

# SEDIMENT REMOVAL:

ARE YOU GETTING WHAT YOU ARE  
PAYING FOR?

Sandy Kubillus

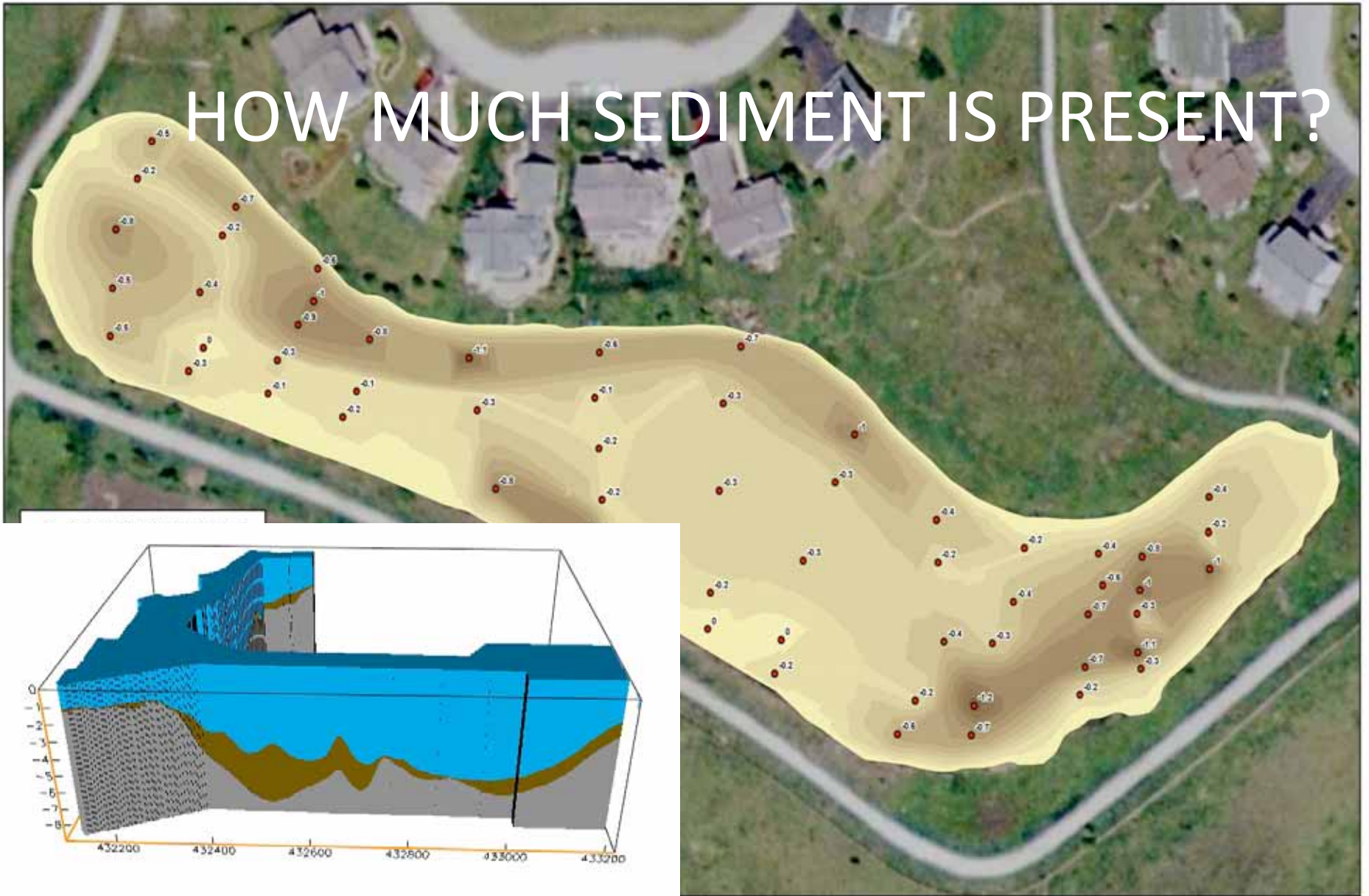


**Integrated Lakes  
Management, Inc.**

Lake and Pond Management  
Restoration ■ Consulting



# HOW MUCH SEDIMENT IS PRESENT?



## Sanctuary Pond - Sediment

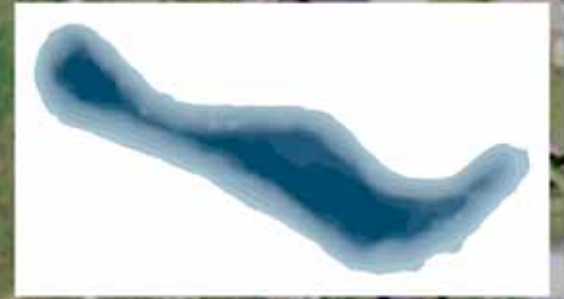
Lake County, IL



Copyright © 2008 Cabela's Trout Properties, LLC. All rights reserved. The portion of this map that is photographic, electronically stored or reproduced in any manner without permission from Cabela's Trout Properties, LLC. Reasonable efforts have been made by Cabela's Trout Properties, LLC ("Cabela's") to verify that this map accurately depicts the source data used in its preparation. However, a degree of error is inherent in all maps, and this map may contain omissions and errors in scale, direction, orientation, positional accuracy, nomenclature, methodology, integration of source data, and other characteristics. CABELA'S DISCLAIMS ANY AND ALL WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. CABELA'S SHALL NOT BE LIABLE TO ANY PERSON UNDER ANY LEGAL OR EQUITABLE THEORY FOR DAMAGES ARISING OUT OF THE USE OF THIS MAP, INCLUDING, WITHOUT LIMITATION, FOR DIRECT, INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES. This map is data security and is intended for use only at the customer's locale. Nothing in this map imparts the right to use private property, which may be within or be bounded by the customer shown on this map. Do not use this map for aviation navigation, swimming, diving, or other related activities, as it does not depict all information necessary to perform these activities safely.



