2024 Dobson Ranch Sediment Survey

July 09, 2024

Presented by Aquatic Consulting and Testing, Inc.

Background

- A similar study was conducted in 2003 and 2014 to assess the amount of sediment in the lakes and future needs for dredging.
- The 2024 study used a new technique to measure and analyze data.

Background (Con.)

- The previous studies were completed using discreet manual water column and sediment readings linked to gps locations
- The 2024 study used advanced sonar mapping and server analysis to measure and analyze data.

Background (Con.)

- The previous studies recorded approximately 100 measurements per acre
- The use of sonar data acquisition allowed for more than 2,000 measurements per acre

Background Information

- The new study shows how the sediment is now distributed in the lakes.

- Sediment may:
  - Accumulate
  - Decompose
  - Compress
  - Diffuse
  - Shift

Data Analysis Methods

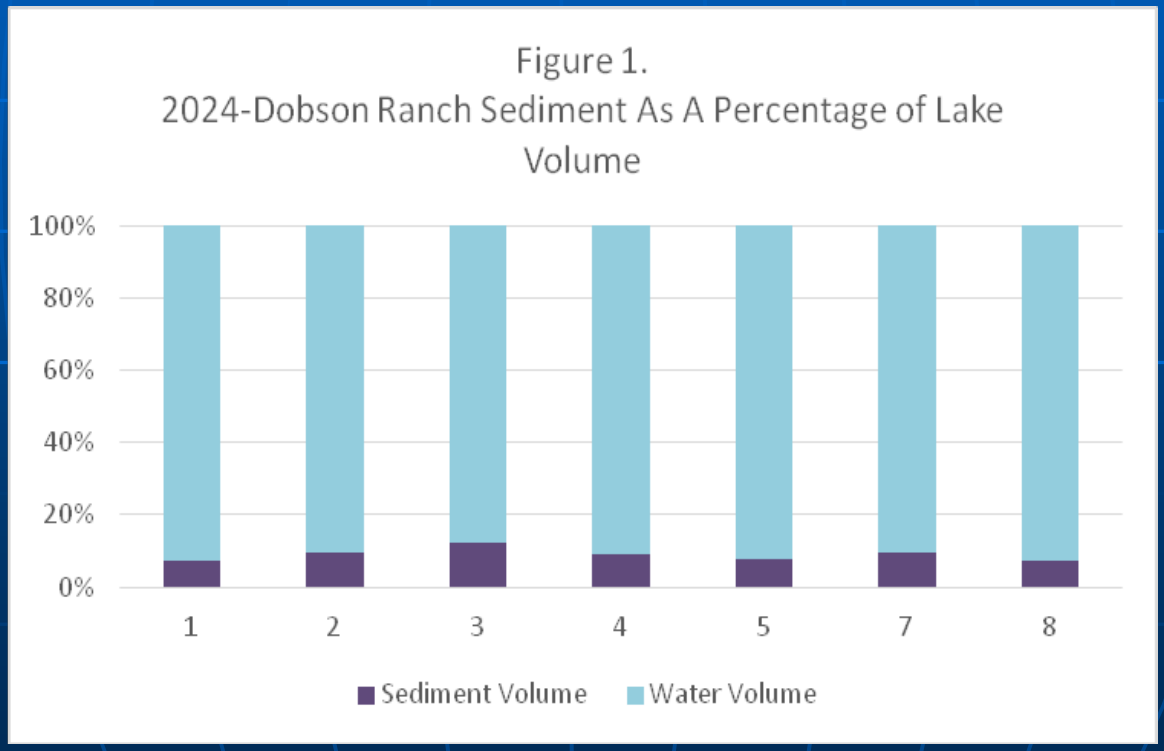
- Water and sediment hardness data were analyzed by Biobase servers, which generated the individual lake profiles.

