SCHEDULE FORECASTING

NOAA Data

Obtain data

- Go to http://www.ncdc.noaa.gov/.
- Then: “Most Popular Data”.
- Then: Item #8 “ U.S. Annual Climatological Summary”.
- Then: “Individual Station”.
- Then: (1) Enter nearest city to the site. (2) Select “Monthly Summaries GHCND. (3) Click the “Search” button.
- Then: Select the station with the ‘best’ data – usually the largest airport. Note the available data dates. Click on “Add to cart”.
- In the “View/Edit Your Cart” supply the “output date range” – usually 01Jan to 31Dec of the available full years. Select CSV for output format. Click “continue”.
- Expand the “Computed” checkbox and select DP01. Click “Continue”. Add your email address and then “Submit Order”. Your data should arrive shortly.

Process Data

- Your file will be listed on the green bar near the top of the email.
- Open the csv file – see RawData.jpg
- Add two columns – one for year and one for month. Use the ‘left’ and ‘mid’ functions to populate the columns – see ModData.jpg.
- Insert a pivot table – see Pivot.jpg
- Determine the mean and standard deviations for the months. Use a ‘Z’ value of 1.28 to determine the P10 and P90 values – see Table.jpg
- Round the mean, P10, and P90 to get your ‘min’, ‘lik’, and ‘max’ values – see Table.jpg.

Charts – days of rain

A	B	C
STATION	DATE	DP01
GHCND:US	19480101	7
GHCND:US	19480201	7
GHCND:US	19480301	3
GHCND:US	19480401	2
GHCND:US	19480501	5
GHCND:US	19480601	4
GHCND:US	19480701	5
GHCND:US	19480801	8
GHCND:US	19480901	2
GHCND:US	19481001	0
GHCND:US	19481101	7
GHCND:US	19481201	7
GHCND:US	19490101	8
GHCND:US	19490201	11
GHCND:US	19490301	9
GHCND:US	19490401	11
GHCND:US	19490501	2
GHCND:US	19490601	8
GHCND:US	19490701	14
GHCND:US	19490801	5
GHCND:US	19490901	7

RawData.jpg

A	B	C	D
DATE	Year	Month	DP01
19480101	1948	01	7
19480201	1948	02	7
19480301	1948	03	3
19480401	1948	04	2
19480501	1948	05	5
19480601	1948	06	4
19480701	1948	07	5
19480801	1948	08	8
19480901	1948	09	2
19481001	1948	10	0
19481101	1948	11	7
19481201	1948	12	7
19490101	1949	01	8
19490201	1949	02	11
19490301	1949	03	9
19490401	1949	04	11
19490501	1949	05	2
19490601	1949	06	8
19490701	1949	07	14

