LOWER BRAZOS RIVER FLOODPLAIN PROTECTION PLANNING STUDY

Angleton, Texas

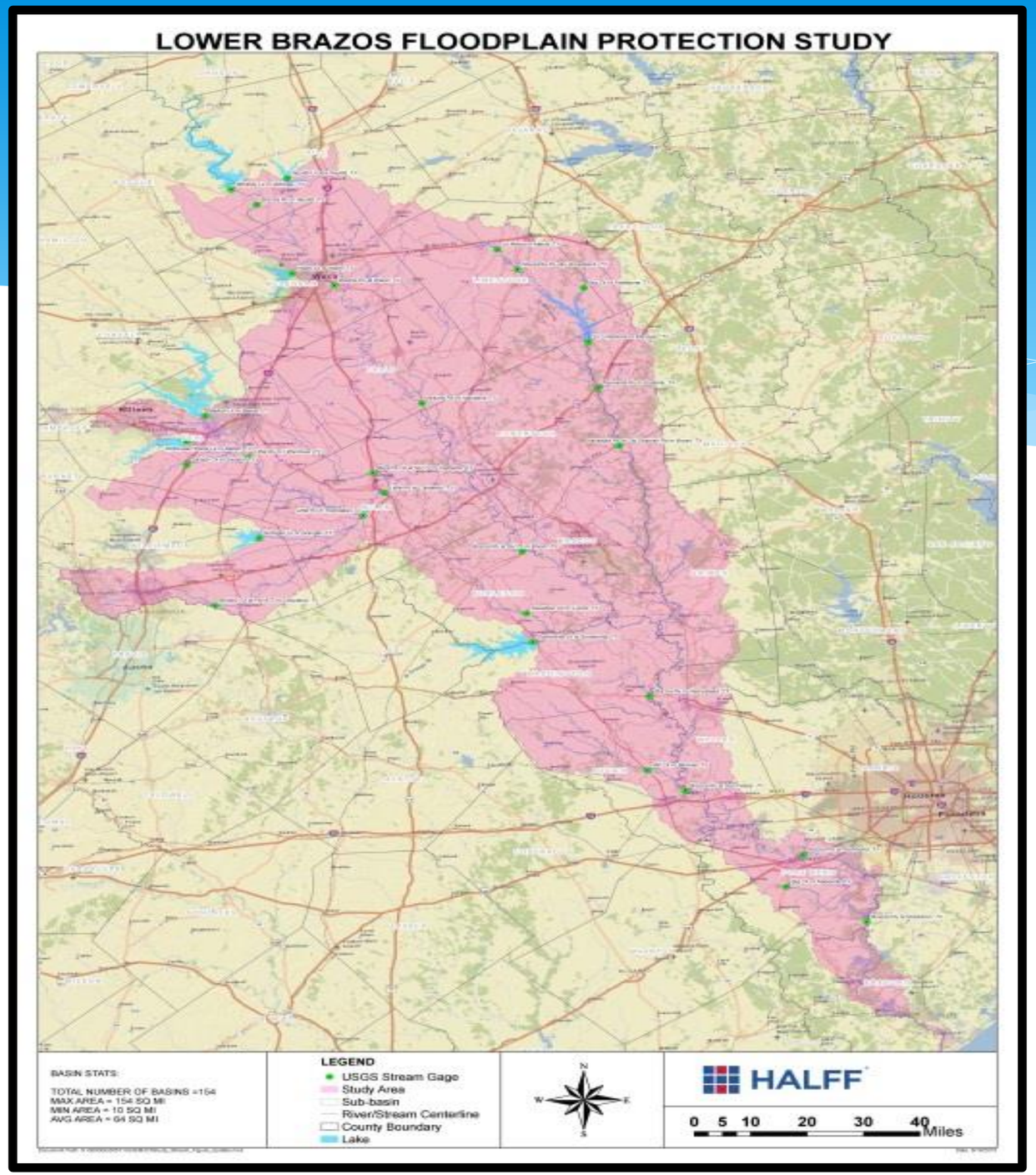
September 16, 2015

Reasons for the Study

* One of the fastest growing areas in the country
* Hydrologic and hydraulic models/data are dated outside of Fort Bend County
* Need for consistent modeling methodology across county boundaries
* Need to assess lower Brazos watershed from a comprehensive basinwide perspective (existing conditions and alternatives)
* 10,000 square miles of uncontrolled drainage area

