

# Operation Watershed-Recovery

## MR&T System 2011 Post-Flood Evaluation

**USACE-USGS HQ Staff Briefing**

**Scott Whitney**  
MVD REGIONAL FLOOD RISK MANAGER

**9 May 2013**



US Army Corps of Engineers  
**BUILDING STRONG**®



# *Operation Watershed-Recovery*

## MR&T Post-Flood Evaluation

### Purpose & Intent

- **EVENT**
- **RECOVERY**
- **EVALUATION**
  - **Scope**
  - **History**
  - **Components/Teams**
  - **Products**
  - **Findings**
  - **Conclusions**
  - **Recommendations**
- **KEY TAKE-AWAYS**

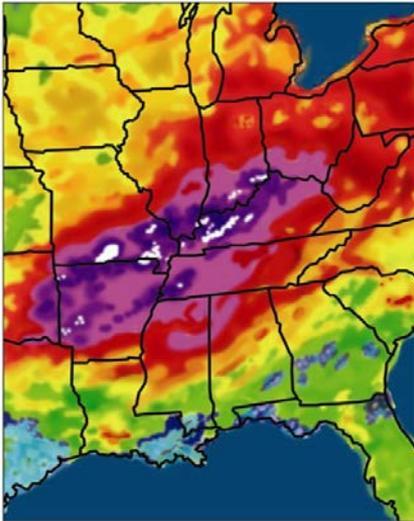


# 2011 LOWER MISSISSIPPI RIVER FLOOD

## The EVENT! Testing the System

30-Day  
Rain Totals  
(April 5 -  
May 5, 2011

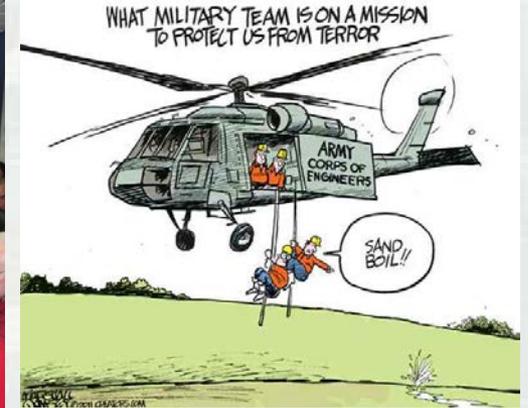
Inches



2011 St. Joseph, LA



Yazoo Backwater



Cairo



BP-NM Floodway