# BEST METHOD

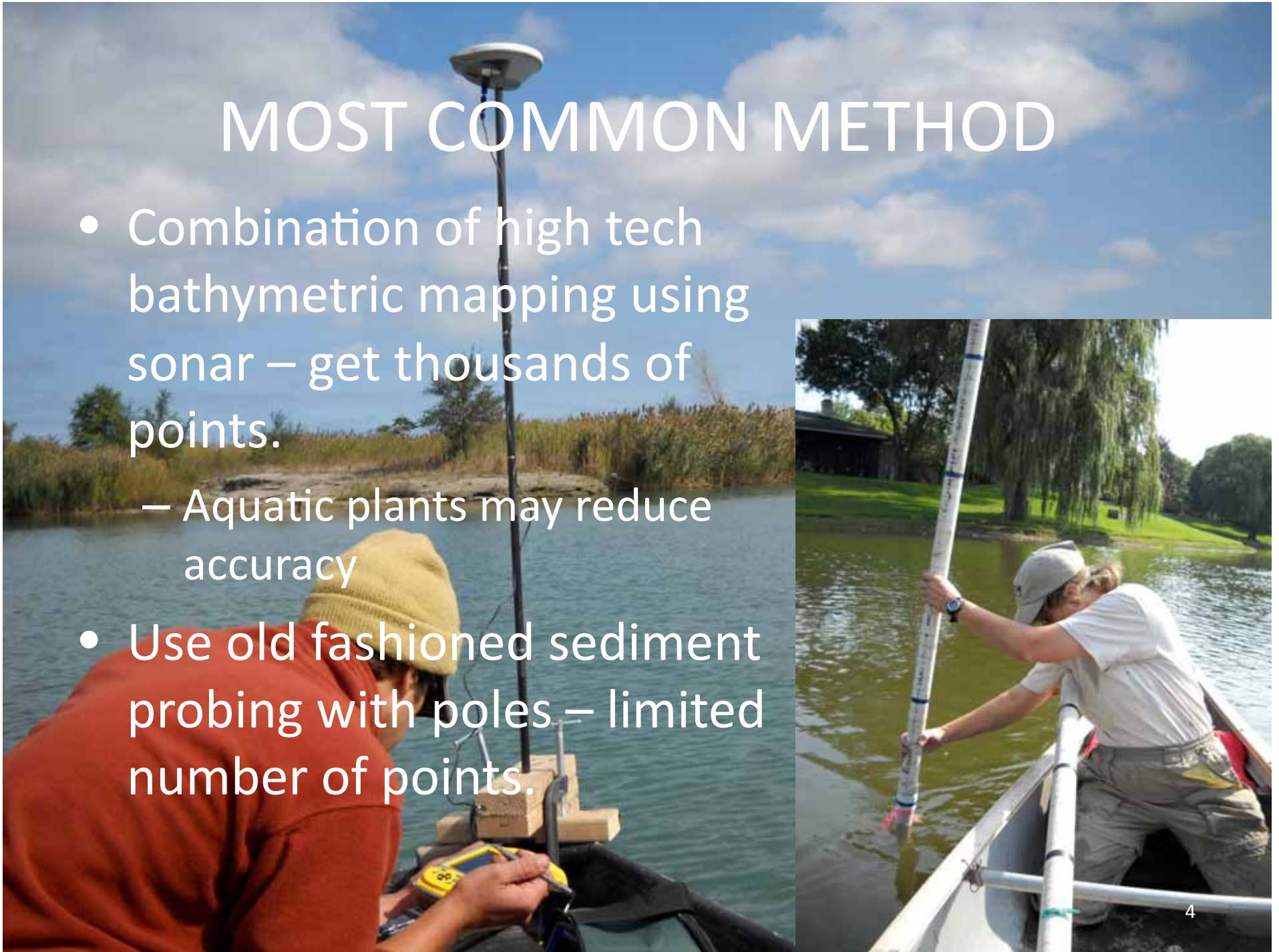


- Compare current bathymetric map to historic one.

- Can have thousands of data points – so it is the most accurate.
- Downfall is that many lakes do not have digital historic bathymetric maps.
- If aquatic plants present at time of survey – maps may not be accurate.

# MOST COMMON METHOD

- Combination of high tech bathymetric mapping using sonar – get thousands of points.
