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Boyd, Mary@Waterboards

YSDI FILE / Yuba County

From: Boyd, Mary@Waterboards
Sent: Thursday, May 29, 2014 8:14 AM
To: Drew Lehman (dlehman@recology.com)
Cc: Wyels, Wendy@Waterboards; Hold, Howard@Waterboards
Subject: RE: Request for website for "X" year storms
Attachments: Vacaville Example.pdf; A00 D Marysville__.pdf

Hi Drew,

1. The precipitation data for a 1,000-year 1-day rainfall (and similar rainfall data) is found through DWR websites. First, go to http://www.water.ca.gov/floodmgmt/hafoo/hb/csm/engineering/.

2. Once on this DWR website, find your rainfall station ID number by opening the PDF file (***Station Index***). Search this PDF file to find your Station ID Number. For example, the Marysville Station ID is A00-5385-00. Or, Vacaville has three stations: A00-9200-00, A00-9200-50, and A00-9200-30.

3. After you have selected your station and you know the Station ID Number, go to this FTP site: ftp://ftp.water.ca.gov/users/dfmhydro/Rainfall%20Dept-Duration-Frequency/Rain%20D%20DDF%20Daily/.

4. Once you're on this FTP site, click on and select "*Rain D DDF Daily*". This will open up a new site; scroll down until you locate the first three letters/digits of your Station ID Number. Click on the selection to open this site, and then scroll down until you find your station. For example, the Marysville Station is listed as "***A00 D Marysville.xls***".

5. Save/download the Excel file. The 1,000-year 1-day rainfall (along with other return period rainfalls) is located near the top of the spreadsheet.

6. As an example, I've attached the DDF table for Marysville. The 1,000-year 1-day event is highlighted in yellow. The 100-Year Return Period Water-Year is highlighted in light blue.

- If you are calculating an average year or a "100-year water year" water balance, you will also need the monthly average rainfalls. To find this data, go to http://www.wrcc.dri.edu/. In the search box, type in the location of interest. For example, type in Vacaville or Marysville. After this new site opens, scroll down until you find "***Period of Record Monthly Climate Summary,***" and click to find the monthly Average Total Precipitation for Vacaville. For Vacaville, this monthly average data is available at http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9200. An example for Vacaville is attached.

Regards,

Mary Boyd, PE
Water Resource Control Engineer
Compliance and Enforcement
Central Valley Water Board
11020 Sun Center Drive #200, Rancho Cordova, CA 95670
(916) 464-4676 (Direct)
(916) 464-4681 (Fax)
www.waterboards.ca.gov/centralvalley

From: Wyels, Wendy@Waterboards
Sent: Wednesday, May 28, 2014 3:58 PM
To: Boyd, Mary@Waterboards; Hold, Howard@Waterboards
Subject: FW: Request for website for "X" year storms

Mary,
Can you please respond? thanks

Wendy

From: Drew Lehman [mailto:dlehman@recology.com]
Sent: Wednesday, May 28, 2014 3:54 PM
To: Wyels, Wendy@Waterboards
Cc: Marc R. Bruner (MBruner@perkinscoie.com)
Subject: Request for website for "X" year storms

May 28, 2014

Wendy

As discussed, if you would please send me the link to the web site for rainfall records that you mentioned, that would be useful.

Thanks,

Drew

Rainfall Depth Duration Frequency

Station	Statio No	County	Lat	Long.	Elev.	Source	Ob Time	Yrs Rec	Slope	Interce
Marysville	A00 5385 00	Yuba	39.146	-121.584	60	CD		108		

