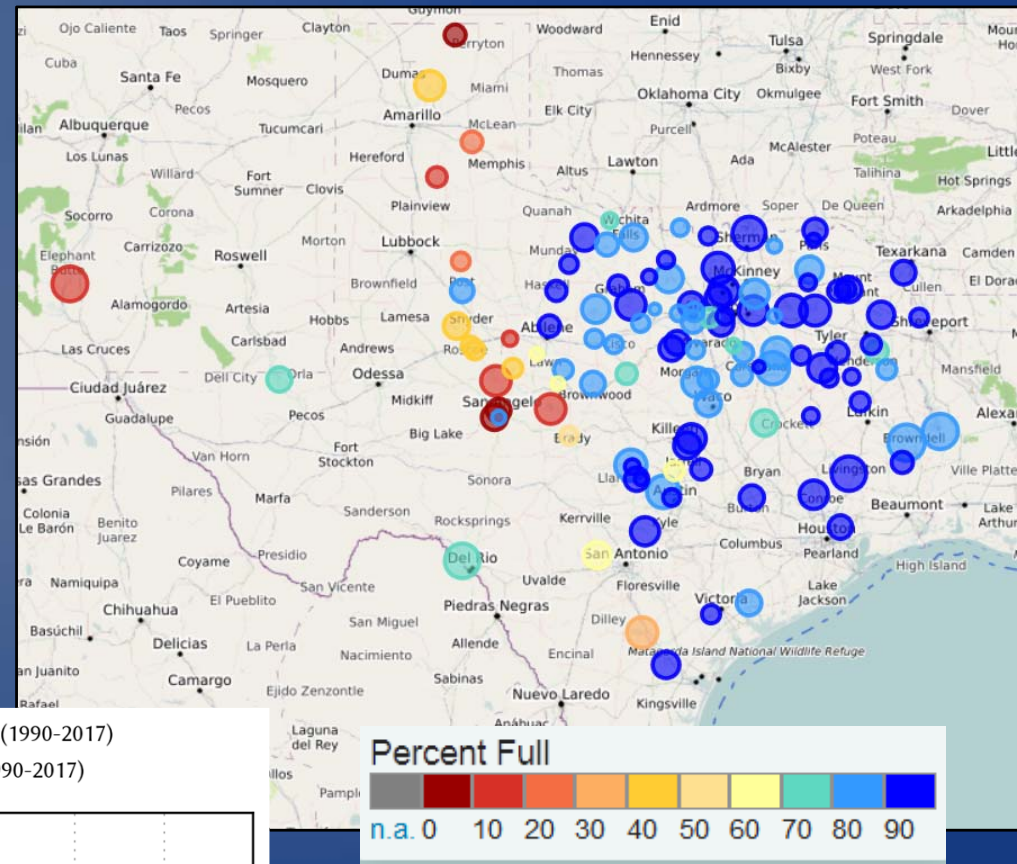
Reservoirs

Drought

Groundwater

Coastal

- Supports TWDB's state-wide water planning function
- Collected data is available to the public
- Elevation-Area-Capacity tables are updated on WaterDataForTexas.org after survey completion



Survey Process

Pre-survey



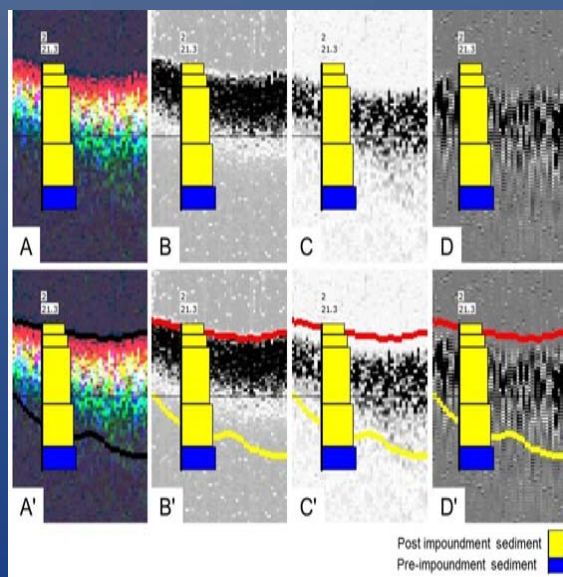
Field data collection



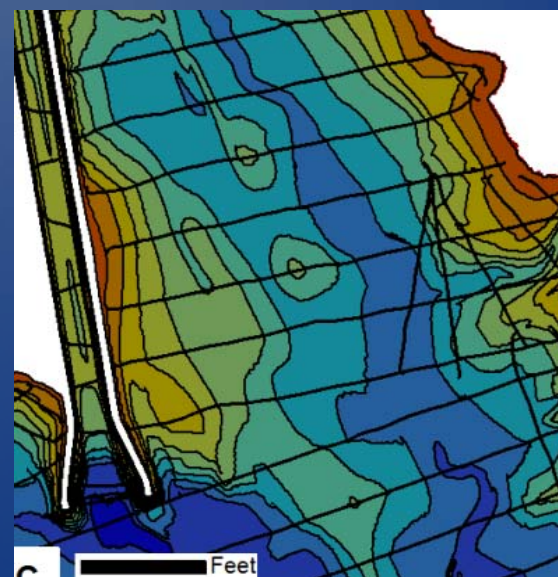
Sediment coring



Data analysis



TIN generation



Pre-survey



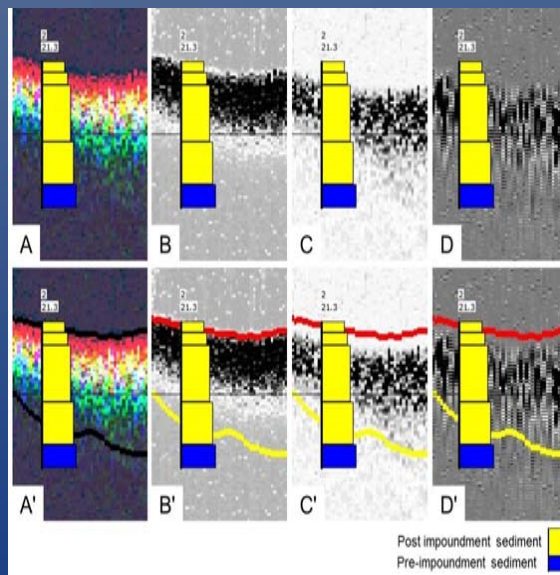
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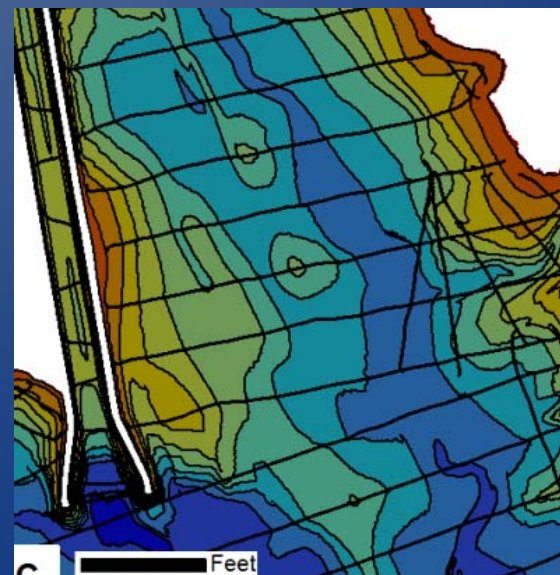
Sediment coring



