Timeline of Bathymetric Maps of Tenkiller Lake

Lake Tenkiller has been the subject of numerous activities to define its bathymetry but only some of these are well known and referenced. To clarify these data sources Oklahoma Water Resources Board (OWRB) GIS and Technical staff have compiled the following timeline and summary from the relevant available sources. OWRB believe this is an accurate reflection of the various surveys and available datasets but some inaccuracies may occur and readers should independently confirm this information. It should be noted that except for the 1996 study, none of these data sets were created by OWRB or their contractors and are not currently, and have never been, the responsibility of OWRB.

1996

Bathymetric map created from 20 ft contours from United States Geological Survey (USGS) topographic maps. OWRB was the grant recipient of this 1996 study (EPA funded) but the original OWRB project files were likely lost in the Oklahoma City Bombing. However, either the same data, or a reconstruction of the data is available in the 20 ft USGS topographic contours presented under the 2008 study.

See page 90 of *1996 Diagnostic and Feasibility Study on Tenkiller Lake, Oklahoma* (OWRB, et al. 1996)
Downloaded from here:
https://www.owrb.ok.gov/studies/reports/reports_pdf/TenkillerPhase1.pdf

2005

Bathymetric data collected during sediment survey by Fisher, et al. (2008, 2009).
See page 1225 of "The History of Poultry Waste Contamination in the Illinois River Watershed as Determined from Sediment Cores Collected from Tenkiller Ferry reservoir" (Fisher, 2008) for a description of the sediment mapping.
Downloaded from here:
https://www.researchgate.net/profile/John_Fisher24/publication/228371721_The_History_of_Poultry_Waste_Contamination_in_the_Illinois_River_Watershed_as_Determined_from_Sediment_Cores_Collected_from_Tenkiller_Ferry_Reservoir/links/0a85e53b55f85e31be000000.pdf

2008

An updated bathymetric map was created by Wells, et al. (2008) using contour line data **and** the data from the 2005 sediment survey.
See page 9 of "Water Quality and Hydrodynamic Modeling of Tenkiller Reservoir" for a description of the data sources used. The data sources were *"(1) contour line elevation data provided by Fishing Hot Spots Inc. and (2) sonar depth measurements collected by Global Remote Sensing LLC."* The report gives a thorough breakdown of how the dataset was constructed.
Downloaded from here:
https://www.owrb.ok.gov/quality/standards/pdf_standards/scenicrivers/OK%20Attorney%20General%20-%20Wells%20File.pdf

Global Remote Sensing LLC is mentioned in this document as one of the data sources. This is because they were the ones who did the actual surveying in 2005. This is supported by the text on page 9 of "Tenkiller Lake EFDC Modeling Update" (Stoddard, 2012) which was presented at a project update meeting in 2012.
Downloaded from here:
https://www3.epa.gov/region6/water/npdes/illinoisriverwatershed/documents/meetings/20121108/tenkiller-efdc-nov2012draft2.pdf

The inclusion of data from the 2005 sediment survey into the 2008 model development by Wells et al. (2008) is also described in 2015 final modeling report page 110 (Baker et al. 2015). Also, see page 1 and 2 of this document concerning this issue. It is clear, from both the Baker et al. 2015 and Stoddard et al. 2012 sources that the modeling group knew of the 2008 bathymetric data set. A comparison of the two data sets could have been made during initial model set up and data set validation.
Downloaded from here:
https://www.epa.gov/ar/illinois-river-watershed-events-and-activities

The other data source appears to be 20 ft USGS topographic contours based upon review of the data in GIS (Figure 1). A shapefile of this overlay of the topographic map is available from OWRB upon request. An image illustrating this is below; see the red lines overlaying the topographic map:

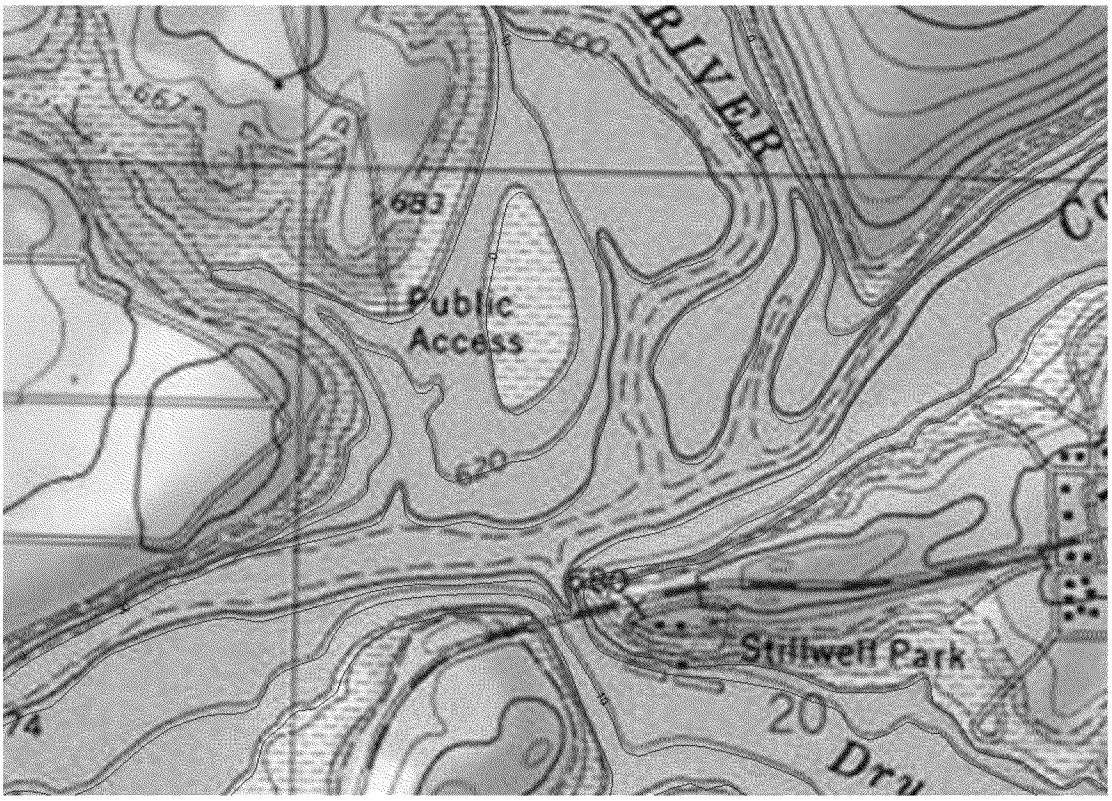

Figure 1 Image of an overlay of 20 ft USGS contours.

2015

A bathymetric map was created for the United States Army Core of Engineers (USACE) by Bowen Engineering and Surveying. A copy of the report and data is available from USACE.

See page 5-6 of the report for a description of the processing of the collected data.

- 3 datasets were used:
  - Boundary digitized from NAIP below normal pool elevation
  - Lidar data that included a 634 ft contour – above normal pool elevation
  - XYZ data
- An area/capacity table was generated from a TIN created from this data.
- The report also states (p 8 of pdf) that the Corps provided 2 additional area/capacity tables
  - One created from 1952 pre-impoundment data
  - One created from 1952 data merged with 2010 lidar data
- Reports incorrectly note that no other bathy surveys have been completed since 1952

References

Baker Jr. M., Aqua Terra and Dynamic Solutions. 2012. Setup, Calibration, and Validation for the Illinois River Watershed Nutrient Model and Tenkiller Ferry Lake EFDC Water Quality Model, Final report. Available from: https://www.epa.gov/sites/production/files/2016-03/documents/final-watershed_lake_model_main_report_08_07_15_0.pdf

Fisher, B.J., Olsen, R.L., Soster, F.M., Engle, B., and Smith, M. 2009. The History of Poultry Waste Contamination in the Illinois River Watershed as Determined from Sediment Cores Collected from Tenkiller Ferry Reservoir. Proceedings of the 2009 International Symposium on Environmental Science and Technology. Pp 1222-1238

OWRB (Oklahoma Water resources Board), OSU (Oklahoma State University), and USACE (United States Army Core of Engineers). 1996. Diagnostic and Feasibility Study on Tenkiller Lake, Oklahoma, Phase I. Available from https://www.owrb.ok.gov/studies/reports/reports_pdf/TenkillerPhase1.pdf

Stoddard, A. 2012. Tenkiller Lake EFDC Modeling Update. Presentation at the Illinois River Watershed Modeling and TMDL Development Project – Informal meeting, November 8, 2012, Springdale, Arkansas. Available from https://www3.epa.gov/region6/water/npdes/illinoisriverwatershed/documents/meetings/20121108/tenkiller-efdc-nov2012draft2.pdf

USACE. 2017. Hydrographic Survey Report – Tenkiller Lake Oklahoma. Available by request through USACE Tulsa District.

Wells, S.A., Wells, V.I., and Berger, C.J. 2008. Water Quality and Hydrodynamic Modeling of Tenkiller Reservoir. Expert report for the State of Oklahoma in Case No. 05-CU-329-GKF-SAJ, State of Oklahoma v. Tyson Foods, et al. Available from https://www.owrb.ok.gov/quality/standards/pdf_standards/scenicrivers/OK%20Attorney%20General%20-%20Wells%20File.pdf