  - Aquatic plants may reduce accuracy
- Use old fashioned sediment probing with poles – limited number of points.





# VARIABLES IN DETERMINING SEDIMENT THICKNESS

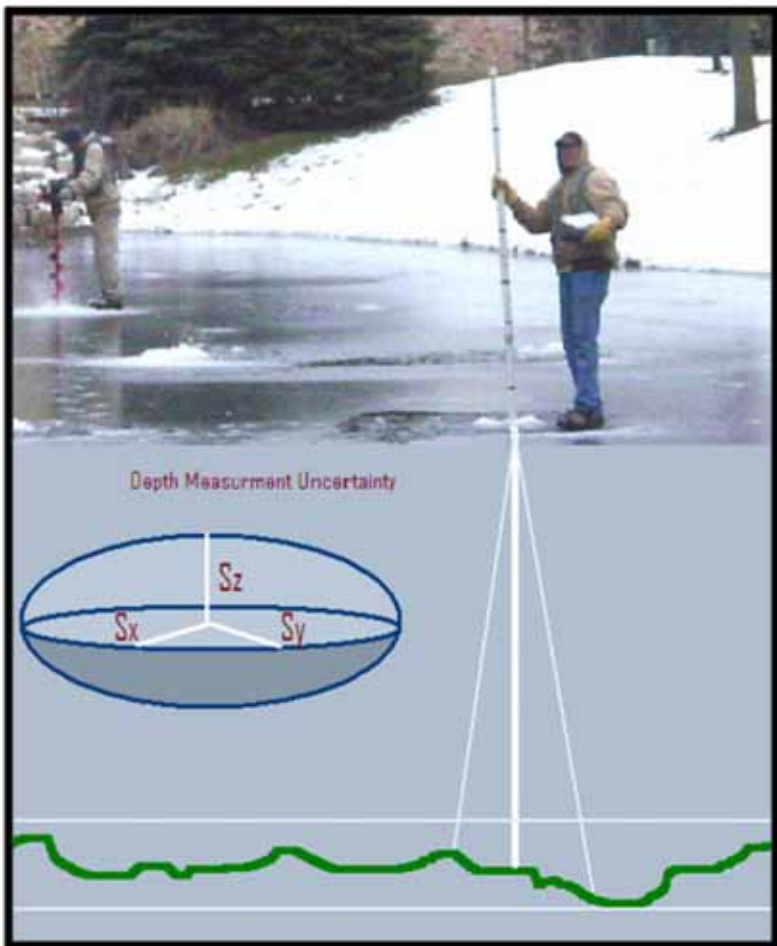


Figure 1: Three-dimensional uncertainty of a measured depth represented as an error ellipsoid. The horizontal light blue lines represent vertical inaccuracy, and the vertical blue lines represent x,y inaccuracy