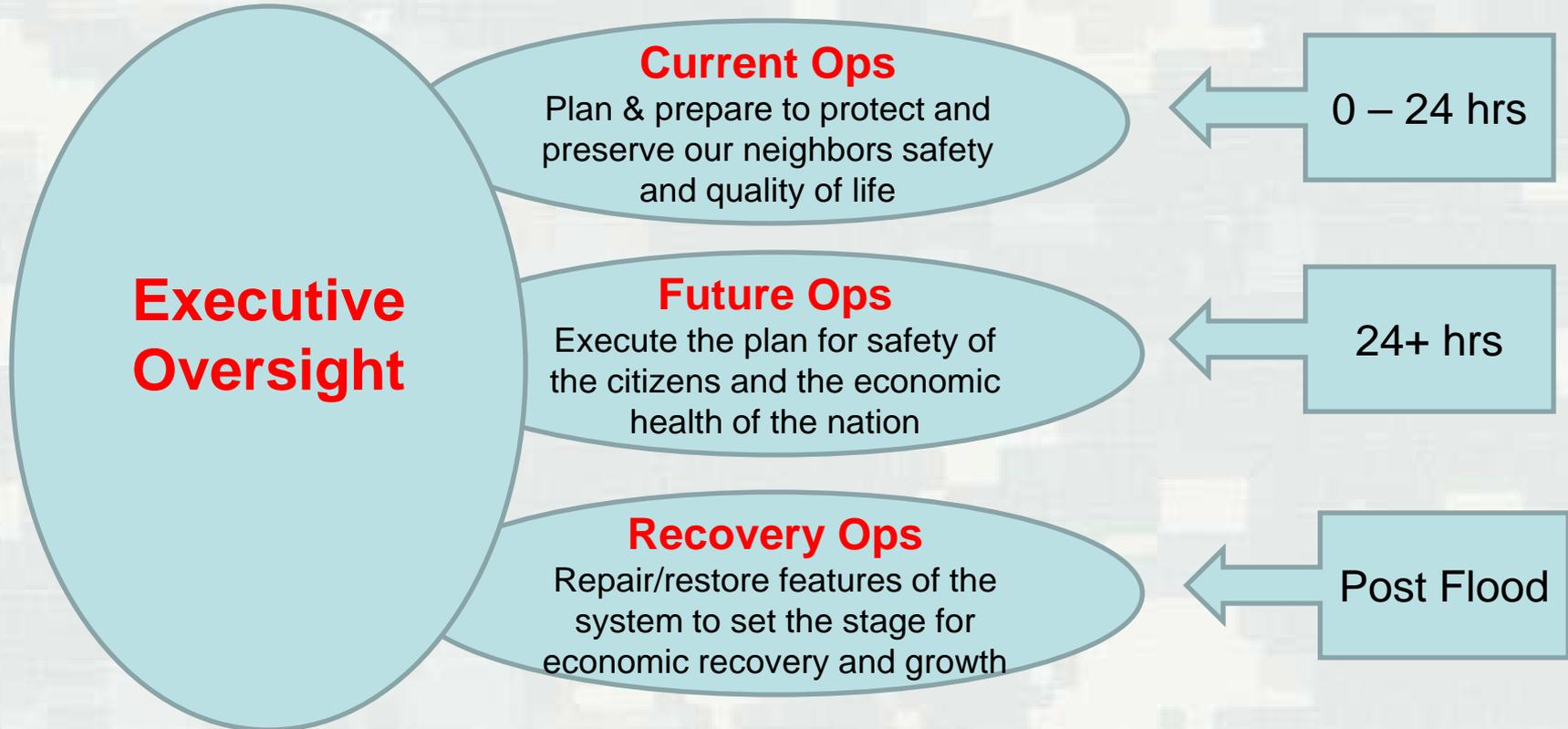
Morganza



# Operation Watershed

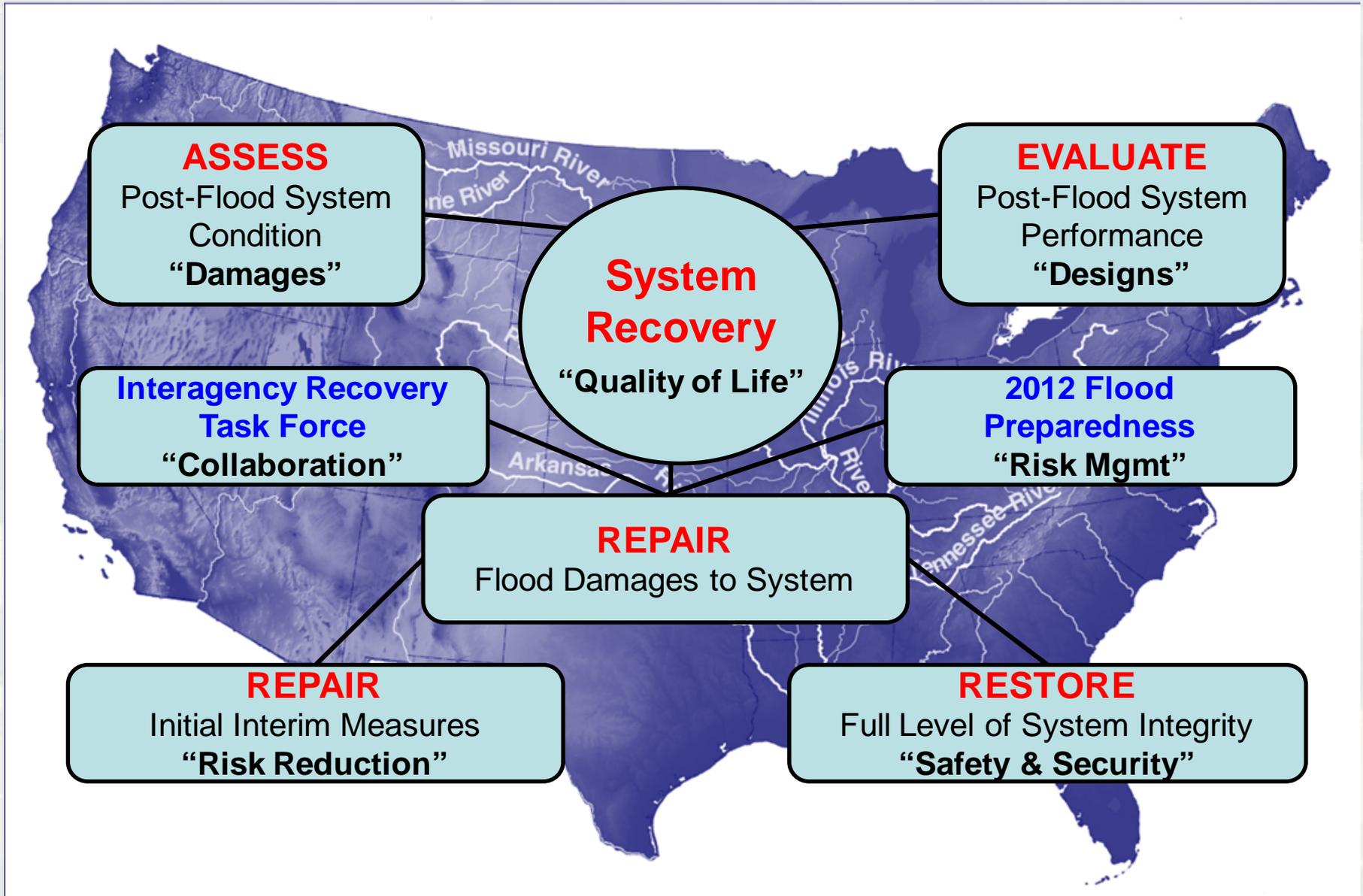
*Responding to the Historic Mississippi River Flood of 2011*

## RESPONSE OVERVIEW



# Operation Watershed - Recovery

*Responding to the Historic Mississippi River Flood of 2011*



# *Operation Watershed-Recovery*

## MR&T Post-Flood Evaluation

### Scope

- **TIMELY:** Executed from Aug 2011-Jul 2012 + 5mo reviews
- **FOCUSED:** Purpose was to investigate and document the 2011 Flood performance of the MR&T system
  - 1) assess MR&T system performance
  - 2) identify and prioritize recapitalization requirements
  - 3) assess effectiveness or areas of improvement
- **LEGACY:** The resulting documents will be a valuable resource and reference guide for future.