Data Analysis Methods

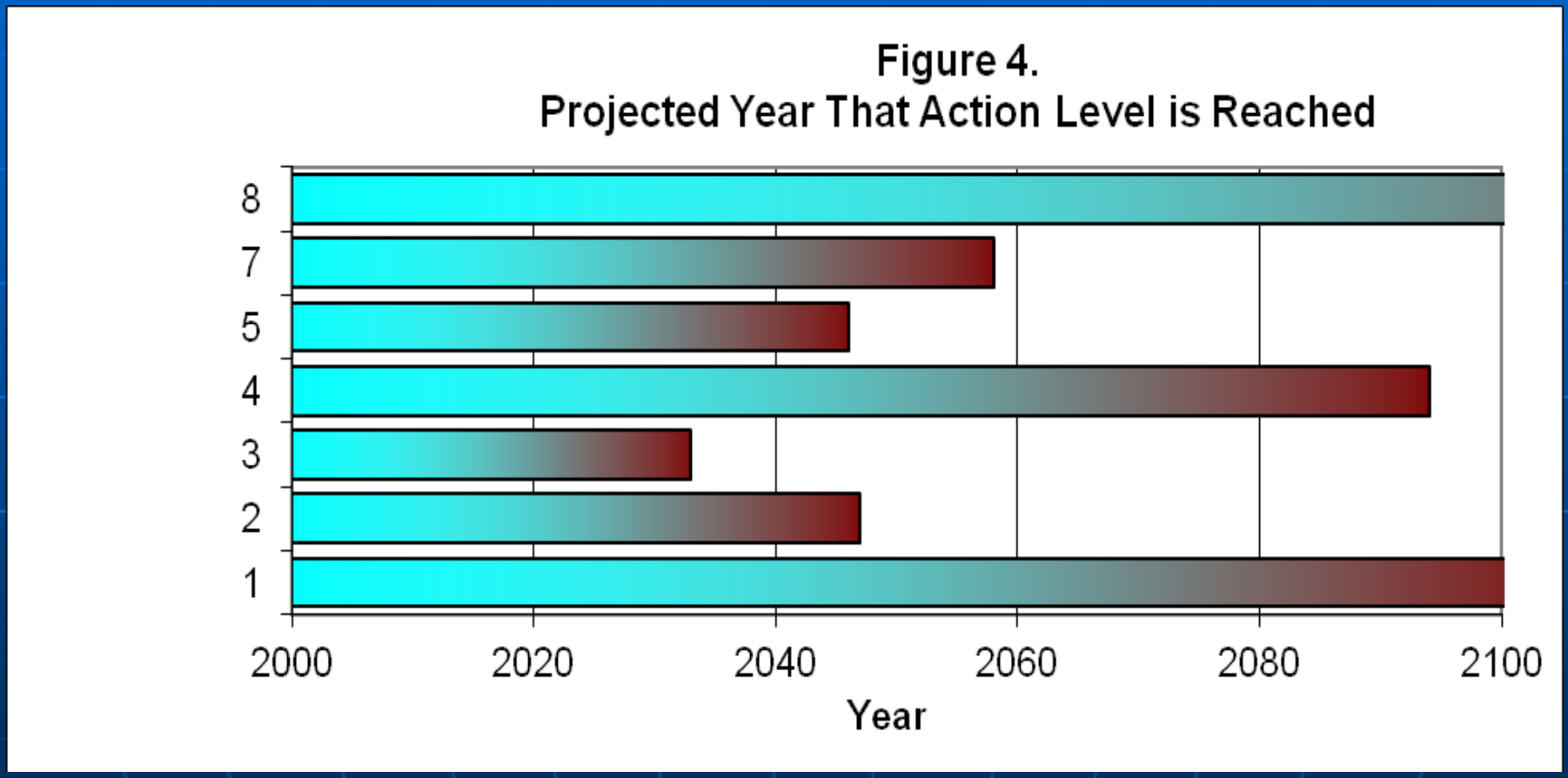
- The 2024 measurements were collected in a new manner, which does not allow direct comparison between the previous studies and the current study
- However, water basin and accumulated sediment volume data can be compared

Data Analysis Methods

- Sediment and total lake volumes were calculated for the 2024 data.



