



**Maj. Gen. Michael J. Walsh**  
*President*



**Hon. Sam E. Angel**  
*Member*



**Hon. R. D. James**  
*Member*



**Hon. Wm. Clifford Smith**  
*Member-Designee*



**Rear Adm. Jonathan W. Bailey**  
*Member*



**Maj. Gen. John W. Peabody**  
*Member-Designee*



**Brig. Gen. John R. McMahon**  
*Member-Designee*

# Mississippi River Commission

## 2011 MR&T Flood Report

Revised January 2012



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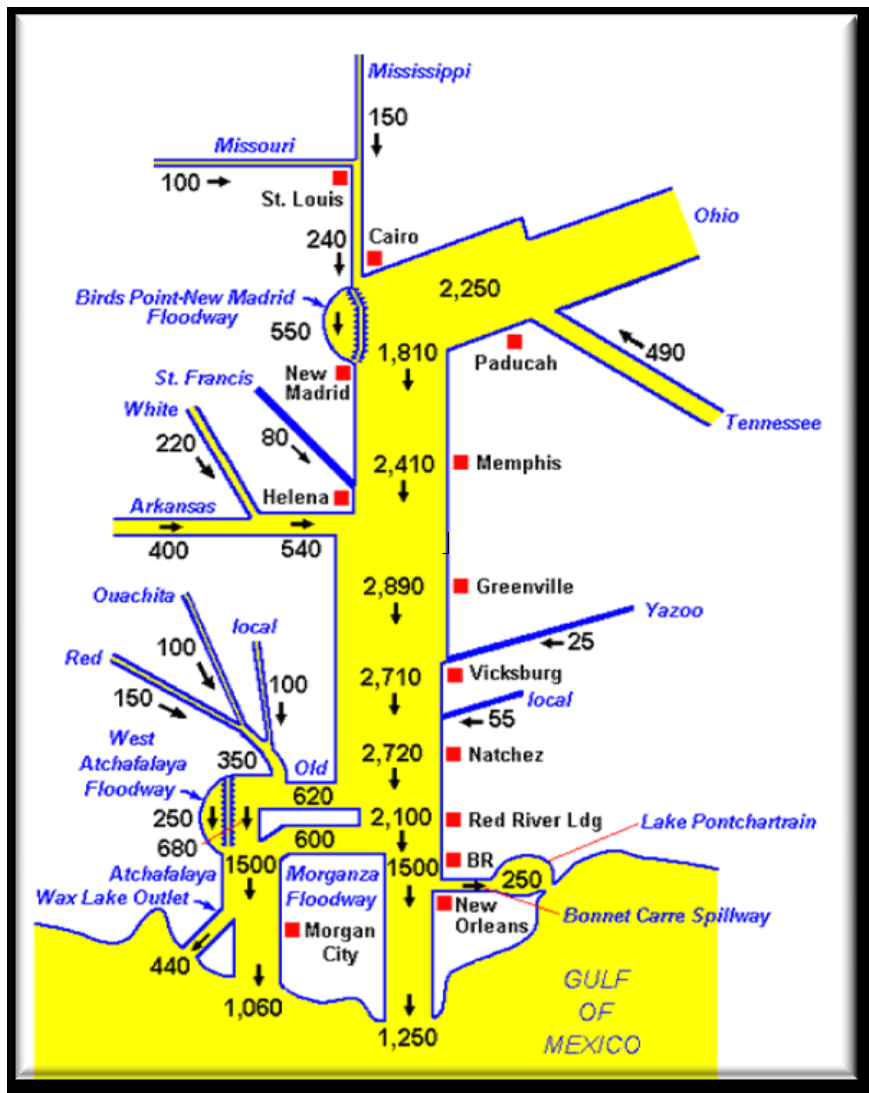
# Mississippi River Commission 2011 MR&T Flood Report

Following the Great Mississippi River Flood of 1927, the nation galvanized its support for a comprehensive and unified system of public works. In the lower Mississippi Valley it would provide enhanced protection from floods while maintaining a mutually compatible and efficient Mississippi River channel for navigation.