Return Period for Rainfall For Indicated Number Of Concecutive Days

	1	2	3	4	5	6	8	10	15	20	30	60	W-YR
RP 2	1.72	2.35	2.77	3.13	3.44	3.74	4.26	4.73	5.58	6.24	7.46	10.98	20.10
RP 5	2.31	3.26	3.87	4.37	4.79	5.16	5.85	6.47	7.56	8.53	10.13	14.81	25.70
RP 10	2.70	3.87	4.60	5.20	5.68	6.06	6.85	7.54	8.73	9.90	11.74	17.07	28.89
RP 25	3.16	4.63	5.53	6.21	6.79	7.16	8.04	8.81	10.09	11.51	13.62	19.67	32.48
RP 50	3.50	5.19	6.20	6.95	7.59	7.94	8.88	9.70	11.02	12.62	14.93	21.48	34.91
RP 100	3.83	5.74	6.87	7.68	8.37	8.70	9.70	10.55	11.91	13.69	16.17	23.18	37.17
RP 200	4.16	6.28	7.53	8.39	9.14	9.44	10.49	11.37	12.75	14.71	17.37	24.80	39.30
RP 500	4.58	6.99	8.39	9.32	10.15	10.40	11.50	12.42	13.82	16.01	18.89	26.86	41.96
RP 1000	4.89	7.53	9.04	10.02	10.91	11.11	12.25	13.20	14.60	16.97	20.00	28.36	43.89
RP 10000	5.92	9.31	11.19	12.32	13.40	13.43	14.69	15.69	17.06	20.01	23.56	33.10	49.86

	1	2	3	4	5	6	8	10	15	20	30	60	W-YR
Average	1.83	2.55	3.01	3.39	3.72	3.99	4.52	4.98	5.80	6.53	7.80	11.41	20.52
Stdev	0.81	1.07	1.18	1.26	1.30	1.39	1.61	1.71	1.99	2.23	2.72	3.84	6.53
Rec Max	7.29	8.69	9.26	9.45	9.45	9.45	10.28	10.28	10.48	14.17	15.39	22.42	39.64
Rec Min	0.81	1.19	1.25	1.40	1.55	1.55	1.55	1.55	1.55	2.21	2.24	3.60	7.68
Z	8.45	6.21	5.22	4.47	3.89	3.51	3.30	2.76	2.12	3.02	2.56	2.58	3.01
Yrs Rec	108	108	108	108	108	108	108	108	108	108	108	108	134
Calc CV	0.443	0.418	0.391	0.372	0.350	0.348	0.357	0.343	0.344	0.342	0.349	0.336	0.318
Reg CV	0.352	0.387	0.397	0.401	0.395	0.39	0.387	0.386	0.382	0.387	0.379	0.374	0.31
Skew	3.5	2.7	2.6	2.0	1.5	1.1	0.9	0.5	0.2	0.4	0.4	0.4	0.5
Reg Skew	1.1	1.3	1.3	1.2	1.2	1.0	0.9	0.8	0.6	0.7	0.7	0.6	0.4
Kurtosis	18.9	12.3	11.8	8.0	5.1	2.7	1.1	0.2	-0.7	0.1	-0.1	-0.2	-0.2