Data Analysis Methods



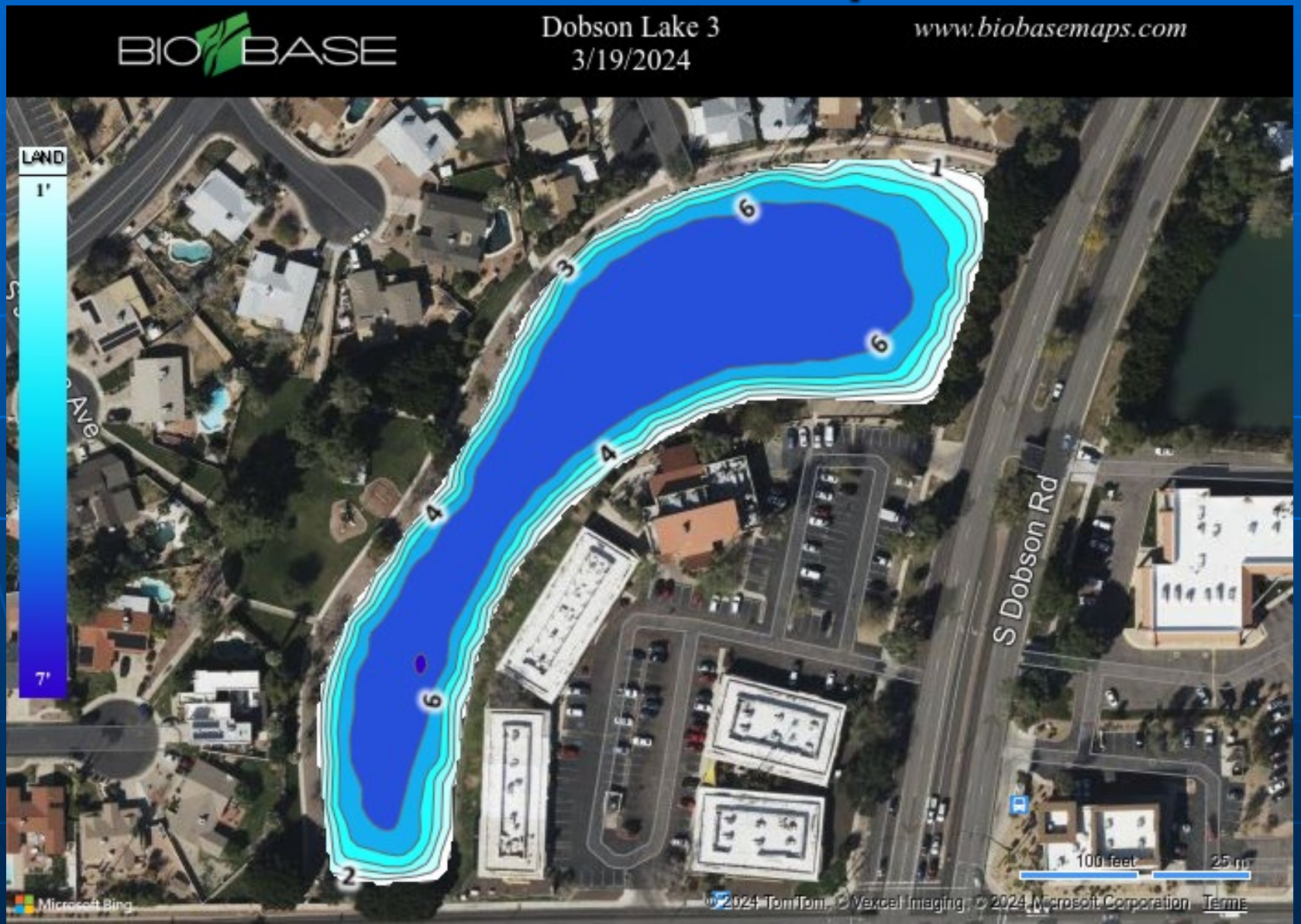
Discussion: Sediment Fate

- The compared sediment volumes may not increase and may decrease.