Goals of the Study

* Quantify existing flooding issues and flood damage reduction alternatives
* Update hydrologic and hydraulic data for the lower Brazos River (Hempstead gauge to mouth across 5 counties)
* Calibrate new models to historical events and provide flood volumes, flood depths, and flood durations
* Facilitate land use planning, emergency response, and sound floodplain management


LOWER BRAZOS FLOODPLAIN PROTECTION STUDY
BASIN STATS:
TOTAL NUMBER OF BASINS =154
MAX AREA = 154 SQ MI
MIN AREA = 10 SQ MI
AVG AREA = 64 SQ MI
LEGEND
USGS Stream Gage
Study Area
Sub-basin
River/Stream Centerline
County Boundary
Lake
N
W
E
S
HALFF
0 5 10 20 30 40
Miles

History of Project

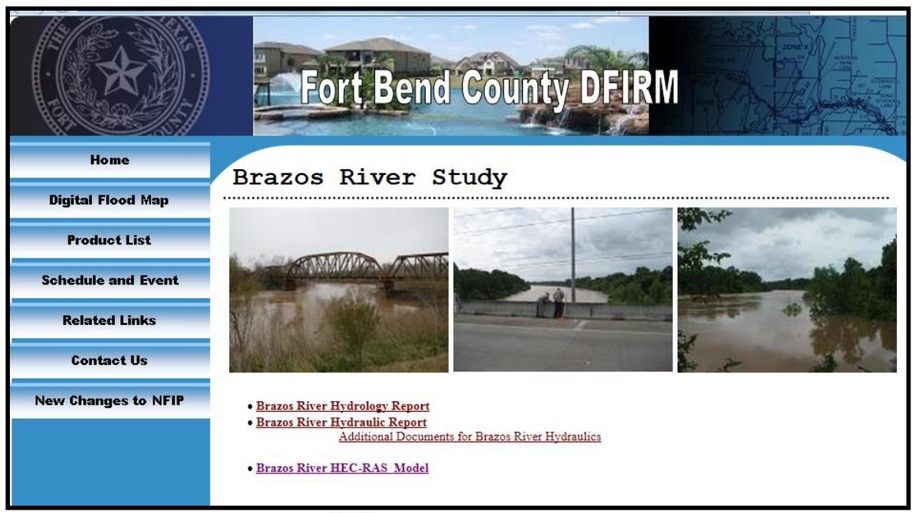
* 2012-2013 – Local entity meetings with BRA and Halff
* January 2014 - BRA applied for TWDB FPP Grant
* May 2014 – TWDB approves funding for Phase 1 ($514,784)
* June 2014 – BRA issues RFQ for Lower Brazos Flood Study
* November 2014 – Halff and BRA execute contract for study and final interlocal agreements signed by BRA for Phase 1
* December 2014 – Phase 1 Kick-off
* Spring 2015 – BRA applied for TWDB FPP Grant Phase 2
* Summer 2015 – TWDB approves funding for Phase 2 ($275,234)
* Current – Seeking Phase 2 local funding partners

Coordination with FEMA and U.S. Army Corps of Engineers

* BRA, TWDB, and Halff met with FEMA and USACE in October 2014.
  * FEMA – Discovery process on-going. Focusing on tributaries.
  * USACE – Began development of CWMS models in Spring of 2015
* Exchanging terrain, historic data, etc… with USACE