Maximum Rainfall For Indicated Number Of Concecutive Days

Year	1	2	3	4	5	6	8	10	15	20	30	60	W-YR
1872													21.57
1873													13.10
1874													27.74
1875													13.68
1876													17.53
1877													11.99
1878													24.36
1879													15.17
1880													18.90
1881													18.04
1882													14.78
1883													15.41
1884													14.22
1885													8.06
1886													22.26
1887													12.86
1888													14.28
1889													23.28
1890													**39.64**
1891													14.98
1892													19.19
1893													22.73
1894													10.88
1895													28.54
1896													18.05
1897													17.00
1898	1.20	1.32	1.99	2.54	2.54	2.54	2.94	2.94	2.94	3.30	5.06	6.51	13.09
1899	1.46	2.33	3.01	3.12	3.70	3.81	4.16	5.86	5.99	6.06	6.30	6.85	16.44
1900	2.00	2.86	3.63	4.50	5.36	6.13	8.05	8.05	9.30	9.65	9.65	16.67	27.81
1901	2.15	2.33	2.46	2.75	3.78	4.61	4.65	4.90	4.90	6.05	6.11	10.68	25.14
1902	1.38	1.65	2.50	2.68	3.42	4.28	4.46	4.60	5.46	5.55	8.24	9.82	19.42
1903	3.15	3.15	3.30	3.80	3.80	4.22	4.32	5.55	6.06	6.56	6.56	9.75	21.26
1904	2.00	2.62	2.88	3.49	3.49	3.49	3.75	4.96	5.67	7.18	7.78	12.95	25.15
1905	1.37	2.17	2.35	2.71	2.71	2.71	3.12	3.23	4.12	4.30	5.71	9.33	24.02
1906	2.14	3.11	3.13	3.13	3.13	3.13	3.13	5.06	5.74	6.20	7.23	12.04	27.80
1907	2.02	3.30	3.77	5.10	5.65	5.85	7.64	8.49	9.24	10.24	11.84	15.93	32.04
1908	1.30	2.35	2.49	2.59	2.59	2.74	2.95	3.19	3.68	4.76	6.16	11.02	16.91
1909	1.00	1.85	1.97	2.70	3.05	3.45	4.07	4.57	6.10	7.41	9.19	14.15	21.47
1910	1.43	1.45	1.70	2.70	2.70	2.70	3.60	3.60	3.60	4.31	5.55	9.19	18.73
1911	2.45	4.25	4.91	5.56	5.57	5.75	6.95	6.95	8.60	**14.17**	**15.39**	**22.42**	26.42
1912	1.55	1.87	1.97	2.15	2.15	2.15	2.50	2.71	3.06	3.06	3.06	5.77	14.16
1913	1.45	1.45	2.25	2.40	2.40	2.75	3.05	3.05	3.05	3.09	3.24	4.15	11.36
1914	3.00	4.27	4.38	4.91	4.91	5.53	6.26	6.90	8.37	9.32	12.07	15.88	28.52
1915	1.45	2.10	2.66	2.94	3.34	4.18	5.33	6.14	8.09	8.64	9.84	14.03	27.57
1916	3.95	4.73	4.98	4.98	4.98	4.98	5.60	5.85	7.96	8.32	10.37	16.46	21.69
1917	1.40	2.30	2.35	2.58	3.18	3.33	3.68	3.85	3.85	3.85	4.71	7.49	16.90
1918	1.35	1.52	1.61	2.15	2.64	2.81	2.90	2.90	3.40	4.05	4.29	8.31	15.23
1919	2.00	2.68	3.56	3.76	3.86	3.96	4.22	4.42	5.07	6.87	8.22	11.96	19.32
1920	1.12	1.55	1.95	1.95	2.04	2.04	2.55	2.55	3.80	3.90	5.50	7.68	11.70
1921	2.35	2.90	2.99	3.55	3.64	3.64	4.65	4.91	5.96	6.16	8.28	12.42	25.08
1922	1.81	2.63	3.48	4.43	4.80	5.75	5.92	6.11	7.40	8.44	8.44	11.67	21.02
1923	2.56	2.85	3.16	4.01	4.43	4.53	5.16	6.05	6.53	7.67	9.89	13.04	22.78

Rainfall Depth Duration Frequency

Station	Statio No	County	Lat	Long.	Elev.	Source	Ob Time	Yrs Rec	Slope	Interce
Marysville	A00 5385 00	Yuba	39.146	-121.584	60	CD		108		