- Reduction in total sediment volumes can occur through:
  - Compaction
  - Scouring and re-deposition
  - Organic breakdown

Discussion: Examples

Discussion: Examples

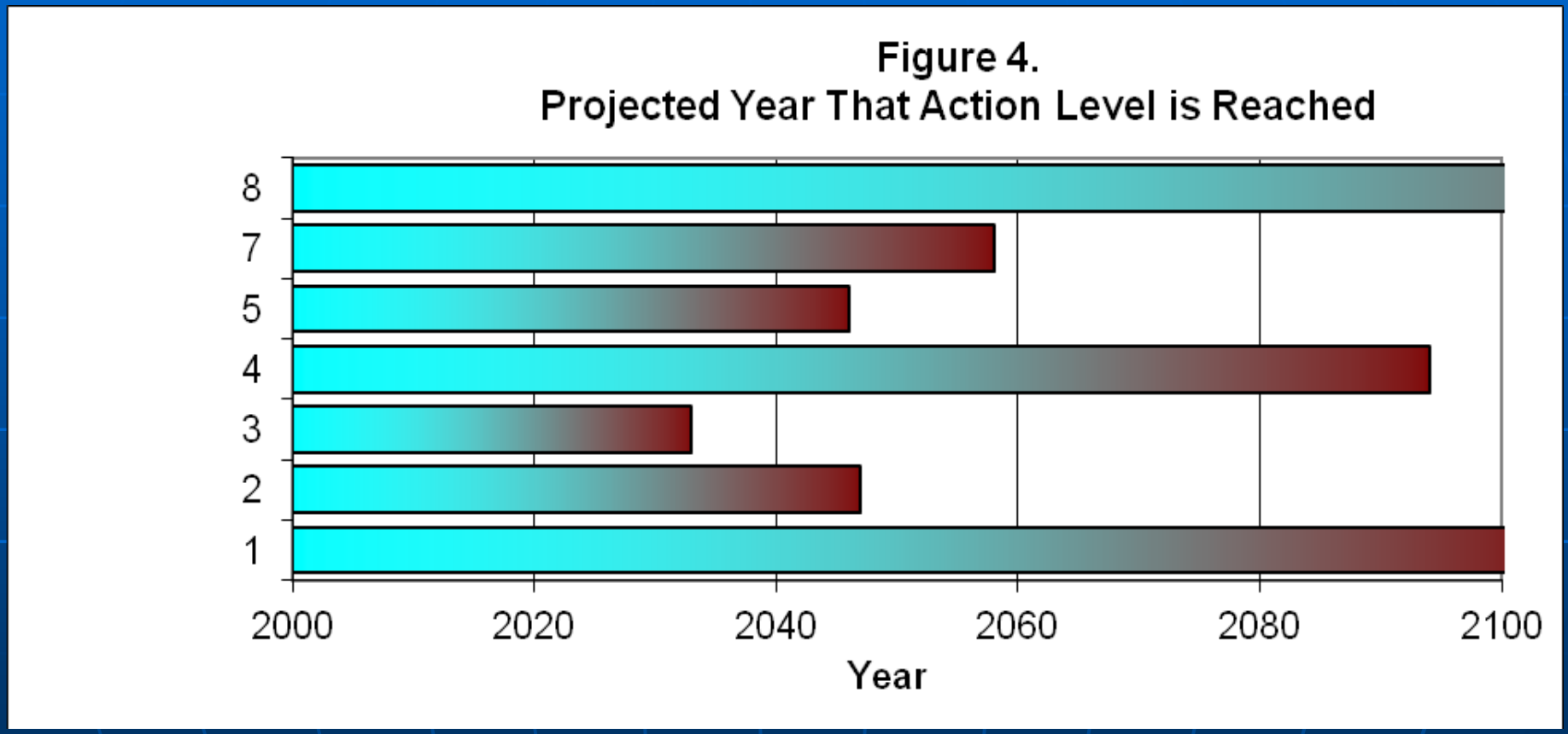


Discussion: Examples

Discussion: Examples

- It appears as though the Schlixx application to Lake 8 has been successful in slowing down the rate of sediment accumulation in the basin
- The 2014 study estimated a rate of 0.12%/year. The 2024 estimates a rate of 0.04%/year