Administered by the Mississippi River Commission under the supervision of the Office of the Chief of Engineers, the resultant Mississippi River and Tributaries (MR&T) project employs a variety of intensely managed engineering techniques, including an extensive levee system to prevent disastrous overflows on developed alluvial lands; floodways to safely divert excess flows past critical reaches so that the levee system will not be unduly stressed; channel improvements and stabilization features to protect the integrity of flood control measures and to ensure proper alignment and depth of the navigation channel; and tributary basin improvements, to include levees, reservoirs and pumping stations, that maximize the benefits realized on the main stem by expanding flood protection coverage and improving drainage into adjacent areas within the alluvial valley.

Since its initiation, the MR&T project has brought an

unprecedented degree of flood protection to over 4.5 million people living in the 35,000 square-mile project area within the lower Mississippi Valley. The nation has contributed \$13.9 billion toward the planning, construction, operation and maintenance of the project and, to date, the nation has received a 34 to 1 return on that investment, including \$350 billion in flood damages prevented. Such astounding figures place the MR&T project among the most successful and cost-effective public works projects in the history of the United States.





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The success of the MR&T flood control program is rooted in a profound change in engineering policy that evolved after the 1927 flood. Prior to that tragic flood event, the control of floods on the lower Mississippi was attempted by building levees high enough to withstand the last great flood of record.

Since the inception of the MR&T project in 1928, however, the comprehensive flood control program is designed to control the “project design flood” through the combined use of levees, floodways, channel improvements, backwater areas and reservoirs.

The performance of the comprehensive Mississippi River and Tributaries system and the Ohio Valley reservoir system during the 2011 flood on the lower Mississippi River validates the wise investment the nation made to prevent another calamitous natural disaster like the 1927 flood—the devastating event that changed America and forcibly unified its people to support protection of lives and property from the fury of the river. The MR&T system performed as designed, despite rainfall exceeding 600 to 1,000 percent of the



Mainline levee north of Vicksburg, Miss.

normal average rainfall in a two-week period from April 21-May 3 over a significant portion of six states that coincided with the arrival of the upper Mississippi spring snowmelt crest. The

significant flood event established many new record discharges and stages along the lower Ohio and Mississippi rivers.

Unlike the 2011 flood, the Mississippi River during the benchmark and calamitous Great Flood of 1927 inundated most of the alluvial valley. Like the toppling of a series of dominoes, one over-matched levee after another burst under the unprecedented pressure exerted by the swollen river.