ModData.jpg

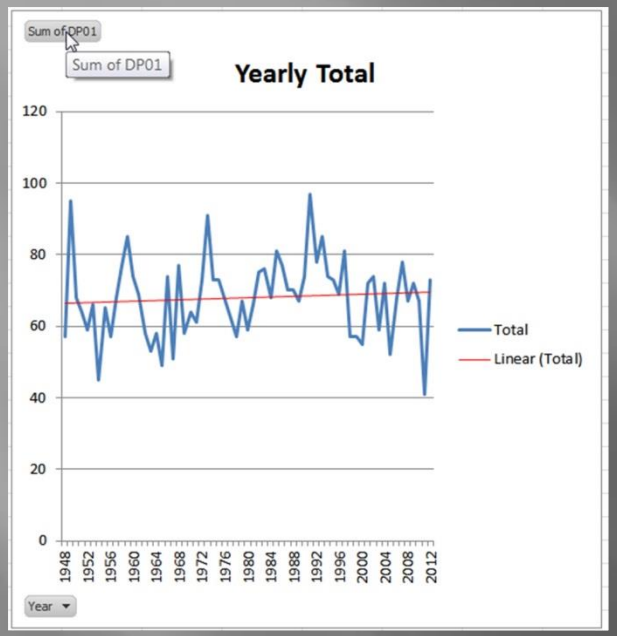
A	B	C	D	E	F	G	H	I	J	K	L	M
Rain												
Year	01	02	03	04	05	06	07	08	09	10	11	12
1948	7	7	3	2	5	4	5	8	2	0	7	7
1949	8	11	9	11	2	8	14	5	7	11	1	8
1950	6	7	7	9	4	6	8	6	5	1	2	7
1951	8	3	8	3	5	3	8	3	13	2	4	4
1952	5	8	4	6	4	5	9	3	3	0	6	6
1953	4	9	2	3	8	4	6	7	1	3	8	11
1954	4	1	4	5	2	4	4	7	3	6	3	2
1955	7	7	0	5	5	6	11	10	4	1	5	4
1956	4	7	4	4	7	2	4	6	3	4	5	7
1957	2	1	9	7	3	6	8	4	10	4	9	5
1958	6	8	4	3	8	4	9	8	13	5	6	3
1959	5	12	3	6	5	8	13	10	7	6	3	7
1960	6	8	2	3	1	4	8	13	5	6	5	13
1961	8	7	2	4	4	5	5	11	6	1	7	9
1962	5	3	3	5	2	7	3	7	7	6	5	5
1963	3	5	1	3	2	6	6	6	8	0	8	5
1964	8	7	5	4	5	4	6	7	4	0	4	4
1965	3	4	3	1	5	2	6	3	7	3	4	8
1966	10	8	3	6	9	4	9	11	5	3	2	4
1967	4	2	2	3	6	1	5	9	3	7	0	9
1968	8	7	7	2	9	12	8	3	5	4	7	5
1969	3	7	7	5	8	2	7	7	3	4	1	4

Pivot.jpg

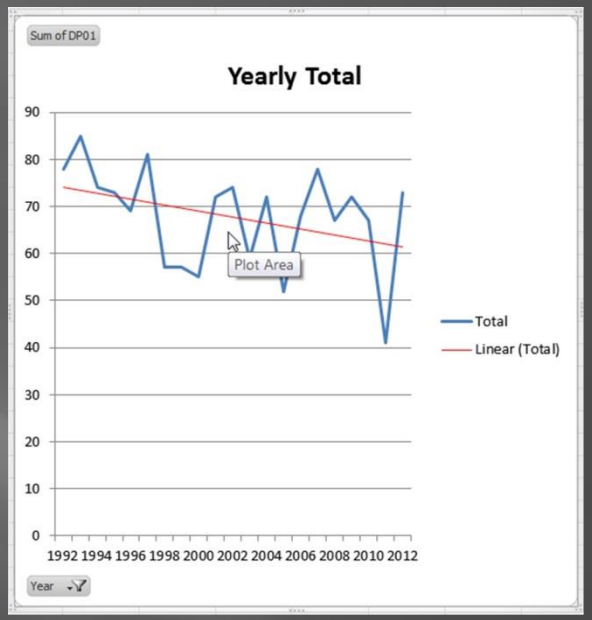
412	349	302	267	316	385	491	459	425	283	338	393	
6.3	5.4	4.6	4.1	4.9	5.9	7.6	7.1	6.5	4.4	5.2	6	Mean
2.6	2.7	2.2	2.3	2.6	3.2	2.6	3	3	2.9	2.6	2.1	SDs
2.6	2.6	2.2	2.2	2.6	3.2	2.6	3	3	2.9	2.5	2.1	SDp
3.3	3.4	2.8	2.9	3.3	4.1	3.4	3.9	3.9	3.8	3.3	2.7	Zfactor
3	2	1.8	1.2	1.6	1.9	4.2	3.2	2.7	0.6	1.9	3.3	Min
6.3	5.4	4.6	4.1	4.9	5.9	7.6	7.1	6.5	4.4	5.2	6	Lik
9.4	7.3	6.5	5.3	6.4	7.8	12	10	9.2	4.9	7.1	9.4	Max
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
3	2	2	1	2	2	4	3	3	1	2	3	Min
6	5	5	4	5	6	8	7	7	4	5	6	Lik
9	7	6	5	6	8	12	10	9	5	7	9	Max

