



HEC-SSP

Statistical Software Package

The screenshot displays the HEC-SSP software interface. The main window is titled "Bulletin 17B Editor -Ridgway Frequency Curve". It contains several fields for user input, including Name, Description, Flow Data Set, DSS File Name, and Report File. Below these fields are tabs for "General", "Options", and "Results". The "Results" tab is active, showing a table of "Frequency Curve for: CLARION RIVER-RIDGWAY, PA-FLOW-ANNUAL PEAK".

Percent Chance Exceedance	Computed Curve Flow in cfs	Expected Prob. Flow in cfs	Confidence Limits Flow in cfs	
			0.05	0.95
0.2	65,716	89,948	135,020	41,581
0.5	54,620	65,042	98,769	34,056
		50,659	76,711	28,932
		39,171	58,532	24,246
		27,309	39,484	18,636
		20,267	28,210	14,755
		14,420	19,164	11,087
		7,875	9,925	6,230
		4,453	5,779	3,331
		3,321	4,508	2,382
		2,604	3,717	1,809
		1,639	2,646	1,090

Below the table are sections for "System Statistics" and "Number of Events". The "System Statistics" section includes a table with columns for "Statistic" and "Value".

Statistic	Value
Mean	3.9059
Standard Dev	0.2921
Station Skew	0.2334
Regional Skew	0.0
Weighted Skew	0.1335
Adopted Skew	0.2

The "Number of Events" section includes a table with columns for "Event" and "Number".

Event	Number
Historic Events	0
High Outliers	0
Low Outliers	0
Zero Or Missing	0
Systematic Events	24
Historic Period	0

An inset window titled "Exceedance Probability for Ridgway Frequency Curve" shows a log-log plot of Flow (cfs) versus Probability. The plot includes USGS Observed Events (Weibull plotting positions), a Computed Curve (solid red line), an Expected Probability Curve (dashed green line), and a 95 Percent Confidence Limit (dashed black line). The y-axis ranges from 1000.0 to 100000.0 cfs, and the x-axis ranges from 0.9999 to 0.0001 probability.

At the bottom of the main window, a message box states: "Johnsbourg Frequency Analysis saved successfully to C:\HEC Data\SSP\Stats Class Example\Johnsbourg_Frequency_Analysis.17b Created C:\HEC Data\SSP\Stats Class Example\Johnsbourg Frequency Analysis in directory Bulletin 17B".

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Topics

- **History and Status**
- **Overview of HEC-SSP Software**
- **Features currently under development**
- **Future Work**



History and Status

- **HEC-FFA, STATS, and REGFRQ developed by HEC in response to Corps statistical needs in 1970's**
- **Evolved with addition of new capabilities and platform support**
- **In late 1980's, HEC-FFA, STATS, and REGFRQ reconfigured for PC and UNIX**



History and Status

- **HEC-SSP started development in FY2005**
- **Funded by the Flood and Coastal Storm Damage Reduction Research Program**
- **Gary Brunner, Beth Faber, Jeff Harris**
- **Version 1.0 Beta (Released June 2006)**
 - **Only flow frequency following Bulletin 17B**



HEC-SSP Software

The screenshot displays the HEC-SSP software interface with the following components:

- Data Explorer:** A tree view on the left side of the main window showing the project structure: Stats Class Example > Analyses > Bulletin 17B > Data > Map > Base Map.
- Desktop:** A large grid-based workspace in the center-right area, currently empty.
- Description:** A text area at the bottom left of the main window, currently empty.
- Message Window:** A text area at the bottom right of the main window, currently empty.

The software window title is "HEC-SSP - Stats Class Example". The menu bar includes File, Edit, View, Maps, Data, Analysis, Results, Tools, Window, and Help. The status bar at the bottom shows "Coordinates: 1099 east, 973 north".