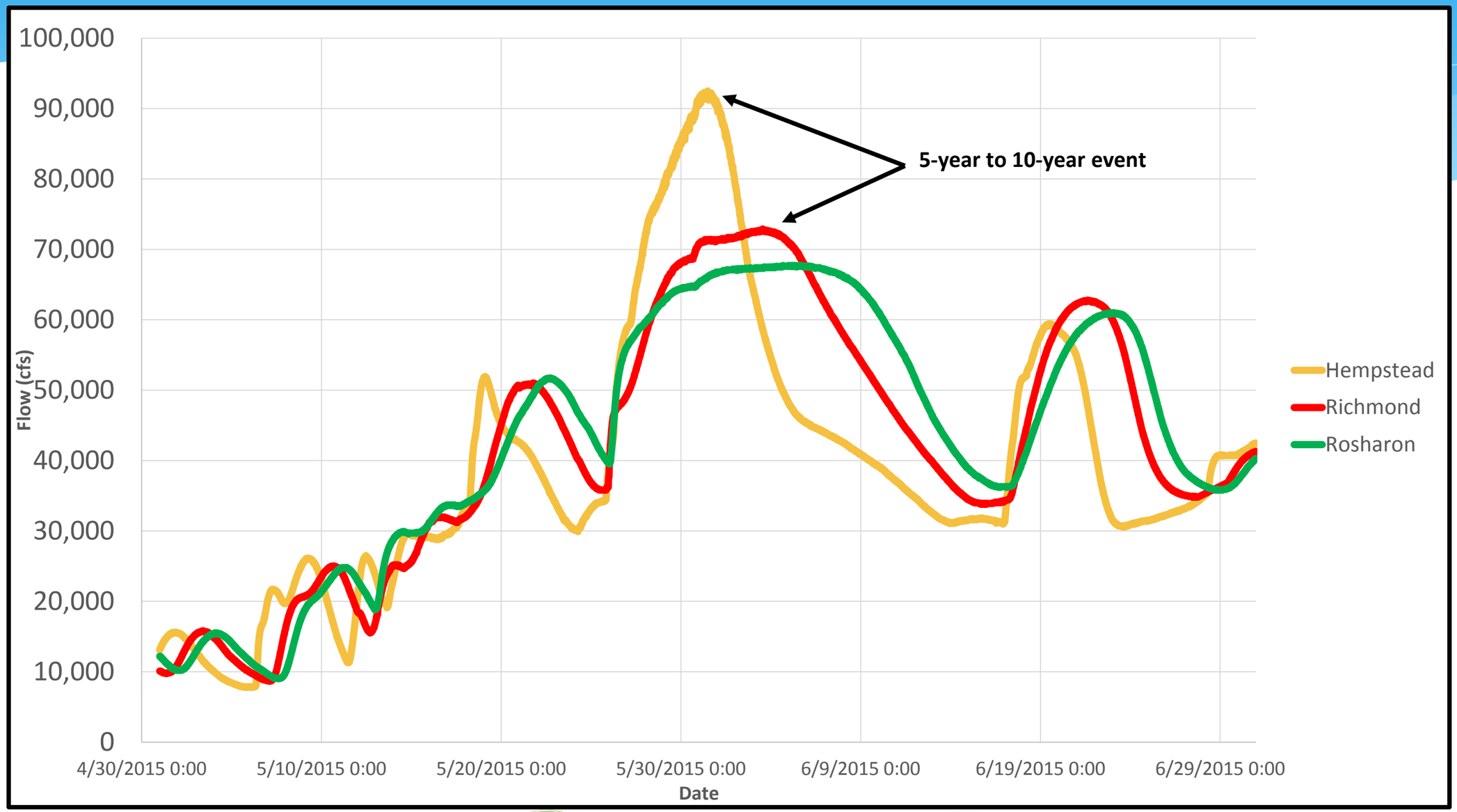
Incorporation of Fort Bend Co. Data

* DFIRM Update for Fort Bend County (2009)
  * Hydrology: 2006 Flood Frequency Analysis (LJA Engineering & Surveying)
  * Hydraulics: HEC-RAS Hydraulic Model



May-June 2015

May-June 2015



Total Study Costs

Task	Amount
Project Management	$104,136
Terrain Development	$60,000
Base Map Data Collection	$30,000
Hydrologic Analysis	$276,500
Field Surveys	$180,000
Hydraulic Analysis	$655,000
Alternatives Formulation	$112,000
Flood Damage Analysis Modeling	$72,000
Environmental Constraints Analysis	$64,000
Documentation	$60,000
Total	**$1,613,636**

Funding Breakdown

PHASE 1	Study Costs	Committed Funding	Additional Funding Needed
TWDB FPPG		$514,783.50	$0.00
Brazoria County		$300,000	$0.00
Waller County		$120,000	$0.00
Velasco Drainage District		$106,316.50	$0.00
Pecan Grove MUD		$7,500	$0.00
BRA (In-Kind)		$14,568	$0.00
Phase 1 Total	**$1,063,168**	**$1,063,168**	**$0.00**
PHASE 2			
TWDB FPPG		$275,234	$0.00
Local Funding Participants to Date		$0.00	$260,666
BRA (In-Kind)		$14,568	$0.00
Phase 2 Total	**$550,468**	**$289,802**	**$260,666**
STUDY TOTAL	**$1,613,636**	**$1,352,970**	**$260,666**

Schedule

Phase 1

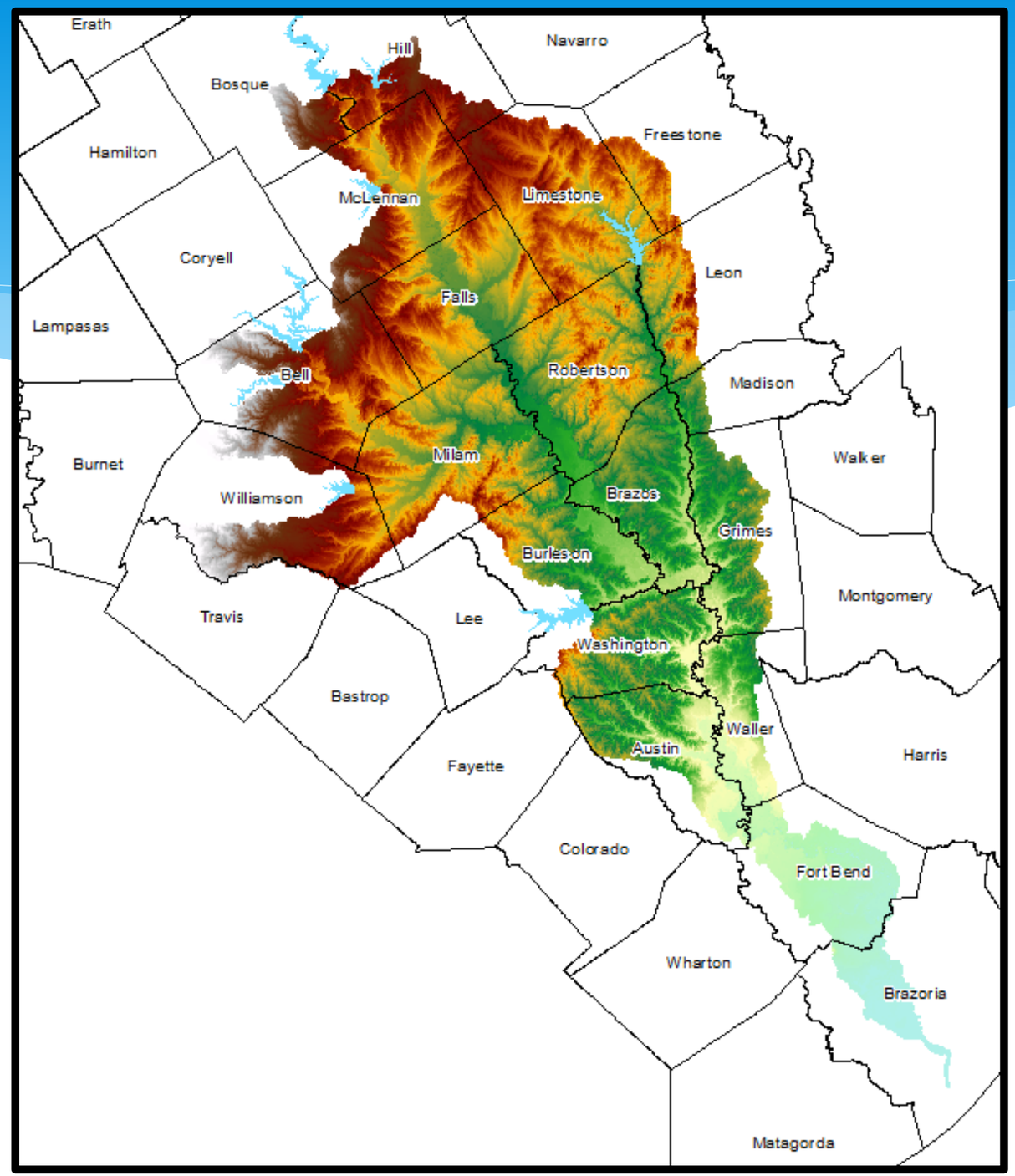
* Terrain Development – March 2015
* Data Collection – February 2015
* Hydrology – September 2015
* Field Surveys – June 2015
* Hydraulics – February 2016
* Alternatives Formulation – June 2016
* Flood Damage Analysis – June 2016
* Environmental Constraints Analysis – April 2016
* Draft Report – October 2016
* Final Report – April 2017

Phase 2

* Begin Work – January 2016
* Terrain Development – July 2016
* Data Collection – March 2016
* Field Surveys – June 2016
* Hydraulics – November 2016
* Alternatives Formulation – June 2017
* Flood Damage Analysis – June 2017
* Environmental Constraints Analysis – April 2017
* Draft Report – October 2017
* Final Report – March 2018

Terrain Development

* Utilized latest LiDAR where available (7 datasets)
* Supplemented with USGS DEM
* Processed into seamless terrain dataset
* Spliced in Brazos River survey for Phase 1
* Generating contours for future mapping



Brazos River Authority

HALFF®

Data Collection

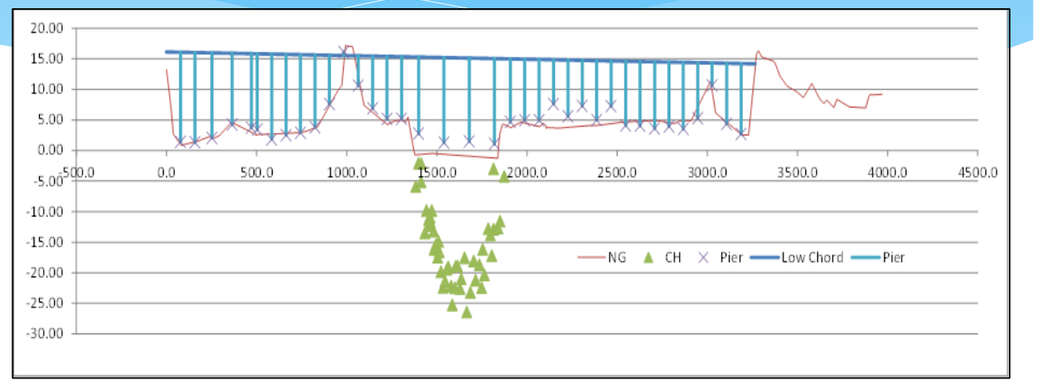
* TxDOT Bridge Plans
* USGS Streamflow Records
* Historic Rainfall Records
* USACE Reservoir Release Records
* FEMA Library Request
* Historic Flood Photos/Highwater Marks
* Base Map Data:
  * Roads
  * City/County Limits
  * Railroads
  * Aerial Photos
  * Landuse
  * Stream Centerlines
  * Floodplains
  * Soils

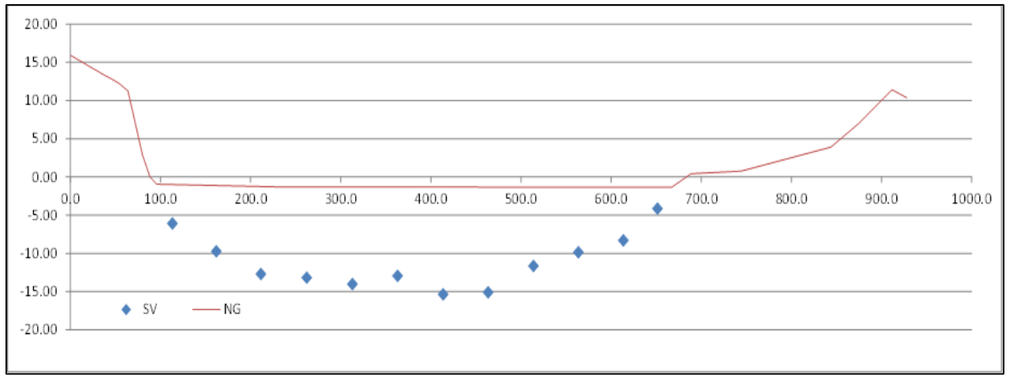
Field Surveys

* Locations – Field Recon and aerials
* 15 cross sections and 7 bridges
* Right-of-Entry – public and private
* Survey Methods – Topography and Bathymetry

Field Surveys

* Datum – NAD 83 and NAVD 88
* Established Control
* FEMA Data Capture Standards
* Ties in with LiDAR data





Hydrologic Analysis Overview

HEC-RAS ROUTING MODELS (STEADY)

↓

INITIAL HEC-HMS MODEL

↓

CALIBRATED HEC-HMS TO HISTORICAL EVENTS

→

PERIOD-OF-RECORD FLOW ANALYSIS (UNREGULATED & REGULATED)

↓

FREQUENCY RESULTS

↑

HISTORICAL FREQUENCY ANALYSIS (STREAM GAUGES) UNREGULATED

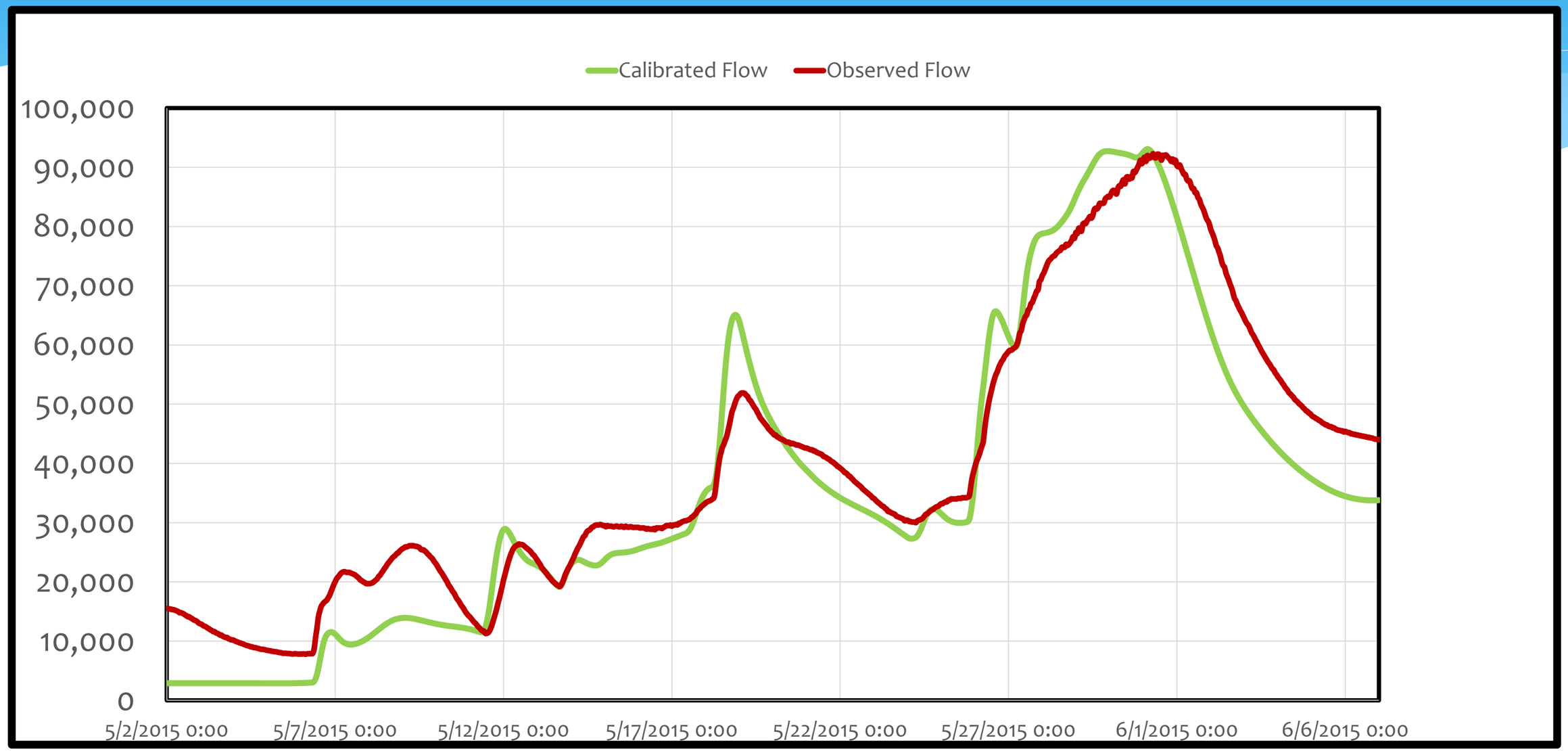
→

FINAL HEC-HMS WITH CRITICAL STORM CENTERING

↓

HYDRAULICS FINAL HEC-RAS (UNSTEADY)

2015 Flood Event Calibration - Hempstead



Why should my community participate?

* Cost sharing & data sharing
* Consistent H&H models across political boundaries
* Existing H&H data is dated/missing, especially outside of Fort Bend County
* Updated flood damage analysis
* Baseline H&H for: FEMA floodplain revisions, levee design/planning, floodplain management, real-time flood operations

I would like to participate, what should I do?

* Contact Cathy Dominguez (254-761-3176) or Pamela Osborne (254-761-3135) at BRA
* Attend the next stakeholder meeting (October 2015 – TBD)

Questions?