

Tropical Storm Allison June 5-9, 2001

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Tropical Storm Allison (TSA) was the first named storm of the 2001 Atlantic Hurricane Season but that was only the start of a number of “firsts”.

- “The *most extensive tropical storm* in US history. “
- The *costliest natural disaster* in Houston’s history.
- The *first tropical storm to strike the upper Texas coast since Francis* in 1998.
- Allison was *more deadly than Hurricane Alicia* (22 lives lost with Allison, 21 with Alicia) Note – Allison caused 43 deaths nationwide.
- Tropical Storm Claudette stills holds the national rainfall record of 43” in a 24-hour period at Alvin, near Houston, Texas, but Tropical Storm Allison is close behind with 36.99” at the Port of Houston and 29.86” at Thibodaux, LA
- TSA Rainfall exceeded 500-year intensity in 2/3 of Harris County’s 22 watersheds
- The maximum rainfall rate recorded in the Greens Bayou watershed was 28.5” in a 10.5 hour period where the PMP is estimated to be 32.5” in a 12 hour period.
- Approximately 73,000 residences and 95,000 automobiles were flooded
- Over 150 area schools received significant damage.
- Damages estimated exceed \$5B
- The National Flood Insurance Program (NFIP) has paid over 30,000 flood damage claims in Texas and Louisiana for over \$1B
- Allison flooded portions of Texas, Louisiana, Mississippi, Alabama, Georgia, Florida, North Carolina, Pennsylvania, and Virginia
- The average annual rainfall for Houston is 46.07 inches and the first nine days in June produced 35.7% of the annual expected rainfall.
- By June 9, 2001, Houston had already experienced the *wettest June in history*.
- Thanks to excellent flood forecasting and warning there were *no drowning deaths in flooded homes*. This is remarkable with over 73,000 flooded homes.
- The 22 deaths in Houston related to TSA:
 - 12 driving
 - 6 walking
 - 3 electrocutions
 - 1 Building Elevator
- Prior to TSA, the Harris County Flood Control District (HCFCD) completed over \$4 Billion in structural and non-structural flood control projects.
- Over the past 12 years HCFCD purchased 440 properties at a cost of \$40M.
- Approximately 1600 Harris County Repetitive Loss Properties have been identified for a “fast track” acquisition and relocation after TSA.
- The Galveston District COE estimates that over \$246 M in damages were prevented by Federal Flood Control Projects in Harris County during TSA.

Allison was perhaps the best documented disaster event in US history. Federal, state and local agencies utilized the web to keep the public informed prior to, during and after the storm and to provide public access to both “real time” and technical information such as:

“Real Time”

NWS www.srh.noaa.gov
Harris County Office of Emergency Management www.hcoem.org
USGS Real Time Flow <http://waterdata.usgs.gov/tx/nwis/current/?type=flow>

“Disaster Response”:

FEMA www.fema.gov
TNRCC www.tnrcc.state.tx.us
TxDEM www.txdps.state.tx.us
USDA www.usda.gov
USACOE www.usace.army.mil
Texas General Land Office www.glo.state.tx.us

“Tropical Storm Allison Reports”:

NWS Allison Report www.srh.noaa.gov/hgx/projects/allison01.htm
USGS TSA Flood Report <http://tx.usgs.gov/alert/june2001floods.html#table1>
TSARP Flood Recovery Reports www.tsarp.org

“Technical Information”:

TSA Flood Recovery Project www.tsarp.org
Harris County FIRMs www.efloodmap.com
NGS Benchmark Data Sheets www.ngs.noaa/datasheet.html
NGS Continuous Operating Reference Stations www.ngs.noaa.gov/CORS/
USGS Topographic Maps www.topozone.com
Aerial Photos <http://terraserver.homeadvisor.msm.com/default.asp>
Harris-Galveston Coastal Subsidence District www.subsidence.org
Texas Natural Resources Information System www.tnris.org
Houston Galveston Area Council www.hgac.cog.tx.us

The NWS web page www.srh.noaa.gov/hgx/projects/allison01.htm includes rainfall, flood photos and a link to the NWS Service Assessment. I commend the NWS for producing an excellent storm report and I recommend that you review this web site.

Immediately following the June 5-10, 2001 flood event, President Bush declared 30 Texas counties a Disaster Area, which prompted the Federal and State Disaster Response Agencies into action. Jack Quarles, PE, and Gary Zimmerer, PE, lead the FEMA Technical Services Team and coordinated the technical flood response efforts of numerous Federal, state and local agencies. FEMA and Harris County Flood Control District (HCFCD) initiated the Tropical Storm Allison Flood Recovery Project (TSARP). HCFCD is a Cooperative Technical Partner (CTP) with FEMA and the mechanism was

already in place to assist local communities in the flood recovery process. HCFCD was in the process of finalizing the Harris County Map Needs Assessment when Allison struck. The Harris County Map Assessment provided the documented needed to justify restudy and revision of the Harris County Flood Insurance Study and the 142 FIRM panels that cover the 35 communities in Harris County. The Tropical Storm Allison Flood Recovery Project (TSARP) is a “fast track” effort that includes:

- Harris County Flood Control District survey teams preparation of inundation maps, establishing and surveying high water marks, documentation of emergency response efforts during and immediately following TSA and publication of the TSA Post Flood Event Report.
- Harris County Flood Control District publication of the Harris County Map Needs Assessment and Map Needs Update Support System (MNUSS) database
- NWS Tropical Storm Allison Flood Report and Service Assessment
- USGS Tropical Storm Allison Flood Report
- Harris County efforts to perform Substantial Damage Determinations and initiate a “fast track” Acquisition and Relocation Project of approximately 1600 repetitive loss properties that were substantially damaged by TSA
- FEMA and Harris County Flood Control District funding, selection of consultants, and initiation of TSARP with an initial estimate of \$16.5M
- Creation of the TSA Flood Recovery Website www.tsarp.org
- Public Meetings and Press Events to advertise TSARP
- New LIDAR Mapping (12 cm+/-) to produce new topographic/terrain data (2-foot topographic map of Harris County covering 1750 square miles and including 35 communities and 7 MUD's, LID's, and WCID's).
- Base map preparation using HGAC STAR-Map
- Hydrology analysis of 22 watersheds, 202 studied streams, detention ponds, and approximately 1200 stream miles using new design rainfall developed by USGS
- Harris County Flood Control District Post Event calibration to develop data for re-study teams.
- Acceleration of NGS efforts provide 1st order 2000 Datum bench marks throughout Harris County
- Documentation of subsidence measurements in Harris County by Harris-Galveston Coastal Subsidence District to assist in remapping the Special Flood Hazard Areas subject to combined probability flooding.
- Field surveys of over 10,000 channel cross sections for approximately 1200 stream miles
- Utilize LIDAR to define floodplain boundaries in overbank areas
- Hydraulic Analysis of 1200 stream miles within Harris County
- Digital Floodplain Mapping that is GIS compatible to produce 142 DFIRM panels
- Establishing four (4) major committees (Executive, Technical, Stakeholders and Users) to coordinate the TSAFRP with private and public groups, public agencies, real estate and business interests, users of the final products, and technical groups.
- Production of Draft (Preliminary) FIS and FIRM's
- Public Review Period (Required by FEMA before new FIRM's become final)

- Resolution of Technical Appeals
 - Final adoption of FIS and publication of DFIRM's (Target date is June 2004)
- FLOODPLAIN MANAGEMENT AND RELATED WEBSITES

The following websites contain useful information to communities and floodplain management officials:

Associations:

Texas Floodplain Management Association (TFMA)	www.tfma.org
Association of State Flood Plain Managers (ASFPM)	www.floods.org
Bayou Preservation Association (BPA)	www.bayoupreservation.org
Emergency Management Association of Texas (EMAT)	www.emat-tx.org
Oklahoma Floodplain Management Association (OFMA)	www.okflood.org
Oklahoma Emergency Management Association	www.anglefire.com/ok2/oema

Federal Agencies:

Corps of Engineers (COE)	www.swt.usace.army.mil
EMI Independent Study	www.fema.gov/home/emi/ishome.htm
Federal Emergency Management Agency (FEMA)	www.fema.gov
FEMA Map Service Center	www.fema.gov/msc
National Geodetic Survey (NGS)	www.ngs.noaa.gov
NGS Benchmark Data Sheets	www.ngs.noaa/datasheet.html
National Park Service (NPS)	http://www.nps.gov
National Weather Service (NWS)	www.srh.noaa.gov/hgx
NWS TSA Flood Report	www.srh.noaa.gov/hgx/projects/allison01.htm
USGS Real Time Flow	http://waterdata.usgs.gov/tx/nwis/current/?type=flow
USGS Topographic Maps	www.topozone.com
U.S. Fish & Wildlife Service	www.nwi.fws.gov

U. S. Department of Agriculture www.usda.gov

State Agencies:

Texas Natural Resource Conservation Commission (TNRCC) www.tnrcc.state.tx.us

Texas Natural Resources Information System (TNRIS) www.tnr.is.org

Texas Water Development Board (TWDB) info@twdb.state.tx.us

Texas Division of Emergency Management (DEM) www.txdps.state.tx.us

Texas General Land Office (GLO) www.glo.state.tx.us

Texas Parks & Wildlife Department www.tpwd.state.tx.us

Texas A&M Hazard Reduction and Recovery Center (HRRC) <http://hrrc.tamu.edu>

Harris County and City of Houston:

Harris County Flood Insurance Rate Maps (FIRM) www.efloodmap.com

Harris Galveston Coastal Subsidence District (HGCSD) www.subsidence.org

Harris County Office of Emergency Management www.hcoem.org

Harris County NPDES Joint Task Force www.co.harris.tx.us/npdes/docs/frameset.html

Harris County Appraisal District www.hcad.org

City of Houston Aerial Photographs <http://terraserver.homeadvisor.msn.com/default.asp>

Other Texas Cities:

Austin Project Impact www.cityofaustin.org/projectimpact

Elected Officials:

Governor Rick Perry www.governor.state.tx.us

Texas House of Representatives <http://www.house.state.tx.us>

Texas Senate <http://www.senate.state.tx.us>

Texas State Senator first name.last name@senate.state.tx.us
Example www.kenneth.armbrister@senate.state.tx.us