Discussion: Action Level



Discussion: Action Level

Lake Number	Current % of Total Volume	Rate of Accumulation (per Year)	Year Action Level is Met
1	7.42%	0.09%	2105
2	9.46%	0.24%	2047
3	12.36%	0.32%	2033**
4	9.17%	0.08%	2094
5	7.90%	0.32%	2046**
7	9.63%	0.16%	2058
8	7.09%	0.04%	2150

**Based on the Quickest Rate of Accumulation Observed in the Other Lakes (0.32%per Year)

Dredging Options

Removal by Equipment

- Lake is drained
- Sediment is allowed to dry
- Sediment is then removed from the lake by equipment and hauled to a landfill

Dredging Options

Removal by Equipment

- Benefits:
  - Sediment is allowed to dry and compact which results in less material to remove.
  - Removal equipment is commonly available.
  - The drained lake allows for easy access and removal of the sediment.

Dredging Options

Removal by Equipment

Challenges:

- The lake needs to be drained completely.
  - Existing fishery will need to be transported
  - Odors may develop as the sediment dries out
  - Sediment takes a long time to dry
- Equipment will be making multiple trips through the neighborhood.
  - Increases traffic within the community
  - Equipment can be quite noisy

Dredging Options

Removal by Equipment

- Challenges:
  - The lakes are designed as a flow through system.
    - Once an upstream lake is drained, it will be very difficult to maintain the water level in all of the downstream lakes
  - Potential that the equipment may damage the lake liner during the removal activities.

Dredging Options

- Direct Removal by Mechanical or Suction Dredge
  - Lake remains full
  - Dredges remove sediment and deposited on shore
  - Sediment is removed from shore and hauled to a landfill

Dredging Options

Direct Removal by Mechanical or Suction Dredge

- Benefits:
  - Minimal risk to the lake liner
  - The lake does not need to be drained
    - Fishery does not need to be moved
    - Reduces the risk of odor formation from the sediment
    - The water levels in all downstream lakes will not be effected

Dredging Options

Direct Removal by Mechanical or Suction Dredge

- Challenges:
  - Removal equipment is specialized
  - Fishery may be impacted during dredging activities due to decreased oxygen levels
  - Sediment is not compacted prior to removal which will result in more material to haul
  - Specialized ADOT approved transport containers will need to be used
  - Access for the dredging equipment may not be available.

Dredging Options

- Removal by dredge with additional dewatering step.
  - Similar process as dredge removal, but utilizes dewatering to compact sediment prior to removal.

Dredging Options

Removal by dredge with additional dewatering step

- Benefits (Same as dredging benefits):
  - Minimal risk to the lake liner
  - The lake does not need to be drained
    - Fishery does not need to be moved
    - Reduces the risk of odor formation from the sediment
    - The water levels in all downstream lakes will not be effected

Dredging Options (Con.)

Removal by dredge with additional dewatering step.

- Benefits (Additional):
  - Sediment is compacted prior to removal
  - Allows for easier hauling and disposal

Dredging Options

- Removal by dredge with additional dewatering step.
  - Challenges:
    - Requires a large, secured, staging area for sediment dewatering.
    - Increases the risk of odor formation.
    - Continuous access to the dredge is also required.

Questions?

Zach Hache, MPH
Aquatic Consulting and Testing, Inc.
zhache@aquaticconsulting.com

Rick Amalfi, PhD
Aquatic Consulting and Testing, Inc.
ramalfi@aquaticconsulting.com