Death Valley's Temperature Record History & Overview

Last Updated: 12/16/2022

Official weather observations in Death Valley have always been taken by volunteer weather observers for the National Weather Service since the beginning of records. Official weather records for Death Valley are considered to be 'observation day records' as the data is not collected at the end of each calendar day. In a system where observation day is used to keep on a record, readings of temperatures are made officially once a day generally at a designated observing time determined as part of the agreement between the observer and the National Weather Service. Data collected each day has typically consisted of a high temperature and low temperature for a twenty four period ending at the time of observation as well as the temperature at the time of observation.

This time of observation has changed though over the years. From 1911 through May 31, 1981 (except from September 1, 1955 through March 10, 1956 and June 1, 1956 through August 31, 1957 [no observations were taken between September 1, 1957 through February 1958] when observations were taken between 0700 and 0800 local time), daily observations always took place between 1600 and 1900 local time. Thereafter June 1, 1981, observations have been taken at 0800 LST/LDT (meaning, the "climate day" was 0759 – 0800). This poses an issue with the recording of high temperature records, as the twenty four hour maximum temperature taken at 8am likely occurred during the afternoon of the previous calendar day.

Temperature records in Death Valley were previously taken with maximum-minimum liquid in glass thermometers housed in a white-painted cotton region shelter that meets National Weather Service observing standards. One thermometer is used to record the highest temperature in the last twenty four hours while the other, the lowest. They are then reset manually by the observer after collecting their observation.

The Approach to Construct a More Accurate Temperature Record

In order to better represent a set of weather records, the author assumed that the high and low temperature in the official NOAA's National Centers for Environmental Information (NCEI) datasets was over a calendar day. The official NCEI dataset consists of a set of records that uses observation day for the entire period. The dataset used for this study has thus been time-shifted starting on June 1, 1981 in order to provide what was felt to be a more accurate indication of the day on which the maximum temperature occurred. It is possible in an isolated case that the high temperature occurred during the early-morning hours, meaning it was reported on the appropriate calendar day. However, it is felt such days are not represented in the extreme daily records. No adjustments at all were made for minimum temperatures, thus each minimum was left assigned to

the day it was reported on. However, there may be some cases on a very cold morning where the at-observation temperature may wind up being the low for the next twenty four hour period and thus reflected as the next day's minimum temperature. This procedure was used through November 1, 2015. Effective November 2, 2015, temperature records reflect a calendar day in the GHCN-Daily dataset.

Temperature data for Death Valley were initially written on a monthly observation form. Initially this form was titled "Cooperative Observer's Meteorological Record". During the early 2000s the former National Climatic Data Center in Asheville, North Carolina digitized the cooperative weather records nationwide including those of Death Valley's. Data from 1948 onwards was assigned to a data set known as TD-3200 or Surface Land Daily Cooperative Summary of the Day while the data from 1911 through 1947 was assigned to TD-3206 known as Cooperative Summary of the Day - CDMP (Pre 1948). While the datasets from 1948 onward did have quality control measures noted in them by the National Climatic Data Center (now NCEI), some of the earlier data before the 1940s did not undergo this. Therefore the author of this paper worked with the NCDC (now NCEI) staff to remove suspect temperature data. Many of these observations appear to be related to poor observing practices on the part of observers at the time (such as not resetting thermometers after taking an observation) or occasional faulty equipment. In some cases, a broken thermometer accounted for a large chunk of missing maximum or minimum temperatures until the observer was sent a new thermometer. Prior to the 1940s, very little quality control was done on cooperative observer data. In addition, meteorologists at the time lacked the duration of observations in such an extreme region to perform a thorough assessment of the area's climate with respect to catching some outlying reports. The handwriting on older forms was in many cases illegible or hard to read due to the forms being pulled from microfilm. A number of erroneous temperatures were corrected through consulting the *Climatological Data* publication for values as well as restudying original forms available online from the NCEI Image and Publications System. Lastly, a few months of data were found missing in the NCEI records at the time, but had hard copies of the observations on file at the Death Valley library in Cow Creek. The author, through correspondence with the National Park Service, was able to obtain copies of these forms and have them added into the official NCEI records.

During the mid-2000s, the National Weather Service instituted several changes to the cooperative weather observing program. Among the changes was to submit weather observations through a computer program known as WxCoder. This allowed observers to enter their observations in at a computer and then generated the monthly observation form in a typed format. This significantly reduces the risk of an observation being misread due to poor handwriting. In 2011, the official NCEI datasets for Death Valley moved to a new dataset called GHCN-Daily or (Global Historical Climatology Network)-Daily.

It should be noted that as of the initial publication of this report, some suspect low temperature data was not removed from NCEI datasets as reviews by their staff were still underway. This included low temperatures on May 25 and 27 in 1922, May 1, 1925, from April 24 through the 28 of 1927, May 17, 1927, June 2, 1934 and from May 29 through June 1 of 1935. Low temperatures on these dates were considered suspect by the author based on small diurnal temperature ranges given relatively clear conditions as well as based on comparison checks with nearby cooperative weather stations.

Daily records of temperature in Death Valley started on June 8, 1911. All temperature data is given in degrees Fahrenheit. Normals are from 1991-2020 and provided by NOAA's National Centers for Environmental Information (NCEI).

Month	Normal Average Maximum Temperature	Normal Average Minimum Temperature	Normal Average Temperature
January	67.2	42.5	54.9
February	73.7	49.0	61.3
March	82.6	57.1	69.8
April	91.0	64.8	77.9
May	100.7	75.0	87.8
June	111.1	84.0	97.5
July	117.4	91.0	104.2
August	115.9	88.7	102.3
September	107.7	79.1	93.4
October	93.3	64.4	78.9
November	77.4	50.5	64.0
December	65.6	41.1	53.4
Annual	92.0	65.5	78.8
All normals are based on the period from 1991 – 2020.			

Month	Record Highest Maximum	Record Lowest Maximum	Record Highest Minimum	Record Lowest Minimum
January	90 on 1/16/2021	38 on 1/21/1937	70 on 1/26/1934	15 on 1/8/1913
February	98 on 2/28/1986	44 on 2/9/1920	70 on 2/10/2017	20 on 2/19/1990
March	104 on 3/26/2022	54 on 3/27/1991	78 on 3/27/2022	26 on 3/4/1989
April	113 on 4/22/2012*	59 on 4/10/1927*	90 on 4/30/2020	35 on 4/6/1921
May	122 on 5/29/2000	60 on 5/5/1921	95 on 5/29/2020*	42 on 5/7/1930*
June	129 on 6/30/2013	74 on 6/6/1925	103 on 6/22/1936	49 on 6/2/1923
July	134 on 7/10/1913	85 on 7/8/1918	110 on 7/5/1918	62 on 7/1/1927
August	130 on 8/16/2020	80 on 8/18/1983	106 on 8/1/1920	65 on 8/28/1990*
September	125 on 9/6/2022*	76 on 9/20/2005*	102 on 9/3/2022	41 on 9/22/1924
October	113 on 10/1/2012*	61 on 10/30/1920	86 on 10/2/2018*	32 on 10/13/1924*
November	97 on 11/1/1966*	45 on 11/27/1919	75 on 11/8/1913	24 on 11/27/1921
December	89 on 12/3/1949	38 on 12/23/1990	70 on 12/23/1914*	19 on 12/27/1924
Annual	134 on 7/10/1913	38 on 12/23/1990*	110 on 7/51918	15 on 1/8/1913
Daily records started on June 8, 1911. *Date listed is most recent occurrence.				