

18. White Bear Lake

White Bear Lake is located within the city of White Bear Lake in Washington County. It has a surface area of approximately 2,428 acres and an ordinary high water level of 924.89 (MSL 1912), 925.16 (NGVD 29) or 925.36 (NAVD 88). The lake discharges to the Rice Creek Public Ditch 11 through a double 18-inch by 28-inch RCP arch pipe with upstream invert elevations of 924.57 and 924.58 (NGVD 29), or 924.77 and 924.78 (NAVD 88).

The DNR Lake Finder website provided lake level data for a period of record from 1924-2021 (see **Figure 18a**). This data is recorded by Ramsey County in MSL 1912 datum. The County recommends adding 0.27 feet from MSL 1912 to convert elevation data to NGVD 29 and adding 0.46 feet to convert elevation data to NAVD 88.¹ This is consistent with adding 0.20 feet to lake levels in NGVD 29 datum to obtain levels in NAVD 88, as specified from VERTCON.²

The maximum annual series, consisting of 98 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 18b**). The estimated flood elevations are shown in **Table 18a**. 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.

An additional component of this study consists of creating a non-exceedance frequency graph based on all daily measurements available (see **Figure 18c**). For White Bear Lake, the period of record consists of the data found on the MnDNR Lake Finder website, which consists of 7,022 days of measurements, from 1924 to 2021, as shown on **Figure 18a**. The results are presented in **Table 18b**.

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

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

Table 18a: Estimated Flood Elevations for White Bear Lake

Return Period	Lake Level Data Source		
	1981 FIS	DNR (used in this study) (n = 98)	
	(NGVD 29)	(NGVD 29)	(NAVD 88)*
2	--	924.2	924.4
5	--	925.4	925.6
10	--	925.8	926.0
50	--	926.6	926.8
100	--	927.0	927.2
500	--	--	--

*0.2 feet is added to NGVD 29 datum to convert to NAVD 88 datum

Table 18b: Daily Non-Exceedance Frequency of Lake Levels for White Bear Lake

Non-Exceedance Frequency	Lake Level	
	(NGVD 1929)	(NAVD 1988)
2.5%	920.5	920.7
10%	921.3	921.5
25%	922.4	922.6
50%	923.7	923.9
75%	924.7	924.9
90%	925.3	925.5
99.5%	926.3	926.5