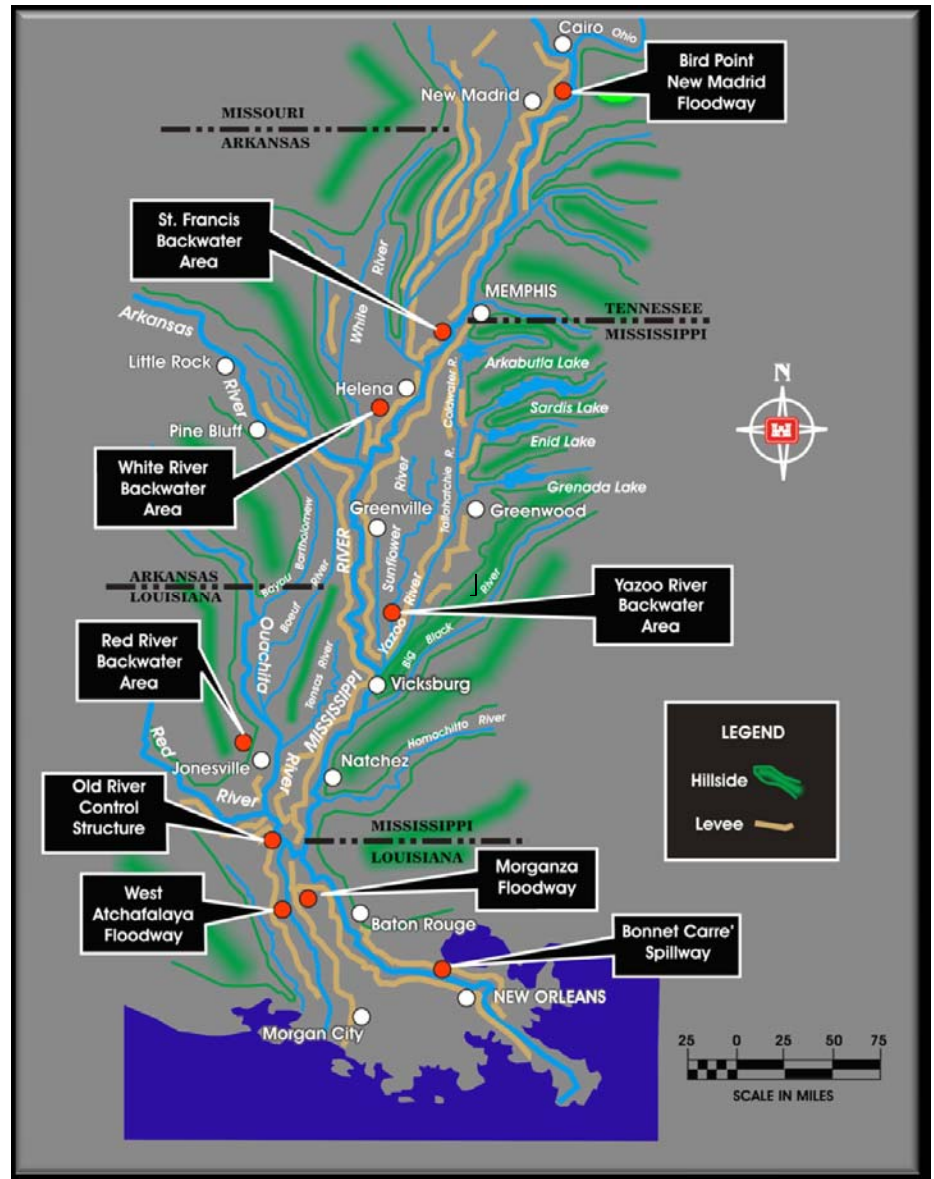


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The resultant chocolate tide swept over and inundated more than 16 million acres in the valley, causing up to 500 people to lose their lives, with another 600,000 seeking shelter in Red Cross refugee camps. More than 41,000 buildings were obliterated. Rail lines were severed; east-west communications, the postal service and commerce were left in shambles. This was not the case in 2011 as the MR&T project confined the river to natural and designated overflow areas, while protecting more than 10 million acres of land and nearly one million structures while preventing more than \$110 billion in damages.

The success of the comprehensive MR&T system during the 2011 flood is rooted in the lessons learned during the 1927 tragedy. Perhaps the most important lesson was the necessity to accommodate room for the Mississippi River by not attempting to exclude it entirely from its natural floodplain.

The nation implemented the floodway and backwater features of the MR&T system for this very purpose—to accommodate the natural tendency of the river during periods of extraordinary floods. At no time in the MR&T project's history has this been more evident than this recent mammoth flood.



For the first time, the Mississippi River Commission placed three floodways in simultaneous operation to help relieve the enormous stress on the much-improved levee system and to reduce the danger to people, their homes and the businesses that bolster our economy. Channel improvements carried out since the 1930s also served as a critical component of the comprehensive flood



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control system during the 2011 flood event. From Memphis to Vicksburg, the continued flood control benefit of the channel improvement program allowed flood crests to stay well below prior record levels despite flows near or above those experienced during the 1927 and 1937 floods.



Likewise, the extensive system of 78 Corps reservoirs and 40 Tennessee Valley Authority reservoirs in the Ohio basin provide additional flood protection. During floods on the lower Ohio and Mississippi rivers, the member of the commission who serves as Commander of the Great Lakes and Ohio River Division (LRD) directs the operation of reservoirs, particularly at Kentucky and Barkley lakes, with the primary objective of preserving and protecting the MR&T levee system.

The Mississippi River Commission convened to monitor the flood conditions

and oversee the management of the MR&T system from April 27 through May 25.

