# JERSEY COUNTY LOSS AVOIDANCE STUDY

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# **PROJECT PARTNERS**

- Illinois Department of Natural Resources
- Illinois Emergency Management Agency
- Jersey County
- U.S. Army Corps of Engineers
- City of Grafton
- Illinois Silver Jacket Study





#### AGENDA

- What is a Loss Avoidance Study?
- Jersey County Overview
- Historical Flooding
- Mitigation Activity
- Data Sources
- Hydraulic Analysis
- Economic Analysis
- Return on Investment





### WHAT IS A LOSS AVOIDANCE STUDY?

- Typically, a FEMA-led effort, to quantify the losses avoided due to implementation of mitigation activity
- Standardized template available for communities or other agencies to determine the return on investment (ROI)
- USACE conducted a "modified" Loss Avoidance Study by incorporating some value-added deviations and to be consistent with USACE policy and regulations

# Loss Avoidance Study

**Riverine Flood Methodology Report** 

April 2011

Version 2



Federal Emergency Management Agency U.S. Department of Homeland Security 500 C Street, Southwest Washington, DC 20472

# **OVERVIEW – JERSEY COUNTY**

- Located in "Southern Illinois"
- Just north of the St. Louis Metropolitan area



# **OVERVIEW – JERSEY COUNTY**

- Jersey County, IL
  - Population: 22,985
  - Rural agricultural communities
  - Confluence of Illinois River and Mississippi River



# **OVERVIEW – JERSEY COUNTY REGIONS**

- Four floodprone communities:
  - Elsah
    - "Boats 'N' mobile homes"
  - Grafton
    - "Ground zero"
  - Coon Creek
    - "Corps' Cabins"
  - Nutwood
    - "Protected, but not protected"

![](_page_6_Figure_10.jpeg)

Jersey County Mitigated Structures

# **OVERVIEW – HISTORICAL FLOODING**

- The Great Flood of 1993 started it all
  - Within Jersey County the 1993 flood inundated hundreds of homes and businesses, thousands of acres of crops and 35 miles of roads
  - Floods in 1994 and 1995 exacerbated the recovery process
  - Post 1995, Jersey County was one of the worst Counties in the state for repetitive losses
  - By 2001, Jersey County placed on probation status within the NFIP

#### Grafton, IL Gage

Date	Peak Stage	Type of Declaration	Historical Ranking
August 1993	38.17	Federal #997	1
May 1994	<29	Federal #1025	N/A
May 1995	30.40	Federal #1053	8
May 2002	28.10	Federal #1316	20
June 2008	30.80	Federal #1771	6
June 2013	30.94	State	4
June 2015	29.51	State	12
December 2015	30.91	State	5
May 2017	29.58	State	10

Flood Stage: 18 feet

![](_page_7_Picture_9.jpeg)

![](_page_7_Picture_10.jpeg)

### **MITIGATION ACTIVITY**

- Mitigate, mitigate, mitigate...
  - Between 1993 and 1996, Jersey County acquired 268 structures
  - After 1997, Jersey County acquired or elevated an additional 147 structures
  - Total of 415 structures mitigated at an estimated cost of \$14 million
  - Total Mitigation Count:
    - Elsah 93
    - Grafton 146
    - Coon Creek 107
    - Nutwood 69

![](_page_8_Figure_10.jpeg)

![](_page_8_Picture_11.jpeg)

![](_page_8_Picture_12.jpeg)

### **DATA SOURCES**

- Issues with data availability
  - Lost hard copy files
  - Obsolete electronic file formats
  - Retired knowledge
- Non-traditional data sources:
  - Closing documents
  - Cabin demolition reports
  - Asbestos surveys
- Traditional data sources:
  - Property record cards
  - FEMA elevation certificates
  - HMGP monitoring reports

4208 321 004-50 Grafton 1101 E. Breadway, Alton, all. Jornger. R3/143 Springman Lumber Co 1-67 25,00000 010/1032 Morge 5 Desherlis (CP) 1-50 350/235 18,000 \$ 7/89 Lots 5-6-7-8-9-10-1 And W 101 Lot 4 37/37 7/95 LAND VALUE CALCULATION Trregular Lot Size TAXING DISTRICTS Regular Lot Size SERVICES AND AREA Off Site Improvement Neighborhood Utilities Zoning City Water Single Family Improving d Street Front Foot Depth, Corner, Other Unit Value Static Two Family Well k Tonned Stree Value Table Facto Sq. Foot Declining Sewer Multi Family velled Stree Septic Tank Business Blighted c Walks Natural Gas Commercia hs and Gutter Cesspool Industria L. P. Gas Alley Electricity TOTAL SUMMARY OF LAND AND BUILDING VALUE. ANNUAL ASSESSMENT SPECIAL NOTES. Appraised Assessed Improve ments Year Reason Land Tota1 Value

US Army Corps of Engineers \*

### **HYDRAULIC ANALYSIS**

- Hydraulic Modeling (HEC-RAS)
  - USACE used data from a flow frequency study within HEC-RAS to output detailed depth grids
    - Depth grids show the depth of flooding at a 4.5 foot intervals for the nine historical storm events
- Mitigated structures extracted flood depth data to determine historical flood heights

#### 1993 Event Depth Grid (Elsah)

![](_page_10_Picture_6.jpeg)

### **ECONOMIC ANALYSIS**

- Structure inventory built in ArcGIS using available data:
  - Geospatial location
  - First floor elevation
  - Ground surface elevation
  - Structure value
  - Structure occupancy type
  - Type/Cost/Date of mitigation
- Once each structure was assigned a flood depth, a depth damage relationship was applied to compute damages avoided

#### Depth-Damage Relationship

![](_page_11_Figure_10.jpeg)

![](_page_11_Picture_11.jpeg)

![](_page_11_Picture_12.jpeg)

#### **ECONOMIC ANALYSIS**

![](_page_12_Picture_1.jpeg)

# Elsah structure inventory overlaid with the 1993 event depth grid Distribution of losses avoided

![](_page_12_Figure_3.jpeg)

# JERSEY COUNTY LOSSES AVOIDED

- Losses avoided calculation based on:
  - 1. Mitigation Timing
  - 2. Post-Mitigation Elevation
  - 3. Post-Mitigation Storm Events
- 84 mitigated structures have not yet yielded losses avoided
- An event the size of 1993 occurring today would yield approximately \$17 million in losses avoided for the Jersey County study area

Date	Mitigated Structures	Losses Avoided
August 1993	9	598,000
May 1994	2	113,000
May 1995	98	1,851,000
May 2002	81	2,282,000
June 2008	184	4,588,000
June 2013	320	9,199,000
June 2015	273	7,553,000
December 2015	327	9,317,000
May 2017	260	7,420,000

![](_page_13_Picture_8.jpeg)

![](_page_13_Picture_9.jpeg)

![](_page_14_Picture_0.jpeg)

- No Losses Avoided
- Less than \$25,000
- \$25,000 to \$100,000
- \$100,000 to \$200,000
- Greater than \$200,000

### JERSEY COUNTY RETURN ON INVESTMENT

Date	Cumulative Losses Avoided	Cumulative Mitigation Cost	Cumulative ROI
August 1993	598,000	706,414	0.85
May 1994	711,000	769,365	0.92
May 1995	2,562,000	5,201,023	0.49
May 2002	4,844,000	11,943,700	0.41
June 2008	9,432,000	12,307,470	0.77
June 2013	18,631,000	14,636,944	1.27
June 2015	26,184,000	14,821,246	1.77
December 2015	35,501,000	14,831,963	2.39
May 2017	42,921,000	14,831,963	2.89

- 20-year payback period (1993 to 2013)
- For every dollar invested in mitigation, two dollars and 89 cents of losses have been avoided

#### JERSEY COUNTY RETURN ON INVESTMENT

![](_page_16_Figure_1.jpeg)

![](_page_17_Picture_0.jpeg)