Return Period for Rainfall For Indicated Number Of Concecutive Days

	1	2	3	4	5	6	8	10	15	20	30	60	W-YR
1924	2.14	3.00	3.22	3.22	3.22	3.22	3.30	5.79	5.79	5.79	5.79	7.19	10.95
1925	2.99	3.26	3.64	3.81	4.23	4.38	4.45	5.33	5.33	6.60	7.43	10.05	26.13
1926	2.89	3.44	3.74	4.22	4.52	5.34	6.40	6.87	7.60	10.05	11.23	11.50	20.95
1927	1.70	2.40	3.15	3.59	4.36	4.87	6.74	7.18	7.75	8.34	8.58	10.93	26.59
1928	1.81	2.78	3.34	3.34	3.99	3.99	3.99	3.99	4.87	4.87	5.50	8.33	17.28
1929	1.22	1.97	2.45	2.45	2.60	2.63	2.78	2.78	2.78	3.32	3.80	6.82	14.04
1930	1.75	2.95	3.65	4.85	5.38	5.41	8.04	8.18	8.18	8.18	10.38	13.43	20.87
1931	1.05	1.40	1.40	1.40	2.10	2.22	2.50	2.50	2.50	2.59	3.63	5.61	12.04
1932	1.61	2.56	2.71	3.01	3.96	4.50	5.81	5.81	6.61	7.21	7.84	10.34	17.35
1933	1.46	2.02	2.27	2.90	2.90	2.90	3.11	3.25	4.12	4.12	4.70	8.02	12.68
1934	1.94	3.16	3.20	3.96	4.57	4.57	4.57	4.57	4.64	5.03	6.69	8.19	14.06
1935	1.93	2.58	2.75	2.75	2.99	3.03	3.87	4.35	5.69	6.21	7.35	10.97	23.40
1936	1.60	2.84	3.51	3.91	4.21	4.68	5.80	6.61	9.46	9.46	9.50	15.32	22.72
1937	2.53	2.81	3.24	3.45	3.50	3.82	4.21	6.01	6.95	7.71	8.31	15.26	21.88
1938	1.86	2.72	3.83	3.87	3.87	3.98	4.10	4.99	7.48	8.78	9.43	13.41	28.78
1939	1.01	1.55	1.88	1.92	1.93	1.99	2.31	2.64	2.78	2.78	4.30	4.97	9.66
1940	1.80	3.31	3.78	4.21	5.40	5.72	6.29	7.08	8.25	8.31	9.62	16.54	26.90
1941	2.23	2.60	4.35	4.95	5.71	6.31	7.54	8.90	**10.30**	10.38	14.01	19.73	33.46
1942	1.62	2.87	3.67	3.95	4.40	4.72	4.82	4.82	7.17	7.61	7.72	13.65	28.95
1943	1.72	1.98	2.94	3.48	3.48	3.51	4.22	5.08	5.72	5.92	5.92	10.52	21.49
1944	2.30	3.01	3.20	3.34	4.08	4.27	4.27	4.77	5.09	5.60	7.84	11.38	19.96
1945	1.70	3.26	4.18	4.80	4.88	5.58	5.65	5.65	5.89	6.02	6.08	9.03	19.72
1946	1.47	2.13	3.04	3.04	3.17	4.00	4.80	5.34	5.82	6.35	7.98	11.94	17.68
1947	1.54	1.86	2.86	2.88	2.93	2.93	3.03	3.73	4.42	5.89	6.66	9.04	14.86
1948	1.04	1.46	1.65	1.88	2.16	2.16	2.32	2.43	3.42	3.69	5.83	7.87	20.82
1949	1.15	1.60	1.61	1.84	2.18	2.18	2.42	2.77	4.01	4.49	5.12	6.76	13.56
1950	1.39	2.32	3.30	3.30	3.30	3.30	4.12	4.12	4.91	5.10	7.57	10.34	15.82
1951	1.90	2.57	3.04	3.65	4.46	4.98	5.01	5.11	5.84	7.71	10.95	13.92	23.28
1952	3.72	3.93	3.93	3.93	3.93	5.16	5.47	5.90	8.04	9.12	10.64	14.61	31.15
1953	1.25	1.96	2.08	2.24	2.34	2.70	3.16	3.74	3.91	5.32	7.25	11.55	19.43
1954	1.64	2.48	3.33	3.41	3.41	3.73	4.38	4.38	4.38	4.47	5.25	8.76	17.97