Table.jpg

Analyze Data



65 Year Totals & Trend line



20 Year Totals & Trend line

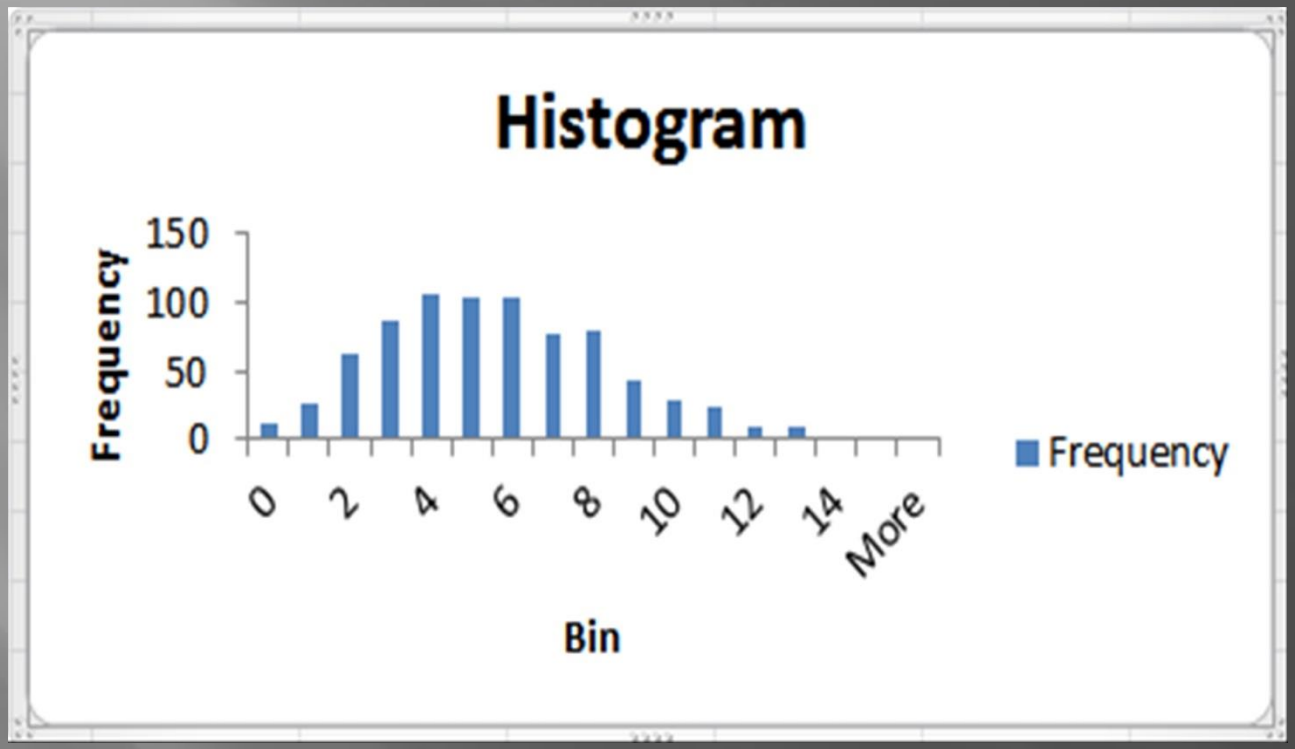
Since slope of the trend line for the last 21 years is decidedly different than the trend line for the 65 year range, it is recommended that you re-run the process on the last 21 years (1992-2012) and compare the differences. It is not recommended that you use less than 20 years of data in developing your 'Table'.