Data analysis

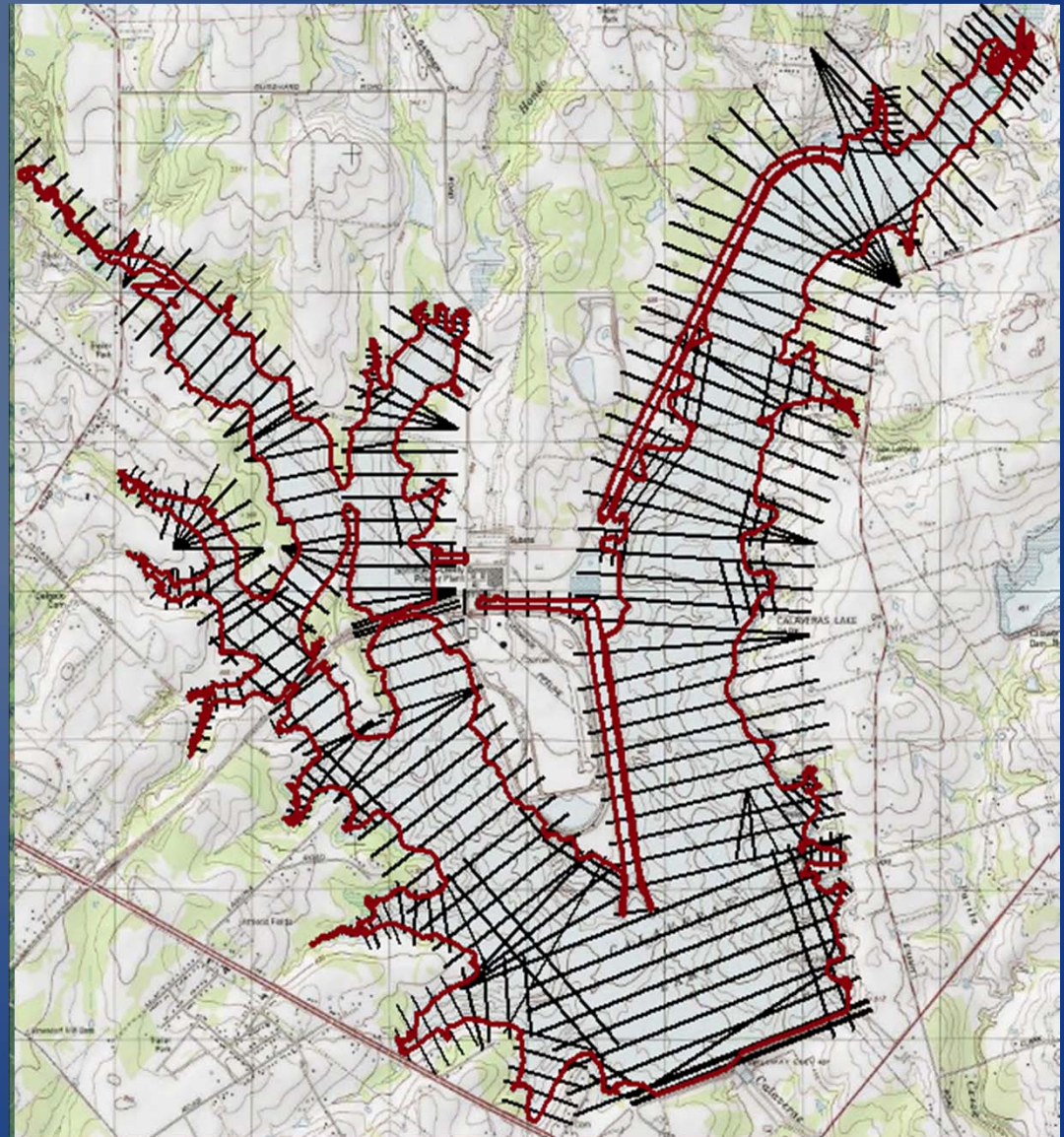


TIN generation



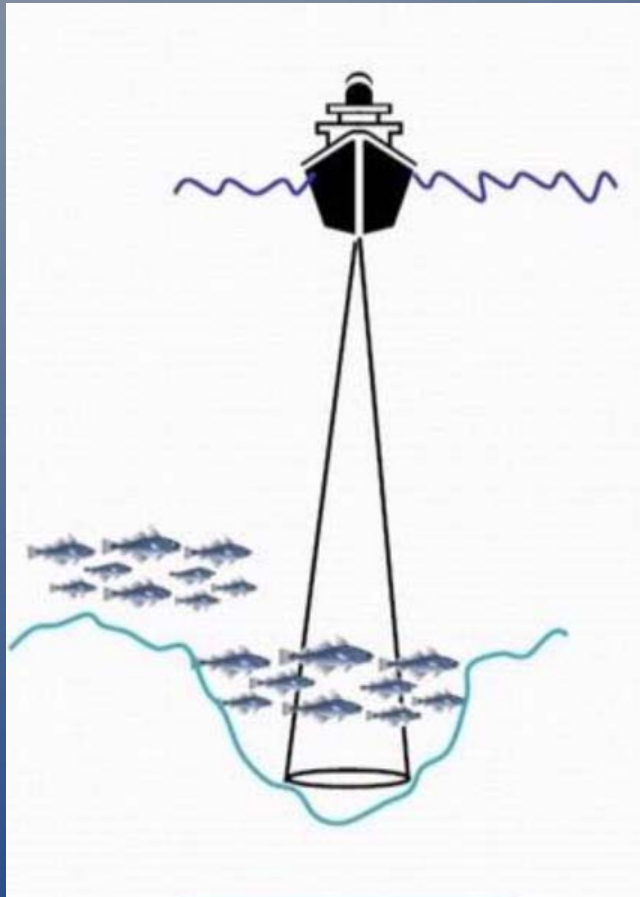
Pre-survey

- Delineate reservoir boundary using available aerial imagery
- Create survey transect planned line file
 - Transects placed perpendicular to existing channels
 - Transects spaced approximately 500 feet apart