The members of the commission during the historic flood event were:

- Maj. Gen. Michael J. Walsh, President of the Mississippi River Commission
- Hon. Sam E. Angel
- Hon. R. D. James, civil engineer
- Hon. William Clifford Smith, civil engineer
- Rear Adm. Jonathan Bailey, National Oceanic and Atmospheric Administration
- Maj. Gen. John W. Peabody, Commander, Great Lakes and Ohio River Division
- Brig. Gen. John McMahon, Commander, Northwestern Division

Col. George T. Shepard served as Secretary of the Commission, which is a non-voting position.





# Mississippi River Commission 2011 MR&T Flood Report



Overflight of impacted areas

On April 21, the Cairo gage reached the moderate flood stage of 50 feet. Bill Frederick, the MRC meteorologist, informed the commission staff that the National Weather Service expected a frontal system to become stationary over the Ohio, middle Mississippi and Arkansas valleys through April 27, with daily rounds of moderate to heavy rains anticipated. Based on the current stages and expected precipitation, NWS models suggested more than a 10-foot rise in the river on the Cairo gage, with a crest exceeding 61 feet on May 4. The commission engineers recognized that if this forecast materialized, the river stages would be in the range that might require the activation of the Birds Point-New Madrid floodway. The Mississippi Valley Division activated its Emergency Operations Center while the commission staff disseminated pre-prepared technical information papers to the commission members, Corps of Engineers leaders, elected officials and key stakeholders that provided the historical context of the Birds Point-New Madrid

floodway and how the MR&T project conveys the project design flood. (For copies of the papers, please see <http://www.mvd.usace.army.mil/mrc/index.php>.)

By April 25, the river rapidly climbed past 55 feet on the Cairo gage and continued to rise. Col. Vernie Reichling, the Memphis District Commander, ordered his crews to load the pump barges with the necessary explosives to activate the floodway. The commission began making arrangements to mobilize for a flyover of southeast Missouri, southern Illinois and western Kentucky and Tennessee and setting up meetings with key stakeholders in the multi-state region. The



Birds Point-New Madrid frontline levee

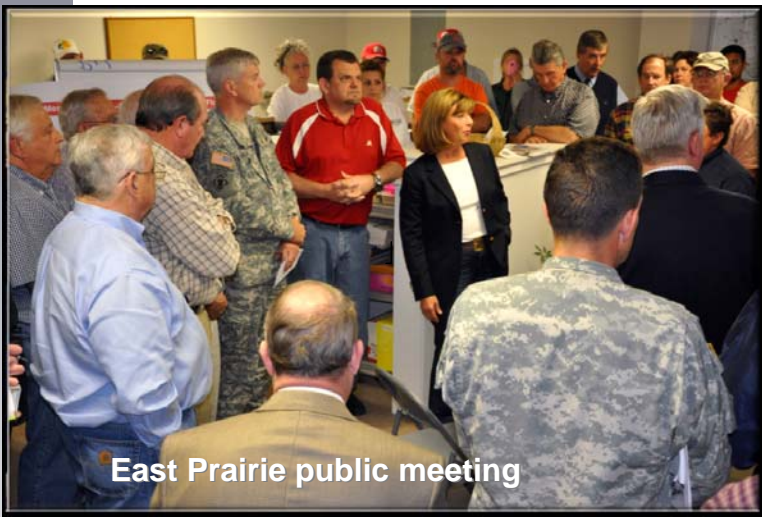
following day, Maj. Gen. Walsh ordered the movement of the barges to Hickman Harbor and movement of the land-based crews to the floodway.

On April 26, Maj. Gen. Peabody directed that the Cumberland and Tennessee river reservoirs reduce outflows to nearly zero to hold water back from Kentucky and Barkley lakes.