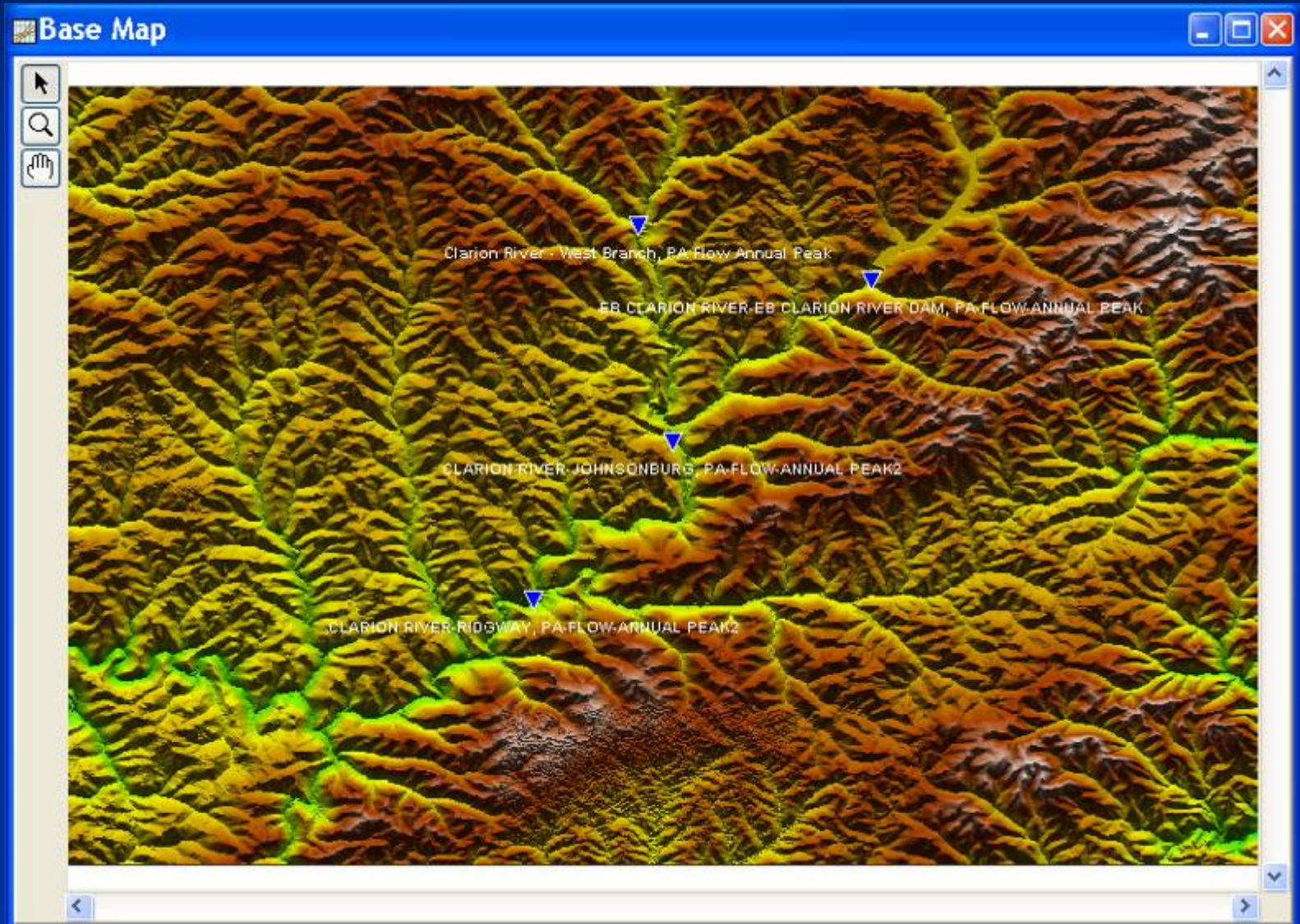


Background Maps

- Background Maps are Optional
- Types of Map Layers:
 - USGS DLG; AutoCAD DXF; Arc shapefile; Raster Image; USGS DEM; Arc Info DEM; and ASCII NetTIN
- Gage Locations Displayed on top
- Map is interactive for Editing Data and Viewing Results



Example Background Map





Data - New Data – DSS File

Data Editor -CLARION RIVER-RIDGWAY, PA-FLOW-ANNUAL PEAK2

Name: R-RIDGWAY, PA-FLOW-ANNUAL PEAK2 Short ID:

Description: Downloaded from USGS website. Station 03029000

Study DSS File: C:\HEC Data\SSP\Clarion River\Clarion_River.dss

Data Source Details

Location

HEC-DSS USGS Website MS Excel Manual

HEC-DSS

Selected DSS File:

Selected DSS Pathname: /CLARION RIVER/RIDGWAY, PA\FLOW-ANNUAL PEAK\IR-CENTURY\USGS\

Search A: C: E:

By Parts: B: D: F:

Number	Part A	Part B	Part C	Part D	Part E	Part F

Import to Study DSS File Clear Selections

Plot Tabulate OK Apply Cancel



Data - New Data – USGS Website

Data Editor -CLARION RIVER-RIDGWAY, PA-FLOW-ANNUAL PEAK2

Name: R-RIDGWAY, PA-FLOW-ANNUAL PEAK2 Short ID:

Description: Downloaded from USGS website. Station 03029000

Study DSS File: C:\HEC Data\SSP\Clarion River\Clarion_River.dss

Data Source: **USGS Website** (circled in red) | HEC-DSS | MS Excel | Manual

USGS Website

Data Type: Annual Peak Flows

Get USGS Station ID's by State

Import Data	USGS Station ID's	Other Qualifier (F Part)
<input type="text"/>	<input type="text"/>	<input type="text"/>

Obtain stations...