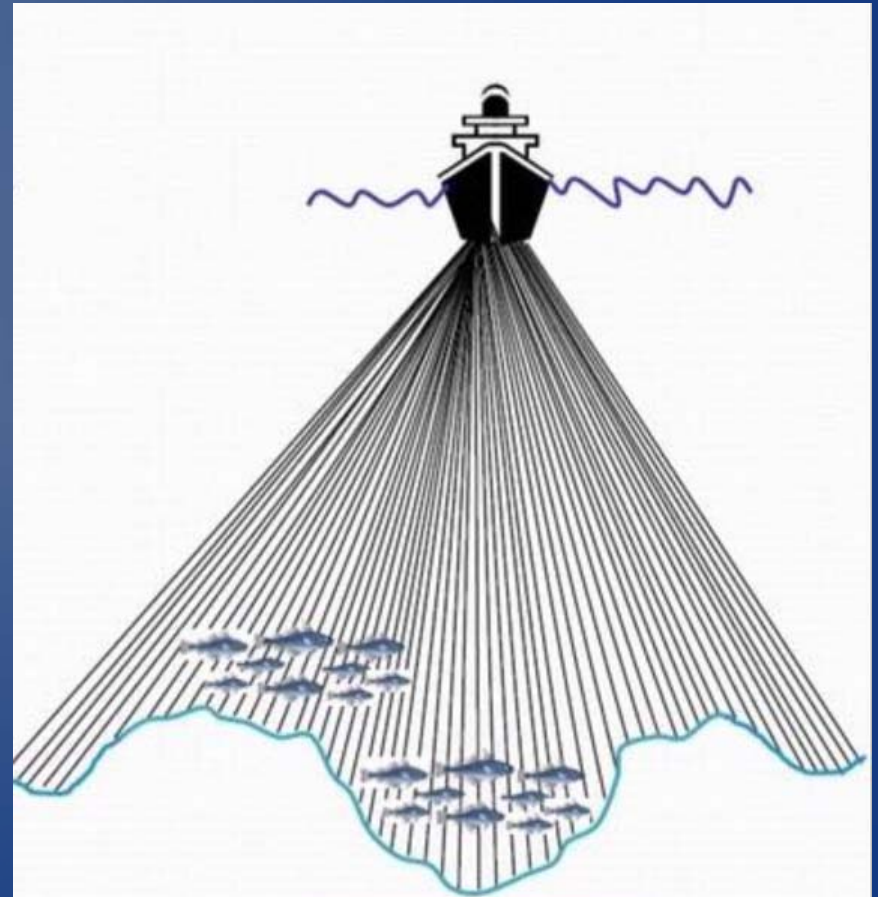


Single Beam Transect vs Multibeam Swath

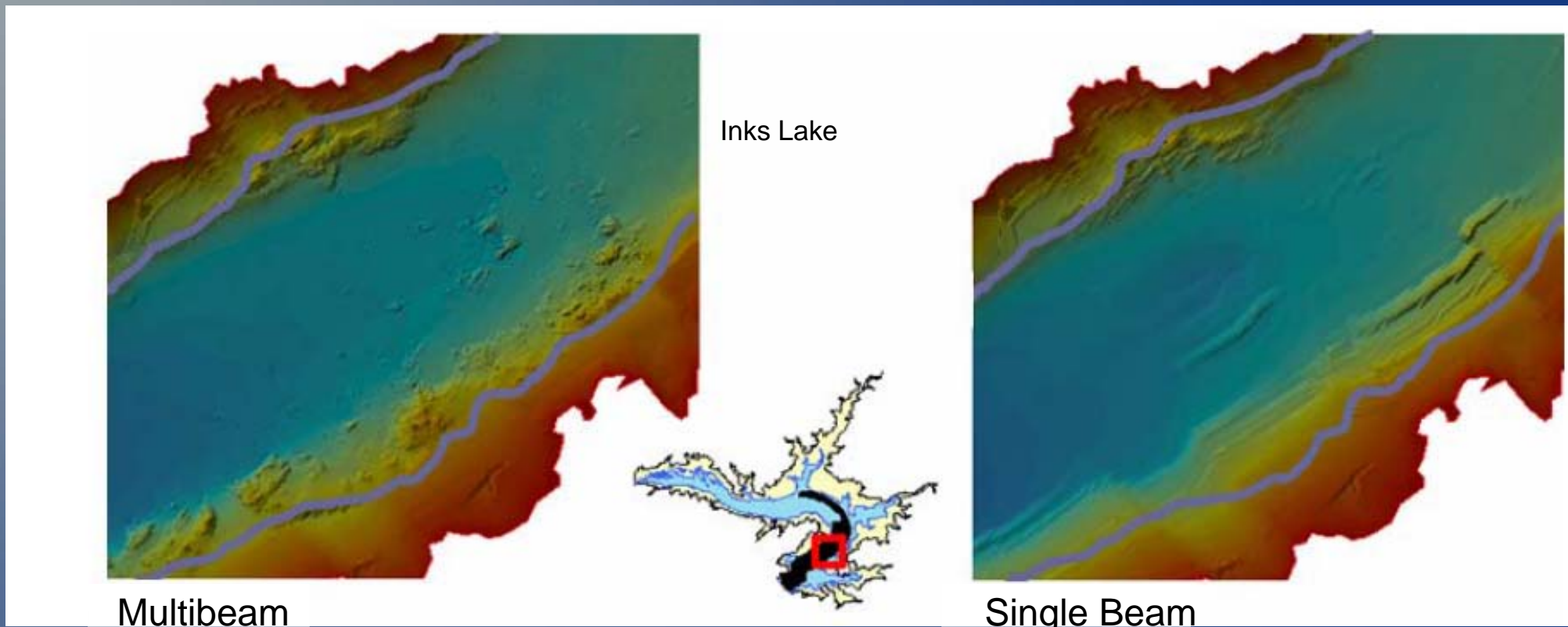
Single Beam Transect



Multibeam



Estimating Survey Accuracy



Data Source	TIN Name	Volume (acre-ft)	ΔV (%)
Multibeam	A	6130.9	\diamond
TWDB Soundings (500ft spacing)	B	5959.2	-2.8%
TWDB Soundings & Interpolated Points	C	6075.7	-0.9%