# Mississippi River & Tributaries Project

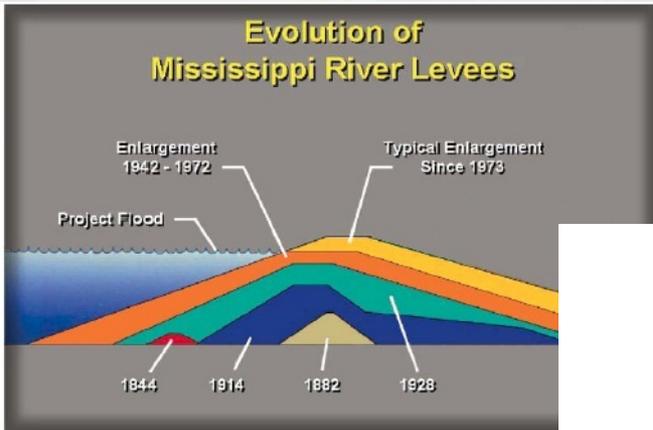


- Most comprehensive and Successful FRM system in the world.
- Comprised of Levees, Channel Stabilization, Tributary improvements and Floodways
- 35,000-square-mile flood plain
- \$14 billion invested
- \$612 billion in flood damages prevented, \$234 billion in damages prevented in 2011
- 44 to 1 return on investment
- 4.5 million people protected
- MR&T Project Currently 89% Complete

# MR&T Post-Flood Evaluation

## HISTORY: Evolution of a Comprehensive FRM System

### Evolution of Mississippi River Levees



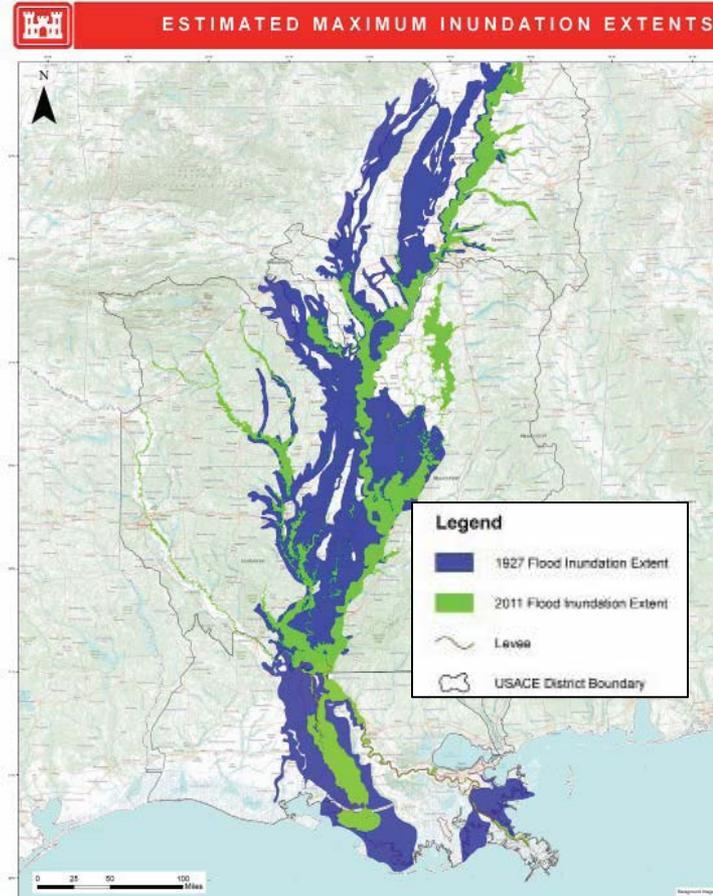
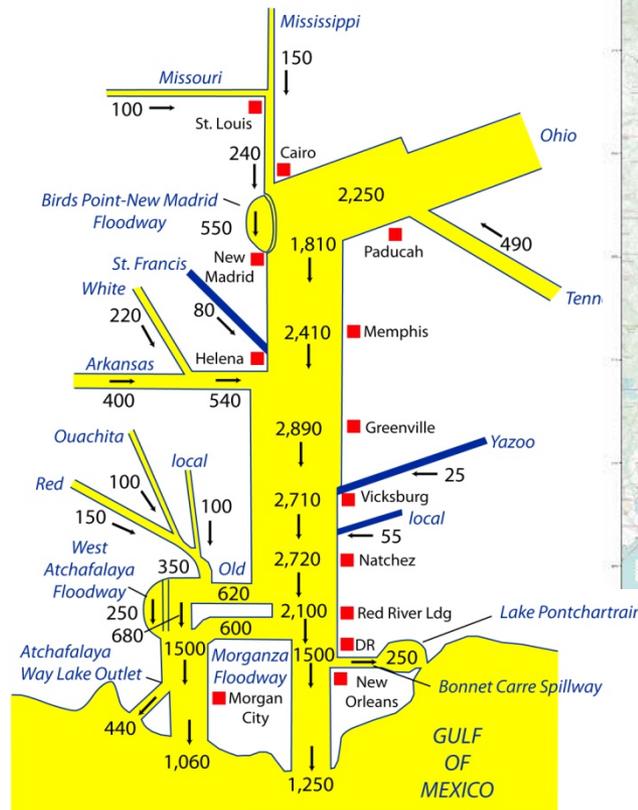
**(A) KNOW YOUR PAST:**  
*Levees Only Policy*

**(B) CATALYST FOR CHANGE:**  
*1927 Flood*



**(C) DESIGN A VISION:**  
*Project Design Flood*

### MR&T Project Design Flood Discharge in 1,000 cfs



**(D) TEST RESULTS:**  
*80+ years of Success*  
*"Room for the River"*

# MR&T Post-Flood Evaluation

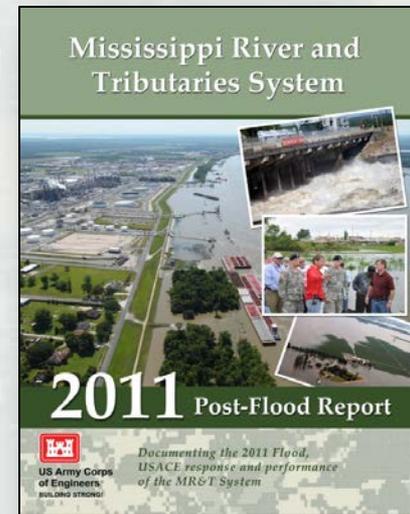
## System Components

1. Reservoirs
2. Levees/Floodwalls
3. Floodways
4. Channel Improvements
5. Outlet Structures (e.g. Old River...etc)
6. Operational Decisions
7. Collaboration
8. Communication