## Probing variables:

- Location
- Human strength (Should be same person)
  - Found 18% difference when 2 people probed same pond.
- Type of lake bottom
  - clay vs. peat
- Reading the probe
- Angle of probe
- Type of probe
  - PVC vs. metal

# PROBING VARIABLES (cont.)



- Measuring the sediment water interface.
- Varies depending on sediment type
  - Analogous to snow –
    - soft and fluffy – hard to measure
    - Compacted - easy to measure



# DATA COLLECTION VARIABLES

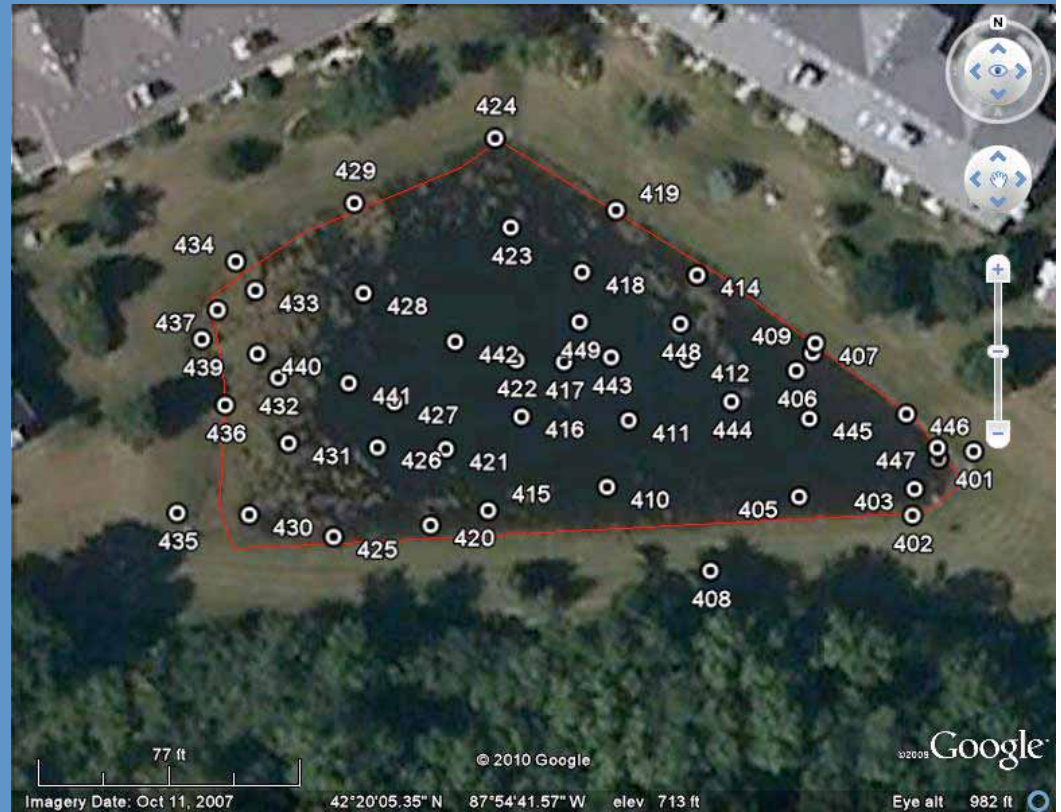
- How many transects? How many data points?
- Generally, the more data points the better.
  - Ponds: 15 – 35 points/acre
  - Lakes: 2 – 20 points/acre
  - Larger lakes have fewer points
- Need to choose transects wisely
  - Depends on shape of lake





# DATA COLLECTION VARIABLES

- GPS Accuracy –
  - Basic handheld units
    - Low cost models
    - 15+ foot accuracy
  - Field computers with GPS
    - Expensive models
    - Sub-foot accuracy
    - Need 5+ satellites available
- Interpretation of GPS point locations
  - Some points may have obvious errors





# Average Sediment Thickness

- Mapping data points vs. averaging data.
- Easy way is to probe a few points and average the data.
- More accurate method is to map the points with a gps and determine area represented by each point.
  - Out of 6 ponds found an average of 8% variability (1.6 – 21% range)
  - Out of 6 lake studies found an average of 35% variability (7.1 – 55.6% range)