Pre-survey



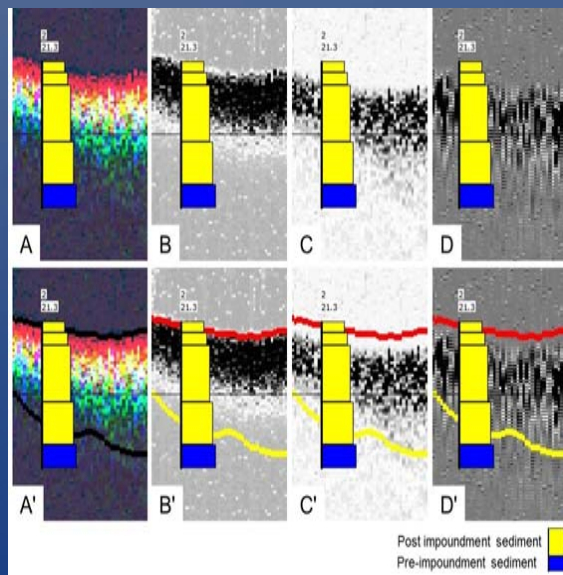
Field data collection



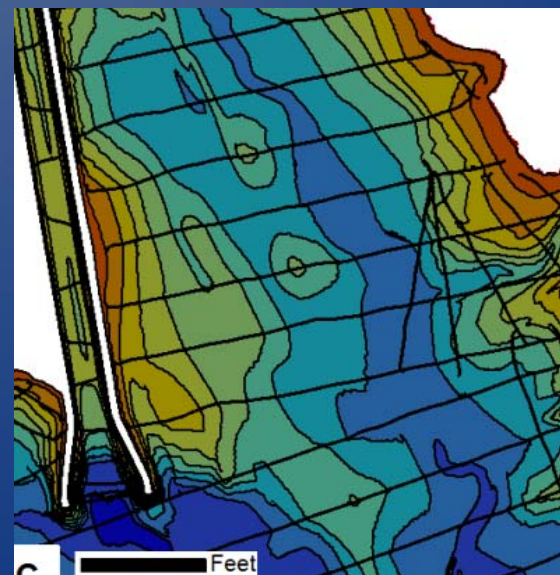
Sediment coring



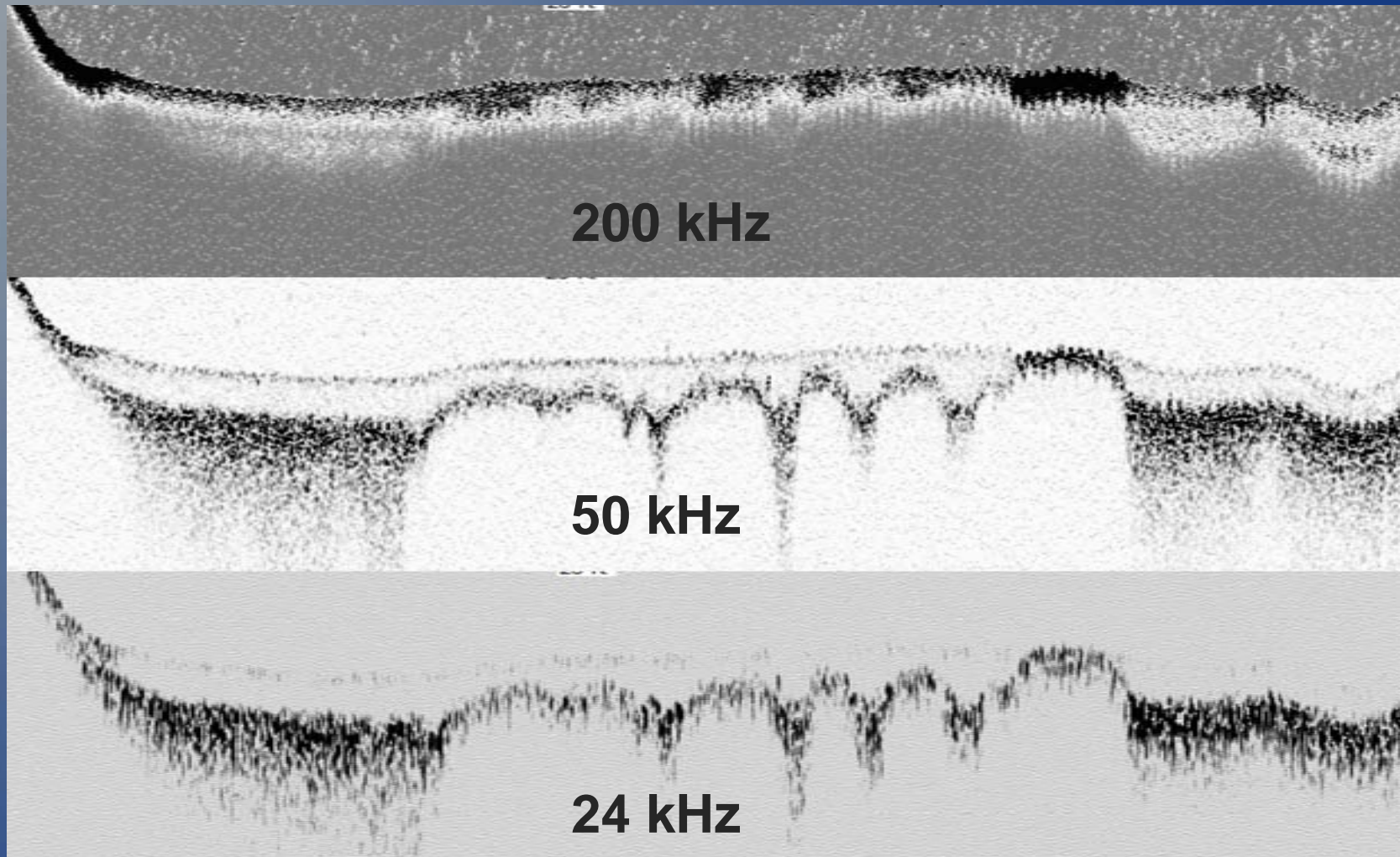
Data analysis



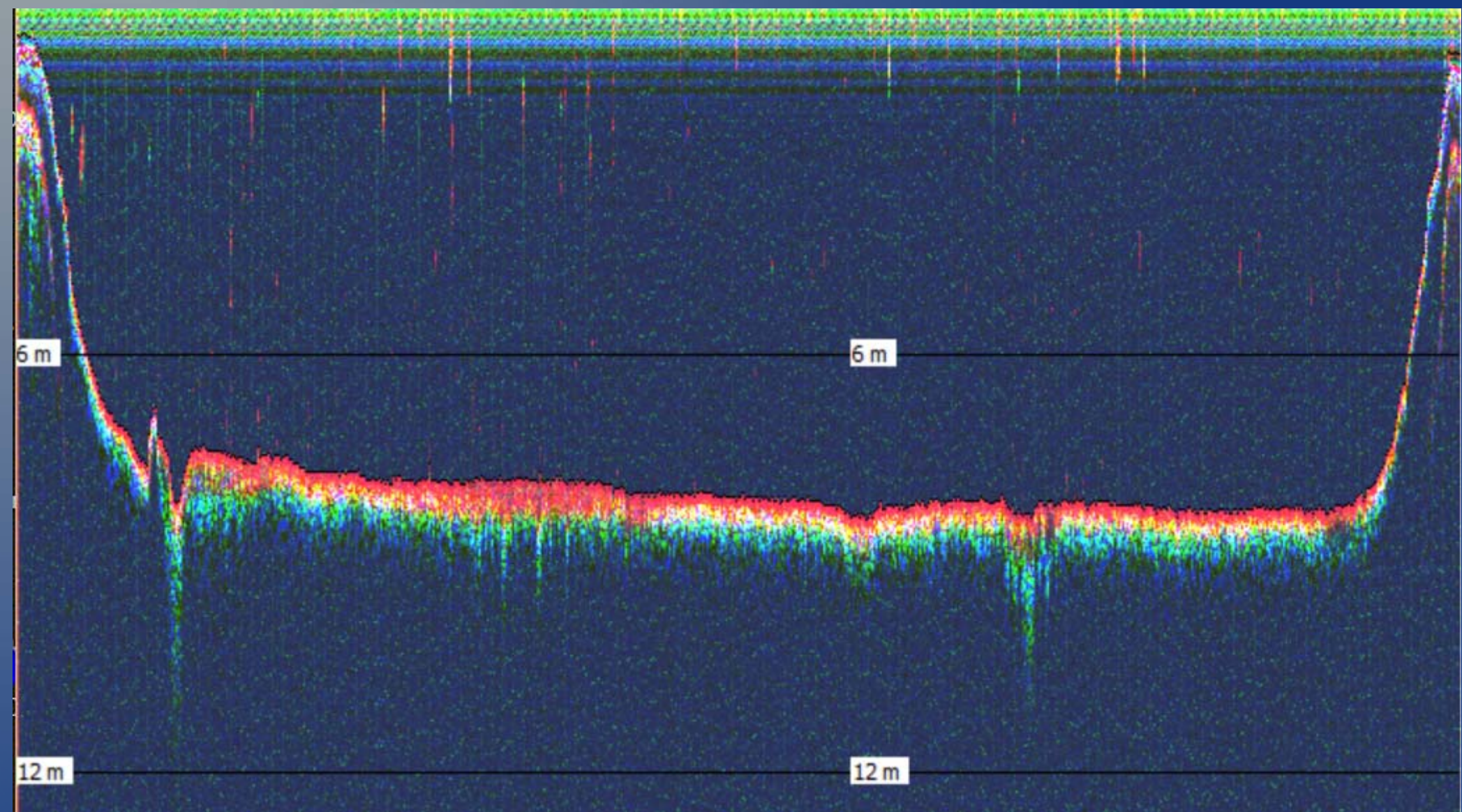
TIN generation



Field Data Collection



- Data collected using single beam, multi-frequency, sub-bottom profiling survey system
- 200, 50, 24 or 12 kHz frequencies



Pre-survey



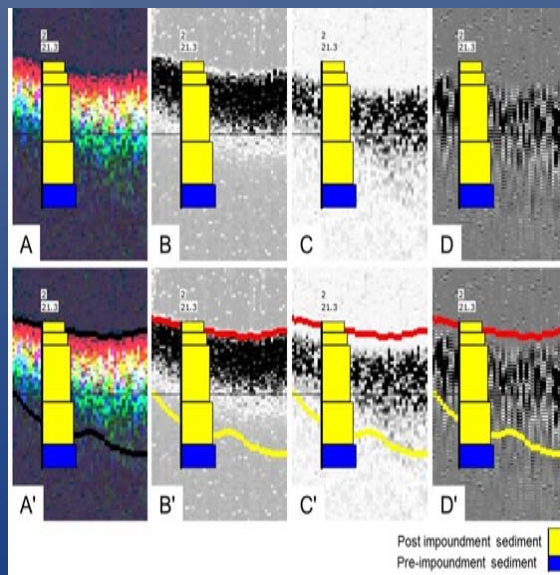
Field data collection



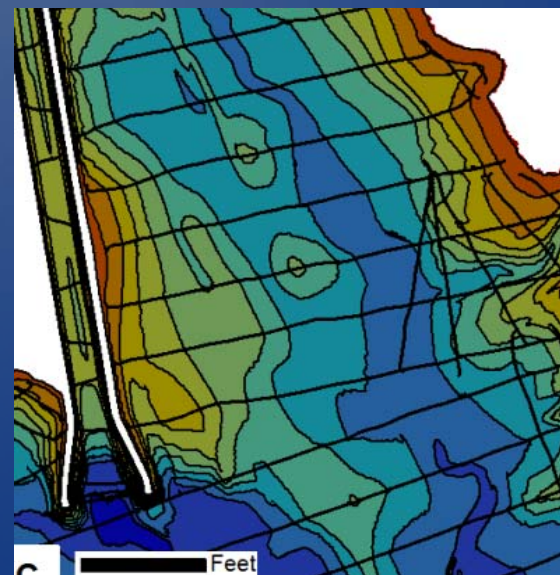
Sediment coring



Data analysis



TIN generation



Sediment Coring

- Coring conducted using vibracoring equipment
- 3-in diameter cores
- Sediment cores penetrate through post-impoundment sediment to pre-impoundment material



Sediment Coring



Core analysis:

- Color
- Texture
- Water content
- Penetrative resistance
- Presence of organic materials