1955	1.51	1.85	1.85	1.98	2.57	2.57	3.31	4.15	4.18	4.18	6.31	8.08	15.85
1956	2.27	4.10	4.31	5.45	6.46	6.78	8.03	8.44	9.12	9.40	14.61	20.50	30.39
1957	1.26	1.95	2.24	3.23	3.52	3.95	4.61	5.34	7.68	8.82	9.73	10.71	17.73
1958	1.75	2.29	3.46	3.51	3.77	4.24	4.55	4.71	6.53	7.58	10.07	15.81	30.65
1959	1.46	1.87	3.28	3.35	3.40	3.87	3.99	4.63	5.19	5.19	5.98	10.64	15.27
1960	1.65	1.83	1.83	1.83	1.83	1.83	2.40	2.74	2.99	4.37	5.40	8.84	13.98
1961	1.00	1.85	2.00	2.11	2.26	2.31	2.93	3.58	4.19	4.61	5.46	7.63	15.53
1962	1.72	1.98	3.22	3.46	3.54	4.38	5.78	6.39	7.13	7.22	9.12	9.98	16.76
1963	4.24	7.29	**9.26**	**9.31**	**9.31**	**9.31**	**9.31**	**9.31**	9.31	9.31	9.36	10.43	28.21
1964	2.76	3.38	3.52	3.53	3.54	3.55	3.70	3.72	3.72	4.75	4.85	7.18	15.50
1965	1.46	2.56	3.27	3.81	3.99	3.99	4.06	4.21	5.48	7.26	7.50	10.09	19.04
1966	1.47	1.62	1.83	1.90	2.74	3.09	3.37	3.37	3.98	4.14	4.15	7.79	12.46
1967	1.81	3.12	3.58	3.59	4.28	4.40	5.36	7.12	8.03	8.04	10.86	11.76	29.52
1968	1.65	1.89	2.05	2.27	2.72	2.88	2.96	3.16	3.25	4.16	5.40	9.14	16.07
1969	2.47	3.47	4.08	4.34	4.34	4.34	5.19	6.82	8.73	9.41	10.59	17.16	29.07
1970	1.64	2.53	2.93	3.08	4.21	5.10	5.32	5.32	6.82	8.11	9.64	14.99	22.16
1971	2.36	3.54	3.69	4.08	4.94	4.95	6.06	6.22	6.84	7.78	8.61	11.70	19.12
1972	0.95	1.19	1.63	2.52	2.57	3.03	3.56	3.56	3.57	3.98	4.83	6.57	13.81
1973	1.78	2.38	3.05	3.79	4.22	4.28	5.86	7.28	7.72	8.40	11.00	17.93	29.94
1974	1.61	2.21	2.40	3.17	3.96	4.15	4.67	5.39	6.69	7.13	9.02	12.59	28.35
1975	2.11	3.78	4.46	5.16	5.24	5.30	5.93	6.58	8.92	9.48	9.52	14.11	22.37
1976	1.10	1.25	1.25	1.49	1.55	1.55	1.55	1.55	1.55	2.33	2.52	4.60	11.23
1977	0.81	1.54	1.61	1.61	1.69	2.05	2.05	2.05	2.21	2.21	2.24	3.60	7.68
1978	1.57	2.01	2.78	3.73	4.18	5.23	5.68	6.46	9.06	9.42	11.85	15.94	29.29
1979	1.29	1.72	2.77	3.08	3.26	3.26	4.40	4.46	4.81	5.71	6.09	11.01	19.99
1980	1.60	2.54	3.34	4.25	5.05	5.58	6.60	6.82	7.32	8.04	8.51	14.27	23.72
1981	1.90	3.05	3.26	3.26	3.28	3.88	4.78	5.00	5.35	5.35	6.01	10.27	19.32
1982	2.23	3.45	3.58	3.60	3.60	3.69	4.20	4.50	5.92	7.48	8.40	15.13	33.18
1983	1.54	2.05	2.65	2.86	3.43	4.19	4.54	5.19	6.21	7.14	9.42	16.95	36.97
1984	**7.29**	**8.69**	8.99	9.45	9.45	9.45	10.28	10.28	10.48	12.05	14.87	20.46	27.07
1985	1.39	1.47	1.74	1.85	1.90	2.55	2.83	2.90	3.56	4.58	5.89	8.08	15.45
1986	1.41	2.60	3.13	3.73	4.13	4.78	6.06	6.08	6.11	9.20	10.52	15.30	25.67
