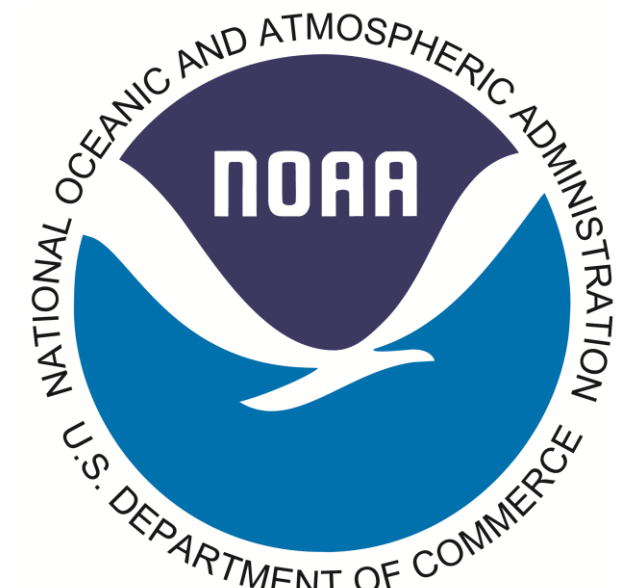




Middle Atlantic River Forecast Center Flood Climatology Analysis

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Introduction

The Middle Atlantic River Forecast Center (MARFC) has received numerous requests from customers for historical flood information. MARFC answered these requests by compiling and analyzing flood events from 1687 to 2012. During this time, more than 7900 floods have occurred at MARFC's 173 current forecast points.

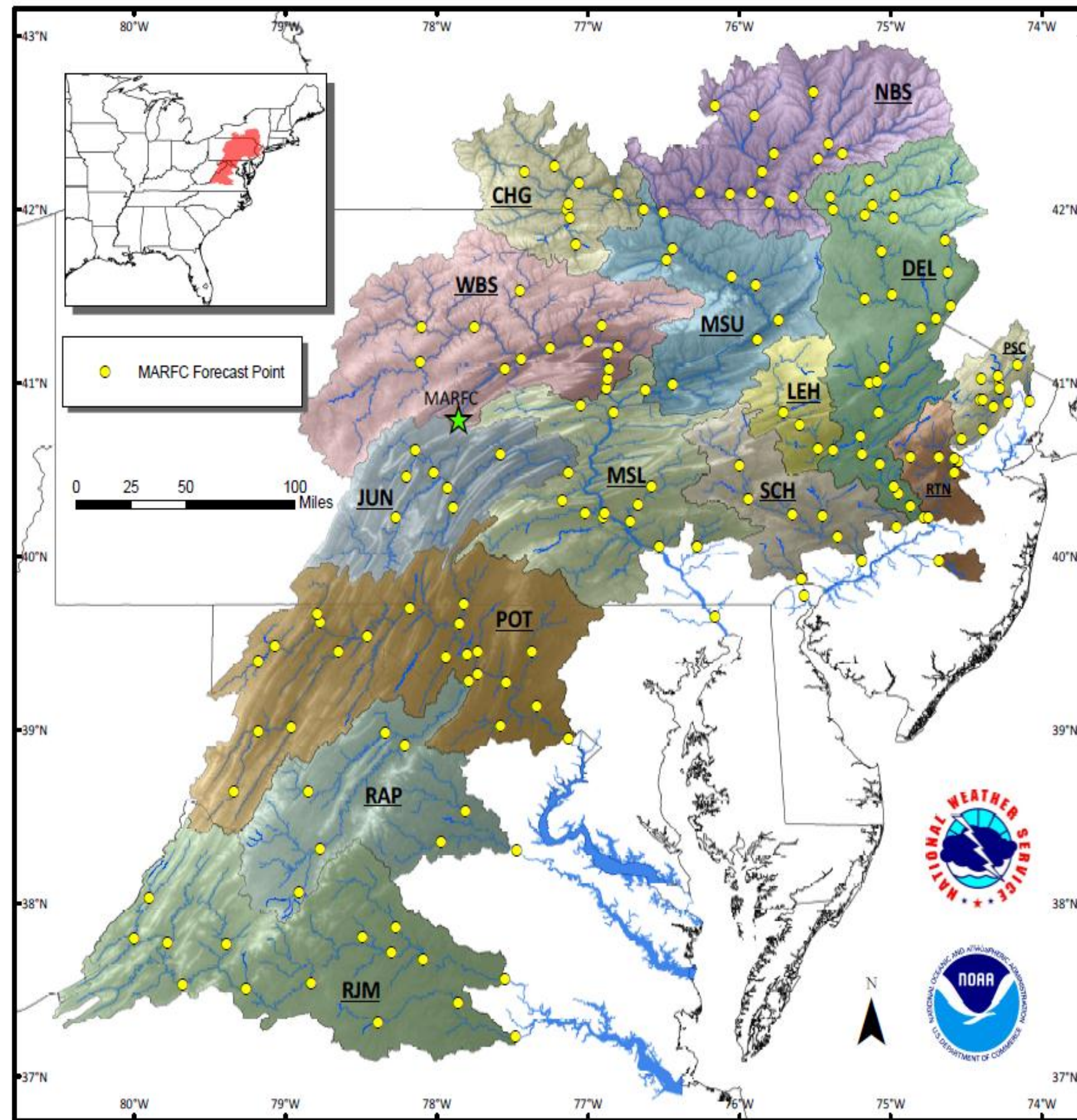


Figure 1: Map of MARFC's basins and forecast points.

Extensive flood event and weather information was gathered from NWS hydrologic reports, USGS, websites, county managers, books, newspaper clippings, and analysis of historical weather maps.

Methods

Several statistics for each of MARFC's forecast points were calculated including return period, flood frequency, probability of exceeding minor, moderate or major flood stage and percentage of flood occurrences.

$$\text{Return Period} = \frac{\text{Period of Record}}{\text{Number of Floods}}$$

A power ranking system based on the number of flooded locations and the severity of each flood was developed to enable flood events comparison.

$$\text{Power Ranking} = (\text{Minor Floods}) + (\text{Unknown Floods}) + (\text{Moderate Floods})(5) + (\text{Major Floods})(10)$$

Data analysis for each forecast point includes the top 10 floods at each location, number of floods by category, number of floods by month, year or season and average height above flood stage.

In addition to a list of flood locations, each MARFC flood event summary includes a synoptic weather briefing, weather maps, precipitation information.

Results

MARFC Flood Climatology data are available online or by request in an Access database. Data and statistics are presented as summary information for all locations and as location-specific information.

Top 10 Flood Events (1687 – 2012) by Power Ranking

Flood Event Dates	Total	Minor	Moderate	Major	Unk.	Power Ranking	Tropical System
6/21/1972 - 6/27/1972	118	21	18	79	0	901	Agnes
1/19/1996 - 1/23/1996	140	34	47	58	1	850	
3/17/1936 - 3/20/1936	92	12	15	64	1	728	
9/06/2011 - 9/15/2011	107	34	41	32	0	559	Lee
6/26/2006 - 7/01/2006	92	29	27	36	0	524	
9/17/2004 - 9/20/2004	83	18	31	34	0	513	Ivan
8/17/1955 - 8/21/1955	71	17	19	34	1	453	Diane
4/01/2005 - 4/04/2005	86	32	31	23	0	417	
9/25/1975 - 9/29/1975	69	22	24	22	1	363	Eloise
3/06/2011 - 3/18/2011	112	71	31	10	0	326	

Table 1: Top 10 highest power ranking floods in the MARFC forecast area from 1687 – 2012.

Information can be analyzed for a particular state, county, weather forecast office hydrologic area of responsibility, or basin.

Flood Events by Category for the Raritan River Basin

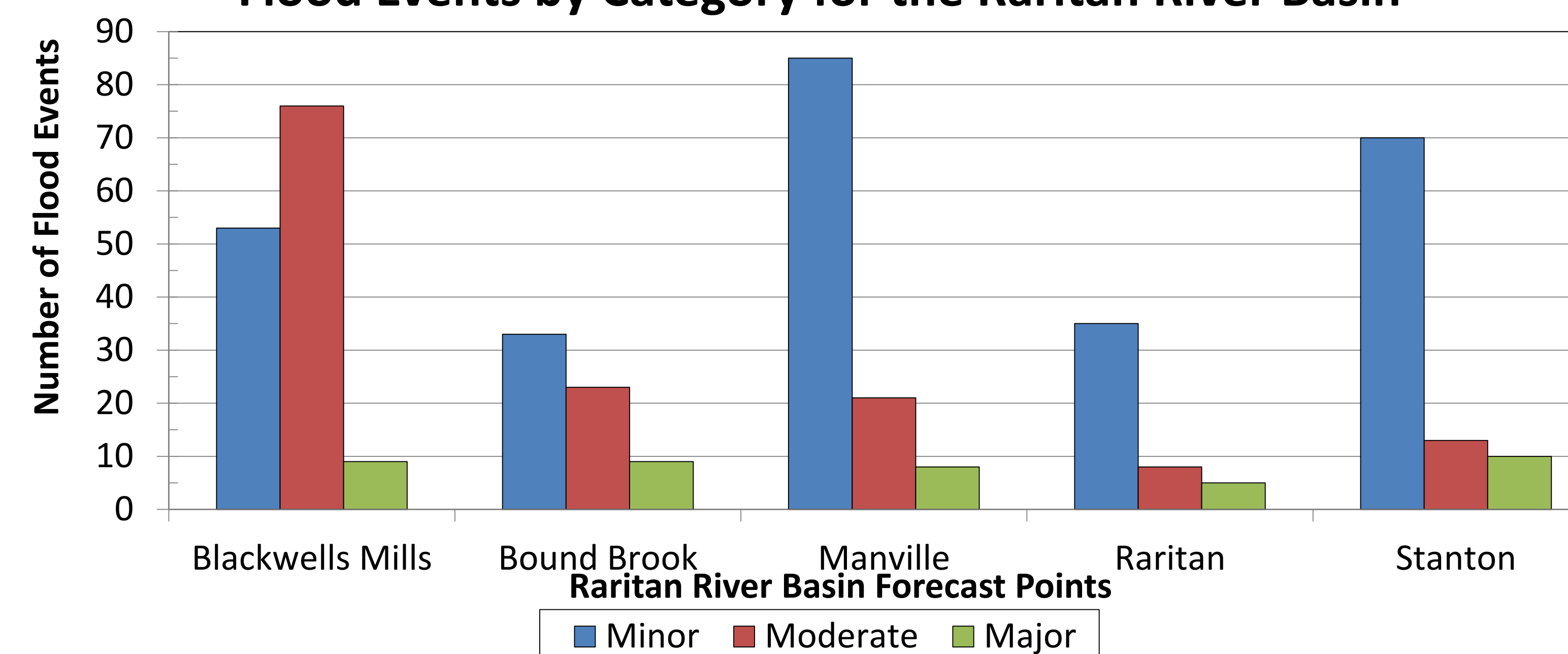


Figure 2: Number of minor, moderate and major floods at each forecast point in the Raritan River Basin.

Statistical information, such as return period, is useful for understanding the chance of a yearly flood event. Smaller return period values correspond to a higher probability of flooding.

Return Periods for the Raritan River Basin

Site	Stream	Flood Stage	Period of Record	Years	Floods	Return Period	Floods per Year
Blackwells Mills	Millstone River	9	8/17/1928-Present	83.17	137	0.61	1.65
Bound Brook	Raritan River	28	10/1/1966-Present	45.8	65	0.7	1.42
Manville	Raritan River	14	8/15/1923-Present	88.17	113	0.78	1.28
Raritan	Raritan River	10	10/17/1936-Present	75	48	1.56	0.64
Stanton	Raritan River	8	8/17/1925-Present	86.17	92	0.94	1.07

Table 2: Return period for MARFC forecast points in the Raritan River Basin.

Conclusions

MARFC's flood climatology addresses the need for historical flood information.

The data are utilized by MARFC forecasters as historical event analogues during large flood events. For example, Hurricane Irene was predicted to have a similar rainfall amounts and rainfall duration as Hurricane Floyd. MARFC forecasters used the floods from Hurricane Floyd as a basis for expected flooding from Hurricane Irene.

During large flood events, emergency managers, hydrologic forecasters, river basin commissions and the media want to know how the current event ranks compared to historical flood events. The flood climatology analysis provides the necessary information.

Future Work

MARFC forecasters have noticed that the spring snowmelt floods seem to be occurring earlier each year. Trends in floods caused by snowmelt will be analyzed to determine if MARFC's Flood Climatology data supports this hypothesis.

In recent months the MARFC's Flood Climatology website has undergone major upgrades. During the next year, data presentation on the website will be catered to a user's specific request.

Acknowledgements

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<http://weather.gov/marfc/Rivers/FloodClimo>