Pre-survey



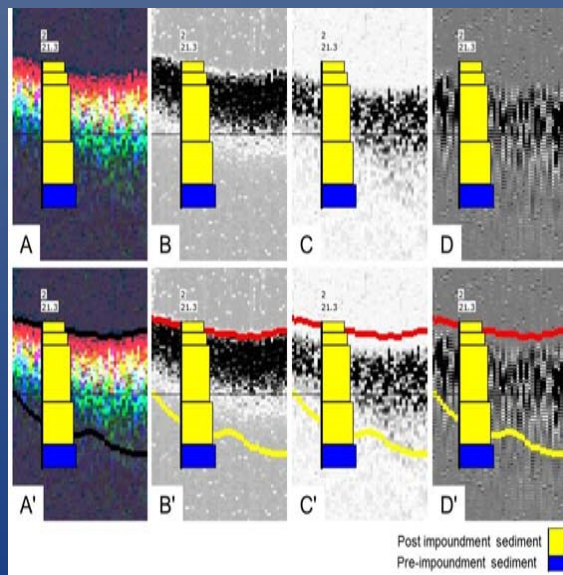
Field data collection



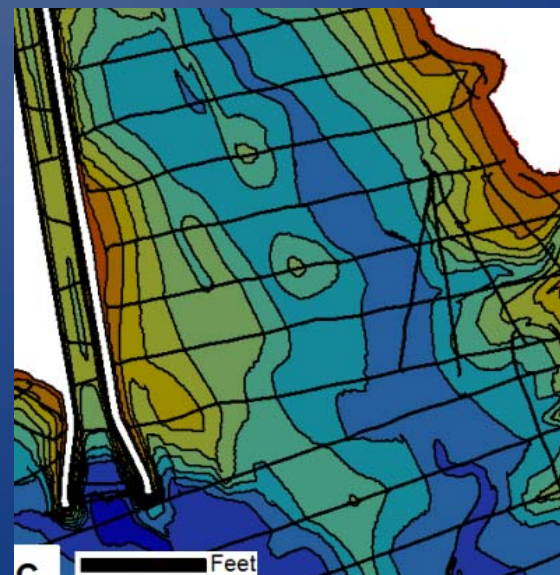
Sediment coring



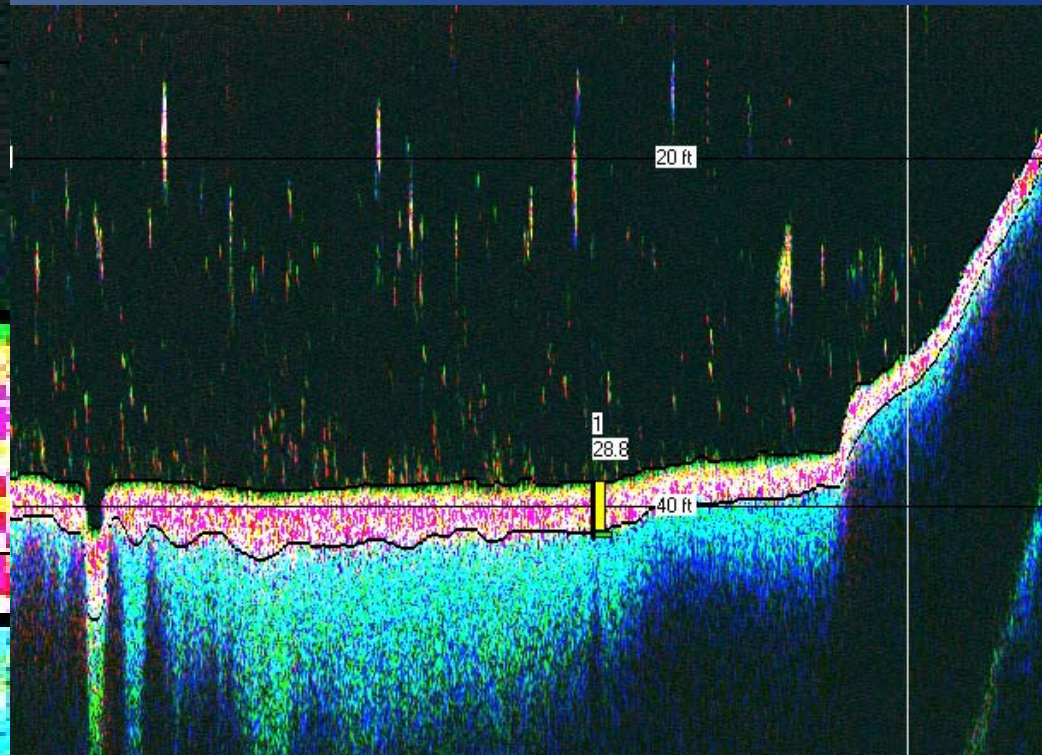
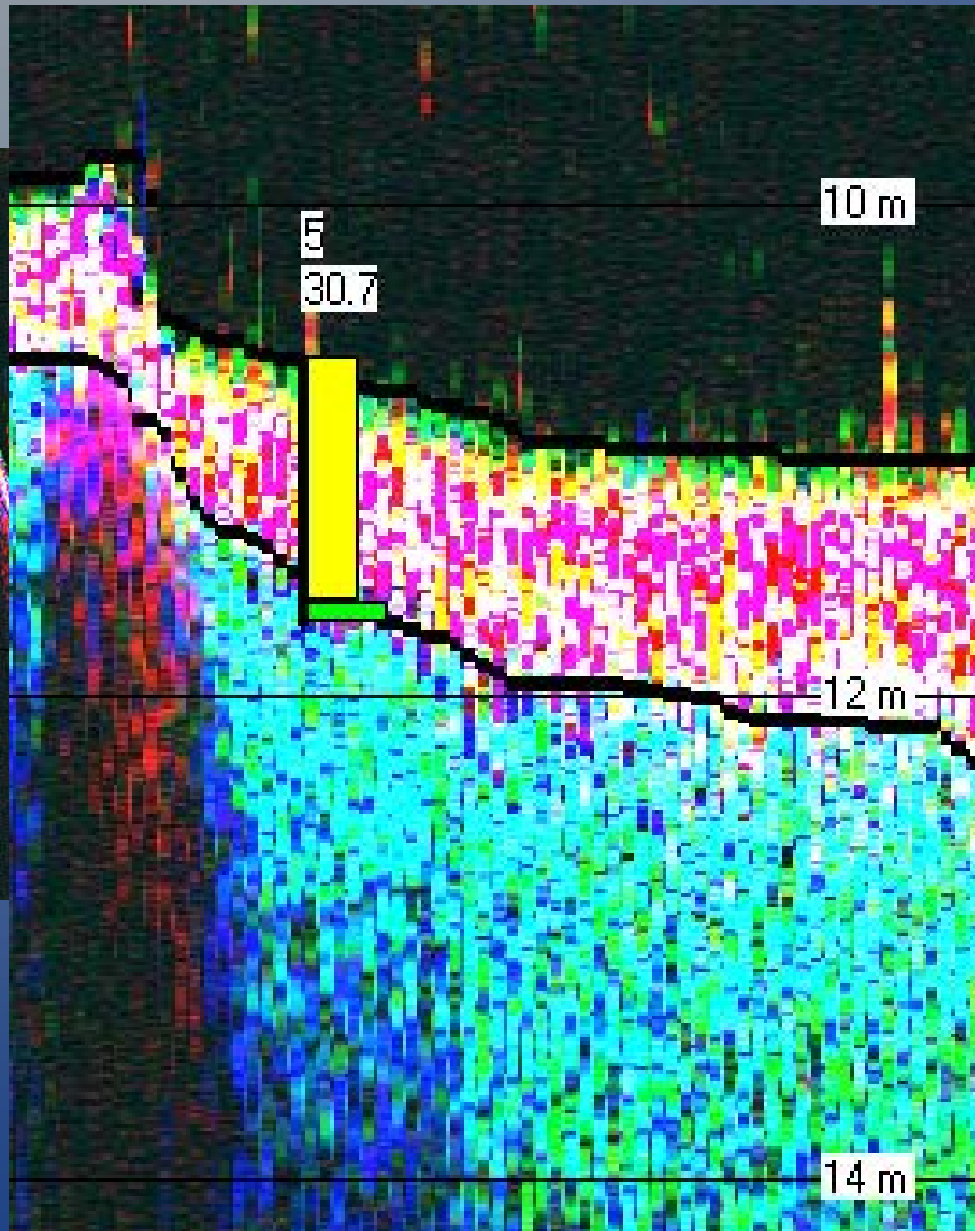
Data analysis