Select State: Pennsylvania

Data Type: Annual Peak Flows

OK Cancel

Import to Study DSS File

Plot Tabulate OK Apply Cancel



Data - New Data – USGS Website

Data Editor -CLARION RIVER-RIDGWAY, PA-FLOW-ANNUAL PEAK2*

Name: R-RIDGWAY, PA-FLOW-ANNUAL PEAK2 Short ID:

Description: Downloaded from USGS website. Station 03029000

Study DSS File: C:\HEC Data\SSPIClarion River\Clarion_River.dss

Data Source: USGS Website HEC-DSS MS Excel Manual

USGS Website

Data Type: Annual Peak Flows

Get USGS Station ID's by State Pennsylvania

Import Data	USGS Station ID's	Basin Name (A Part)	Location (B Part)	Other Qualifier (F Part)
<input type="checkbox"/>	03026400	Richey Run	Emlenton, PA	USGS
<input type="checkbox"/>	03026500	Sevenmile Run	Rasselas, PA	USGS
<input checked="" type="checkbox"/>	03027500	EB Clarion River	EB Clarion River Dam, PA	USGS
<input type="checkbox"/>	03028000	West Branch Clarion ...	Wilcox, PA	USGS
<input checked="" type="checkbox"/>	03028500	Clarion River	Johnsonburg, PA	USGS
<input checked="" type="checkbox"/>	03029000	Clarion River	Ridgway, PA	USGS
<input type="checkbox"/>	03029200	Clear Creek	Sigel, PA	USGS
<input type="checkbox"/>	03029400	Toms Run	Cooksburg, PA	USGS
<input type="checkbox"/>	03029500	Clarion River	Cooksburg, PA	USGS
<input type="checkbox"/>	03030500	Clarion River	Piney, PA	USGS

Import to Study DSS File

Plot Tabulate OK Apply Cancel



Data - New Data – Excel Data

Data Editor -

Name: Short ID:

Description:

Study DSS File: C:\Documents and Settings\q0hecdjh\SSPTests\FFA Tests\FFA_Tests.dss

Data Source | Details

Location

HEC-DSS USGS Website MS Excel Manual

Excel File:

Worksheet: Block:

Data Type: Annual Peak Flows

Data Units:

DSS Pathname Parts

A: B: C: FLOW

D: E: IR-CENTURY F:

Pathname: ///FLOW///IR-CENTURY//

Ordinate	Date	Time	Value
1			
2			

Import to Study DSS File

Plot Tabulate OK Apply Cancel



New Data – Manual

Data Editor -

Name: Short ID:

Description:

Study DSS File: C:\Documents and Settings\q0hecdjh\SSPTests\FFA Tests\FFA_Tests.dss

Data Source Details

Location

HEC-DSS USGS Website MS Excel Manual

Data Type: Annual Peak Flows Start Date: 08Apr1998 Start Time: 1345

Data Units: cfs

DSS Pathname Parts

A: Sacramanet B: I-Street C: FLOW

D: E: IR-CENTURY F: Observed

Pathname: /Sacramanet/I-Street/FLOW/IR-CENTURY/Observed/

Ordinate	Date	Time	Value
1	08Apr1998	13:45	13546
2	07Jan1999	08:30	25670
3			
4			

Import to Study DSS File

Plot Tabulate OK Apply Cancel



MetaData

Data Editor - CLARION RIVER-RIDGWAY, PA-FLOW-ANNUAL PEAK

Name: Short ID:

Description:

Study DSS File:

State:	<input type="text" value="Pennsylvania"/>	County:	<input type="text" value="Elk"/>
Stream:	<input type="text" value="Clarion River"/>	Location:	<input type="text" value="Ridgway, PA"/>
Drainage Area:	<input type="text" value="303"/>	DA Units:	<input type="text" value="sqmi"/>
Gage Operator:	<input type="text" value="USGS"/>	USGS No:	<input type="text" value="3029000"/>
Gage Datum:	<input type="text" value="10"/>	HUC:	<input type="text" value="05010005"/>
Vertical Datum:	<input type="text" value="NGVD29"/>		

Description:

Coordinate Location Data

Coordinate System:	<input type="text" value="Lat/Long"/>	Coordinate ID:	<input type="text" value="0"/>
Horizontal Datum:	<input type="text" value="NAD27"/>	Datum Units:	<input type="text" value="Degrees Minutes Seconds"/>
Coordinate X Value:	<input type="text" value="-784410"/>	Coordinate Y Value:	<input type="text" value="412515"/>



Bulletin 17B Analysis - General

Bulletin 17B Editor - Sample Analysis 1

Name:

Description:

Flow Data Set:

DSS File Name:

Report File:

General | Options | Results

Generalized Skew

Use Station Skew

Use Weighted Skew

Use Regional Skew

Regional Skew:

Reg. Skew MSE:

Expected Probability Curve

Compute Expected Prob. Curve

Do Not Compute Expected Prob.

Plotting Position

Weibull (A and B = 0)

Median (A and B = 0.3)

Hazen (A and B = 0.5)

Other (Specify A, B)

Plotting position computed using formula
 $(m-A)/(n+1-A-B)$

Where:
m=rank, 1=largest
N=Number of Years
A,B=Constants

A:

B:

Confidence Limits

Defaults (0.05, 0.95)

User Entered Values

Upper Limit:

Lower Limit:

Compute Plot Curve View Report Print OK Apply Cancel



Bulletin 17B Analysis - Options

Bulletin 17B Editor - Sample Analysis 1

Name:

Description:

Flow Data Set:

DSS File Name:

Report File:

General **Options** Results

Low Outlier Threshold

Use Low Outlier Threshold

Value:

Historic Period Data

Use Historic Data

Historic Period:

Start Year:

End Year:

High Threshold Flow:

Historic Flood Peaks	
Water Year	Peak Flow

User Specified Frequency Ordinates

Use Values from Table below

Frequency in Percent	
	0.2
	0.5
	1.0
	2.0
	5.0
	10.0
	20.0
	50.0
	80.0
	90.0
	95.0
	99.0



Bulletin 17B Analysis - Results

Bulletin 17B Editor - Sample Analysis 1

Name:

Description:

Flow Data Set:

DSS File Name:

Report File:

General | **Options** | Results

Frequency Curve for: Sample River at Sample Location					
Percent Chance Exceedance	Computed Curve Flow in cfs	Expected Prob. Flow in cfs	Confidence Limits		
			Flow in cfs		
			0.05	0.95	
0.2	357,859	368,385	430,389	307,045	
0.5	313,568	320,707	371,964	271,965	
1.0	280,542	285,658	329,033	245,484	
2.0	247,834	251,308	287,116	218,939	
5.0	204,821	206,693	233,048	183,445	
10.0	172,091	173,100	192,865	155,872	
20.0	138,536	138,973	152,756	126,918	
50.0	89,785	89,785	97,208	82,963	
80.0	56,753	56,548	61,921	51,505	
90.0	44,202	43,889	48,868	39,366	
95.0	35,767	35,361	40,104	31,261	
99.0	23,730	23,142	27,459	19,912	

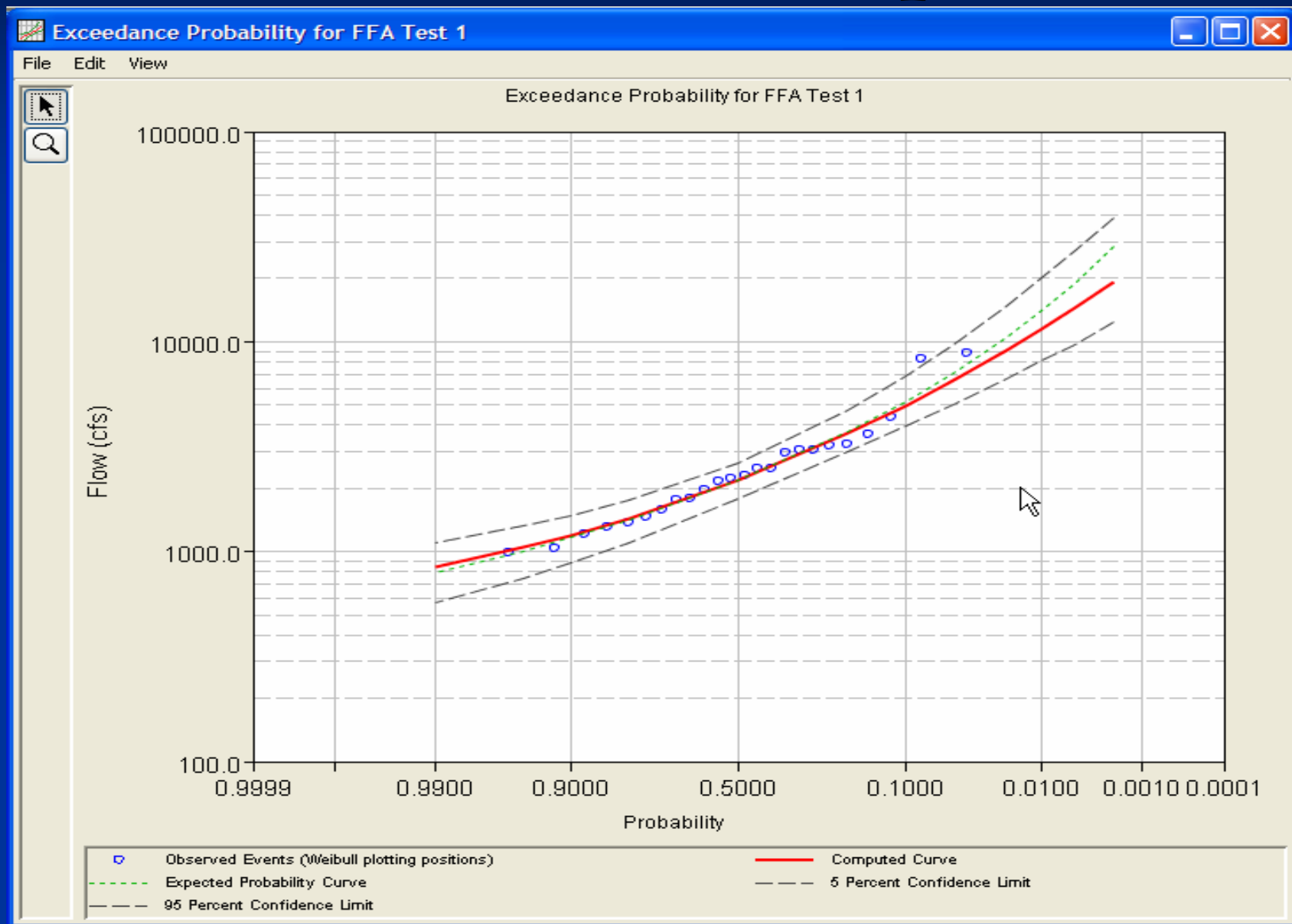
System Statistics	
Log Transform: Flow,	
Statistic	Value
Mean	4.9455
Standard Dev	0.2307
Station Skew	-0.1804
Regional Skew	0.0
Weighted Skew	-0.1541
Adopted Skew	-0.2

Number of Events	
Event	Number
Historic Events	0
High Outliers	0
Low Outliers	1
Zero Or Missing	0
Systematic Events	123
Historic Period	0

Compute Plot Curve View Report Print OK Apply Cancel



Results - Graph





Results - Report

```
FFA_Test_1.rpt
File Edit Search Format
File: C:\Documents and Settings\q0hecdjh\SSPTests\FFA Tests\Bulletin17bResults\FFA_Test_1\FFA_Test_1.rpt
-----
Bulletin 17B Frequency Analysis
  07 Jan 2006  10:58 AM
-----

--- Input Data ---

Analysis Name: FFA Test 1
Description: WRC Appendix 12, Example 1 - Fitting the Log-Pearson Type III Distribution
Fishkill Creek at Beacon, NY
WRC Appendix 12, Example 1 - Fitting the Log-Pearson Type III Distribution
Fishkill Creek at Beacon, NY

Data Set Name: FISHKILL CREEK-BEACON-FLOW
DSS File Name: C:\Documents and Settings\q0hecdjh\SSPTests\FFA Tests\FFA_Tests.dss
DSS Pathname: /FISHKILL CREEK/BEACON/FLOW/01jan1900/IR-CENTURY//

Report File Name: C:\Documents and Settings\q0hecdjh\SSPTests\FFA Tests\Bulletin17bResults\FFA_Test_1\FFA_Test_1.rpt
XML File Name: C:\Documents and Settings\q0hecdjh\SSPTests\FFA Tests\Bulletin17bResults\FFA_Test_1\FFA_Test_1.xml

Skew Option: Use Station Skew
Regional Skew: 0.6
Regional Skew MSE: 0.302
Round adopted skew to nearest tenth

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

Round ordinate values to 3 significant digits
Display ordinate values using 0 digits in fraction part of value

--- End of Input Data ---

--- Final Results ---
```



Current Development...

- **General Frequency Analysis**
 - **Stage-Frequency (analytical or graphical method)**
 - **Flow-Frequency (Methods other than Bulletin 17B specific)**
- **Volume-Duration Frequency (1-day, 3-day, etc...)**



Generalized Frequency Analysis Analytical Frequency Settings Tab

General Frequency -Stage Frequency Analysis*

Name:

Description:

Data Set:

DSS File Name:

Report File:

General Options Analytical Graphical

Settings Results Plot

Log Transformation:
log transform is On

Distribution

Generalized Skew

Use Station Skew

Use Weighted Skew

Use Regional Skew

Regional Skew:

Reg. Skew MSE:

Expected Probability Curve

Compute Expected Prob. Curve

Do Not Compute Expected Prob.

Compute Plot Analytical Curve Plot Graphical Curve View Report OK Cancel Apply



Generalized Frequency Analysis

Analytical Frequency Tabular Results

General Frequency -Stage Frequency Analysis*

Name: Stage Frequency Analysis

Description:

Data Set: CLARION RIVER-RIDGWAY, PA-STAGE-ANNUAL PEAK

DSS File Name: C:\HEC Data\SSP\Clarion River\Clarion_River.dss

Report File: C:\HEC Data\SSP\Clarion River\GeneralFrequencyResults\Stage_Frequency_Analysis\Stage_Frequency_ /

General Options Analytical Graphical

Settings Results Plot

Percent Chance Exceedance	Curve based on Data			Curve based on User-Adjusted Statistics		
	Computed Curve STAGE in FEET	Confidence Limits STAGE in FEET		Computed Curve STAGE in FEET	Confidence Limits STAGE in FEET	
		0.95	0.05		0.95	0.05
0.2	24	33	20			
0.5	22	29	19			
1.0	21	27	17			
2.0	19	24	16			
5.0	17	20	15			
10.0	15	18	13			
20.0	13	15	12			
50.0	10	11	9			
80.0	8	9	7			
90.0	7	8	6			
95.0	6	7	5			

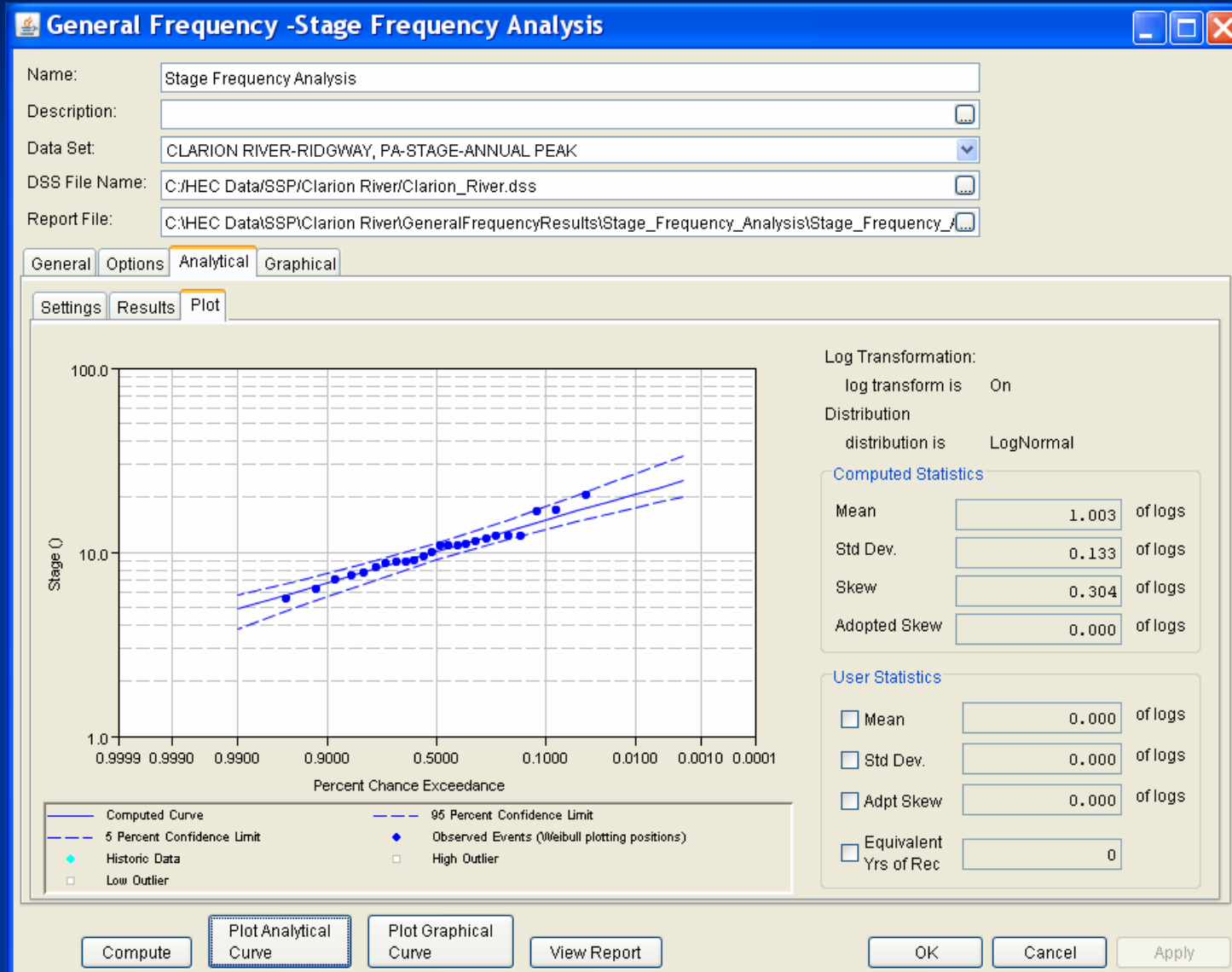
System Statistics		Number of Events	
Statistic	Value	Event	Number
Mean	1.003	Historic Events	0
Standard Dev	0.133	High Outliers	0
Station Skew	0.304	Low Outliers	0
Regional Skew		Zero Or Missing	0
Weighted Skew		Systematic Events	24
Adopted Skew	0.000	Historic Period	-1

Log Transformation:
log transform is On
Distribution
distribution is LogNormal

Compute Plot Analytical Curve Plot Graphical Curve View Report OK Cancel Apply



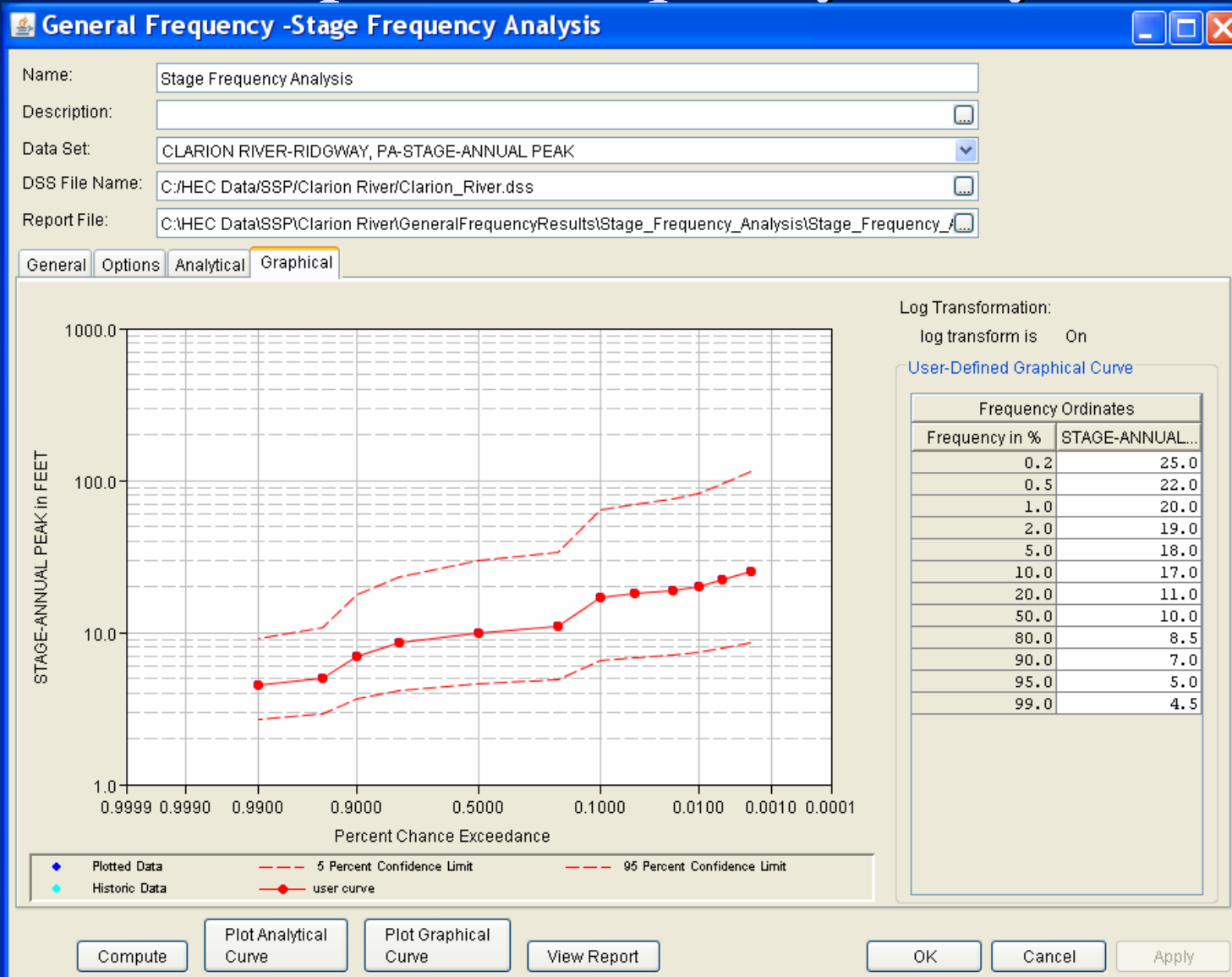
Generalized Frequency Analysis Analytical Results Plot





Generalized Frequency Analysis

Graphical Frequency Analysis





Volume-Duration Frequency General Input Tab

Volume-Duration Frequency

Name:
Description:
Data Set:
DSS File Name:
Report File:

General | Options | Vol-Duration Table | Analytical | Graphical

Log Transform
 Use Log Transform
 Do Not Use Log Transform

Maximum or Minimum Analysis
 Analyze Maximums
 Analyze Minimums

Plotting Position
 Weibull (A and B = 0)
 Median (A and B = 0.3)
 Hazen (A and B = 0.5)
 Other (Specify A and B)

Plotting Position computed using formula
$$\frac{(m-A)}{(N+1-A-B)}$$
where:
m = rank, 1 = largest
N = Number of Years
A, B = Constants
A:
B:

Year Specification
 Water Year (starts Oct 1)
 Calendar Year (starts Jan 1)
 Other
starting:

Time Window Modification
End Points
DSS Range is 2/1/1962 – 7/31/1997
 start date
 end date

Season
To define a subset of the year
season start: season end:

NOTE: season must be within a year, as defined above

COMPUTE | Plot Duration Data | Plot Analytical Curves | Plot Graphical Curves | View Report | OK | Apply | Cancel



Volume-Duration Frequency Options Tab

Volume-Duration Frequency

Name:
Description: ...
Data Set: v
DSS File Name: ...
Report File: ...

General | **Options** | Vol-Duration Table | Analytical | Graphical

Output Labeling

Data Name
DSS data name is **FLOW-PEAK**
 change label
Data Unit
DSS data unit is **CFS**
 change label

Flow Durations

Change or add to default values

Duration in days	
	1
	3
	7
	15
	30
	60
	90
	120
	183

User-Specified Frequency Ordinates

Change or add to default values

Frequency in Percent	
	0.2
	0.5
	1.0
	2.0
	5.0
	10.0
	20.0
	50.0
	80.0
	90.0
	95.0
	99.0

COMPUTE Plot Duration Data Plot Analytical Curves Plot Graphical Curves View Report OK Apply Cancel



Volume-Duration Frequency

Volume-Duration Output

Volume-Duration Frequency

Name:
Description:
Data Set:
DSS File Name:
Report File:

General Options **Vol-Duration Table** Analytical Graphical

Volume-Duration Data
Lowest Mean Value for Duration, Average Daily Flow in cfs

Year	1	3	7	15	30	60	90	120
1945								
1946								
1947								
1948								
1949								
1950								
1951								
1952								
1953								
1954								
1955								
1956								
1957								
1958								
1959								
1960								
1961								
1962								
1963								
1964								
1965								

Note: this table is populated after the Extract button below is pressed

Extract Volume-Duration Data

COMPUTE Plot Duration Data Plot Analytical Curves Plot Graphical Curves View Report OK Apply Cancel



Volume-Duration Frequency Analytical Frequency Analysis

Volume-Duration Frequency

Name: Name
Description: Description
Data Set: Data Set
DSS File Name: DSS File Name
Report File: Report File

General Options Vol-Duration Table **Analytical** Graphical

Settings Results Plot Statistics

Log Transform:
log transform is OFF (or ON)

Distribution

None	None
Normal	LogNormal
PearsonIII	LogPearsonIII

Note, if a distribution other than LPIII or PearsonIII is selected, the Skew box is grayed out

Skew

Use Station Skew
 Use Weighted Skew
 Use Regional Skew

Duration	Reg. Skew	R.Skew MSE
1		
3		
7		
15		
30		
60		
90		
120		
183		

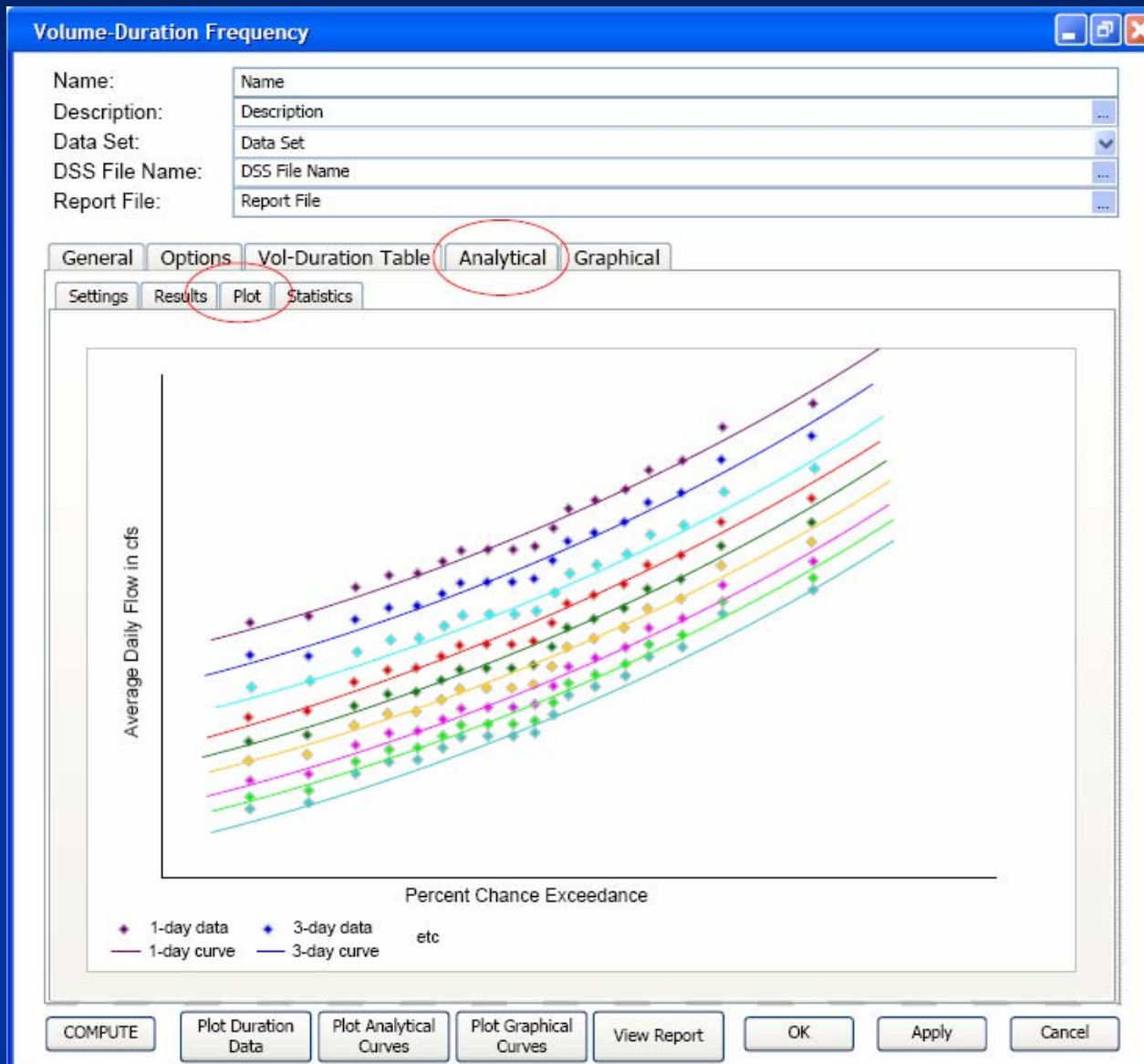
Expected Probability Curve

Compute Exp. Prob. Curve
 Do Not Compute Exp. Pr. Curve

COMPUTE Plot Duration Data Plot Analytical Curves Plot Graphical Curves View Report OK Apply Cancel



Volume-Duration Frequency Plotted Results





Future Development

- **Coincident Frequency**
- **Regional Frequency Analysis**
- **Multiple Linear Regression Analysis**