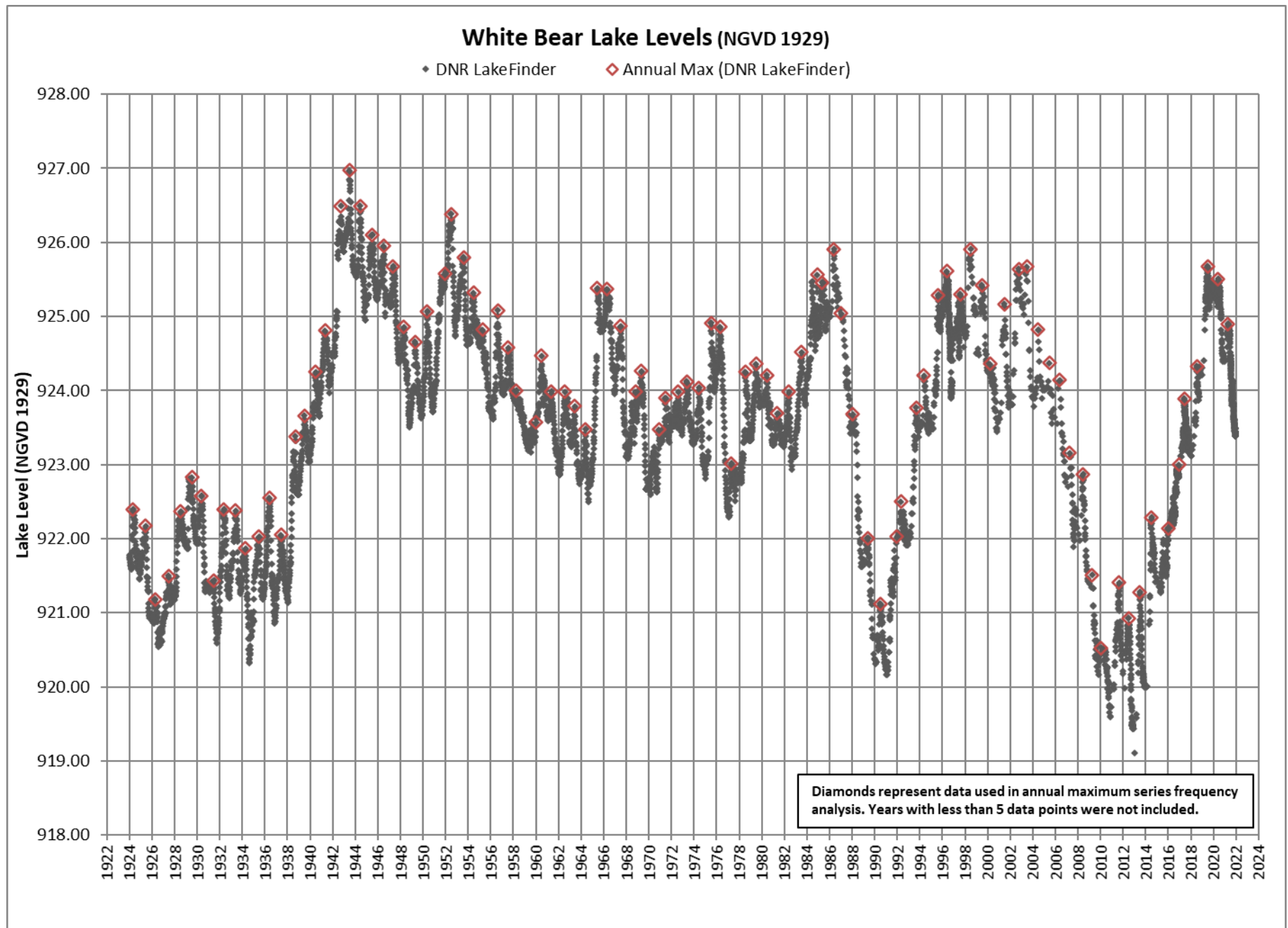
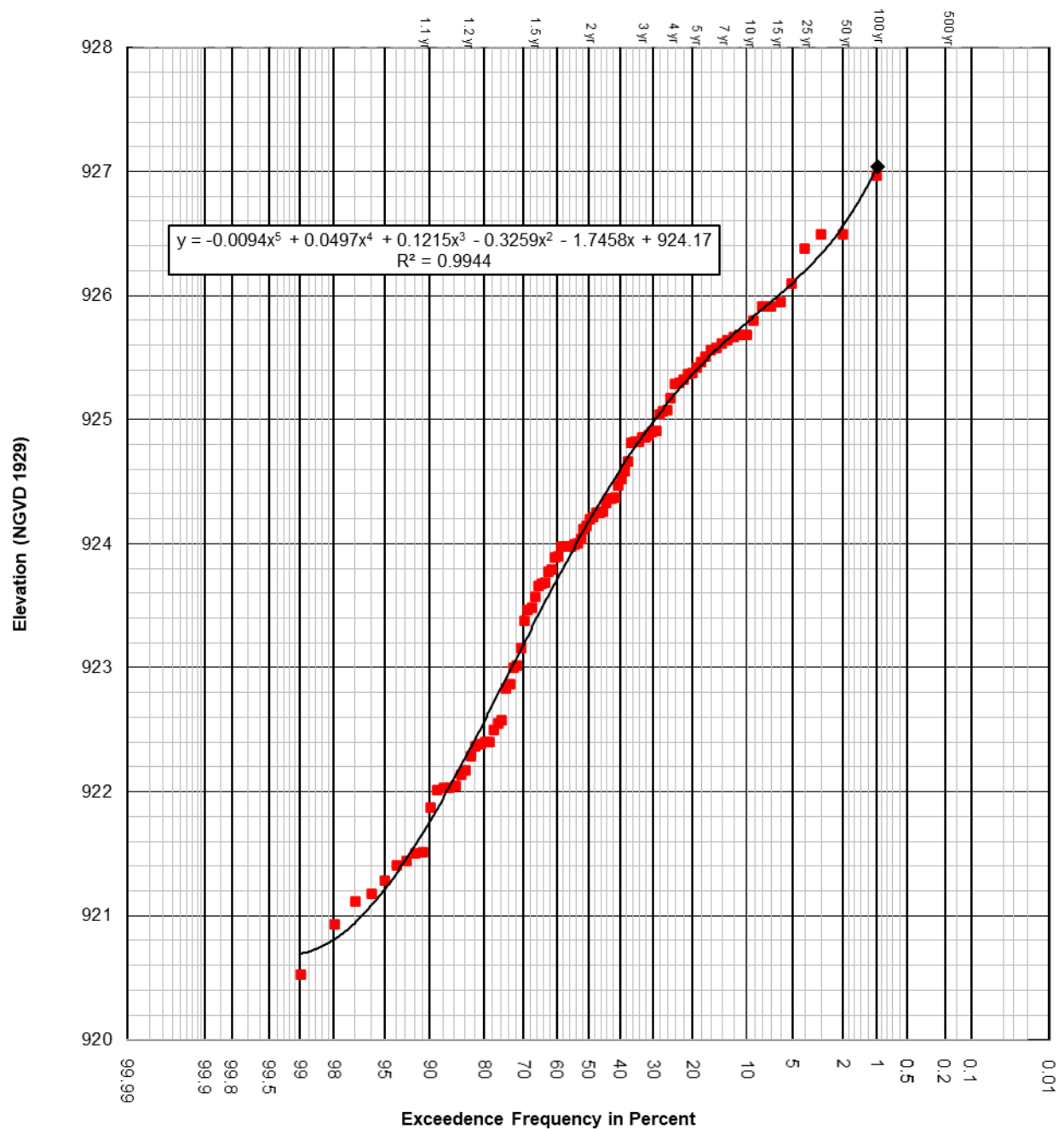


Figure 18a

White Bear Lake Levels (NGVD 1929)
Maximum Annual Series Frequency Curve
(Weibull Plotting Positions)



■ DNR data (n = 98 years)

Outlet:

5 – 18" x 28" RCP Arches

Inverts: 924.57, 924.58 (NGVD 29)

Figure 18b

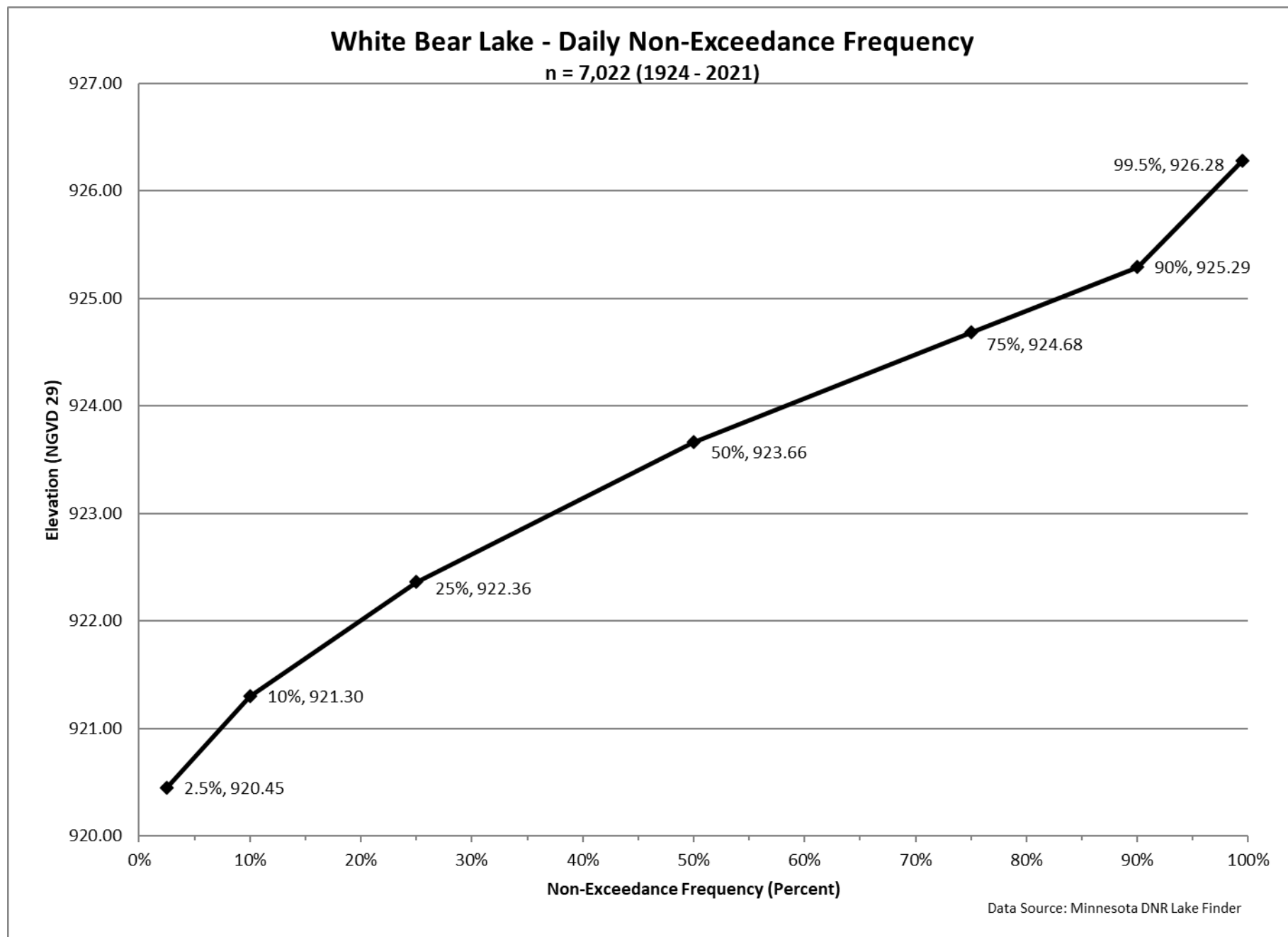


Figure 18c