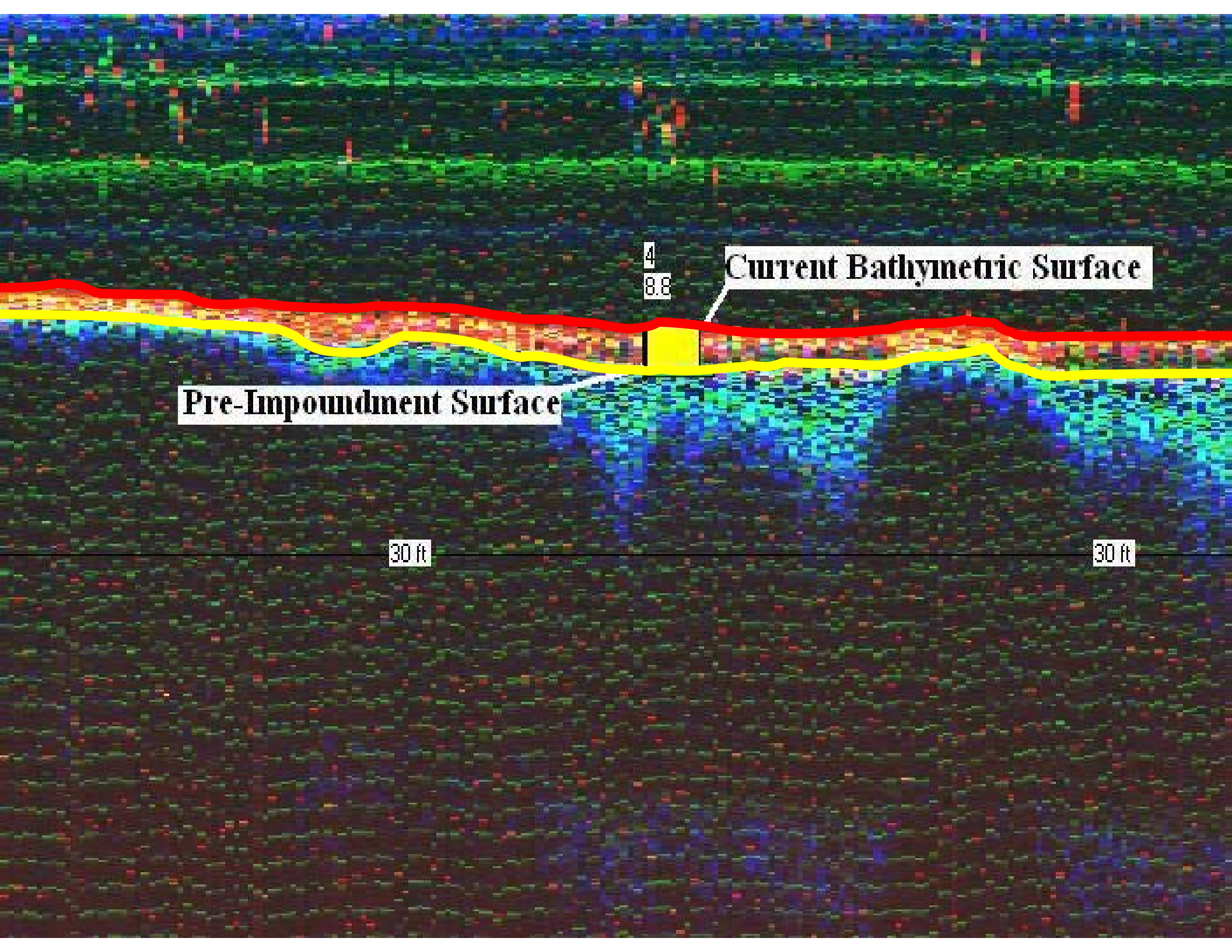


TIN generation



Data Analysis





Current Bathymetric Surface

Pre-Impoundment Surface

4
8.8

30 ft

30 ft

Pre-survey



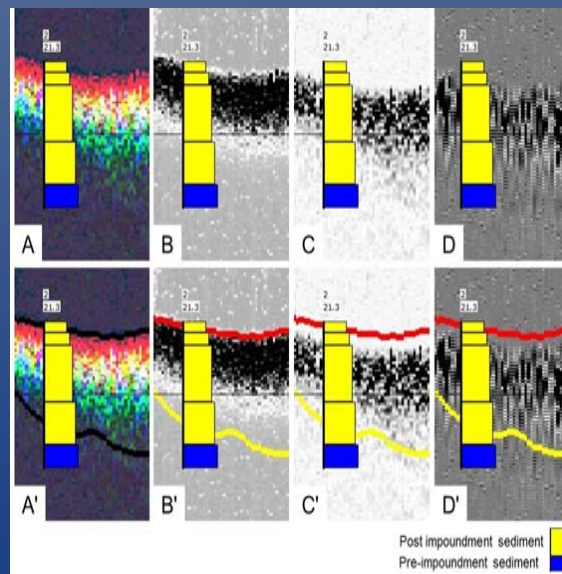
Field data collection



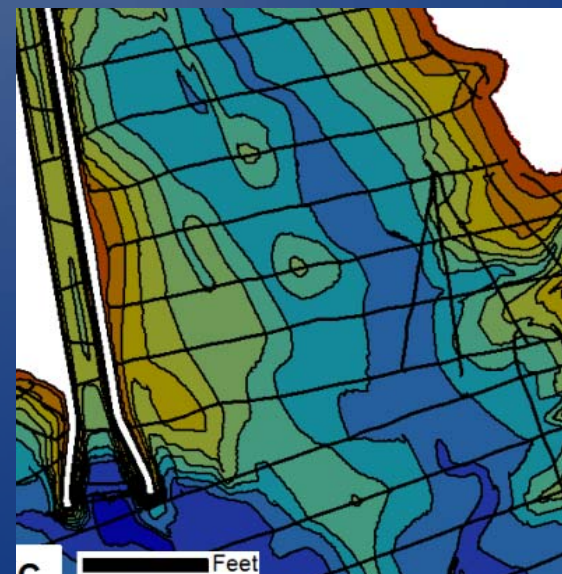
Sediment coring



Data analysis



TIN generation



Data Interpolation, TIN Model Generation

- Cleaned survey data imported to ArcGIS
- An anisotropic interpolation is used to assign depth values to a grid of points between survey transects
- TIN model created from current surface X,Y, Z points

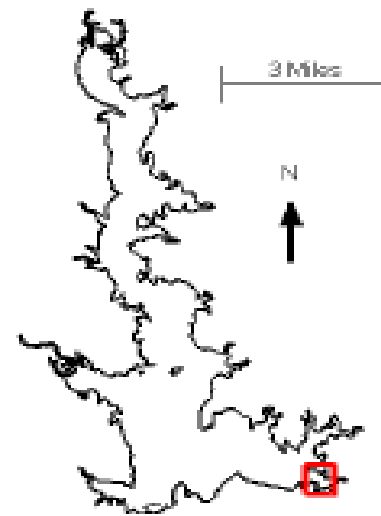
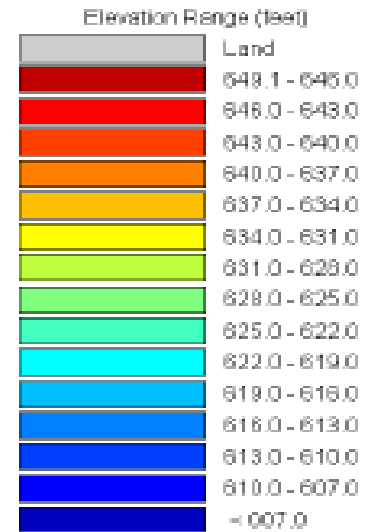
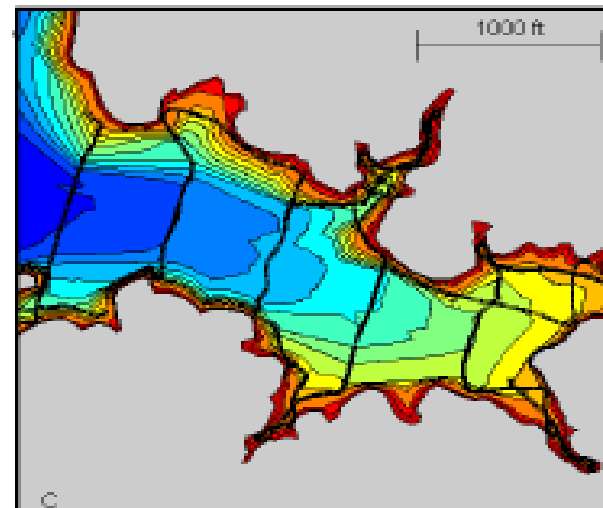
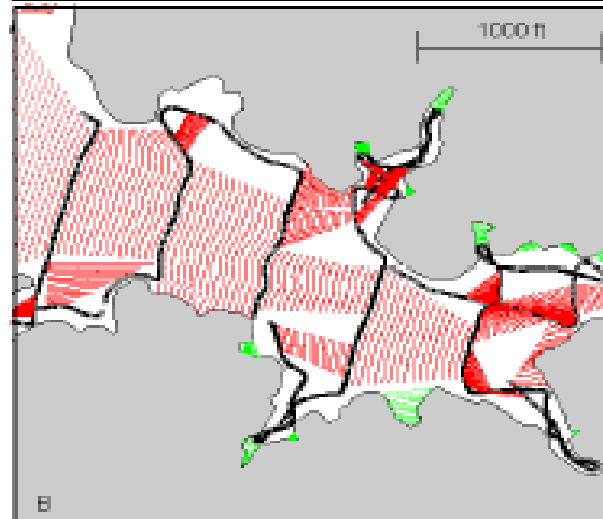
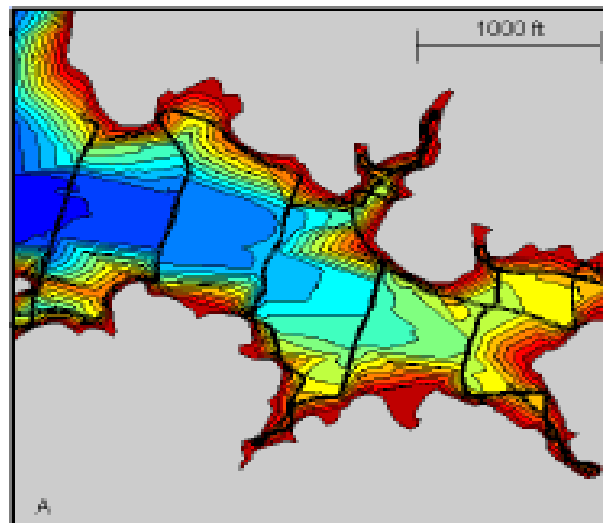
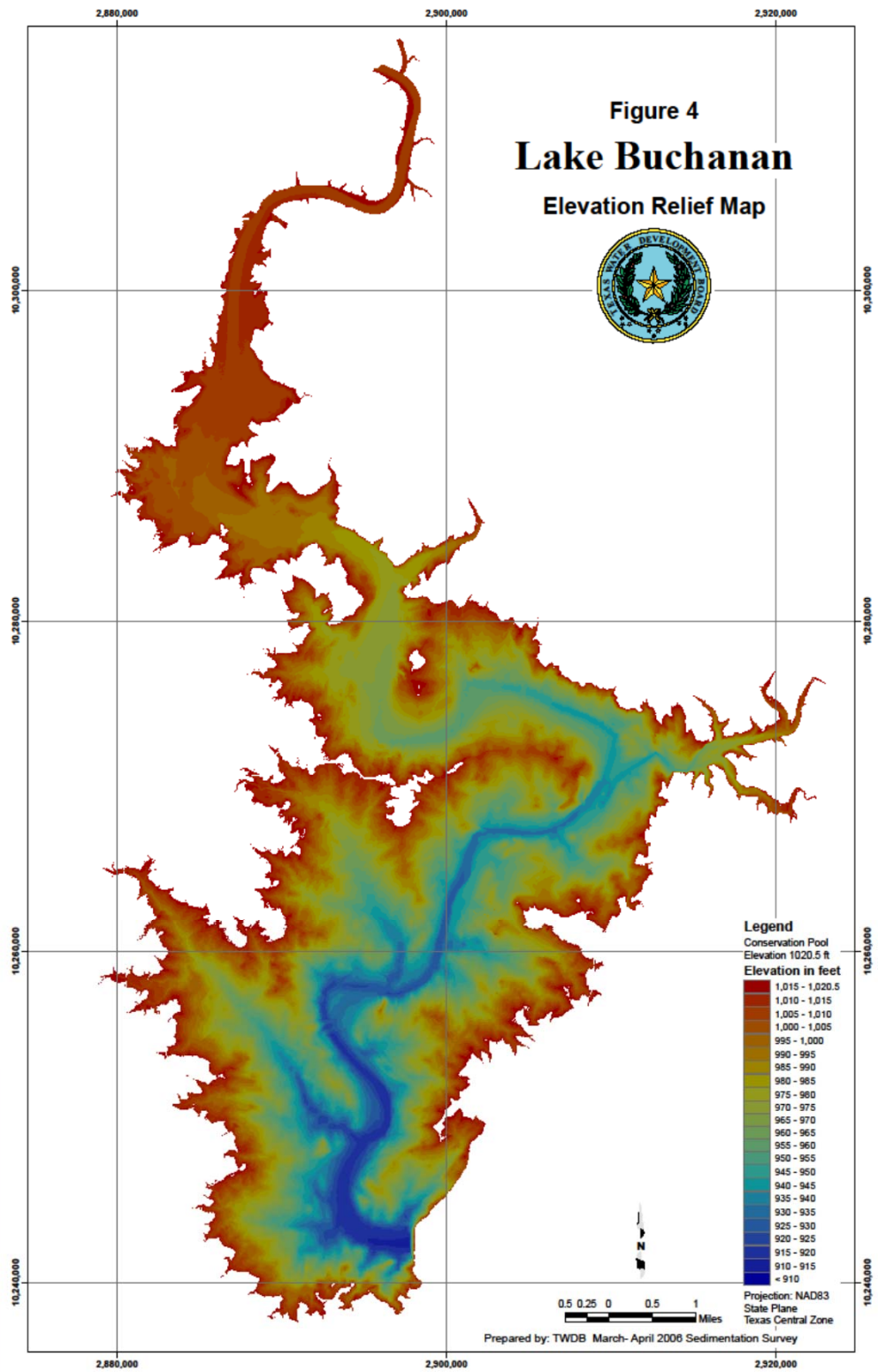


Figure 4
Lake Buchanan
Elevation Relief Map



Legend

Conservation Pool
Elevation 1020.5 ft

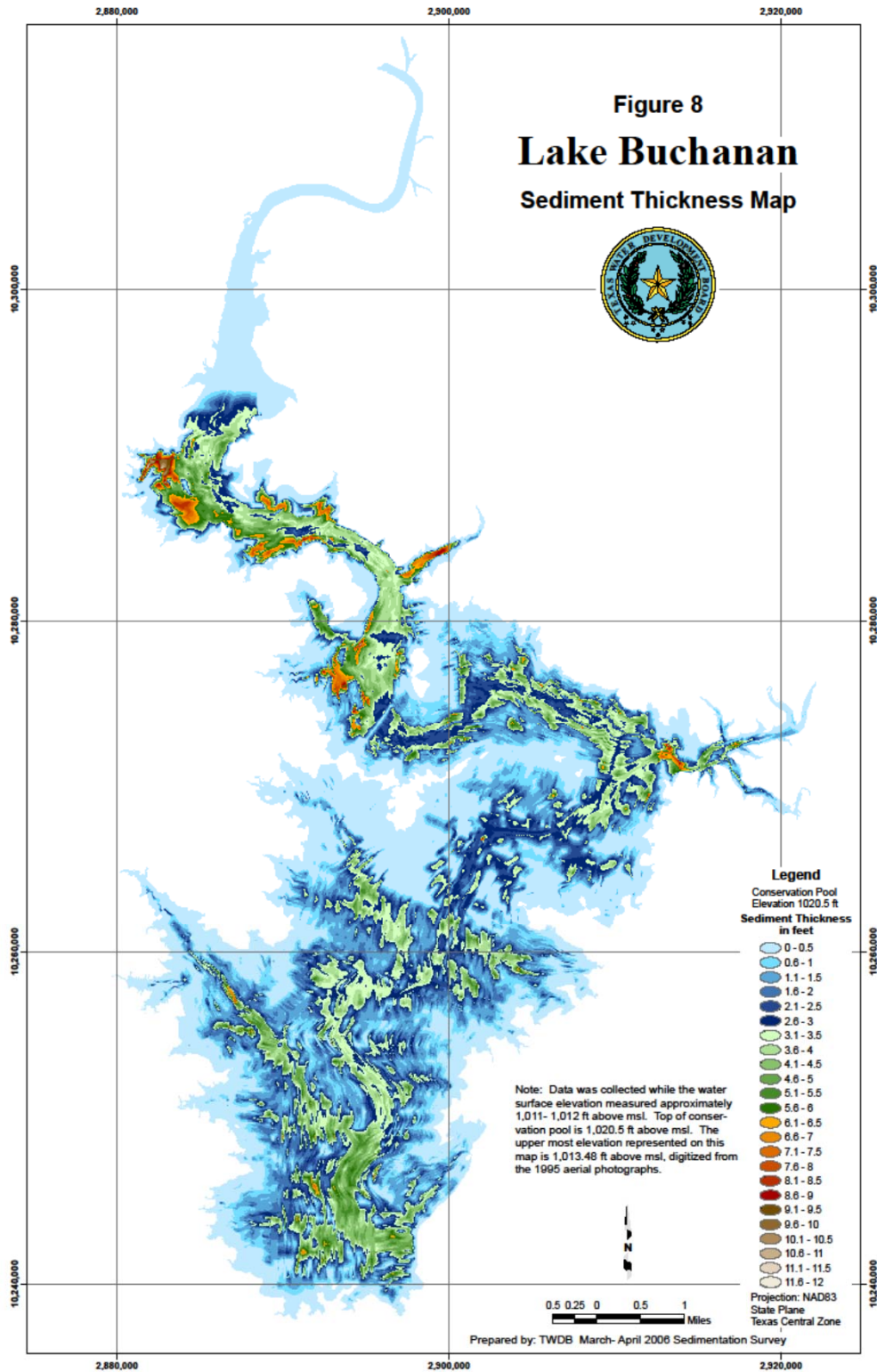
Elevation in feet

1,015 - 1,020.5
1,010 - 1,015
1,005 - 1,010
1,000 - 1,005
995 - 1,000
990 - 995
985 - 990
980 - 985
975 - 980
970 - 975
965 - 970
960 - 965
955 - 960
950 - 955
945 - 950
940 - 945
935 - 940
930 - 935
925 - 930
920 - 925
915 - 920
910 - 915
< 910

Projection: NAD83
State Plane
Texas Central Zone

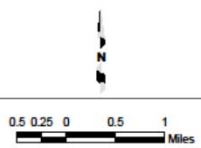
Prepared by: TWDB March-April 2008 Sedimentation Survey

Figure 8
Lake Buchanan
Sediment Thickness Map



- Legend**
 Conservation Pool
 Elevation 1020.5 ft
Sediment Thickness
 in feet
- 0 - 0.5
 - 0.6 - 1
 - 1.1 - 1.5
 - 1.6 - 2
 - 2.1 - 2.5
 - 2.6 - 3
 - 3.1 - 3.5
 - 3.6 - 4
 - 4.1 - 4.5
 - 4.6 - 5
 - 5.1 - 5.5
 - 5.6 - 6
 - 6.1 - 6.5
 - 6.6 - 7
 - 7.1 - 7.5
 - 7.6 - 8
 - 8.1 - 8.5
 - 8.6 - 9
 - 9.1 - 9.5
 - 9.6 - 10
 - 10.1 - 10.5
 - 10.6 - 11
 - 11.1 - 11.5
 - 11.6 - 12

Note: Data was collected while the water surface elevation measured approximately 1,011- 1,012 ft above msl. Top of conservation pool is 1,020.5 ft above msl. The upper most elevation represented on this map is 1,013.48 ft above msl, digitized from the 1995 aerial photographs.

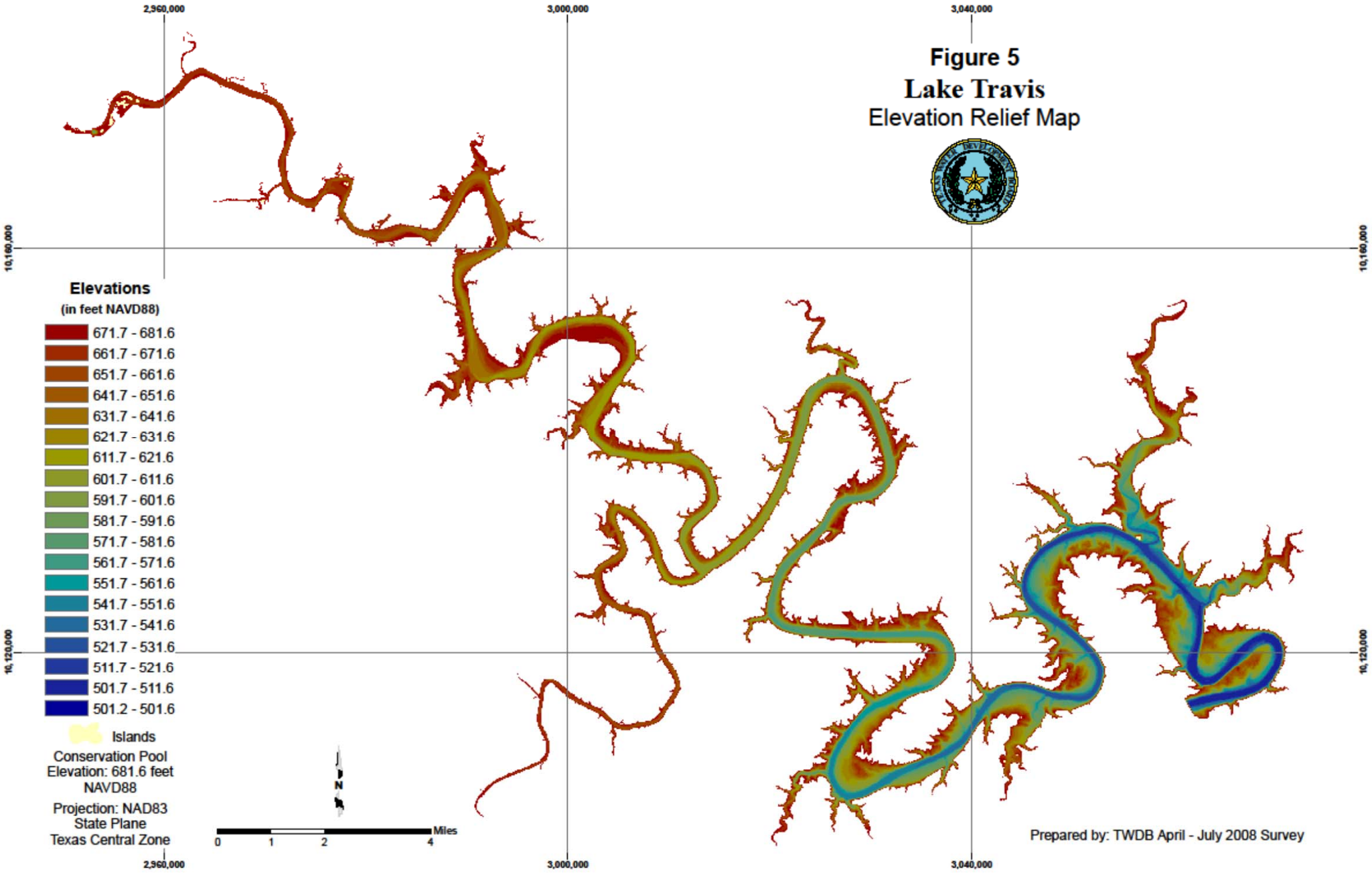


Projection: NAD83
 State Plane
 Texas Central Zone

Prepared by: TWDB March-April 2006 Sedimentation Survey

Lake Buchanan 2006 Sedimentation Survey	Volume comparisons at conservation pool elevation 1020.5 ft NGVD 29 (acre-feet)
TWDB pre-impoundment estimate based on 2006 survey	920,901
2006 volumetric survey	886,626
Volume difference (acre-feet)	34,275
Number of years since impoundment	68
Capacity loss rate (acre- feet/year)	504

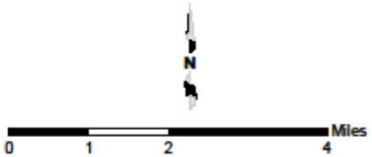
Figure 5
Lake Travis
Elevation Relief Map



Elevations
 (in feet NAVD88)

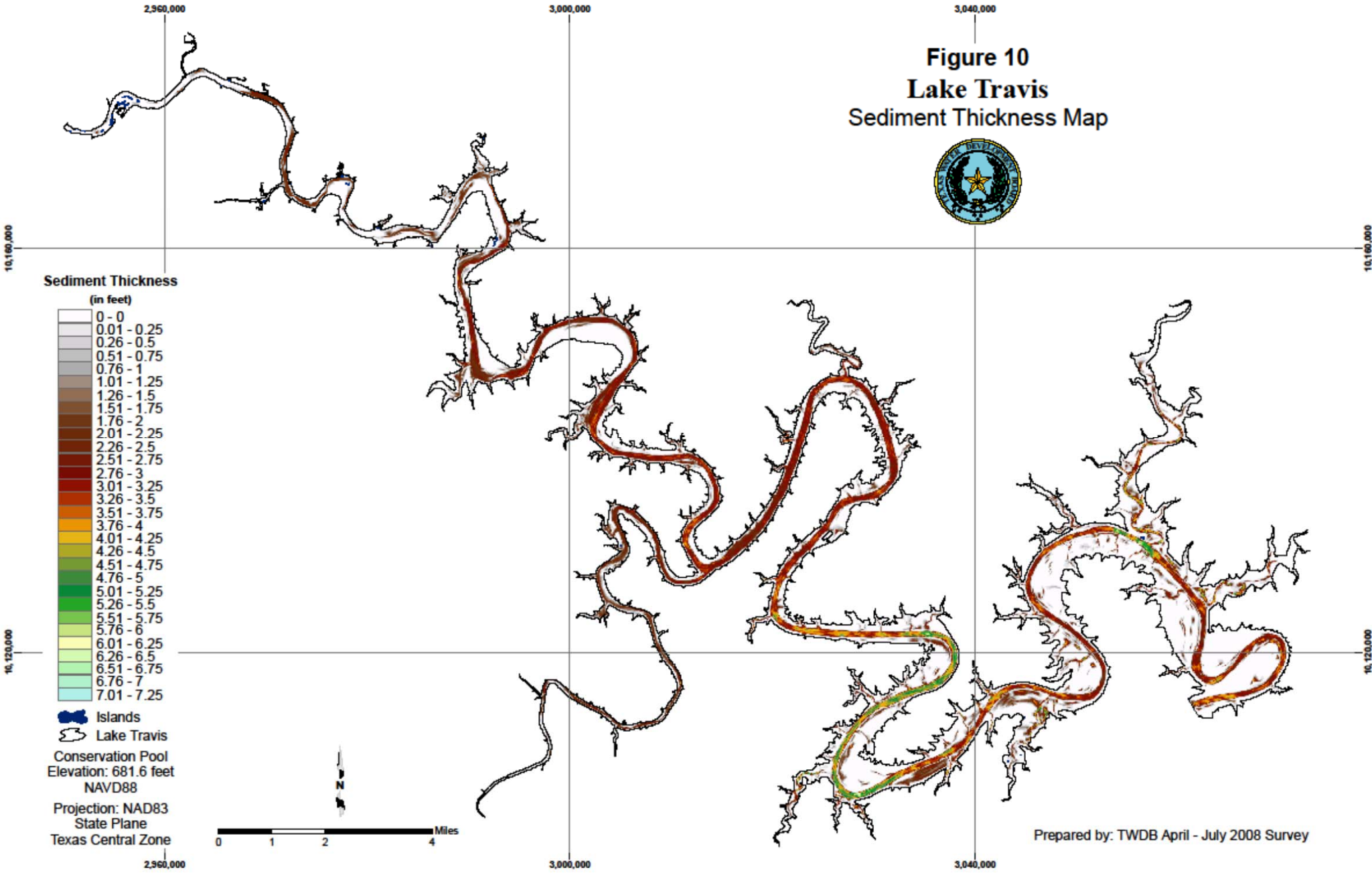
- 671.7 - 681.6
- 661.7 - 671.6
- 651.7 - 661.6
- 641.7 - 651.6
- 631.7 - 641.6
- 621.7 - 631.6
- 611.7 - 621.6
- 601.7 - 611.6
- 591.7 - 601.6
- 581.7 - 591.6
- 571.7 - 581.6
- 561.7 - 571.6
- 551.7 - 561.6
- 541.7 - 551.6
- 531.7 - 541.6
- 521.7 - 531.6
- 511.7 - 521.6
- 501.7 - 511.6
- 501.2 - 501.6

Islands
 Conservation Pool
 Elevation: 681.6 feet
 NAVD88
 Projection: NAD83
 State Plane
 Texas Central Zone



Prepared by: TWDB April - July 2008 Survey

Figure 10
Lake Travis
Sediment Thickness Map



Sediment Thickness

(in feet)

0 - 0
0.01 - 0.25
0.26 - 0.5
0.51 - 0.75
0.76 - 1
1.01 - 1.25
1.26 - 1.5
1.51 - 1.75
1.76 - 2
2.01 - 2.25
2.26 - 2.5
2.51 - 2.75
2.76 - 3
3.01 - 3.25
3.26 - 3.5
3.51 - 3.75
3.76 - 4
4.01 - 4.25
4.26 - 4.5
4.51 - 4.75
4.76 - 5
5.01 - 5.25
5.26 - 5.5
5.51 - 5.75
5.76 - 6
6.01 - 6.25
6.26 - 6.5
6.51 - 6.75
6.76 - 7
7.01 - 7.25

- Islands
- Lake Travis

Conservation Pool
 Elevation: 681.6 feet
 NAVD88

Projection: NAD83
 State Plane
 Texas Central Zone



Prepared by: TWDB April - July 2008 Survey

Lake Travis 2008 Sedimentation Survey	Volume comparisons at conservation pool elevation 681.6 ft NAVD 88 (acre-feet)
TWDB pre-impoundment estimate based on 2008 survey	1,151,837
2008 volumetric survey	1,134,863
Volume difference (acre-feet)	16,974
Number of years since impoundment	67.8
Capacity loss rate (acre- feet/year)	250

Questions?

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