## System Teams

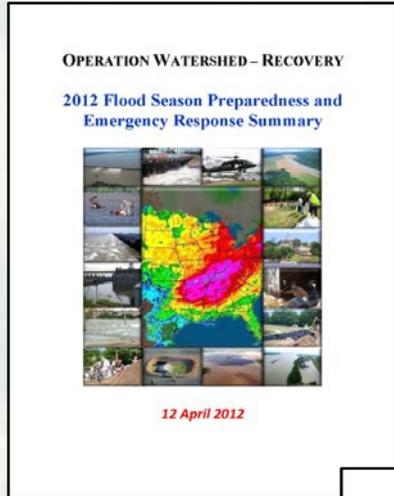
### Regional Management Team

1. Reservoirs (Fusion Team)
2. Levees/Floodwalls/Outlet Structures
3. Floodways
4. Channel Improvements
5. Communications/Collaboration
6. Environmental
7. Economics
8. Flow Lines / Design Flood
9. Data Management
10. Reports

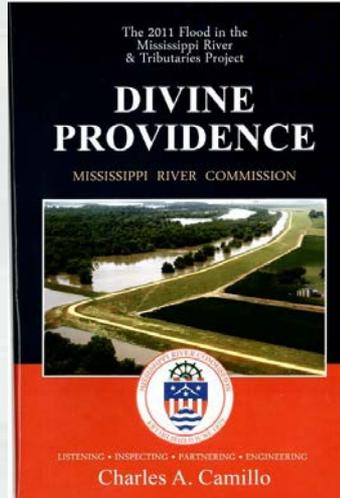


# MR&T Post-Flood Evaluation

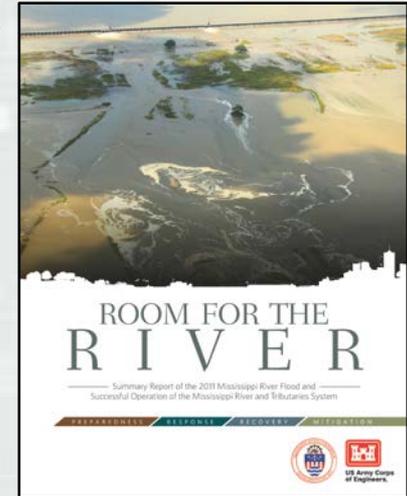
## PRODUCTS



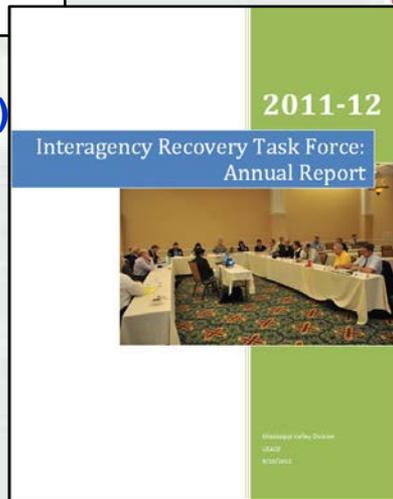
**APR 2012**  
**(50 pgs + Appd)**



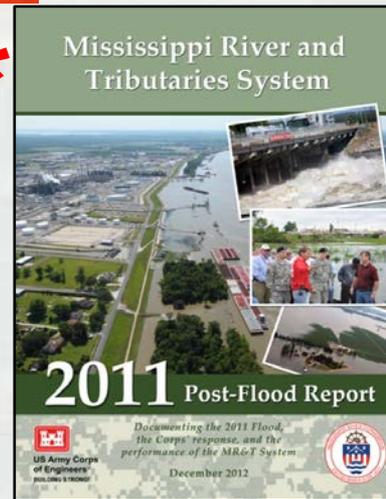
**AUG 2012** \*  
**(312 pgs)**



**DEC 2012**  
**(36 pgs)**



**AUG 2012**  
**(30 pgs)**



**DEC 2012**  
**(350 pgs + Appd)**

# Operation Watershed-Recovery

## MR&T Post-Flood Evaluation

### MAIN REPORT - Outline

EXECUTIVE SUMMARY

ACRONYMS

I. INTRODUCTION

II. MISSISSIPPI RIVER & TRIBUTARIES PROJECT

III. THE 2011 FLOOD

IV. MR&T OPERATION AND EMERGENCY ACTIVITIES

V. AREAS FLOODED, FLOOD DAMAGES, AND FLOOD DAMAGES PREVENTED

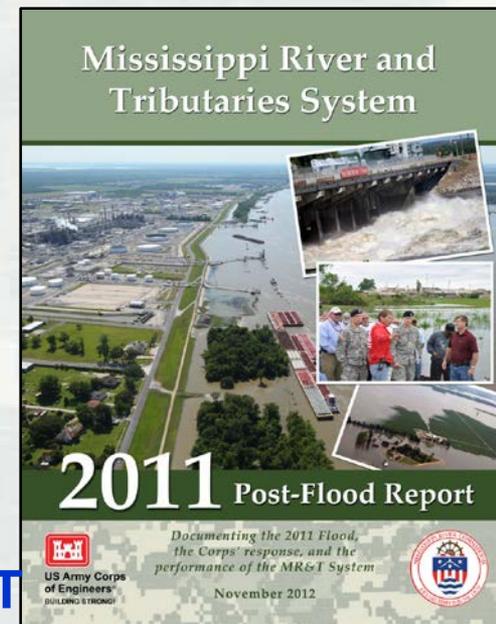
VI. POST-FLOOD RECOVERY

VII. SUMMARY AND CONCLUSIONS

VIII. INTERAGENCY RECOVERY TASK FORCE

IX. RECOMMENDATIONS

APPENDICES



# *Operation Watershed-Recovery*

## **MR&T Post-Flood Evaluation**

### **SUMMARY REPORT - Outline**

**INTRODUCTION:** *Winning the Next Flood*

**HISTORY:** *Flood by Flood*

**2011:** *A Record Flood*

**FLOOD FIGHT:** *The Ultimate Test*

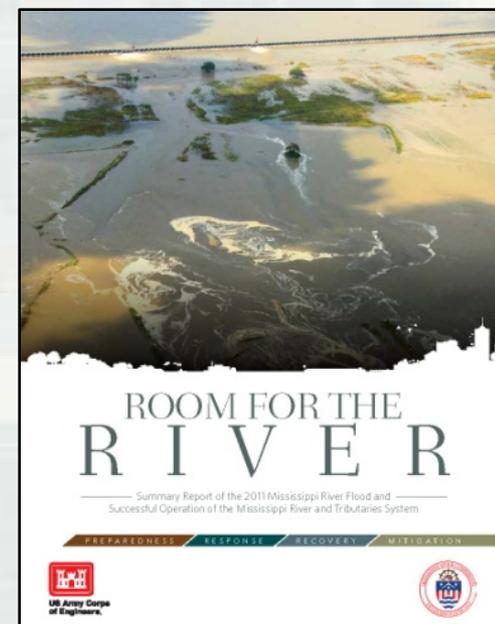
**PERFORMANCE:** *Making Room for the Record Flood*

**RECOVERY:** *Restoring a Flood-Battered System*

**PREPAREDNESS:** *Coping with Risk*

**RECOMMENDATIONS:** *A Secure Future*

**FUTURE:** *Applying Hard-Learned Lessons*



# Operation Watershed-Recovery

## MR&T Post-Flood Evaluation

### Key Findings

- The Mississippi River and Tributaries (MR&T) project is one of the world's most **comprehensive and successful** flood control and navigation systems.
- More than a dozen significant floods have **tested the MR&T** over the past eighty years, but none as extensively as the 2011 record flood.
- In 2011, the MR&T system performed as designed by accommodating the river while using only **85 percent of its design** capacity. Yet at the same time, not a single life was lost.
- More than **\$230 billion** in flood damages were prevented by the MR&T during the 2011 record flood.
- Since its inception, the MR&T system is credited with preventing **\$612 billion**, or in excess of half a trillion dollars, in cumulative flood damages. At an investment level of \$14 billion, those savings result in a \$44 return on every \$1 invested.

# Operation Watershed-Recovery

## MR&T Post-Flood Evaluation

### Key Conclusions

- We owe a **debt of gratitude** for the wisdom, tenacity and efforts of our forbearers who devised, funded, constructed and maintained this innovative system that has proven so beneficial to so many for so long.
- We extend our **sincere appreciation** to the thousands of local land owners, levee boards, cities, states and other partners who desperately fought the flood fight alongside us and who continue to stand with us during the path to recovery.
- After more than a year of evaluation and documentation, these documents will serve as **educational tools and reference points** for our citizens, decision makers and future flood fighters.
- Facts, figures and lessons learned from the 2011 flood serve to hasten and **guide our endeavors** to rebuild and improve the MR&T project, ensuring continued safety and security of our citizen's lives and livelihoods.