1987	1.03	1.43	1.56	1.56	1.81	1.81	2.12	2.40	3.11	3.89	4.88	8.58	12.15
1988	1.83	2.29	2.29	2.54	2.82	2.89	3.68	4.30	4.37	5.44	6.49	10.20	17.53
1989	2.00	2.76	2.76	3.36	3.36	3.36	3.37	3.84	4.35	5.62	7.06	9.03	22.03
1990	1.64	3.24	3.42	3.64	4.04	4.08	4.21	4.61	5.01	5.26	5.94	9.30	15.01
1991	1.70	2.86	3.14	3.47	3.95	4.03	4.03	4.43	6.96	7.98	11.67	13.86	19.41
1992	1.53	2.07	2.78	3.67	4.38	5.07	5.41	5.99	6.92	6.99	9.10	11.75	20.49
1993	1.62	2.18	2.89	3.06	3.46	3.90	4.40	5.71	7.46	8.25	10.90	17.38	30.78
1994	1.70	1.85	2.22	2.84	2.84	2.84	2.84	2.84	3.92	4.93	6.16	7.90	14.92
1995	3.20	4.34	4.64	5.15	5.75	6.32	6.90	7.49	8.87	9.76	11.94	15.85	36.33
1996	2.21	2.85	2.95	3.21	3.62	3.62	4.28	5.04	5.56	6.57	8.59	12.86	25.35
1997	2.29	3.04	3.67	4.99	5.74	6.37	6.78	6.93	6.94	7.23	10.34	15.34	22.91
1998	1.55	1.85	2.31	2.66	3.07	3.32	4.06	4.72	6.34	8.09	11.25	17.25	34.41
1999	1.20	1.31	1.67	1.67	1.89	2.15	2.33	2.66	3.87	4.33	5.04	7.84	16.43
2000	1.48	2.56	3.67	4.55	4.93	4.93	4.99	4.99	7.13	8.96	10.98	15.74	21.97
2001	1.22	1.77	1.81	2.83	3.38	3.38	3.38	3.38	3.87	4.38	4.69	8.74	15.01
2002	1.50	1.74	2.19	2.37	3.65	3.77	3.82	4.75	4.86	6.37	7.53	12.92	20.92
2003	*1.22*	*2.19*	*3.09*	*3.59*	*3.93*	*3.93*	*4.71*	*5.15*	*5.58*	*6.81*	*7.81*	*8.64*	*18.4*

JDG

5/29/2014

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NOTE:
To print data frame (right side), click on right frame before printing.

1981 - 2010

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1981-2010 Normals (~3 KB)

1971 - 2000

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1971-2000 Normals (~3 KB)

1961 - 1990

- Daily Temp. & Precip.
- Daily Tabular data (~23

VACAVILLE, CALIFORNIA (049200)

Period of Record Monthly Climate Summary

Period of Record : 1/ 1/1893 to 12/31/2009

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	55.4	61.3	66.6	72.9	80.9	88.6	95.2	93.9	89.6	79.8	66.4	56.1	75.6
Average Min. Temperature (F)	36.7	39.6	41.7	44.1	48.8	53.5	56.1	55.0	52.6	47.3	41.0	37.3	46.1
Average Total Precipitation (in.)	5.48	4.45	3.28	1.51	0.65	0.14	0.02	0.04	0.30	1.20	2.77	4.73	24.55
Average Total SnowFall (in.)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 96.6% Min. Temp.: 96.6% Precipitation: 96.7% Snowfall: 96.8% Snow Depth: 96.8%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu