

INLAND FLOODING FROM TROPICAL CYCLONES

Climatology

Hydrometeorology

Keeping Informed

Thursday May 27



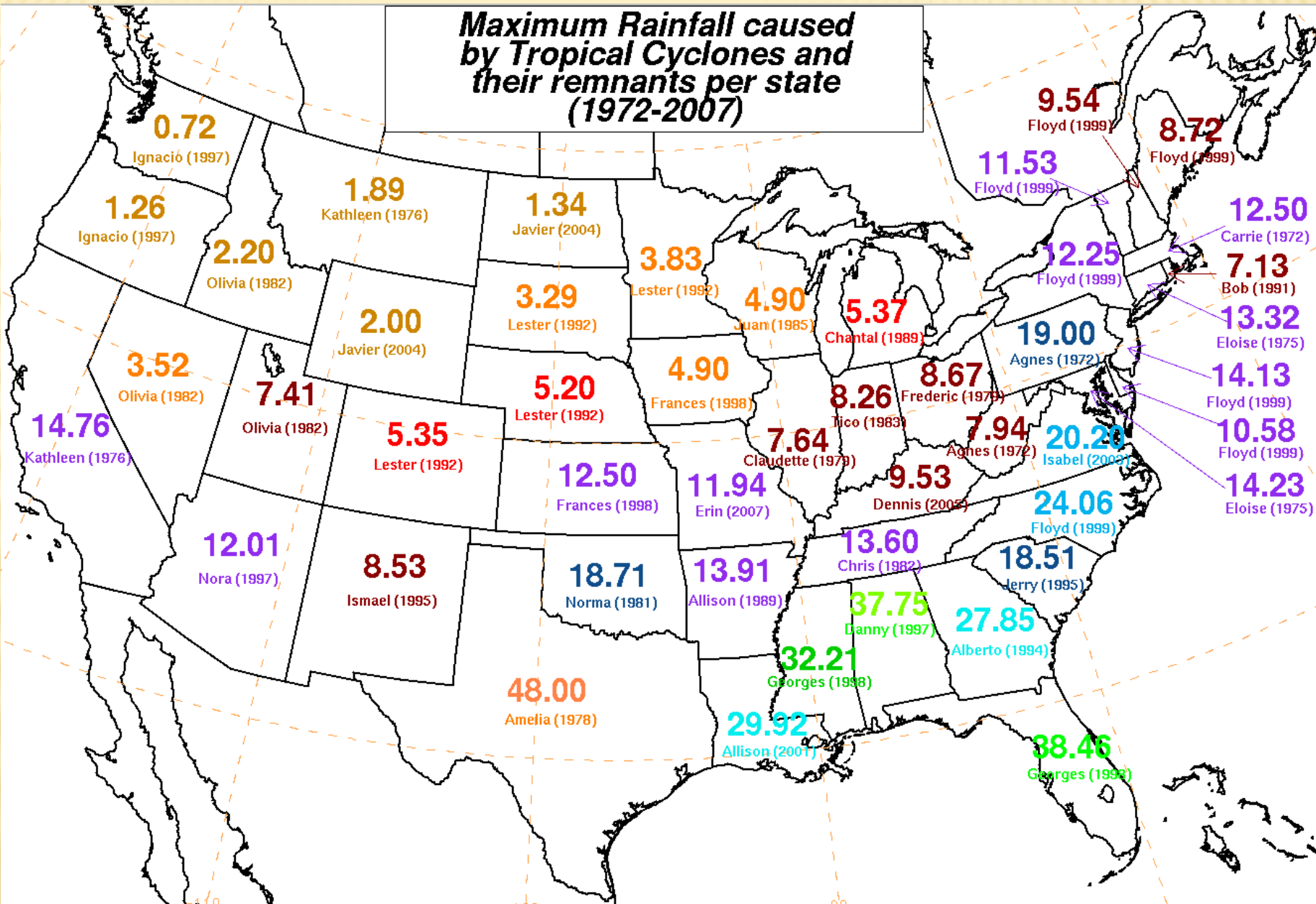
John Feldt
Hydrologist-in-Charge
Southeast River Forecast Center



CLIMATOLOGY

Fatalities Related to Inland Flooding
Locations Most Prone to Inland Flooding
Florida Flood Climatology

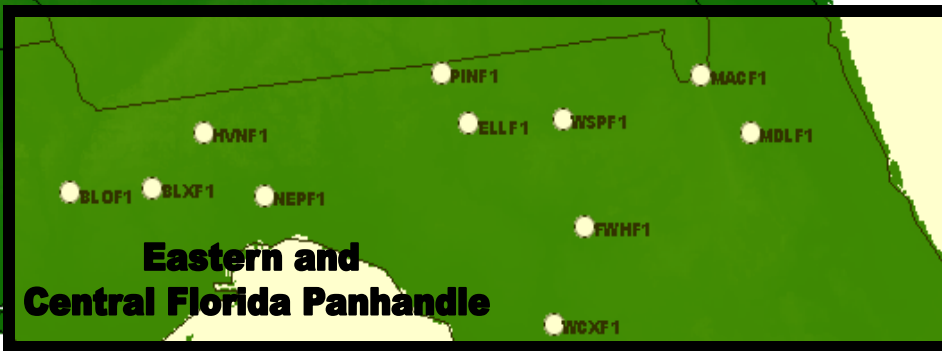
Maximum Rainfall caused by Tropical Cyclones and their remnants per state (1972-2007)



Western Florida Panhandle



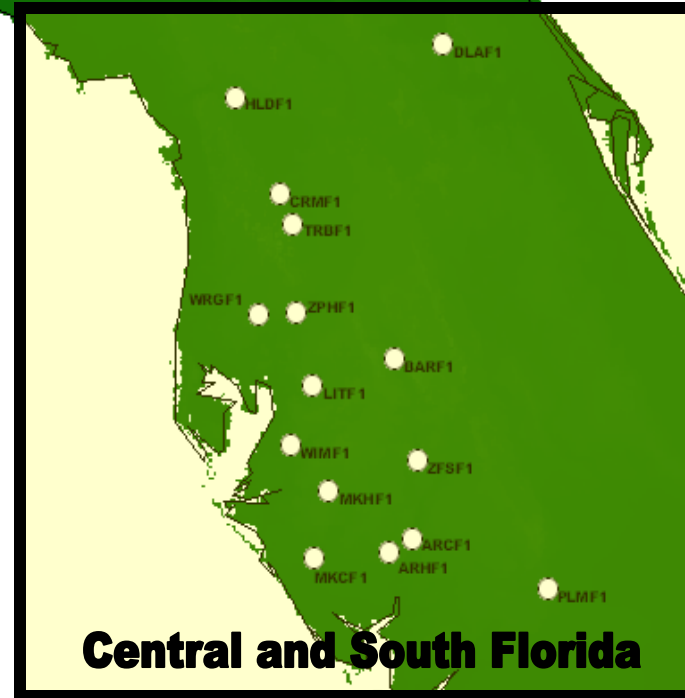
Eastern and Central Florida Panhandle



30 Locations

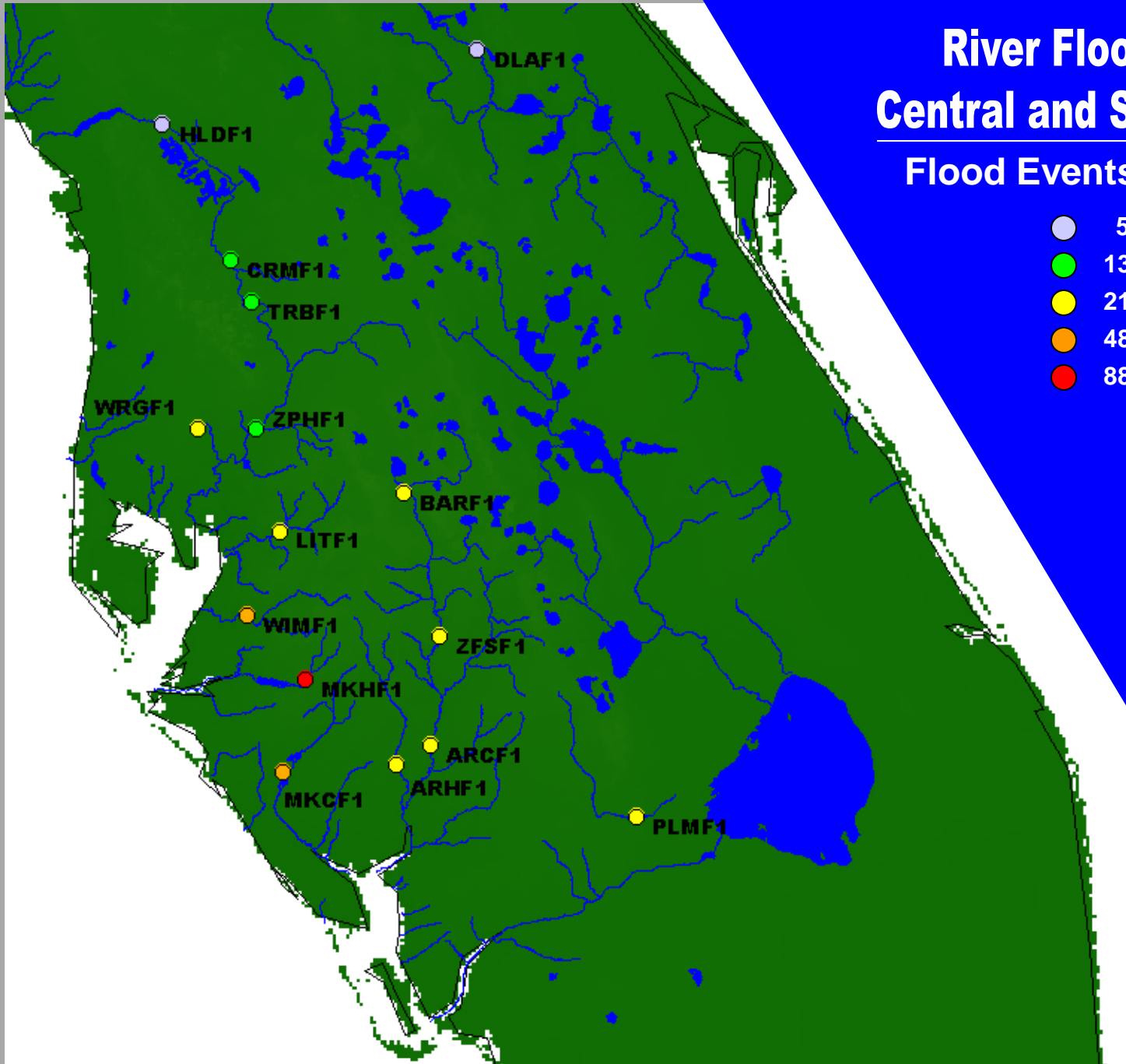
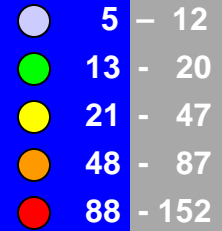
ID	Station Name
DLAF1	St John River near Deland
MDLF1	Black Creek near Middleburg
BDFD1	Suwannee River at Branford
BLXF1	Ochlocknee River near Bloxham
ELLF1	Anclote River near Elfers
FWHF1	Sante Fe River at Fort White
HVNF1	Ochlocknee River near Havana
MACF1	St Marys River at Macclenney
NEPF1	St Marks River near Newport
PINF1	Withlacochee River near Pinetta
WCXF1	Suwannee River near Wilcox
WSPF1	Suwannee River at White Springs
ARCF1	Peace River near Arcadia
ARHF1	Horse Creek near Arcadia
BARF1	Peace River near Bartow
CRMF1	Withlacochee River near Croom
HLDF1	Withlacochee River near Holder
LITF1	Alafia River near Lithia
MKCF1	Myakka River at Myakka River State Park
MKHF1	Manatee River at Myakka Head
TRBF1	Withlacochee River near Trilby
WIMF1	Little Manatee River near Wimauma
WRGF1	Cypress Creek at Worthington Gardens
ZFSF1	Peace River at Zolfo Springs
ZPHF1	Hillsborough River at Zephyrhills
PLMF1	Fisheating Creek near Palmdale
BLOF1	Apalachicola River near Blountstown
BAKF1	Blackwater River at Baker
CARF1	Choctawhatchee River at Caryville
MLGF1	Yellow River at Milligan
MLNF1	Big Coldwater Creek at Milton

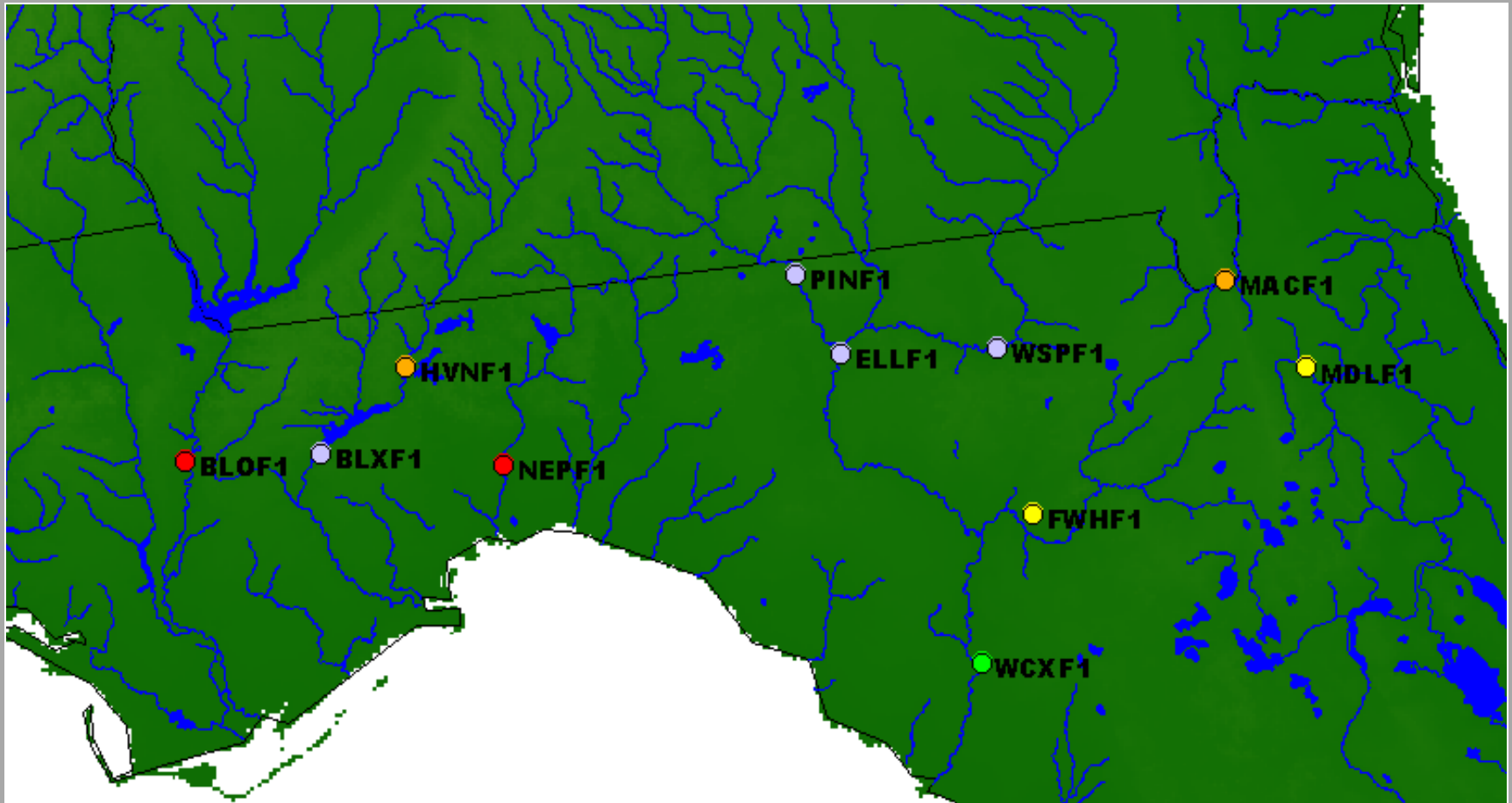
Central and South Florida



River Flood Events Central and South Florida

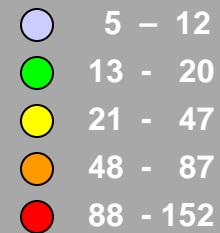
Flood Events (1975-2006)





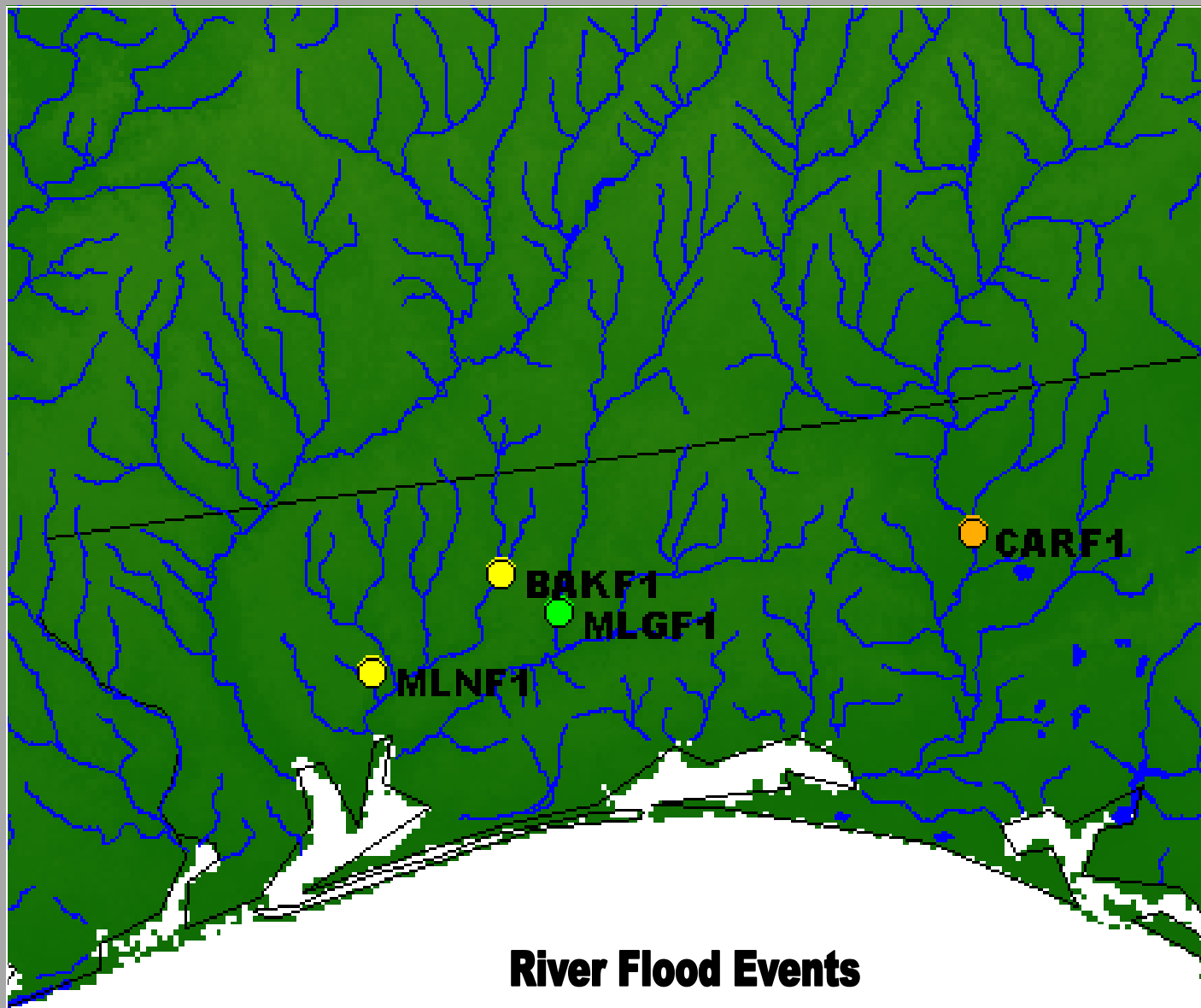
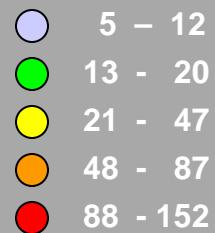
River Flood Events Eastern and Central Florida Panhandle

Flood Events (1975-2006)



Flood Events

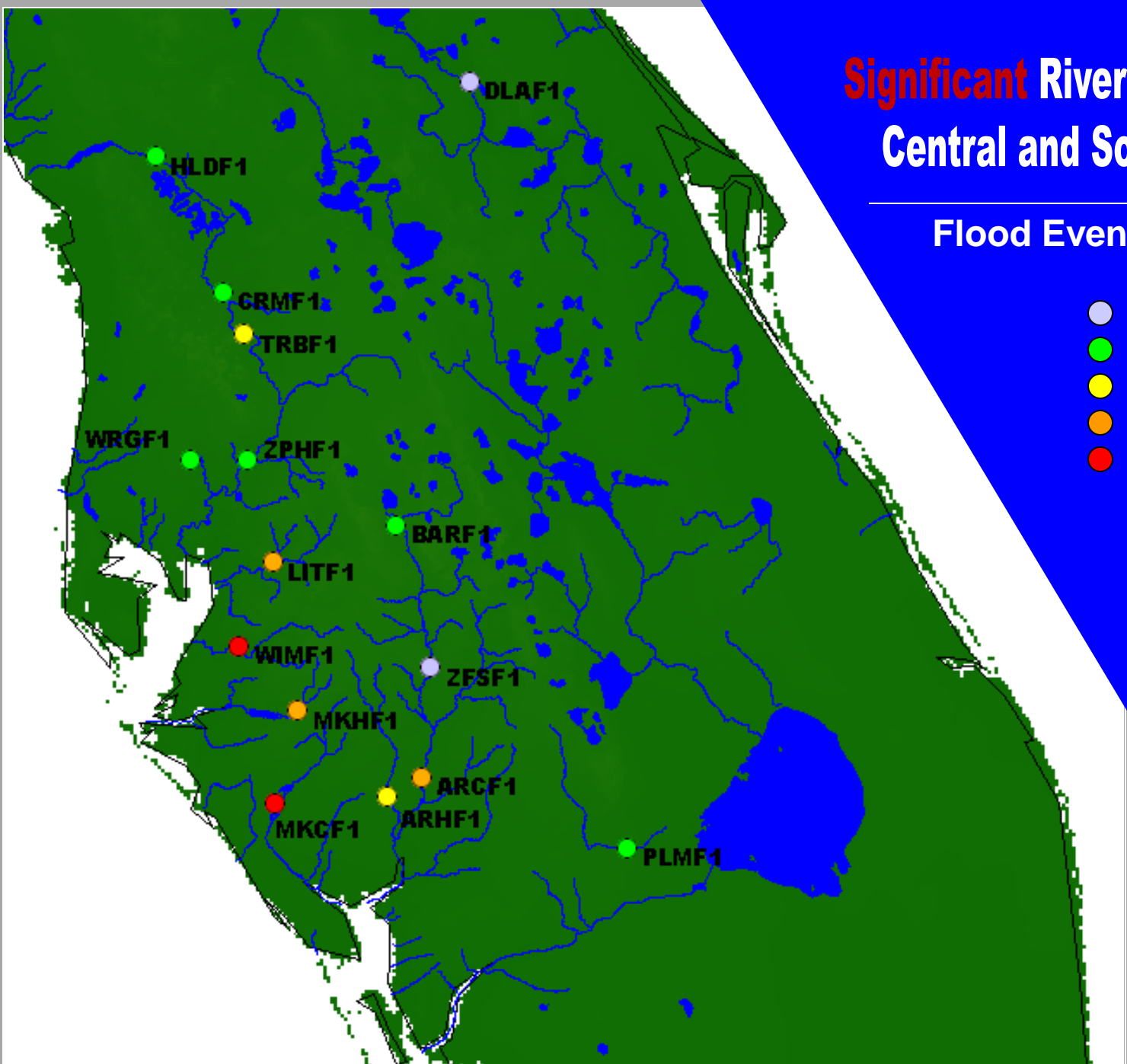
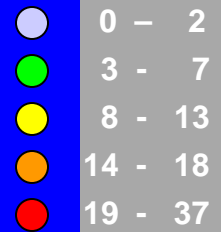
(1975-2006)

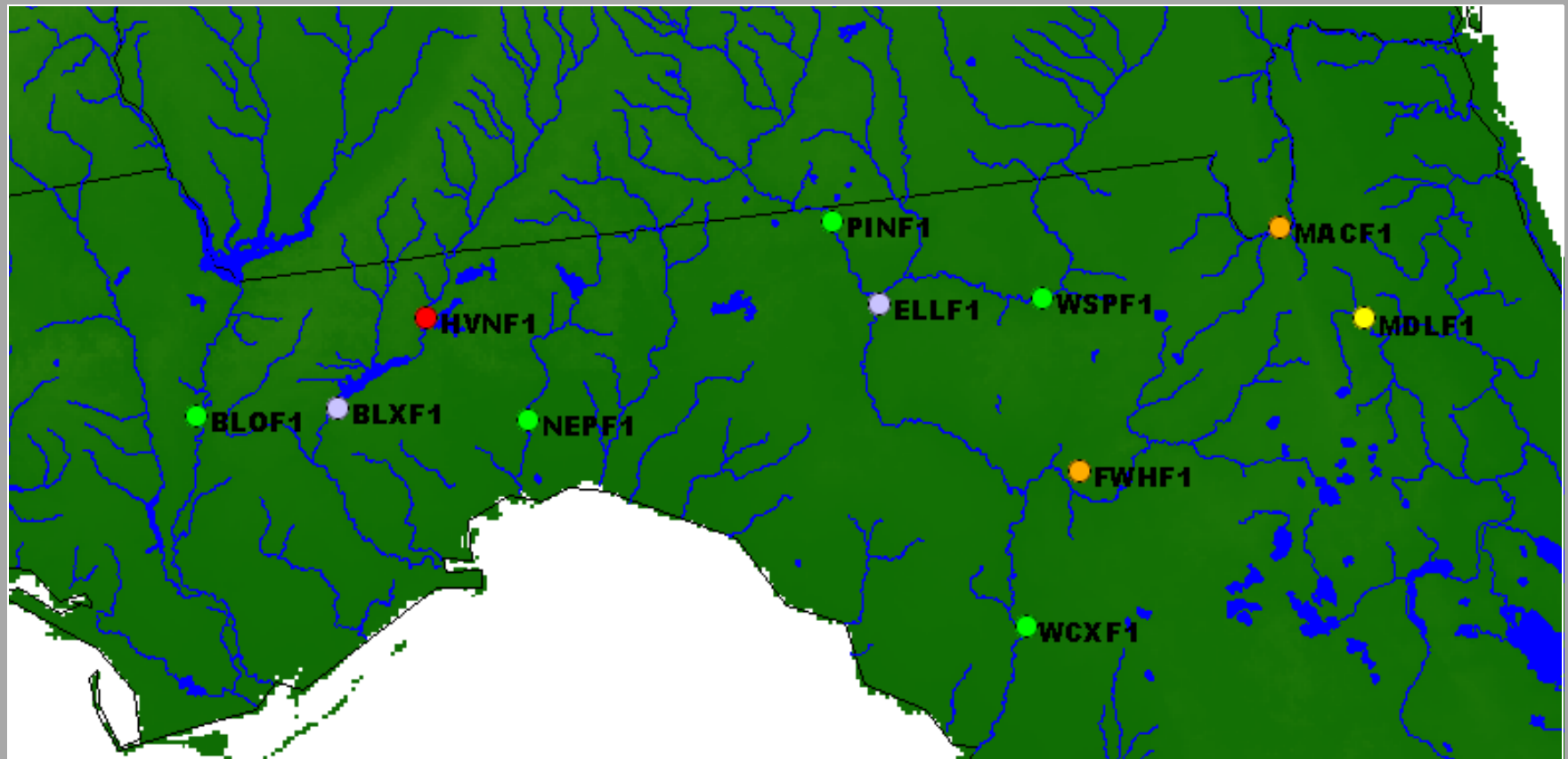


**River Flood Events
Western Florida Panhandle**

Significant River Flood Events Central and South Florida

Flood Events (1975-2006)

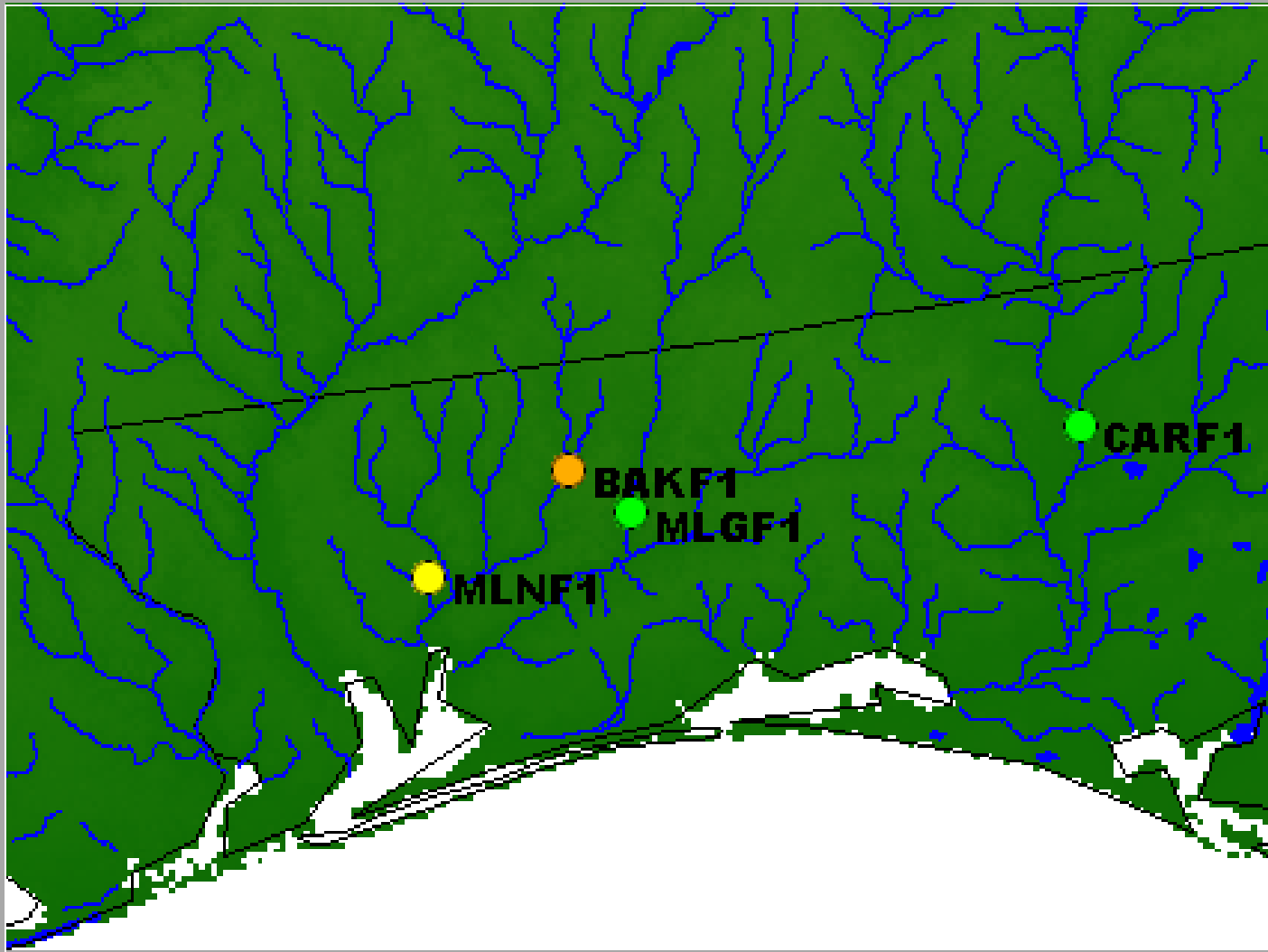




Significant River Flood Events
 Eastern and Central
 Florida Panhandle

Flood Events (1975-2006)





Flood Events

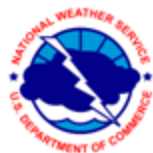
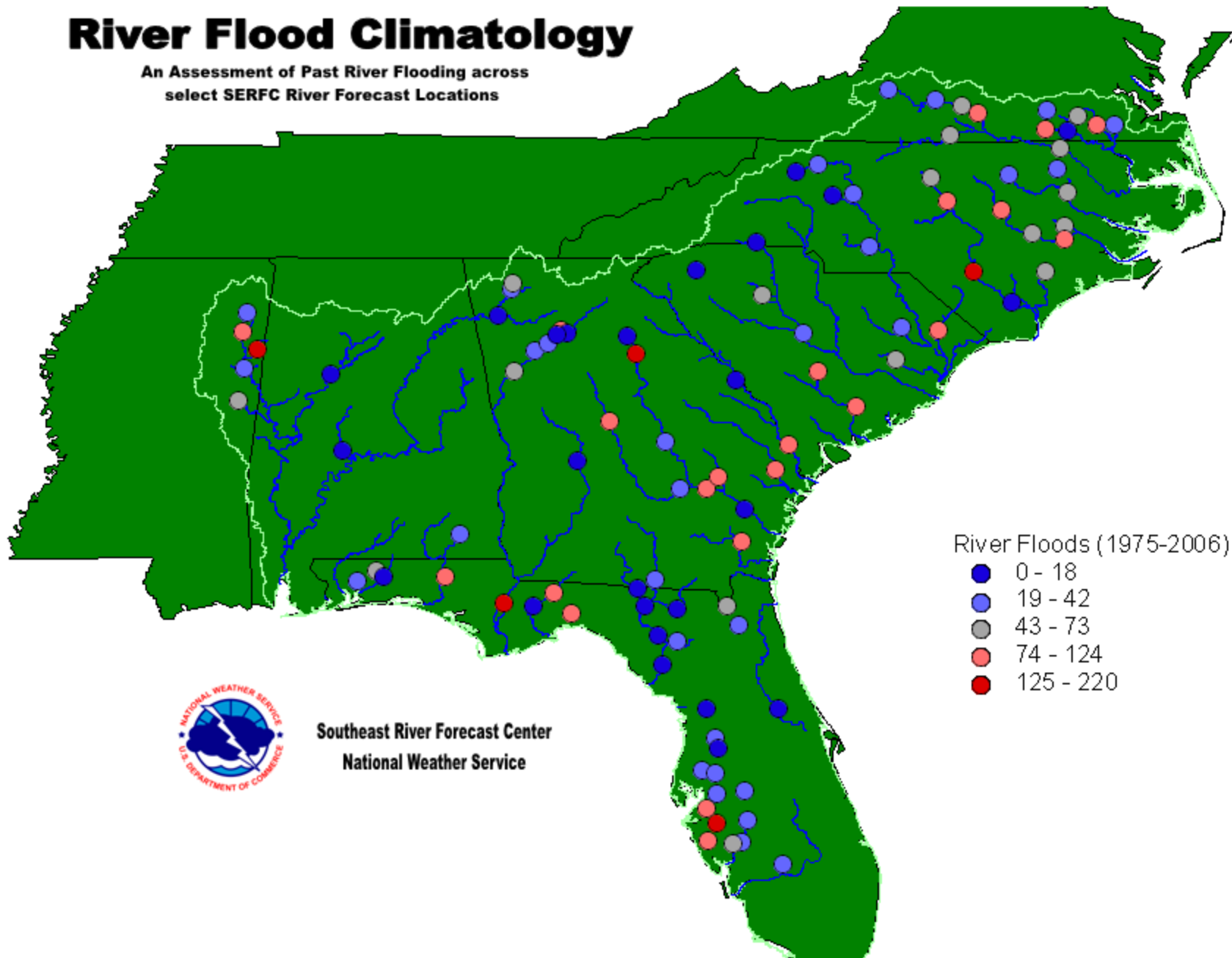
(1975-2006)



Significant River Flood Events
Western Florida Panhandle

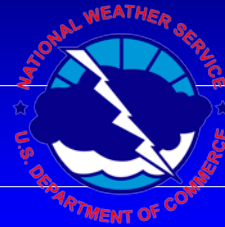
River Flood Climatology

An Assessment of Past River Flooding across
select SERFC River Forecast Locations

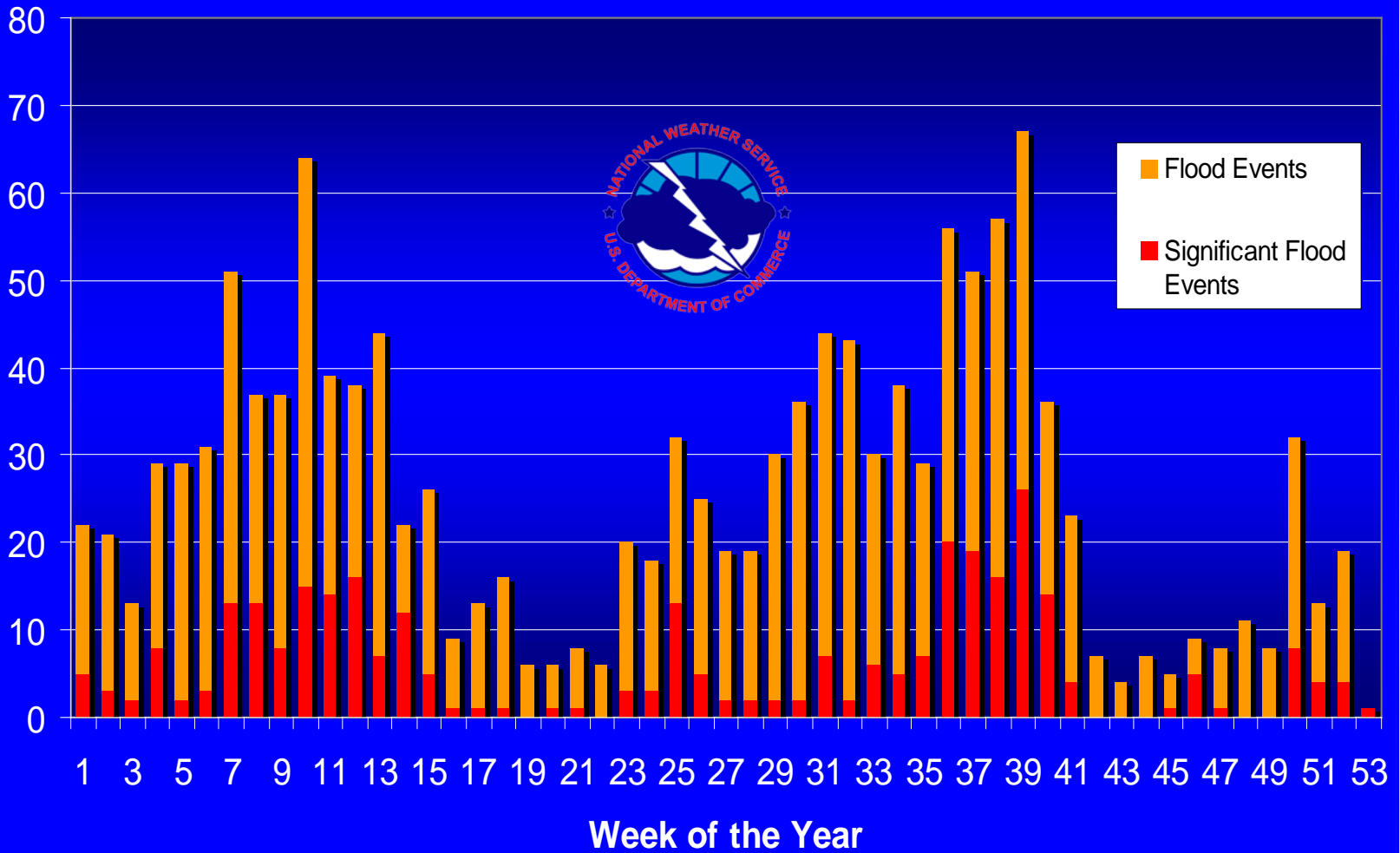


Southeast River Forecast Center
National Weather Service

River Floods - State of Florida (1975-2006)

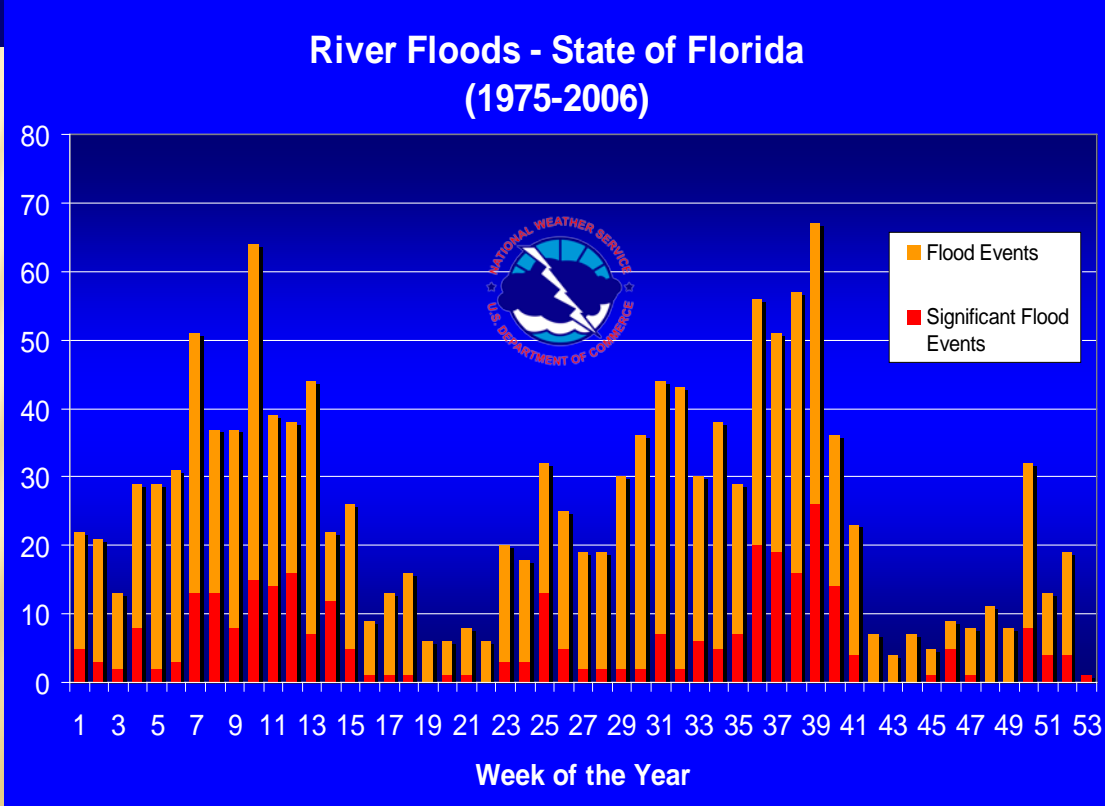
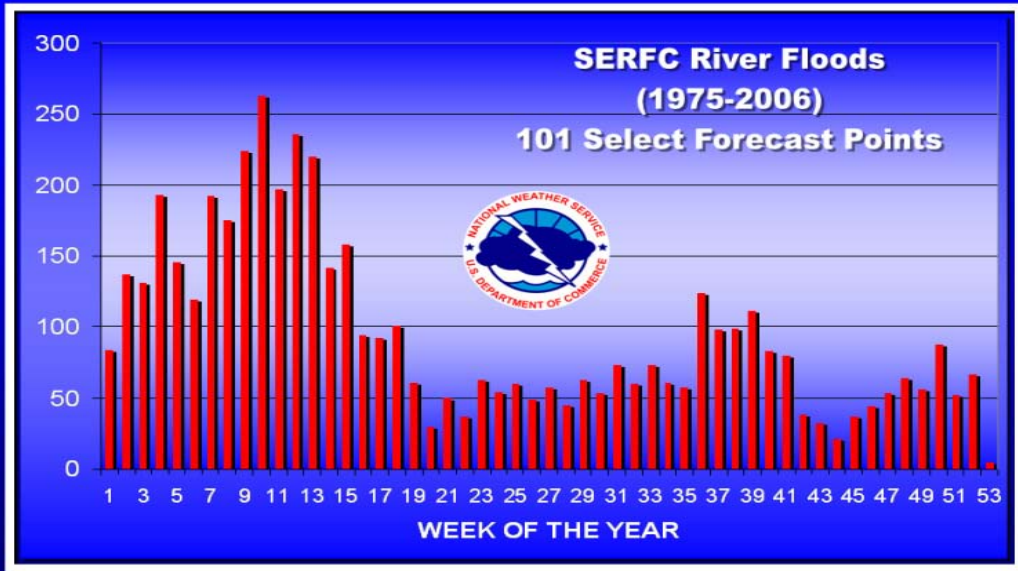


■ Flood Events
■ Significant Flood Events



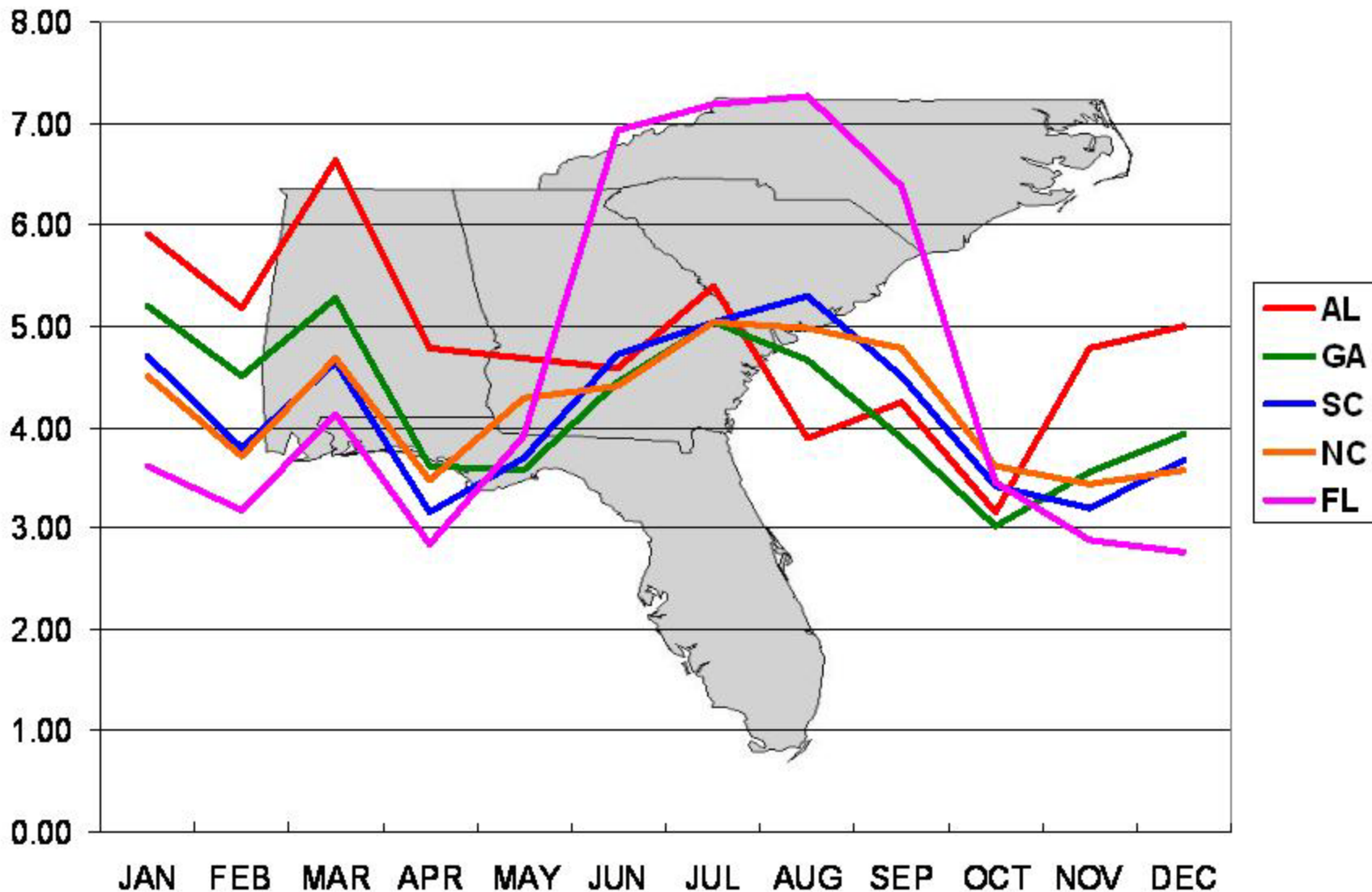
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Dec-Jan	52

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Dec-Jan	52



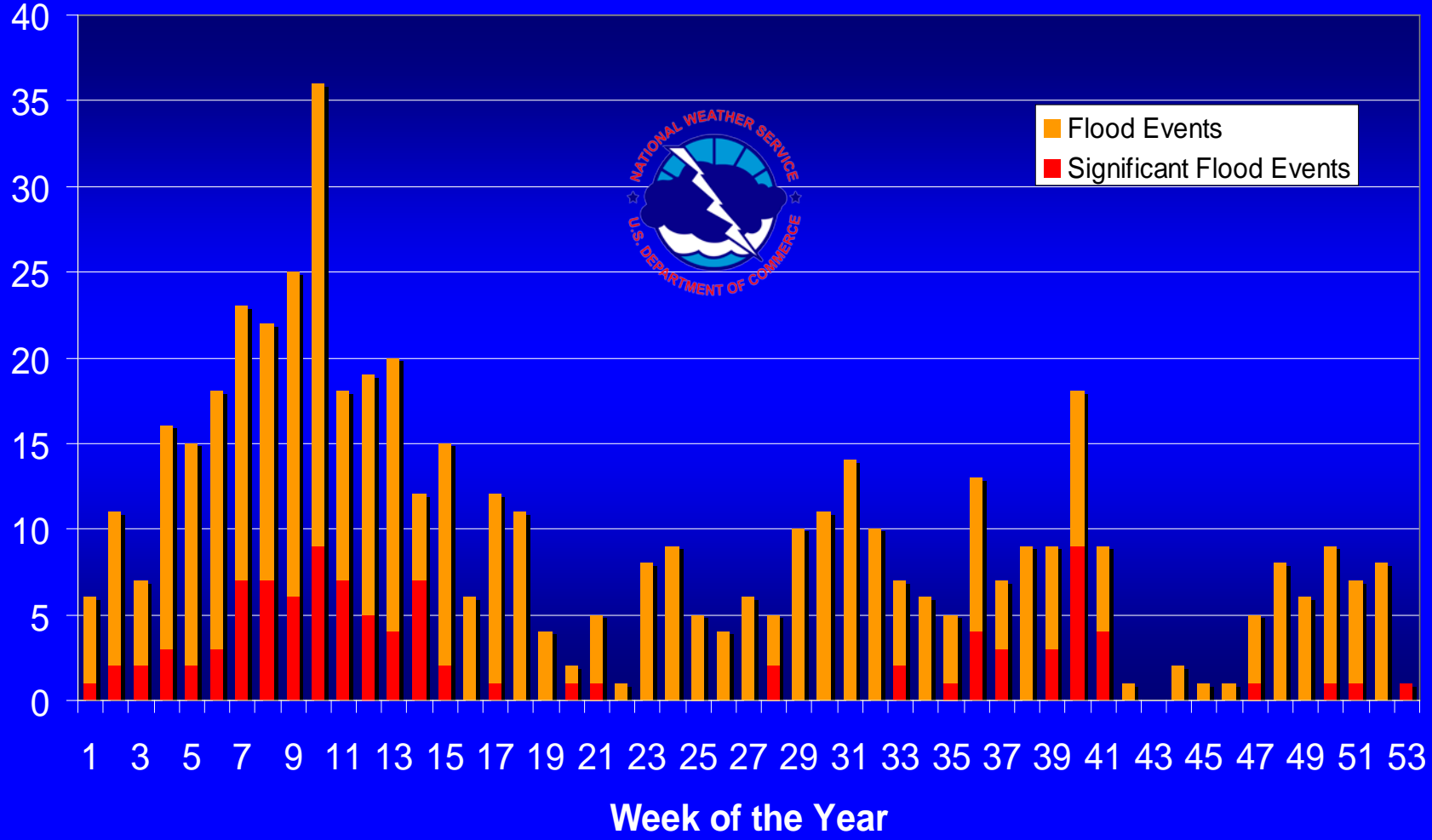
Normal Monthly Rainfall by State Average (1971-2000)

NOAA ESRL Data



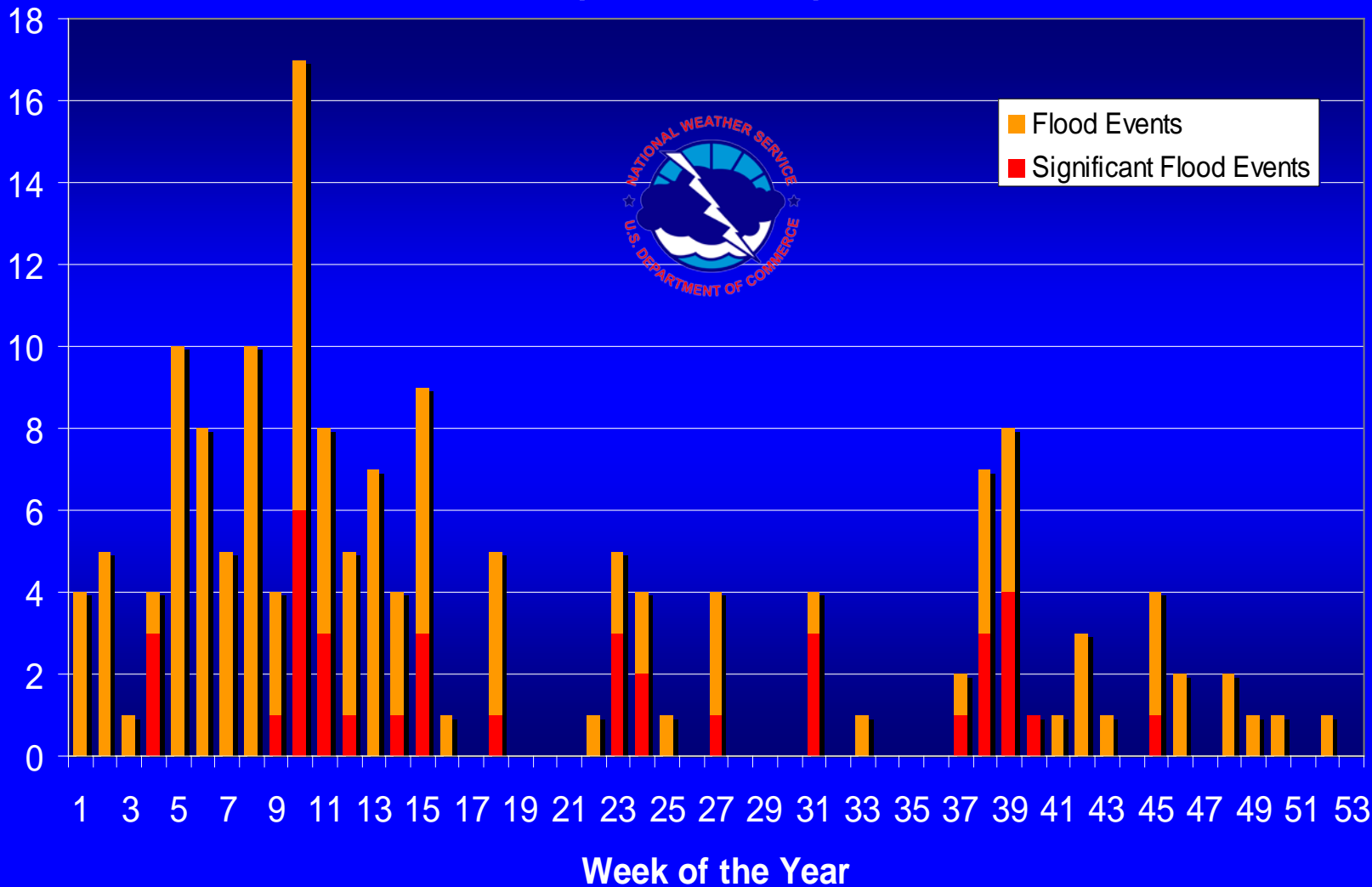
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Nov-Dec	47
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Dec-Jan	52

River Floods - Central and Eastern Florida Panhandle (1975-2006)



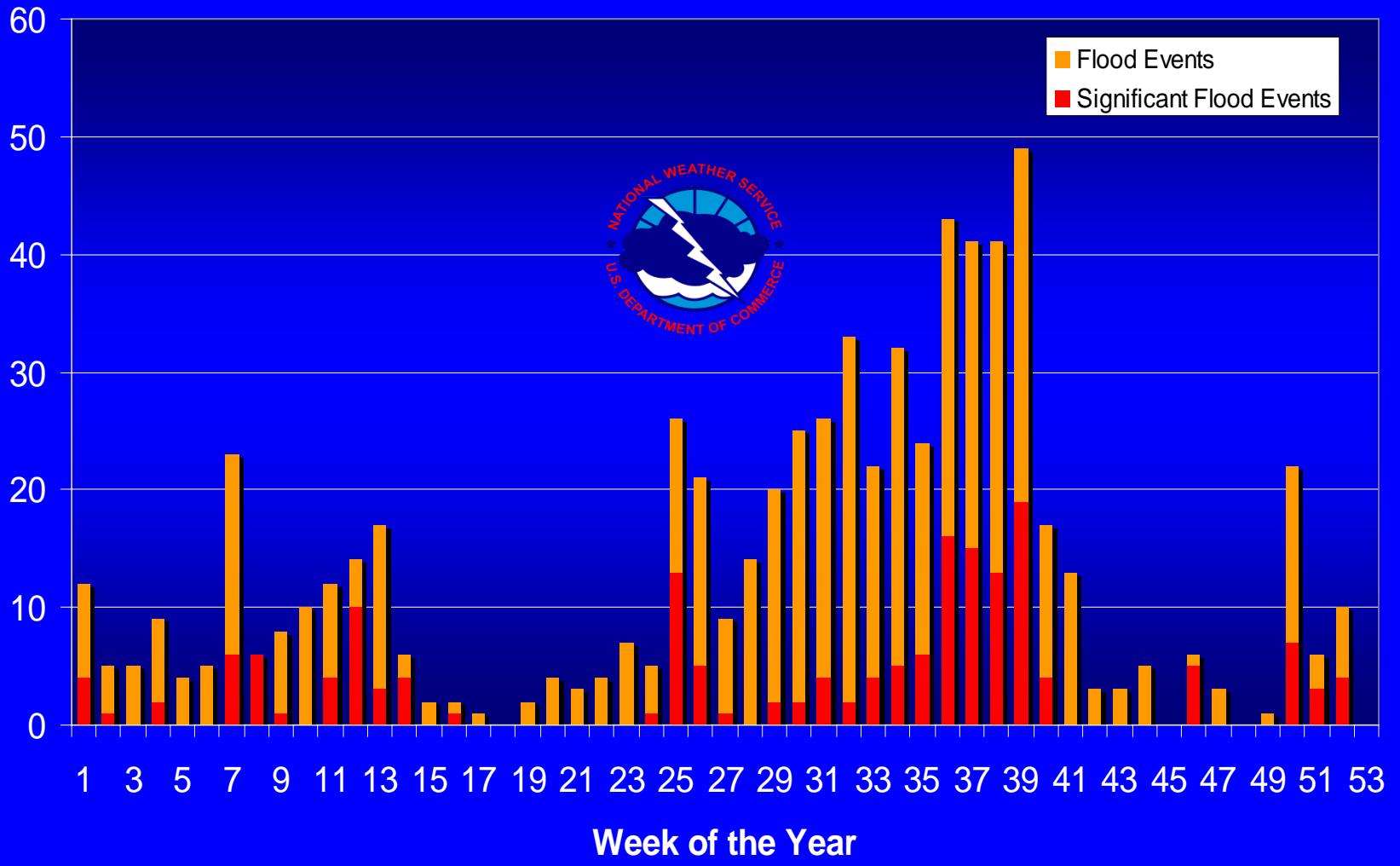
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Dec-Jan	52

River Floods - Western Florida Panhandle (1975-2006)



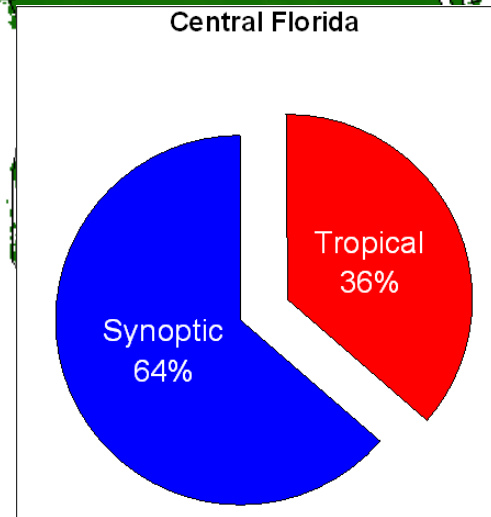
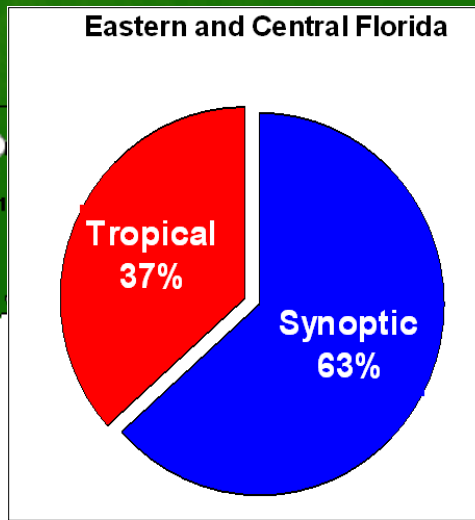
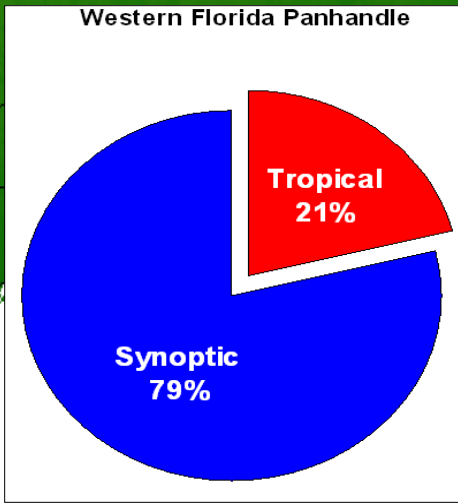
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River Floods - Central Florida (1975-2006)

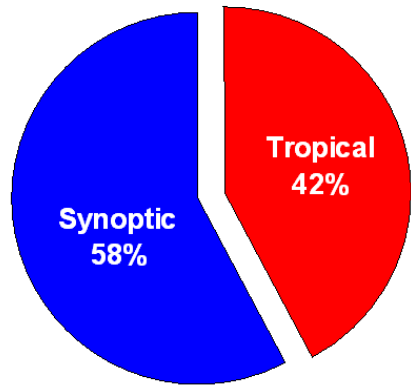


Week of the Year

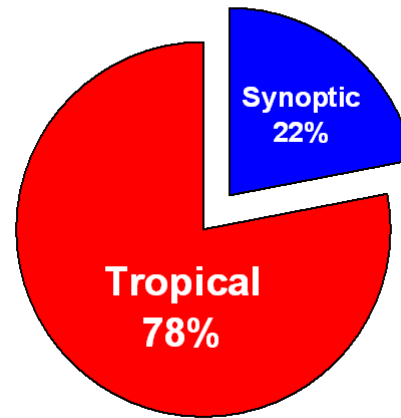
Florida Significant River Floods (1975-2006)



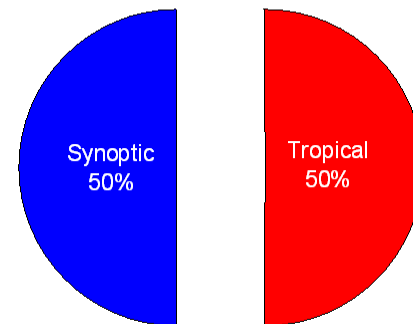
Western Florida Panhandle



Eastern and Central Florida Panhandle



Central Florida

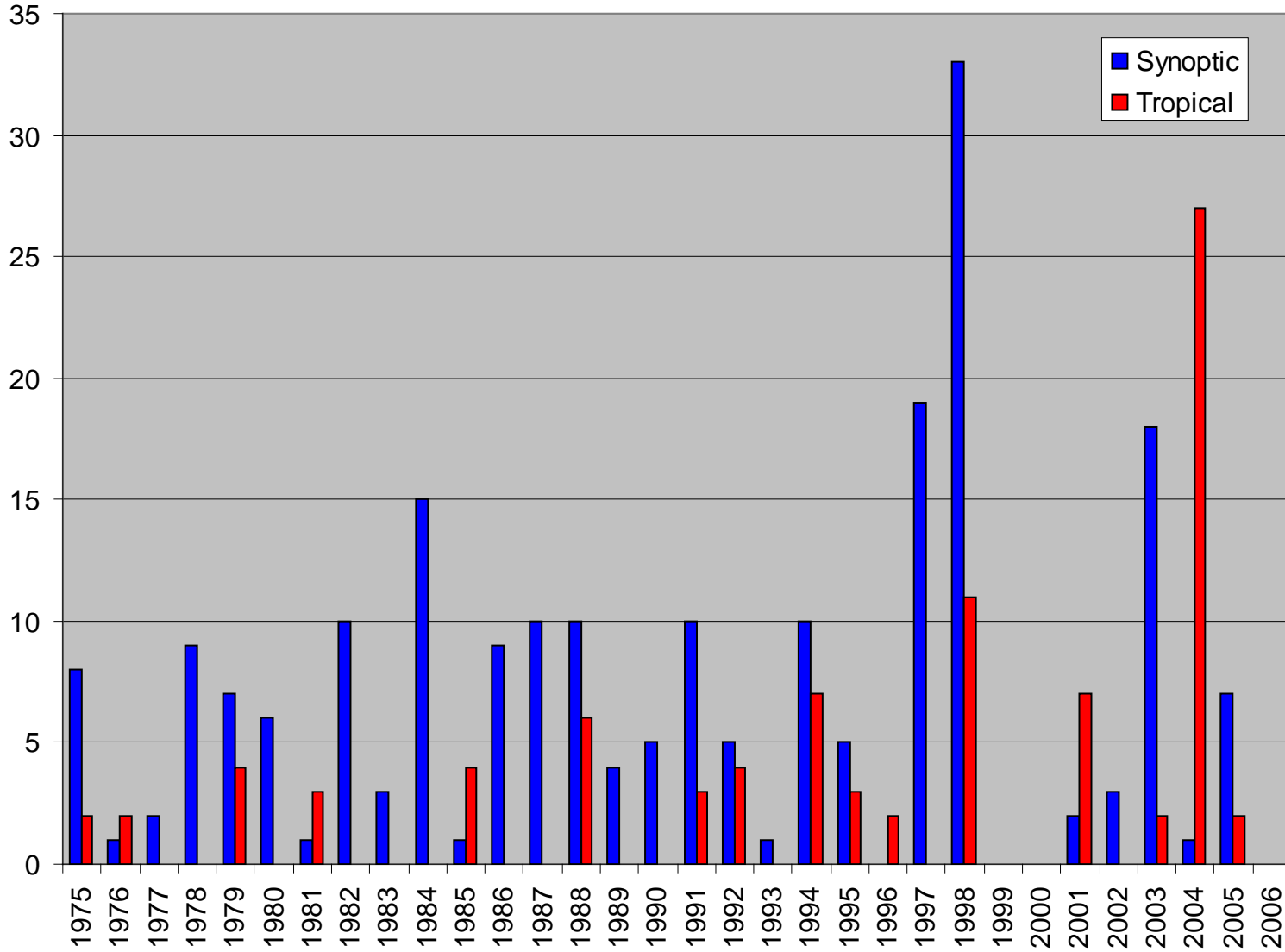


Florida Significant River Floods (1975-2006)

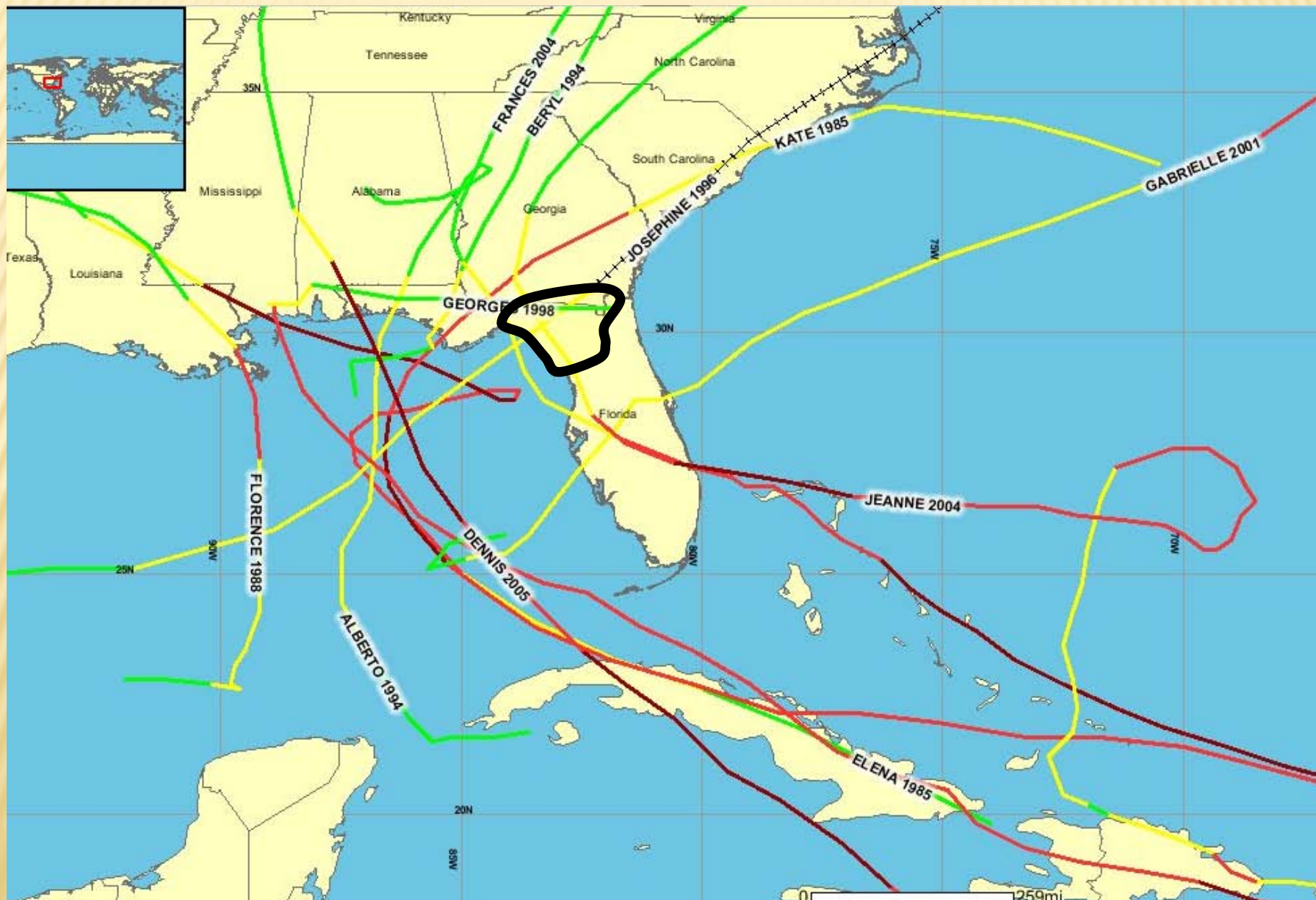
during the Tropical Season

(June through Nov)

Florida Significant River Flood Events from 1975 to 2006



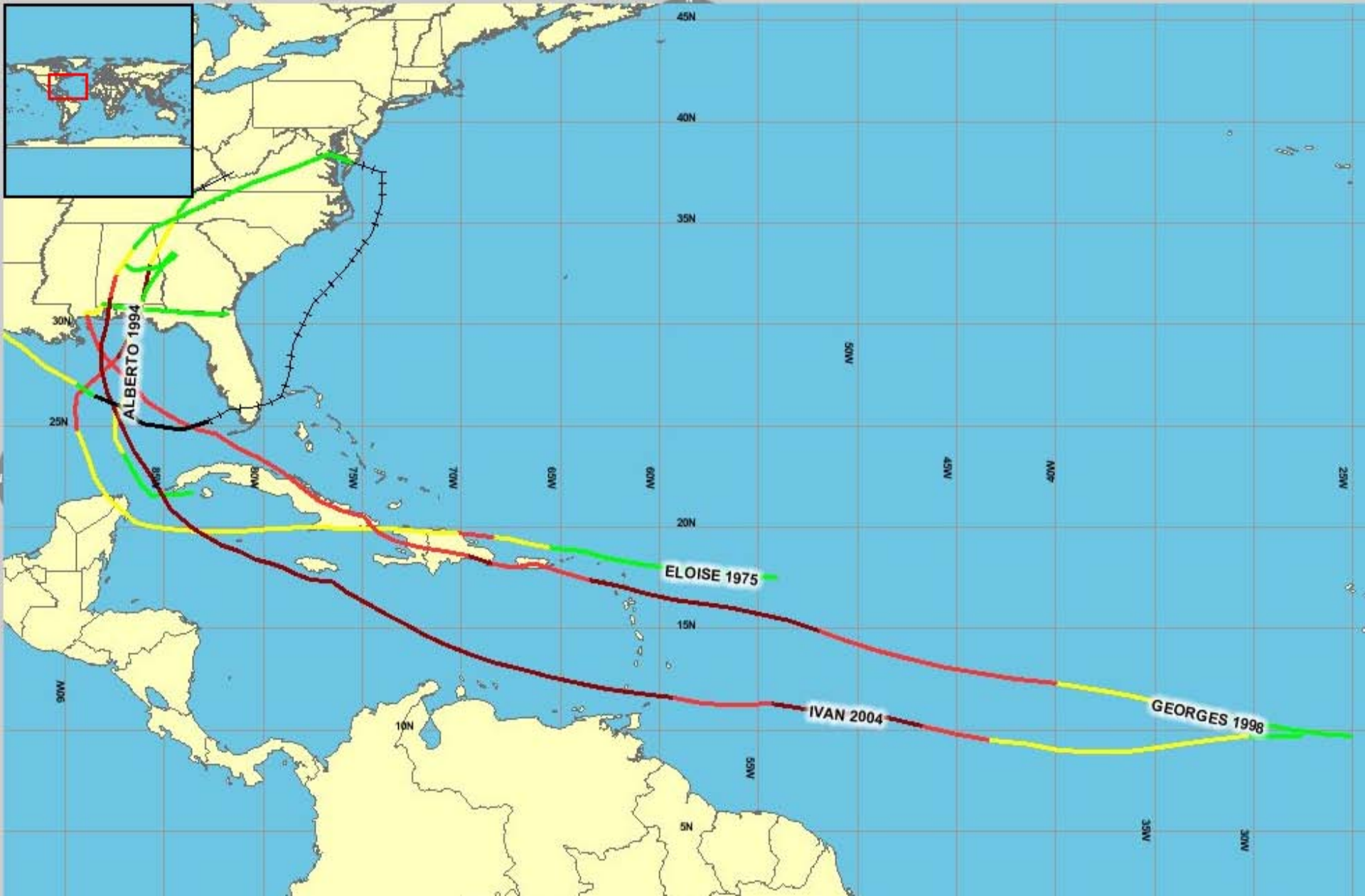
Tropical Storms related to Significant Floods in Eastern and Central Florida Panhandle



Tropical Storms related to Significant Floods in Central Florida



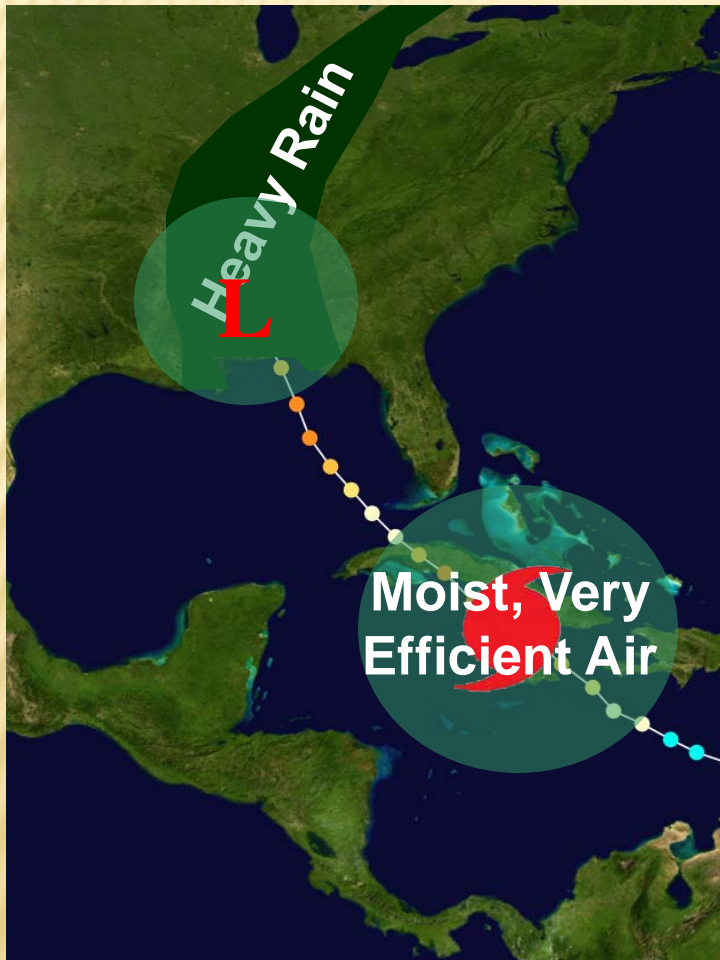
Tropical Storms related to Significant Floods in Western Florida Panhandle



HYDROMETEOROLOGY

Heavy Rainfall in Tropical Cyclones
Measuring Rainfall
Hydrology

Precipitation Efficiency



💧 **Ocean-Atmosphere Interaction**

💧 **Instability and Lift**

💧 **Tropical Environment Favorable
for Raindrop Formation**



*Tropical Cyclones form in an
environment primed for
precipitation and they transport
that environment to landmasses*



Size and Strength

Strength



Rainfall



Size



Rainfall



Storm size and strength are not reliable indicators of the heavy rainfall potential in your area

Storm Speed



Storm speed may impact heavy rainfall potential but there are many other potential factors to consider.

? **Non-Cyclone Features**

? **Erratic Cyclone Motion**

? **Persistent Rain Bands**

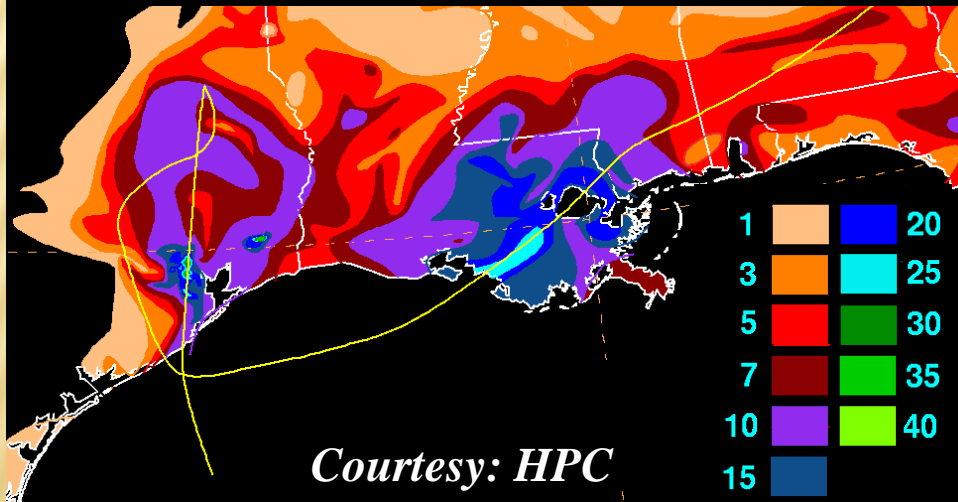
? **Terrain Impacts**

Erratic Cyclone Motion

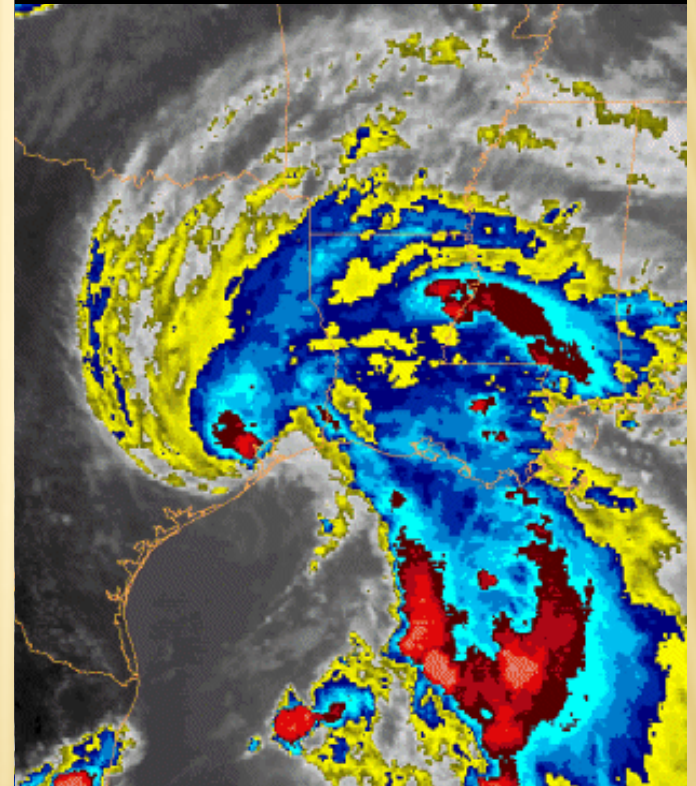
Tropical Storm Allison *June 4-17, 2001*

Storm-Total Rainfall

Slow; Erratic Motion Led to Record Rainfall



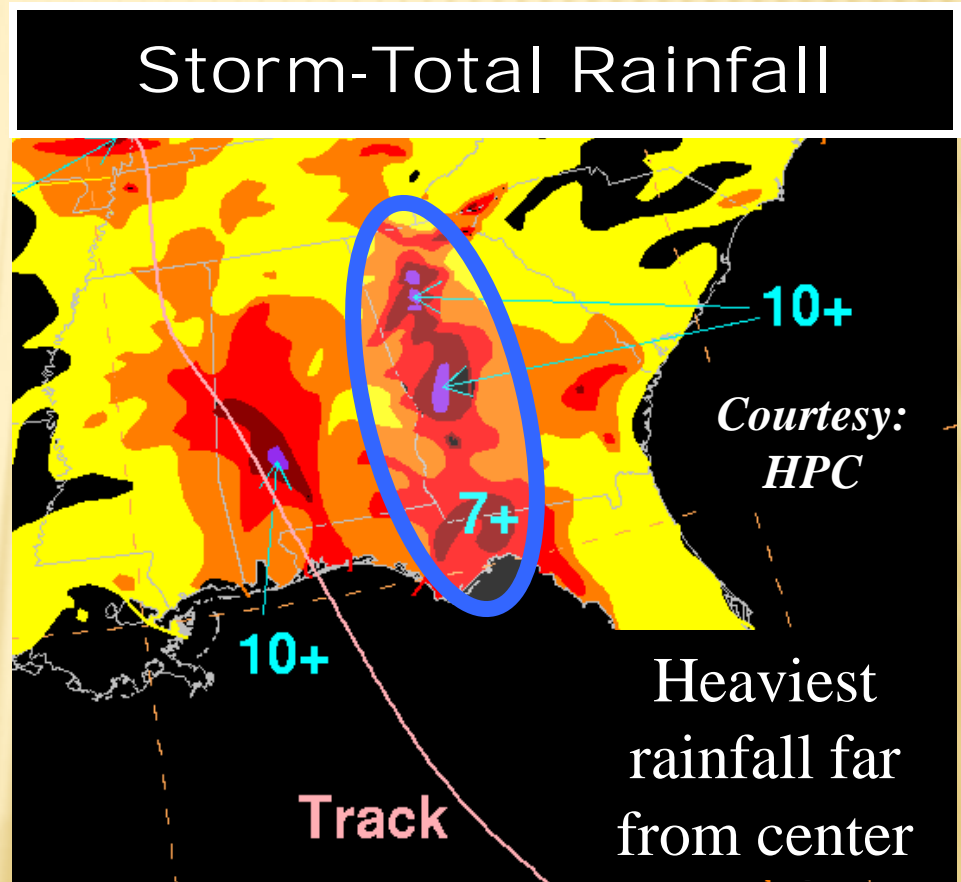
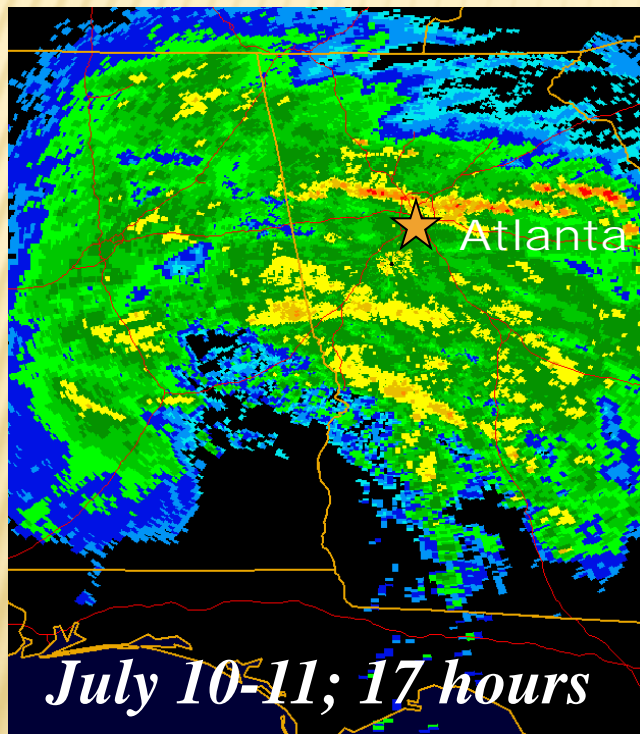
June 5-6, 2001



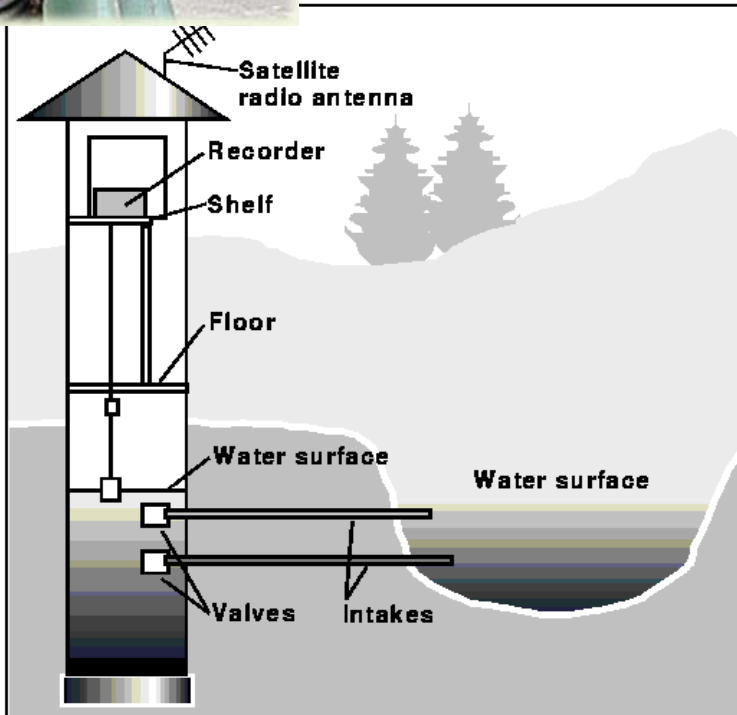
Courtesy: NWSWFO HGX

Persistent Rain Bands

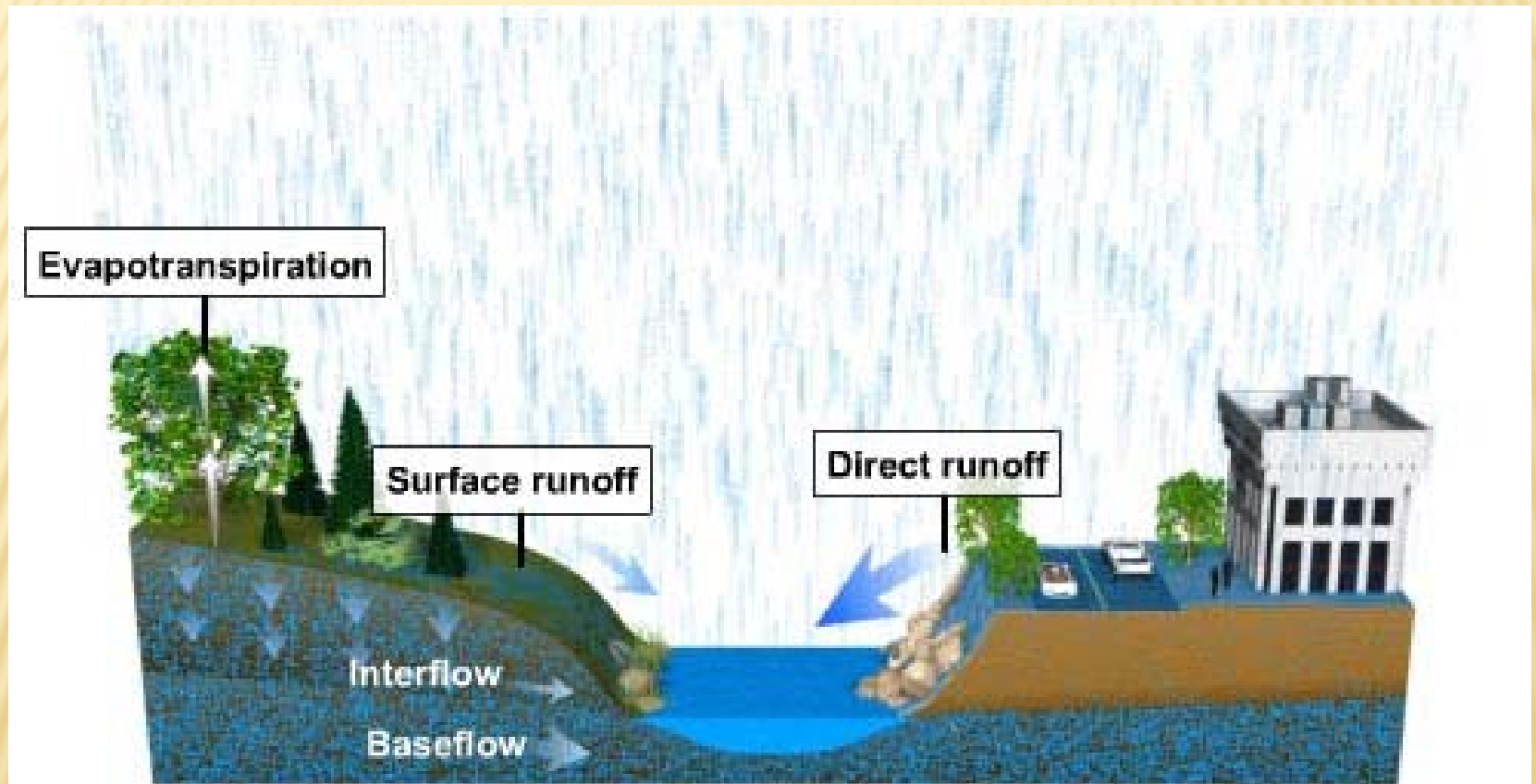
Hurricane Dennis *July 7-18, 2005*



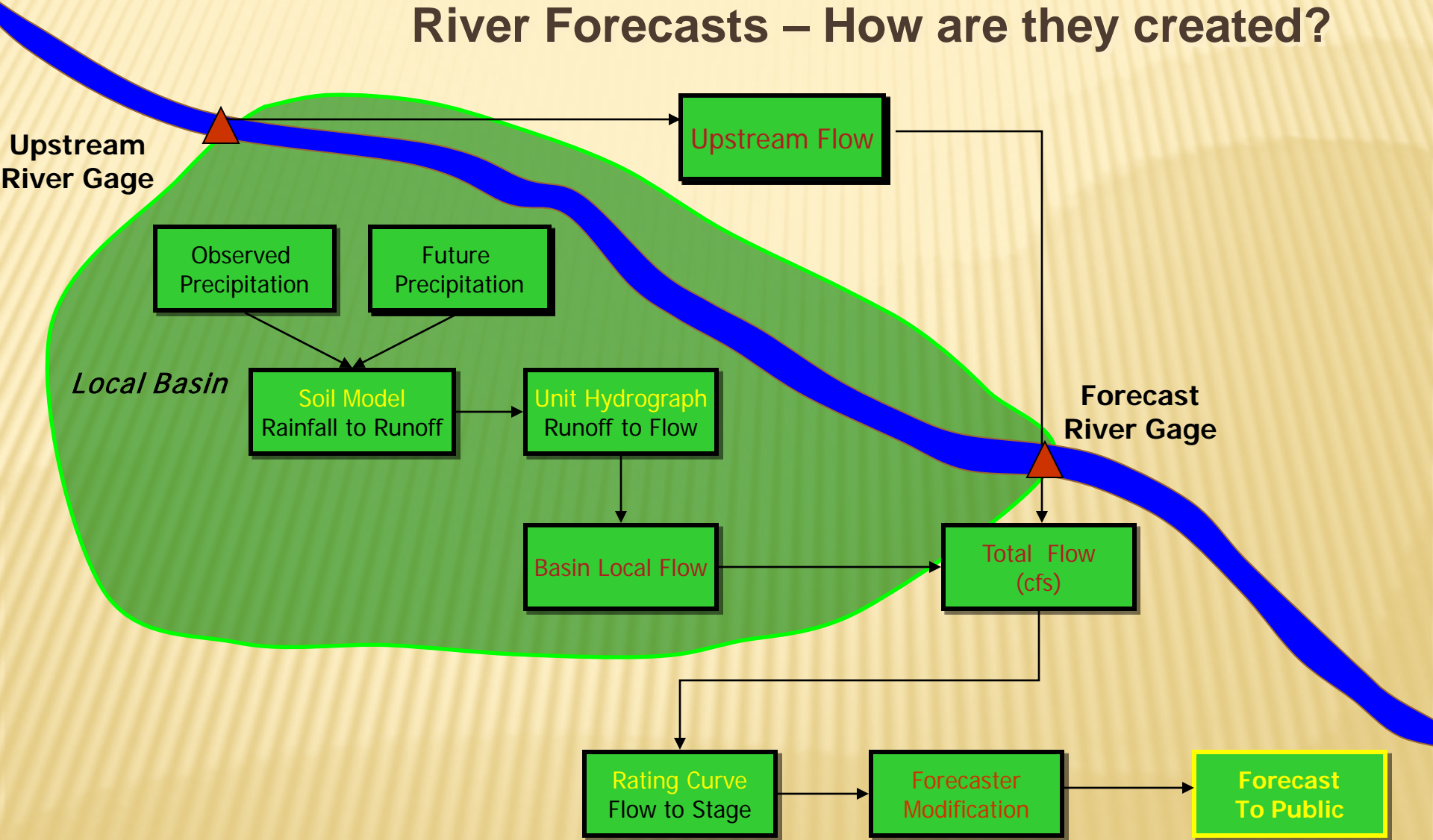
STREAM GAUGES



RAINFALL TO RUNOFF MODELING

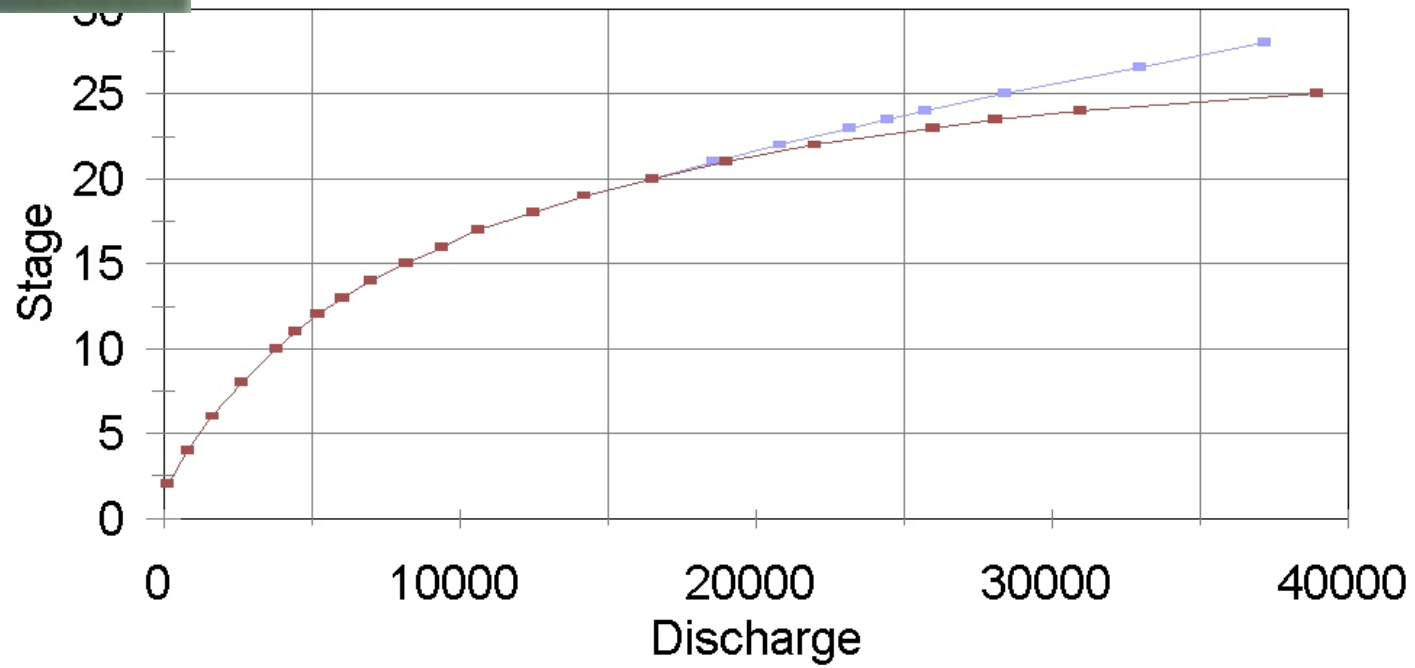


River Forecasts – How are they created?





KINRAID



KEEPING INFORMED

NOAA/NWS Hydrologic Organization
Products and Services



"Flood Prevention begins with Flood Preparation"



Flood Information Resources

National Hurricane Center

Hydromet Prediction Center

River Forecast Centers

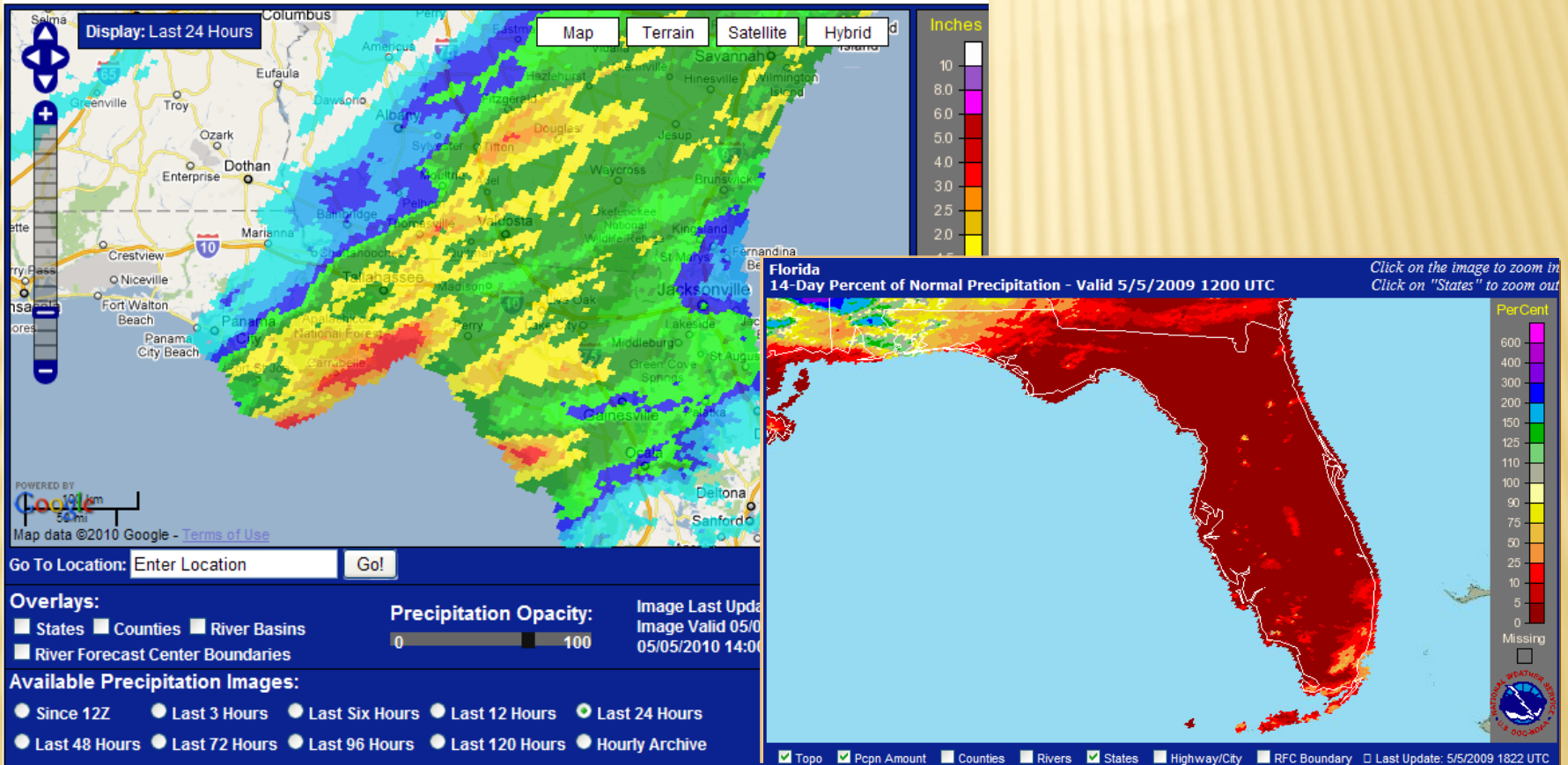
Weather Forecast Offices

NHC HPC
RFC WFO

Rainfall - Past

National Precipitation Analysis Page

Precipitation Map | Download Shapefiles | About this Page | Other Useful Information



NHC HPC
RFC WFO

Rivers

AHPS Advanced Hydrologic Prediction Service

National Oceanic and Atmospheric Administration's
National Weather Service

Local forecast by "City, St"
City, St

XML RSS Feeds
Warnings
Current
By State/County...
UV Alerts
Observations
Radar
Satellite
Snow Cover
Surface Weather...
Observed Precip
Forecasts
Local
Graphical
Aviation
Marine
Hurricanes
Severe Weather
Fire Weather
Text Messages
By State
By Message Type
National
Forecast Models
Numerical Models
Statistical Models...

Site Map News Organization
Home > Rivers

NWS Information in Geospatial Format

To advance the environmental information enterprise, NOAA/NWS plans to provide information in forms that can be easily incorporated into GIS applications. We are seeking comments from

Warnings & Forecasts Graphical Forecasts National Maps Radar Rivers Air Quality Satellite Climate

All Locations Click The Map To Zoom In.

3648 Total Gauges
152 Locations in Flood

- 420 Gauges: Observations older than 24 hours
- 21 Gauges: Out of Service
- 4 Gauges: Major Flooding
- 19 Gauges: Moderate Flooding
- 129 Gauges: Minor Flooding
- 143 Gauges: Near Flood Stage
- 2912 Gauges: No Flooding

Last map update: Tue, Jan, 16, 2007 at 01:57:49 pm EST.

Hydrologic Resources

- ▶ Text Products
- ▶ River Forecast Centers
- ▶ About AHPS
- ▶ Partners
- ▶ AHPS Gage Shapefile
- ▶ AHPS Feedback

Additional Resources

- ▶ National Significant River Flood Outlook
- ▶ U.S. Geological Survey Streamflow Information
- ▶ Snow Information

Warnings & Forecasts Graphical Forecasts National Maps Radar Water Air Quality Satellite Climate

All Locations Click The Map To Zoom In.

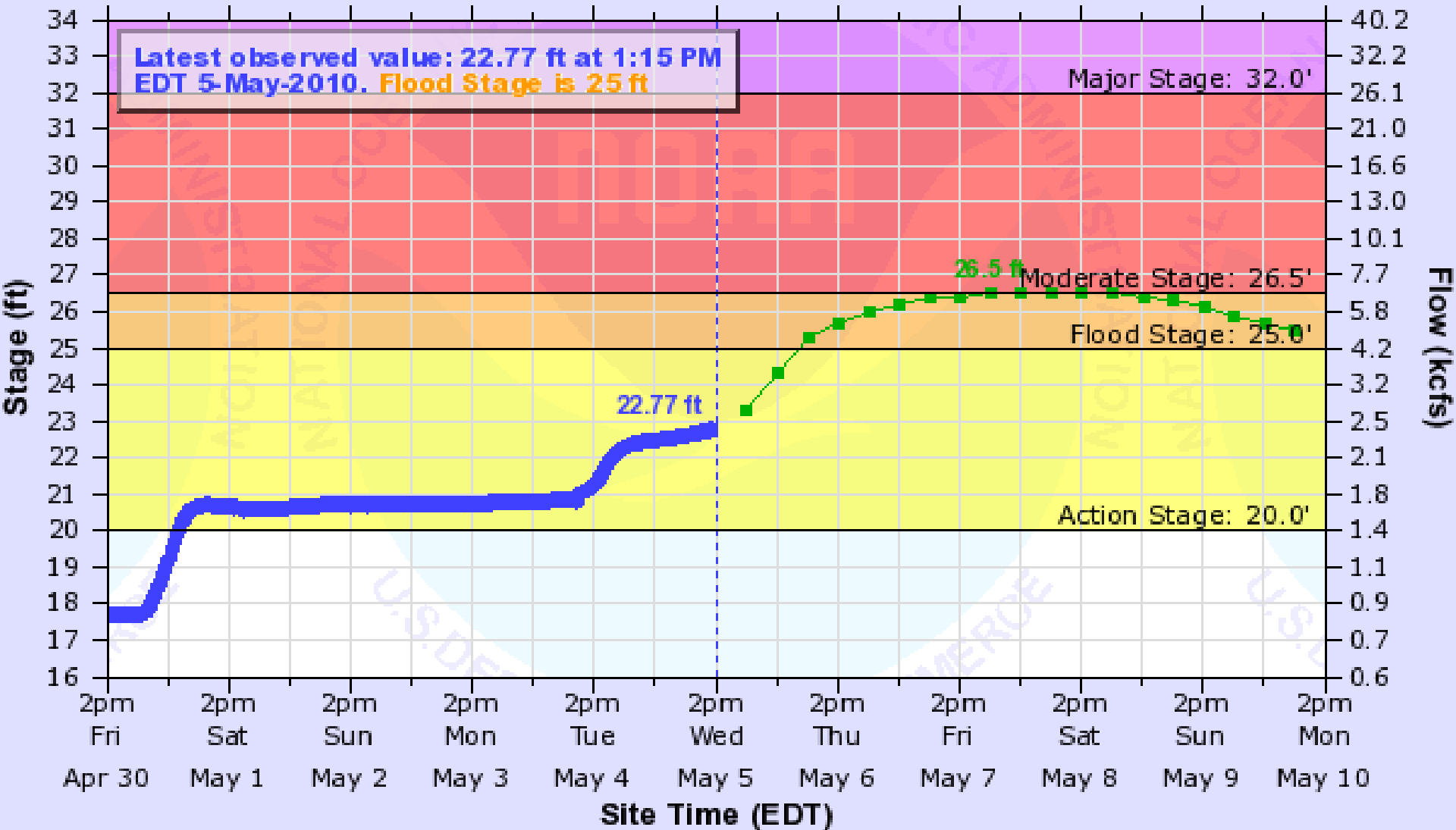
American Samoa · Guam · Puerto Rico · Virgin Islands

Contiguous United States

OCHLOCKONEE RIVER NEAR HAVANA

Universal Time (UTC)

18Z Apr 30 18Z May 1 18Z May 2 18Z May 3 18Z May 4 18Z May 5 18Z May 6 18Z May 7 18Z May 8 18Z May 9 18Z May 10



--- Graph Created (2:03PM May 5, 2010) ● Observed ■ Forecast (issued 10:46AM May 5)

Minor Flood



Minimal or no property damage, but possibly some public threat or inconvenience

Moderate Flood



Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.

Major Flood



Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.

NHC HPC
RFC WFO

Flood

Where to find flood information?

National Weather Service
Advanced Hydrologic Prediction Service

Home News Organization Search for: _____

Weather Forecast Office Lake Charles, LA

Experimental National Precipitation Graphics Suite.

ALERT!! A Flood Statement is in effect for portions of the area. View all valid statements/warnings or choose a specific point or river to get the details for that location.
Updated 07:41 AM CST Nov 06 2006

Adjacent Areas

ALERT!! A Flood Statement is in effect for portions of the area. View all valid statements/warnings or choose a specific point or river to get the details for that location.
Updated 07:41 AM CST Nov 06 2006

Information Available

- Major Flooding
- Moderate Flooding
- Minor Flooding
- Near Flood Stage
- No Flooding
- Observation More Than 24 Hours Old
- Out of Service

Expand View

All Locations

River Menus

Red River Bayou Nezpique **Neches River (and Tributaries)**

Vermilion River Mermentau River

Calcasieu River (and Tributaries) Sabine River (and Tributaries)

Flood Statement

WGUS84 KLCH 060148

FLSLCH

FLOOD STATEMENT

NATIONAL WEATHER SERVICE LAKE CHARLES LA

745 PM CST SUN NOV 05 2006

RIVER FLOOD WARNING CONTINUES FOR THE CALCASIEU RIVER, INCLUDING OLD TOWN BAY

LAC019-061545-

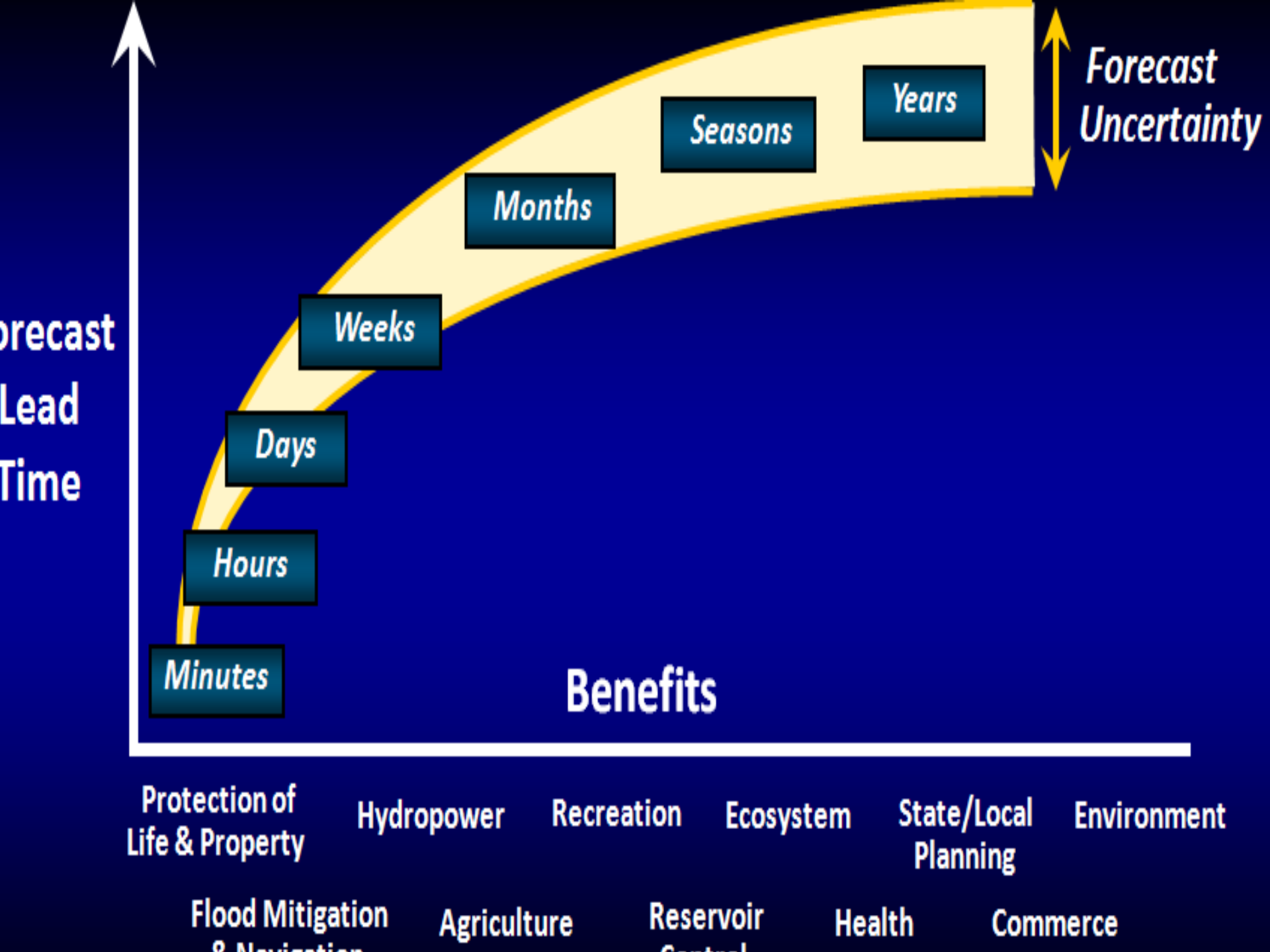
745 PM CST SUN NOV 05 2006

- * MINOR FLOODING IS OCCURRING AND MINOR FLOODING IS FORECAST.
- * FLOOD STAGE IS 4.0 FEET.
- * THE RIVER WILL FLUCTUATE BETWEEN 4.1 FEET AND 4.2 FEET OVER THE NEXT SEVERAL DAYS.
- * AT STAGES NEAR 4.0 FEET, MINOR FLOODING OF GOOS FERRY ROAD WILL OCCUR.

##

DO NOT DRIVE INTO FLOODED AREAS OR ATTEMPT TO CROSS ROADWAYS COVERED BY HIGH WATER. YOU MAY CHECK THE FOLLOWING WEBSITE FOR THE LATEST RIVER AND WEATHER INFORMATION, WWW.SRH.NOAA.GOV/LCH.

##



SERFC DECISION SUPPORT STRATEGY

Weeks

Days

Hours

READY

SET

GO



Water Resources Outlook
Tropical Hydrologic Vulnerability Assessment
Hydrologic Entry Region Analysis
Hydrologic Vulnerability Assessment

GoTo Webinars
Contingency Fcsts
SERFC ALERT!
Partner-Specific Briefings and Support
MMEFS

24-Hour Ops
Enhanced Staffing
GoTo Webinars
SERFC ALERT!
EMA – Specific Briefings
Detail On-Site Support
Partner-Specific Briefings
And Support

STAY INFORMED

SERFC ALERTS

We'll email you notice of important SERFC information and alerts.

SUBSCRIBE NOW



Southeast River Forecast Center
Florida / Alabama / Mississippi Alert
Issued: 11:15 a.m. Tuesday, August 18, 2009

...Scattered rainfall left from Claudette, T.S. Ana has dissipated, and Hurricane Bill should stay in Atlantic ...

Predicted heavy rainfall was more isolated than expected from the remnants of Claudette. There were a couple heavy rainfall reports in the panhandle of Florida and East Central Georgia. Tropical Low Ana has dissipated and will continue to move west as a tropical wave. There is a less than 30% chance of redevelopment of the system. However, rainfall associated with the wave will reach South Florida later this week. Hurricane Bill is forecast to turn north into the Atlantic and currently should not be responsible for any rainfall over the Southeast United States.

SERFC ALERT

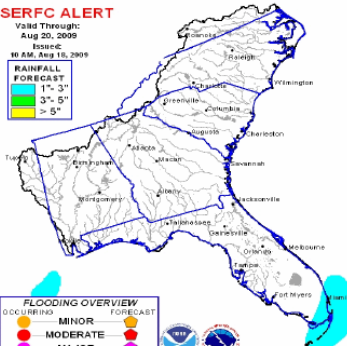
Valid Through:
Aug 20, 2009
Issued:
10 AM Aug 18, 2009

RAINFALL
FORECAST

1" - 3"
3" - 5"
> 5"

FLOODING OVERVIEW

OCURRENCE	FORECAST
MINOR	
MODERATE	

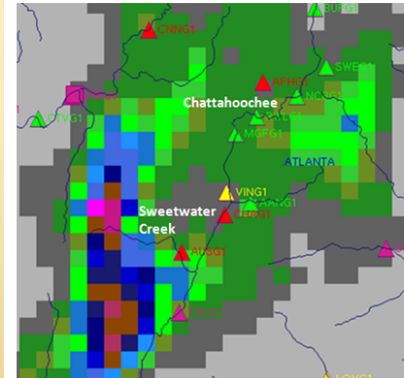


<http://www.srh.noaa.gov/alr/hmd/gis/impactmain.jpg>



September 24, 2009

Here is a close up of the extreme rainfall over the Atlanta area this past week. This image shows rainfall above 8 inches. The area in green indicates rainfall of 10 inches or more, blue 12 inches, and red near or over 20 inches.



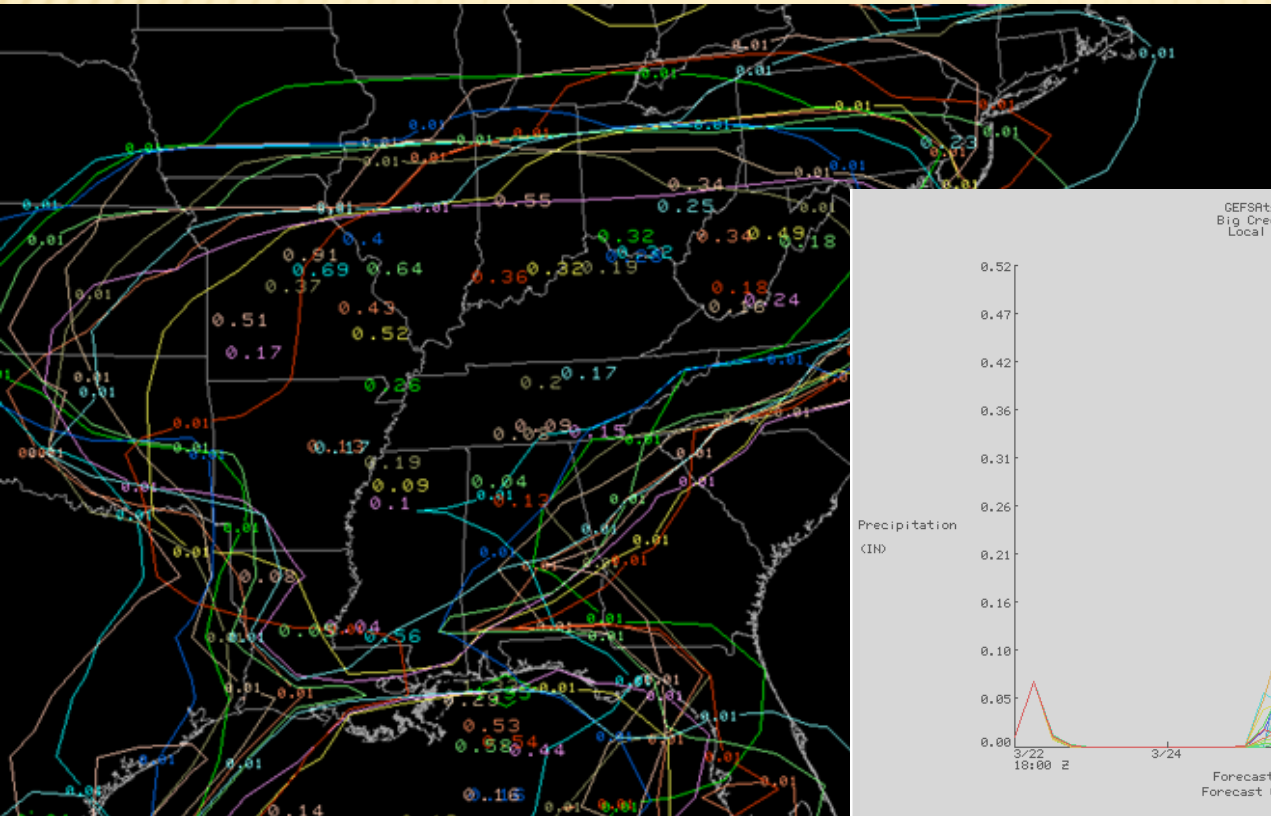
I want to point out some interesting factors regarding this major flood.

- The ground was highly saturated prior to the event. Daily rains of an inch or more saturated the ground leading towards extreme runoff with the heavy rain.

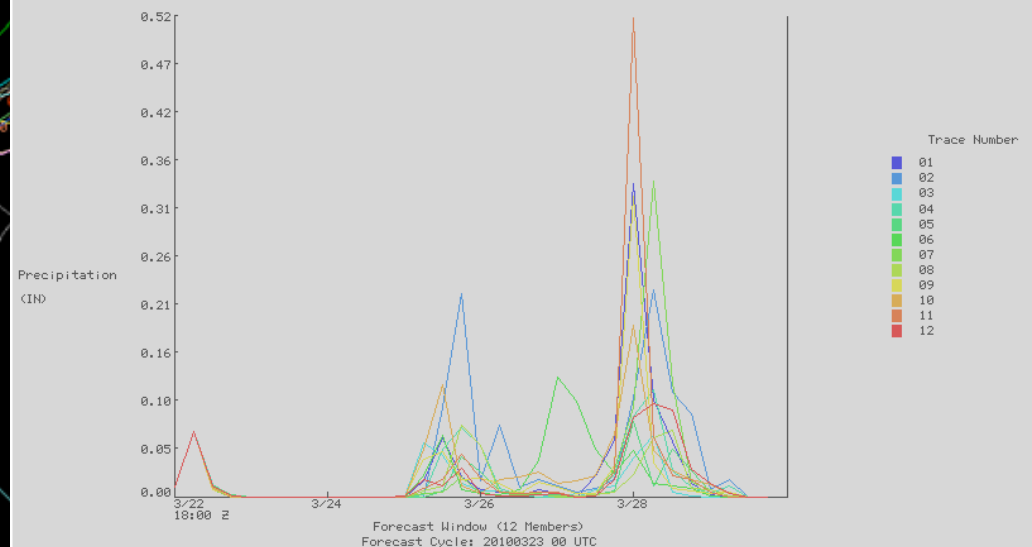
- The extreme flash and urban flooding occurred in areas that generally received 8 inches or more (green, blue, and red).



MULTI-MODEL ENSEMBLE FORECAST SYSTEM (MMEFS)



GEFSRtst-based OPF Traces
Big Oneck at Alpharetta, GA
Local area precipitation



GFSENSEnable Precipitation (in)	Perturbation 12	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 11	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 10	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 9	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 8	23.00	72HR	Fri	00:06Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 7	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 6	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 5	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 4	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 3	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 2	23.00	72HR	Fri	00:00Z	26-Mar-10
GFSENSEnable Precipitation (in)	Perturbation 1	23.00	72HR	Fri	00:00Z	26-Mar-10

Questions

weather.gov

Stay ahead of the flood by having the information to get the complete picture.

