

## **17. Turtle Lake**

Turtle Lake is located within the city of Shoreview in Ramsey County. It has a surface area of approximately 450 acres and an ordinary high water level of 892.4 (MSL 1912), 891.80 (NGVD 29) or 891.97 (NAVD 88). The lake discharges to the Branch 1 of Rice Creek Ditch 8 through a weir structure connected to a 24-inch culvert (CMP) with a controlling elevation of 890.98 (NGVD 29) or 891.15 (NAVD 88).

The DNR Lake Finder website provided lake level data for a period of record from 1923-2021 (see **Figure 17a**). This data is recorded by Ramsey County in MSL 1912 datum. The County recommends subtracting 0.60 feet from MSL 1912 to convert elevation data to NGVD 29, and subtracting 0.43 feet to convert elevation data to NAVD 88.<sup>1</sup> This is consistent with adding 0.17 feet to lake levels in NGVD 29 datum to obtain levels in NAVD 88, as specified from VERTCON.<sup>2</sup>

The maximum annual series, consisting of 99 years, was plotted on probability paper. A polynomial line was fit to the data to determine the elevations for the various recurrence intervals (see **Figure 17b**). The estimated flood elevations are shown in **Table 17a**. The 100-year flood elevation was estimated using the polynomial equation. Insufficient lake level data and information on potential overflow elevations are available to provide a reliable estimate of the 500-year flood elevation.

The water surface elevation for the 100-year recurrence interval reported in the 2010 Ramsey County FIS is 892.8 NAVD 88 (see FIS for details on methodology), as compared to 892.8 estimated in this study.

An additional component of this study consists of creating a non-exceedance frequency graph based on all daily measurements available (see **Figure 17c**). For Turtle Lake, the period of record consists of the data found on the MnDNR Lake Finder website, which consists of 3,101 days of measurements, from 1923 to 2021, as shown on **Figure 17a**. The results are presented in **Table 17b**.

---

<sup>1</sup> Email from Al Rupnow, Environmental Resource Specialist, Ramsey County Public Works, May 19, 2011.

<sup>2</sup> <http://www.ngs.noaa.gov/TOOLS/Vertcon/vertcon.html>

**Table 17a: Estimated Flood Elevations for Turtle Lake**

Return Period	Lake Level Data Source		
	1981 FIS	DNR (used in this study) (n = 99)	
	(NGVD 29)	(NGVD 29)	(NAVD 88)*
2	--	891.5	891.6
5	--	891.9	892.0
10	--	892.1	892.3
50	--	892.5	892.7
100	--	892.7	892.8
500	--	--	--

\*0.17 feet is added to NGVD 29 datum to convert to NAVD 88 datum

**Table 17b: Daily Non-Exceedance Frequency of Lake Levels for Turtle Lake**

Non-Exceedance Frequency	Lake Level	
	(NGVD 1929)	(NAVD 1988)
2.5%	888.7	888.9
10%	889.7	889.8
25%	890.5	890.7
50%	891.0	891.1
75%	891.4	891.5
90%	891.7	891.8
99.5%	892.3	892.5

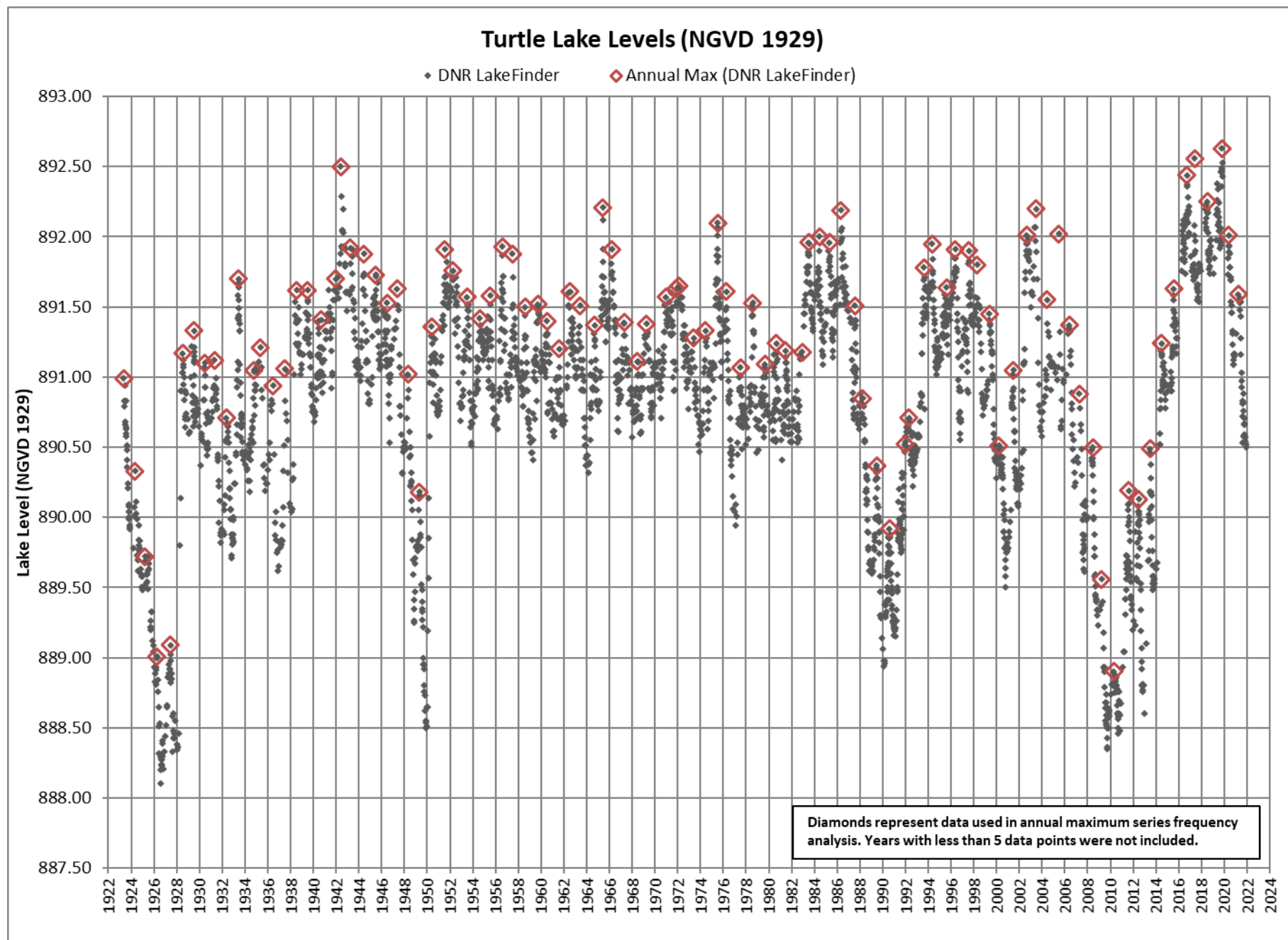
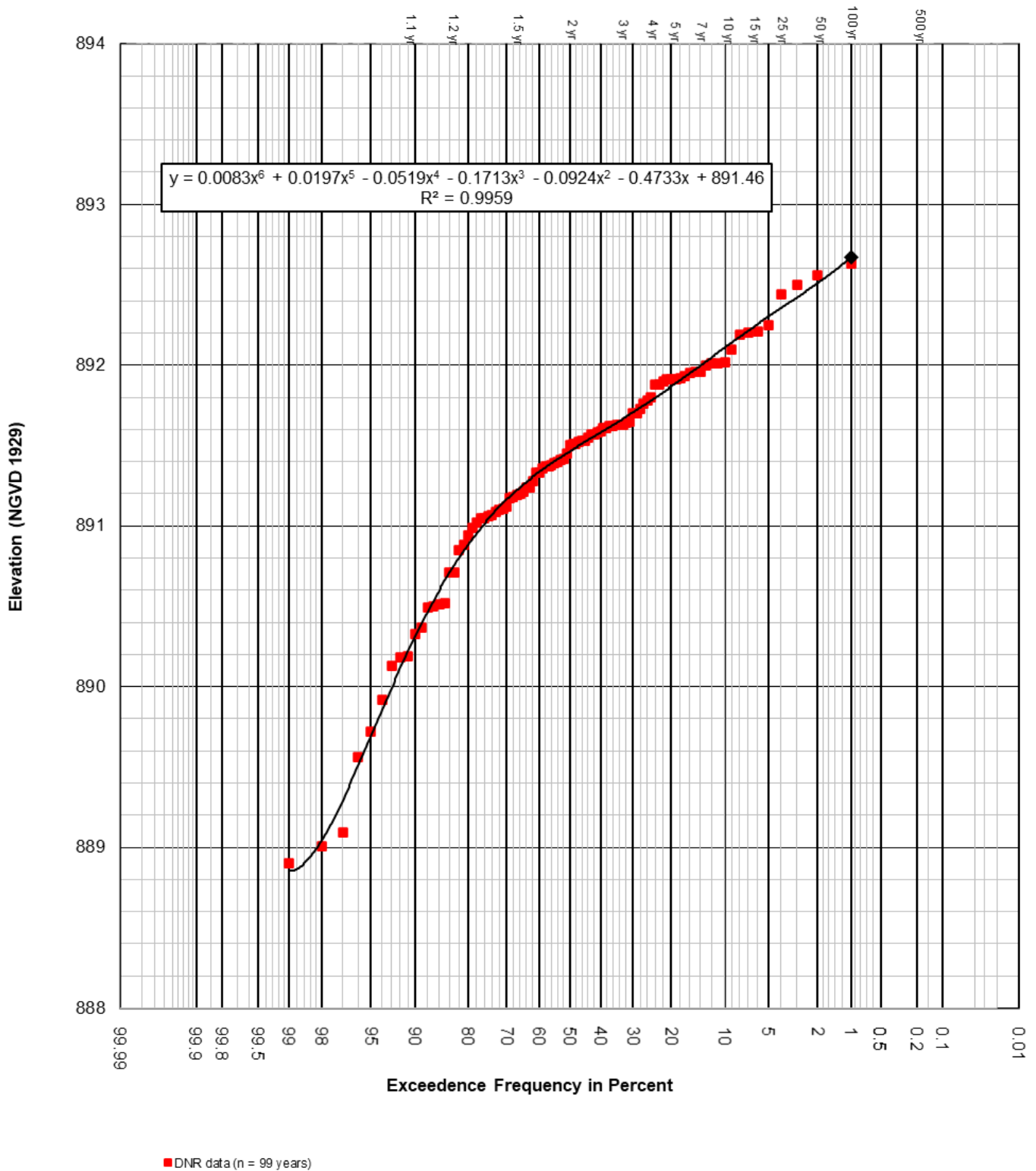


Figure 17a

# **Turtle Lake Levels (NGVD 1929)** **Maximum Annual Series Frequency Curve** **(Weibull Plotting Positions)**

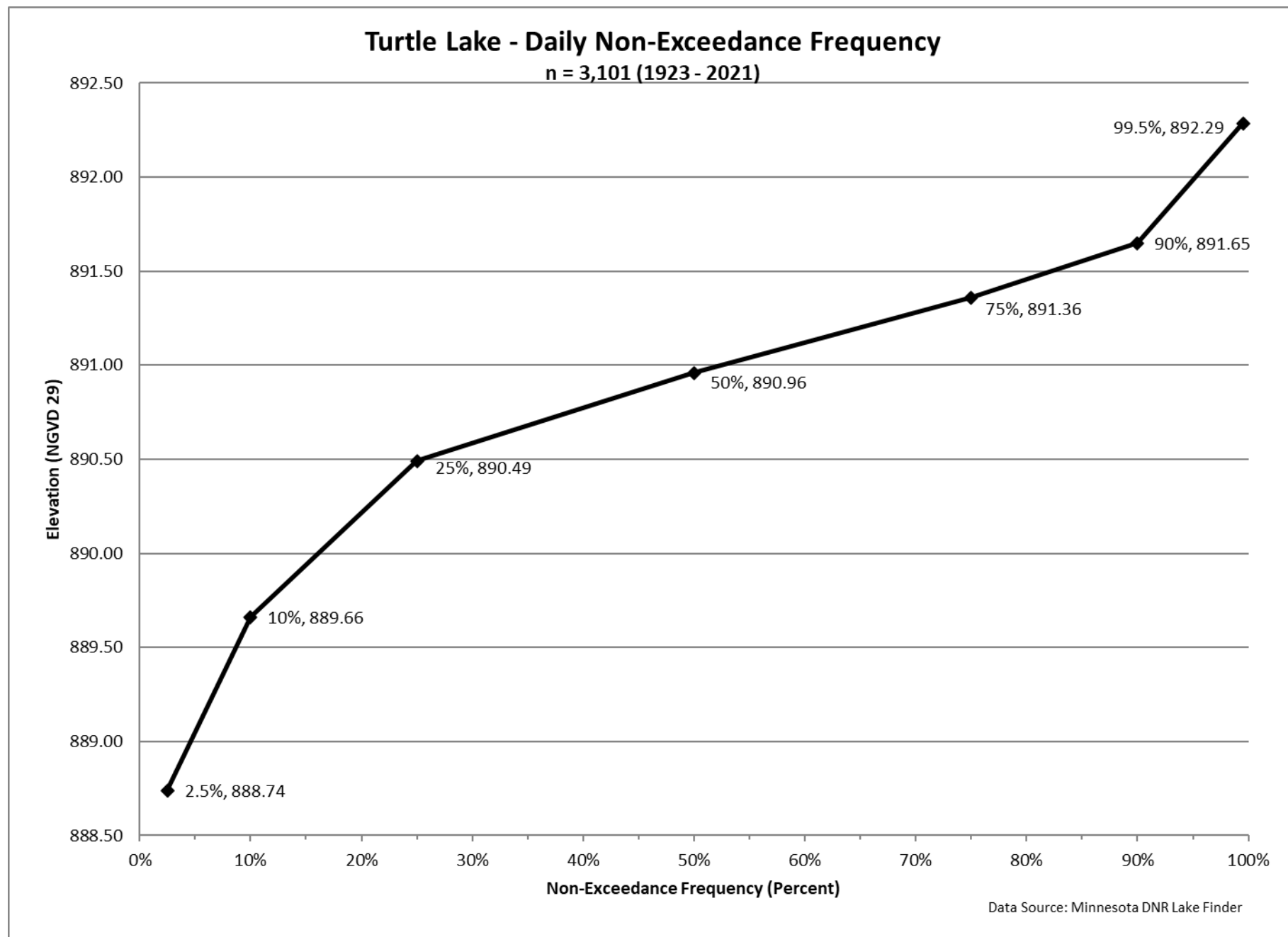


## **Outlet:**

Weir structure connected to culvert

Controlling elevation: 890.98 (NGVD 29), 891.15 (NAVD 88)

**Figure 17b**



**Figure 17c**