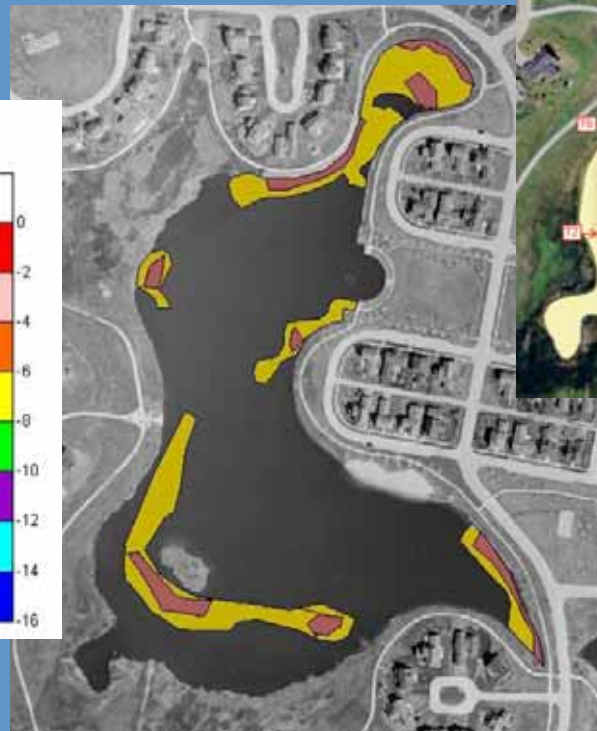
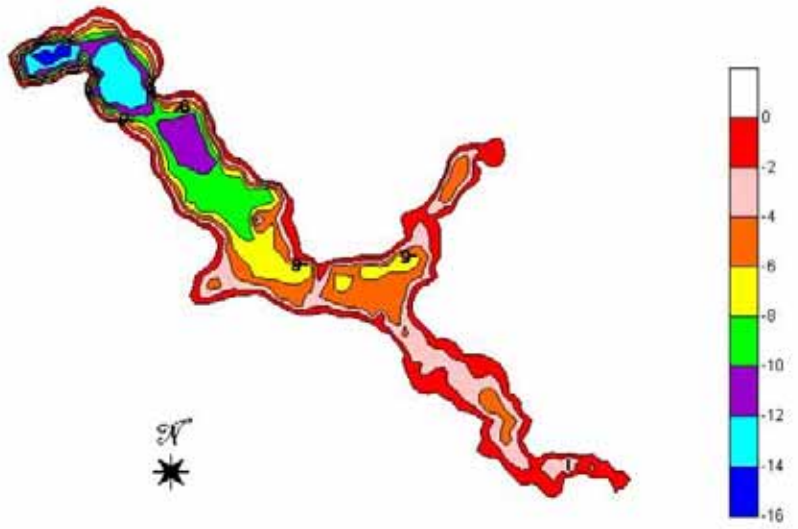
# MAPPING VARIABLES

- Model chosen to determine Sediment volume

Arc View 3D analyst (best)

Arc View w/o 3D analyst

Surfer





# SEDIMENT VOLUME

- How much sediment is removed vs. volume to be disposed?
- Sediment shrinks as it is dewatered and dries.
  - This sample lost 61% of its weight and 40% of its volume.
- May be more or less depending on type of sediment



# SEDIMENT REMOVAL

- Sediment in the lake is removed based on volume.
- Volume determined from mapping.
- Much of volume may be water.





# SEDIMENT DISPOSAL

- Sediment trucked off-site is based on weight – usually after it has been dried.



# HOW DO DREDGERS CHARGE?

- Depends on method of dredging / sediment removal
  - Usually based on sediment volume
    - Charge per cubic yard
    - Wet or dry sediment
  - May be based on time
    - Used by diving method
    - Divers limited by # hours can spend underwater.
    - Filter bag use limited by pumping rates, particle size and % solids being pumped.





## If you are considering sediment removal:

1. Determine how much in-situ sediment is in the lake or pond (this will be a point of reference when determining if the contractor has met the agreed upon performance standards.
2. Acquire appropriate permits.  
    May need to determine particle size analysis and other sediment quality tests
3. If possible, determine the volume of dry sediment (typically ~50% moisture)
4. Get quotes from experienced service providers using this information (be sure to consider the method and cost of getting rid of the sediment).
5. Re-measure in-situ sediment after work is completed to verify performance.

# QUESTIONS?



Contact: Sandy Kubillus

847-244-6662

[skubillus@lakesmanagement.com](mailto:skubillus@lakesmanagement.com)

[www.lakesmanagement.com](http://www.lakesmanagement.com)