# *Operation Watershed-Recovery*

## **MR&T Post-Flood Evaluation**

### **Overarching Recommendations**

- Inform repair of the MR&T System
- Inform completion of the MR&T System
- Update Operation Plans/Manuals, Communications Plans, and SOPs
- Standardize communication approaches and products
- Updated flow line study for the MR&T System
- Regional “triage” effort to prioritize, refine and implement the recommendations

# (1) “CRITICAL LESSONS LEARNED AND APPLIED” Room for the River Concept

- 1927 Flood
  - Flooded 26,000 square miles = 16,800,000 acres
  - Levees only policy – No floodways or backwater areas
- 2011 Flood
  - Flooded 9,900 square miles = 6,350,000 acres
  - Flooded 38% of area flooded by 1927 Flood
  - MR&T project includes levees and floodways and backwater areas to **Make Room for the River**
- Floodways and Backwater Areas
  - Total acreage of floodways = 366,000 acres
    - Total used during 2011 Flood = 212,000 acres
  - Total acreage of backwater areas = 1,652,000 acres
    - Total used during 2011 Flood = 335,000 acres (interior flooding)
  - Over 1.5 million acres of floodways and backwater areas were not inundated during the 2011 Flood
  - While the 2011 Flood is not as large as the Project Design Flood, there is still **Room for Larger Floods**

# (2) INTERAGENCY RECOVERY TASK FORCE



US Army Corps of Engineers®

# (3) DATA MANAGEMENT

**Inventory** – Identify data/documents to preserve

• Completed Jul-Sept 2011

**Secure** – Capture both printed and digital data

• Completed May-Dec 2011

**Identify** – Catalog and inventory individual data sources

• Completed Jan-Feb 2012

**Store** – Develop retrieval system for accessing data

• Awaiting Funding

**Access** – Create open platform for retrieval system to share data with agencies

• Awaiting Funding

**Archive** – Develop and implement migration plan to ensure long-term survival

• Awaiting Funding

**Training** – train end users on preservation methods to be used on their data

• Completed Sept 2012

**Report** – Complete Post Flood Report components and recommendations

• Completed Nov 2012

# (4) SOCIAL MEDIA

- ✓ Links, Contacts and Resources
- ✓ Real time information
- ✓ Public documents & presentations
- ✓ Key Messages
- ✓ Operation Watershed Recovery Components
- ✓ Public, Partner and Stakeholder Accessibility

MISSISSIPPI VALLEY DIVISION

US Army Corps of Engineers

HOME > MISSIONS > FLOOD RISK MANAGEMENT > REGIONAL FLOOD RISK MANAGEMENT PROGRAM

**HOT INFO** Video Library | 2012 Fall Our Mississippi

### Regional Flood Risk Management Programs

- Flood Season Preparedness
- Silver Jackets
- National Flood Risk Management Programs

### Operation Watershed Recovery

- Interagency Recovery Task Force
- MR&T Post Flood Report

### Information Resources

- St. Paul District
- Rock Island District
- St. Louis District
- Memphis District
- Vicksburg District
- New Orleans District

### Resource Library

Contact

### Regional Flood Risk Management Program

The U.S. Army Corps of Engineers (USACE) established the National Flood Risk Management Program in May 2006 for the purpose of integrating and synchronizing USACE flood risk management programs and activities, both internally and with counterpart activities of the Department of Homeland Security, Federal Emergency Management Agency (FEMA), other Federal agencies, state organizations, and regional and local agencies.

Some of the specific goals of the National Flood Risk Management Program include:

- Providing current and accurate floodplain information to the public and decision makers.
- Identifying and assessing flood hazards posed by aging flood damage reduction infrastructure.
- Improving public awareness and comprehension of flood hazards and risk.
- Integrating flood damage and flood hazard reduction programs across local, state and federal agencies.
- Improving capabilities to collaboratively deliver and sustain flood damage reduction and flood hazard mitigation.

As part of our ongoing efforts, we have created a new set of Corps papers.

facebook

Search

## Floodfight 2011- Operation Watershed

Government Organization

Wall

**Floodfight 2011- Operation Watershed**  
NOLA.com: Mississippi, Atchafalaya rivers drop, flood worries ease  
<http://jow.ly/8qQ1n>

**Mississippi, Atchafalaya rivers drop, flood worries ease**  
ow.ly  
Corps of Engineers says it is ending flood inspections that began last month

Like • Comment • Share • January 13 at 2:29pm via HootSuite

**Floodfight 2011- Operation Watershed**  
News Release - Mississippi Valley Division prepares for 2012 flood season, conti...  
on.fb.me  
News Release - Mississippi Valley Division prepares for 2012 flood season, continues Operation Watershed recovery work: <http://bit.ly/yxjwkw> (<http://bit.ly/yxjwkw>, <http://www.mv.usace.army.mil>)

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Candy Johnson Robertson likes this

Write a comment...

8,783 like this

10 talking about this

<http://www.mvd.usace.army.mil>

YouTube

us army corps of engineers

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## Army Corps Of Engineers Opts To Blow Up Levee

4,255 videos

1:16 / 1:22

343 views

5 files, 0 disks

May 02, 2011 - The U.S. Army Corps of Engineers will blow up the Birds Point Levee

to kill many crops, to raise food prices

Millions 5 months ago

# (5) UNITED STATES IS AT RISK!



- ✓ Flooding is the costliest natural hazard in the nation
- ✓ **Inform & Educate Public and Elected Officials**
- ✓ **Consequences of Flooding:**
  - Loss of Life
  - Loss of business revenue
  - Property damage
  - Infrastructure damage
  - Environmental damage
  - \$\$\$ Recovery

- ✓ Flood events are getting more extreme and frequent
- ✓ Need to break cycle of damage-repair-damage-repair
- ✓ Flood Risk Management is a **SHARED RESPONSIBILITY!**

**A NATION AT RISK:** Throughout the Nation, both existing and new development are locating in flood prone areas, often behind aging and poorly maintained flood risk management infrastructure. There is limited information available on the extent of current-day and potential future flood risks and a widespread lack of understanding of flood risks by the public and decision makers.

# Operation Watershed – Recovery

## POST FLOOD EVALUATION

*Responding to the Historic Mississippi River Flood of 2011*

# QUESTIONS?



# CORPSMAP – Knowing your Risk

- ✓ Risk based and prioritized recovery
- ✓ Web based site locator
- ✓ Overview of site specific flood damages.
- ✓ Information papers, Risk management and Construction fact sheets
- ✓ Interim risk management measures

### Information Paper

#### Buck Chute

**OPERATION WATERSHED RECOVERY – CRITICAL REPAIR SITES**

**Contacts**  
**Scott Parikh**, MVD Regional MRL Team Leader  
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[Scott.Parikh@usace.army.mil](mailto:Scott.Parikh@usace.army.mil)  
**Scott D. Whitney**, MVD Regional Flood Risk Manager  
 Ph. 609-784-5356 fax 609-784-5710  
[scott.d.whitney@usace.army.mil](mailto:scott.d.whitney@usace.army.mil)

**OVERVIEW**  
**STRICT**: Vicksburg District  
**TYPE**: Banks and Seepage  
**ML**: RM 575-110-00 BSEA  
**RAGO CLASS**: 1 – High Potential for Loss of Life  
**FIN**: 3,996 residents, \$188.5M infrastructure  
**EP&R**: Boms, 30 Relief Wells, and 12 Bore drains  
**ST REPAIR COST**: \$2,600,000

**Damage Assessment**  
 In early 2010, MXX was notified of multiple boils in the riparian area. In early summer of 2010, the boils were mitigated in River Levels reached flood stage and below of the boils increased. In February 2011, when additional to the project area very dry, one of the largest boils were pumped, revealing voids at soil sources as wide as 20 ft and as deep as 10 ft. The voids revealed an obvious "bat" that continued downward or away from the void spots. As River levels continued to rise and approach soil stages in March 2011, the boil area voids were backfilled with sand material, covered with a geotextile for fabric, and other sandbags or curtain dams were constructed around them. In May 2011, an emergency berm was constructed over the area which encompassed the worst void areas. The top of the berm was constructed to approximate elevation 80 ft. Because of the high water indicators to the predicted flood stages for the known boil void, and the consequences of failure at this site, it was decided to flood the entire project site by raising water rock in English Lake to approximate elevation 90 ft to avoid the use of Muddy Bayou Control Structure. In order to reduce the risk of failure without raising boils with in English Lake, remediation is recommended prior to next high water season.

**Special Considerations**  
 The site is covered under the 1998 MRL SEIS, as item 456-1, and covers multiple work items. The SEIS does not cover planned relief wells for this site; however, an EA was prepared to cover these wells with a FONSI Agency construction under Section 9 of the Endangered Species Act has been completed. The dilt water quality permit for the project has been obtained, and all project responses have been mitigated for, as this site is part of the existing MRL mitigation program. This response of EBML is not currently certified, but this file, along with other work MXX currently has planned in the area, will allow certification of the levee system. The Board of Mississippi Levee Commissioners has approved the necessary BOPM for the project.

**Schedule**  
 Bids solicited - 10 Aug 2011  
 Contract Awarded - 30 Aug 2011  
 Anticipated contract duration 120 days. Scheduled completion in January 2012.

**Risk and Consequence**  
 The East Bank Mississippi River Levee System were to at the Buck Chute site, the population at risk would be 996. The value of the non-residential structures is \$1,141,000, and the value of the 1,436 residential residences is \$171,796,000.

**Acquisition Strategy**  
 Unencumbered competitive bid awarded 30 Aug 2011 to Playbay Construction, LLC for \$3,000,250.00. This site was contacted with No. 8 site, Albernath.

### MISSISSIPPI-OHIO RIVER CONFLUENCE UPDATE

Illinois, Kentucky, Missouri, Tennessee

Memphis District  
January 18, 2013

Work continues at the Above Cairo, Illinois, Shury Trench project with the placement of the semi-compacted fill on the riverside slope as weather permits.

The Contractor has drilled and installed all 30 relief wells for the City of Cairo, Illinois, Relief Wells project. Contractor continues with the drainage work and the development and testing of the relief wells.

The Cairo-Mound City Shury Trench contract has been awarded and is in the non-work period. And at Island 5, Kentucky, the contractor has drilled all of the 112 pilot holes.

Work continues to progress on the Birds Point-New Madrid Floodway Project with reconstruction of the levee system. For the Upper and Center Crossways, the levee is constructed to its authorized height with the operating mechanisms installed and construction continues at the Lower Crossway.

Ragna Kuykendall Cash  
Project Manager

**Above Cairo (Shury Trench)**

**Awarded:** September 2011  
**Forecasted completion:** January 2013

7,200 linear feet of soil-bentonite will create an impervious barrier, reducing the risk of seepage underneath the Mississippi River levee. The contractor has completed excavating and backfilling the shury trench and is backfilling work platforms. Contractor is approximately 94% complete with the construction contract.

**In construction**

**Above Cairo (Relief wells)**

**Awarded:** September 2011  
**Completion Date:** August 2012

Contractors completed 28 relief wells which will reduce uncontrolled seepage under the Mississippi River levee north of Cairo. Existing ditches and culverts were improved along roadways to ensure adequate drainage. The final inspection took place on Aug. 15, 2012. Photo shows stone in most along Rise. Above Cairo relief wells.

**COMPLETED**

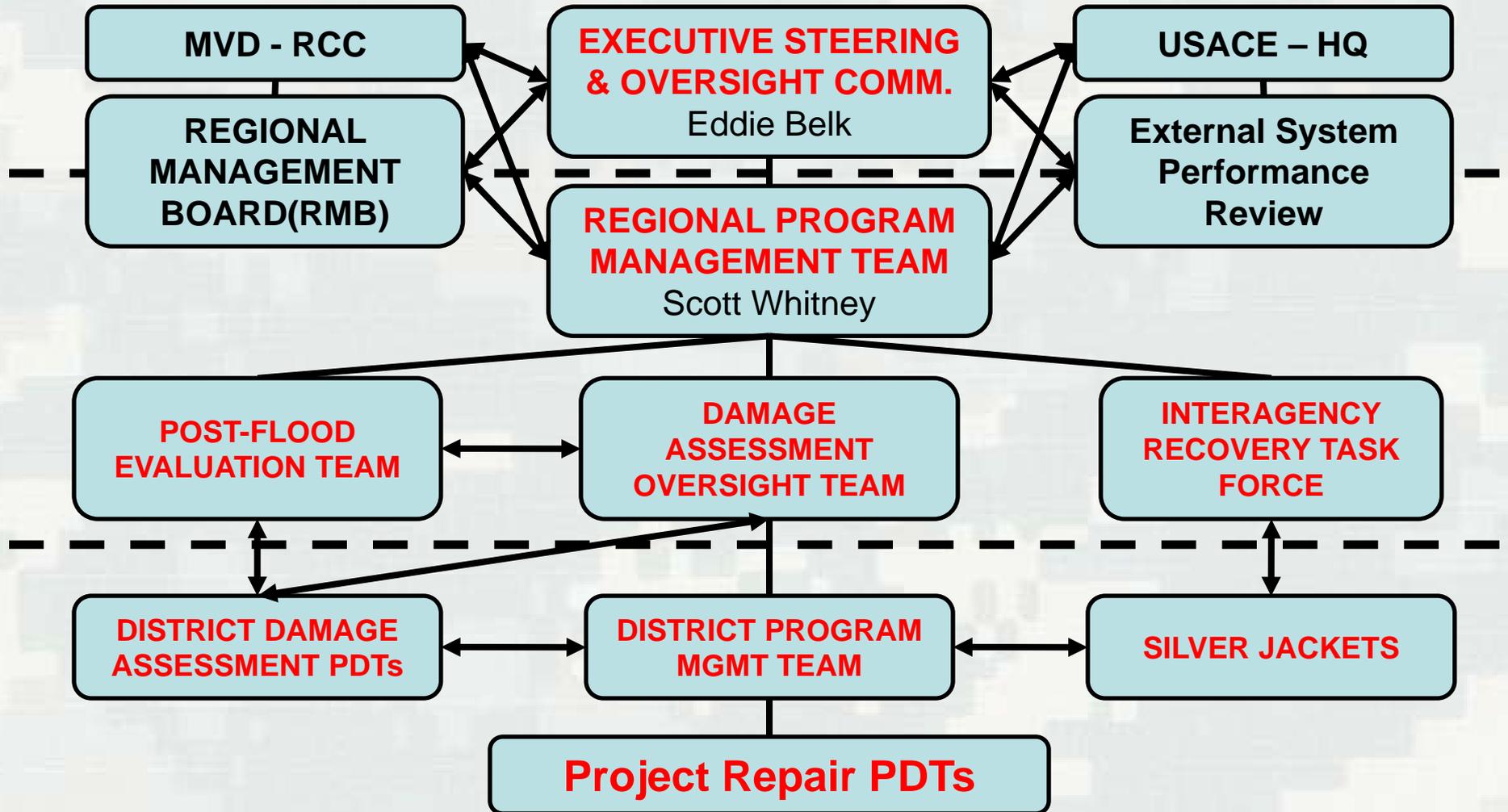
<http://www.mvd.usace.army.mil/>

District Commander: Col. Warren Riedinger - Acting Area Engineer: James Ruffell - Secretary for Project Management: James A. Bodden, P.E.  
 Editor of the Floodplain Information System: Christopher G. Galt - Editor of the Floodplain Information System: Christopher G. Galt  
 U.S. Army Corps of Engineers - Memphis District, 857 N Main St, 38202, Memphis, TN 38103

# Operation Watershed - Recovery

*Responding to the Historic Mississippi River Flood of 2011*

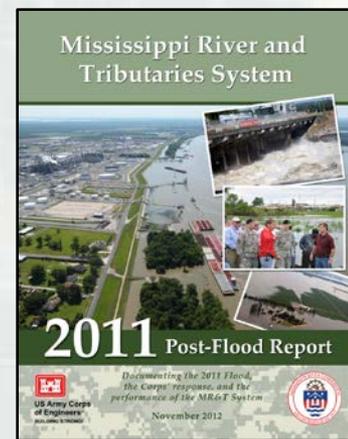
## MANAGEMENT STRUCTURE



# Operation Watershed-Recovery

## MR&T Post-Flood Evaluation

### MAIN REPORT

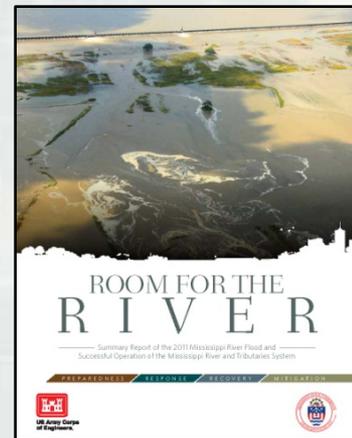


**DECEMBER 2012:** 350 page technical document entitled “***MR&T 2011 Post Flood Report: Documenting the 2011 Flood, the Corps’ Response, and the performance of the MR&T System***”. A series of ten Appendices provided several thousand pages of supporting data and documentation are provided on accompanying CD. This comprehensive internal technical assessment evaluates the performance of individual MR&T System components and how well the individual components were utilized and operated as a system to manage the complex set of risks presented by the 2011 Flood. The report concludes with recommendations for improvements and future studies to aid MR&T recovery efforts and future system operation, management, and flood fight activities.

**Intended Audience:** Flood Risk Management Professionals, Decision Makers and Flood Fighters.

# Operation Watershed-Recovery

## MR&T Post-Flood Evaluation



## SUMMARY REPORT

**DECEMBER 2012:** a 32 page summary document entitled “*Room for the River*” provides a colorful series of images and condensed narratives on intriguing facts, figures and lessons learned from the 2011 flood experience and evaluation. The document focuses in on key themes and hot topics surrounding the 2011 Flood and Recovery.

**Intended Audience:** Community/State/Federal Leaders, Media and General Public

# (4) DATA MANAGEMENT

2011 Spring Flood Data Catalog

Data Type	Location	Data Format	Storage	Associated System	Availability	District (Present)	POC Organization
After Action Report	Unspecified	Word	District Server	Projec/W/lan	Division Wide	MF/N	CDM/N ED E
Android Phone Data	Unspecified	XML	ERDC Server	MICA	Division Wide	ERDC	CDM/N ED E
Archaeological Mapping Data	Birds Point	TIF/ZIP/Shape	District Server	Unspecified	Local	MF/N	CDM/N ED E
Bathymetric Data	Wichburg	Not Available	Not Available	Unspecified	ERDC	CEED/DF-EM	
Correspondence, Damage to System	Unspecified	Email with JPG & PDF Attachments	District Server	Projec/W/lan/Outlook	Division Wide	MF/N	CDM/N ED E
Damage Assessment Photographs	MVR	JPG	District Server				
Elevations, Water Surface	Fazio Backwater Level	ASCII	ERDC Server				
Facebook Updates	Birds Point	Facebook	Internet				
Gate Change Letters	Burnett Canal	Word	District Server				
Hot Spot Tracker	MVR	PDF	District Server				

## Digital Preservation

Brendan M. Daniels  
Knowledge Manager

## Digital Preservation Handbook An At-Your-Desk Guide



Brendan Daniels  
Certified Knowledge Manager  
(214) 333-9855

Amy McPherson  
Archivist  
(214) 333-8856

Dr. Michael "Sorey" Trimble  
Director, CX-GMAC  
(214) 333-9856

- Made extensive contacts throughout MVD with managers and SMEs.
- Produced a catalog of metadata that describes flood data from the Spring 2011 flood. Includes POC information.
- Produced a Digital Preservation Handbook and accompanying training module which was used to inform key employees of digital data best practices.

- Delivered first-of-its-kind data assessment and review data for the MR&T Post Flood Report.
- Delivered recommendations to improve data storage and sharing in MR&T Post Flood Report.