Analysis continued

A	B	C	D	E	F	G	H	I	J	K	L	M	N
65	412	349	302	267	316	385	491	459	425	283	338	393	
	6.338462	5.369231	4.646154	4.107692	4.861538	5.923077	7.553846	7.061538	6.538462	4.353846	5.2	6.046154	Mean
	2.587693	2.666747	2.210987	2.250855	2.585276	3.178579	2.622205	3.045883	3.010798	2.944437	2.569047	2.131833	SDs
	2.56771	2.646154	2.193913	2.233473	2.565313	3.154034	2.601956	3.022362	2.987548	2.9217	2.549208	2.115371	SDp
	3.312247	3.413436	2.830063	2.881094	3.309154	4.068581	3.356423	3.89873	3.853821	3.76888	3.28838	2.728746	Zfactor
	3.026215	1.955795	1.816091	1.226598	1.552385	1.854496	4.197423	3.162808	2.68464	0.584966	1.91162	3.317408	Min
	6.338462	5.369231	4.646154	4.107692	4.861538	5.923077	7.553846	7.061538	6.538462	4.353846	5.2	6.046154	Lik
	9.364676	7.325026	6.462245	5.334291	6.413923	7.777573	11.75127	10.22435	9.223102	4.938812	7.11162	9.363562	Max
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	3	2	2	1	2	2	4	3	3	1	2	3	Min
	6	5	5	4	5	6	8	7	7	4	5	6	Lik
	9	7	6	5	6	8	12	10	9	5	7	9	Max
	132	103	102	81	81	145	167	144	135	104	106	124	
21	6.285714	4.904762	4.857143	3.857143	3.857143	6.904762	7.952381	6.857143	6.428571	4.952381	5.047619	5.904762	Mean
	2.667262	2.42703	2.264635	2.197401	2.555107	2.844376	2.871867	3.48261	2.890872	2.765433	2.80136	1.757975	SDs
	2.602981	2.368539	2.210057	2.144444	2.493529	2.775827	2.802655	3.398679	2.821203	2.698786	2.733848	1.715608	SDp
	3.414095	3.106599	2.898733	2.812673	3.270537	3.640802	3.67599	4.457741	3.700317	3.539754	3.585741	2.250208	Zfactor
	2.871619	1.798163	1.95841	1.044469	0.586606	3.26396	4.276391	2.399402	2.728255	1.412627	1.461878	3.654554	Min
	6.285714	4.904762	4.857143	3.857143	3.857143	6.904762	7.952381	6.857143	6.428571	4.952381	5.047619	5.904762	Lik
	9.157333	6.702925	6.815553	4.901612	4.443749	10.16872	12.22877	9.256545	9.156826	6.365008	6.509497	9.559316	Max
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	3	2	2	1	1	3	4	2	3	1	1	4	Min
	6	5	5	4	4	7	8	7	6	5	5	6	Lik
	9	7	7	5	4	10	12	9	9	6	7	10	Max
													Net
Compare	0	0	0	0	-1	1	0	-1	0	0	-1	1	-1
	0	0	0	0	-1	1	0	0	-1	1	0	0	0
	0	0	1	0	-2	2	0	-1	0	1	0	1	2

As you will note, there is some slight variance between the two ranges. Which to use is up to the planner. Personally, I would use the 21 year range, but either would return values within the level of accuracy of the analysis.

Conclusion



The analysis of the data is sufficiently ‘normal’ to justify use of the Z table value and standard deviations in determining P10 and P90 values. We are ‘reasonably’ confident in the values derived.

Suggestions - caveats

- Define a rain day. No standard definition exists. Here we used 0.1” or greater of daily rainfall as our definition (DP01).
- Analyze your data. You may not always have ‘acceptable’ data and should inform users if so.
- This procedure is to be used with some other probabilistic analysis. I suggest Primavera Risk Analyzer “Weather Module”. Using a Weather Allowance activity that can be ‘risked’, in lieu of a more rigorous analysis should only be used as a ‘last’ resort – better than nothing, but a poor substitute.
- Define mitigating circumstances – make-up days, non-work days (Saturdays, Sundays, Holidays) that might reduce the impact of a rain day.
- Should another metric be needed - say snowfall, temperature, wind speed, or a greater rainfall amount - this method should hold, though processing the data may be significantly more onerous.