

Does Lake Berryessa Sweat in the Summer?

Evaporation Effects in Reservoirs and Lakes

Human beings sweat (perspire) to stay cool. The laws of physics require that when water changes from a liquid phase to a gas (water vapor) heat is required to support that transition. This is called “the heat of vaporization” and is 541 calories per gram. Boiling water takes heat from some source - fire, stove - to change it to steam. In hot weather, or when the individual's muscles heat up due to exertion, more sweat is produced. The heat source in this case is your own body. Your body heat is absorbed by sweat, which consists of 90 percent water, to change it to vapor - thus your body is cooled - especially in a breeze.

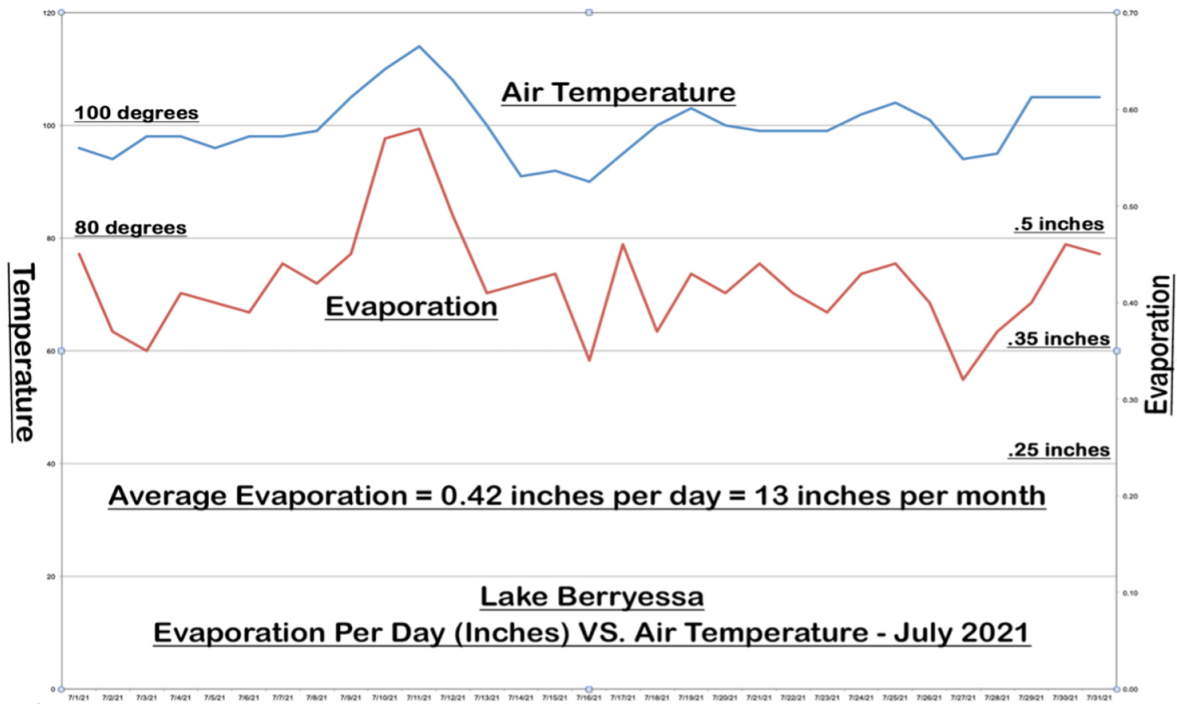
Sunlight and the air temperature support the change of lake surface water to vapor. This does not cool the lake, it just evaporates the surface water. And this evaporation can cause significant water loss in a reservoir during hot weather - especially in desert regions. If you stand on the shore of Lake Tahoe on a hot summer day, the far shore is obscured by haze. This is not smoke; it's water vapor rising from the lake's surface.

Evaporation is a large and continuing problem in the Colorado River basin, including Lake Mead and Lake Powell where about 500 billion gallons of water evaporate annually. This represents roughly 10 percent of the total natural flow of the Colorado River Basin. Measures to reduce evaporation included using a reflective layer on the surface. A modular floating cover stops evaporation by preventing the dry ambient air from contacting the water in the pond. These covers are particularly effective for irrigation ponds in desert climate.



Lake Berryessa has its own evaporation losses which are small but noticeable - up to one foot lake level decrease per month during summer months. The Solano County Water Agency tracks all elements of Lake Berryessa water use with regular reports. Examples of their weekly and monthly reports for July 2021 is shown below. Evaporation is measured in inches using actual evaporation measurements from an evaporation pan, 48" in diameter 10" deep, is located at Markley Cove.

Date	Elevation	Evaporation	High	Low	Precipitation
7/12/21	408.60	0.49	108	58	0.00
7/13/21	408.50	0.41	100	57	0.00
7/14/21	408.39	0.42	91	54	0.00
7/15/21	408.26	0.43	92	56	0.00
7/16/21	408.16	0.34	90	50	0.00
7/17/21	408.08	0.46	95	58	0.00
7/18/21	407.99	0.37	100	60	0.00



Lake Berryessa Annual Evaporation

Month-Year (Days)	Lake Level (Feet)	Evaporation per day (Inches)	Evaporation per month (Inches)	Evaporation per month (Acre-Feet)
Oct-20 (31)	418	0.18	5.58	8,138
Nov-20 (30)	418	0.07	2.1	3,062
Dec-20 (31)	418	0.04	1.24	1,808
Jan-21 (31)	418	0.05	1.5	2,188
Feb-21 (28)	418	0.09	3.08	4,492
Mar-21 (31)	417	0.11	3.3	4,813
Total (6 month)	-1		16.8	24,501
Apr-21 (30)	416	0.19	5.7	8,313
May-21 (31)	414	0.3	9	13,125
Jun-21 (30)	411	0.39	11.7	17,063
Jul-21 (31)	408	0.42	13.02	18,988
Aug-21 (31)	406	0.31	12.6	18,375
Sep-21 (30)	403	0.22	6.6	9,625
Total (6 month)	-13		58.6	85,489
Total (Annual)				110,000

Lake Berryessa Monthly Outflows from Monticello Dam

Month-Year (Days)	Outflow per Day (CFS)	Outflow per Day (A-F)	Outflow per month (CFS)	Outflow per month (A-F)
Oct-20 (31)	289.5	573	8,975	17,802
Nov-20 (30)	86.3	171	2,589	5,137
Dec-20 (31)	84.8	169	2,629	5,216
Jan-21 (31)	76.8	152	2,381	4,721
Feb-21 (28)	82.1	163	2,545	4,554
Mar-21 (31)	219.8	436	6,814	13,516
Total (6 month)				50,946
Apr-21 (30)	460.2	913	13,805	27,334
May-21 (31)	487.8	968	15,123	29,944
Jun-21 (30)	559.2	1109	16,775	33,215
Jul-21 (31)	588.5	1167	18,242	36,119
Aug-21 (31)	464.3	921	14,395	28,502
Sep-21 (30)	357.7	709	10,730	21,245
Total (6 month)				176,359
Total (Annual)				227,305

Total Winter Evaporation (2020-2021): 24,500 acre-feet (48% of Winter Outflow)
Total Winter Outflow (2020-2021): 50,946 acre-feet

Total Summer Evaporation (2020-2021): 85,489 acre-feet (48.5% of Summer Outflow)
Total Summer Outflow (2020-2021): 176,359 acre-feet

Total Annual Outflow (2020-2021): 227,305 acre-feet

Total Annual Evaporation (2020-2021): 110,000 acre-feet (49% of Total Annual Outflow)
Total Summer Evaporation (85,489 acre-feet) is 1.7 times (168%) Winter Outflow (50,946 acre-feet)

Summer Evaporation Impact on Lake Levels

July 1, 2021: 409.7 feet

July 31, 2021: 406.7 feet

Decrease: 3 feet

Decrease Due to Evaporation: 1.1 feet

Decrease Due to Outflow: 1.9 feet

% Decrease Due to Evaporation: 37%