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On April 27, the river surpassed 58 feet on the Cairo gage. The MRC meteorologist notified the commission that he expected the torrential rains of the past week to end for a period of two to three days. The storms during that period dropped in excess of eight inches of precipitation at Tiptonville, Tenn., nine inches at Cairo, 10



**East Prairie public meeting**

inches at New Madrid, 11 at Poplar Bluff, Mo. and Paducah, Ky., and 13 at Greenville, Mo. Taking advantage of the break in the weather, the commission conducted an over flight of the impacted areas. The commission witnessed widespread rainwater and backwater flooding over the Little River drainage area and St. John's Bayou in Missouri and proceeded to the Birds Point-New Madrid floodway. The commission observed high water against the riverside of the frontline levee for its entire length and obtained a clear aerial view of the fuse plug levee section.

Severe backwater flooding was evident at the lower end of the floodway, as was rainwater flooding in the upper end. The flight proceeded to Kentucky and Barkley lakes. From the air, the commission noted that lake levels were extremely high and that LRD water managers were doing all that they could do to hold back water to keep stages on the Cairo gage from rising even more rapidly than they actually were.

On the return trip, the commission flew over Cairo. Floodwaters had turned the city into a virtual island with only a narrow neck of land along Illinois Route 3 remaining as an evacuation route. The commission ended the trip by flying the length of the Commerce to Birds Point levee to view the extent of flooding on the Mississippi River above Cairo. That same day, the commission and Col. Reichling attended an intense public meeting at East Prairie, Mo., located just west of the floodway on the landside of the setback levee. U.S. Congresswoman Jo Ann Emerson (MO-8) hosted the meeting. Missouri Lt. Governor Peter Kinder and Thomas Shulte, U.S. Senator Roy Blunt's Chief of Staff attended the meeting, as did more than 50 members of the public.



**Cairo mega boil**



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Most in attendance opposed the activation of the floodway, with the integrity of the setback levee being the overriding concern.



Following the public meeting, the commission traveled to the frontline levee and received an on-the-levee briefing from Memphis District and ERDC personnel preparing the site for potential activation.

Dry conditions over the afflicted area on April 28-29 allowed for a brief period of guarded optimism that the water management practices might preclude activation of the floodway. LRD water managers began storing water in Kentucky and Barkley lakes and the rate of rise in the river at the Cairo gage slowed considerably and hovered around 59 feet, just shy of the record stage of 59.51 reached in 1937. Despite this, the commission and Memphis District continued preparations.

On April 28, the survey and hired labor crews located, uncovered and prepared all access wells on the frontline levee in the

event activation of the floodway became necessary. Commission and district personnel also reported to the U.S. Courthouse in Cape Girardeau, Mo., after a federal judge indicated he would hear testimony on a temporary restraining order filed by the State of Missouri to prevent use of the floodway. The court denied the order on April 29, as did the 8<sup>th</sup> Circuit appellate court on April 30 and the U.S. Supreme Court on May 1.

On April 30, Maj. Gen. Walsh established OPERATION WATERSHED as the river continued its slow rise on the Cairo gage, reaching 59.1 at 6:00 a.m. with a forecasted crest of 60.5 on May 3. Even though

the rate of ascent has slowed, the tremendous pressure from the swollen river continued its assault on the levee system in the vicinity.

Three “mega boils” discovered near the floodwall in Cairo—the largest boils ever witnessed by experienced geotechnical engineers—caused great concern for the integrity of the Cairo floodwall and led the Corps to advise the city to consider issuing an evacuation order.

Memphis District personnel also provided a dire engineering assessment of conditions at the mainline levee along the Kentucky and Tennessee borders with the Mississippi, particularly the Hickman and Reelfoot-Obion sectors, as numerous boils that were piping material continued to develop despite intense flood fighting





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efforts. The grave assessment of stress on the system was compounded by the latest weather reports that called for a frontal



system to become stationary along the Ohio River valley through May 2 that would produce up to 7.5 inches of rain. The commission and its engineers, along with personnel from LRD, conducted another aerial assessment of the afflicted areas along southeast Missouri, southern Illinois and western Kentucky and Tennessee.

Maj. Gen. Peabody initiated stabilization of the pools at Kentucky and Barkley lakes to conserve storage for this final rain event. Pool levels approached 370 feet — close to the all-time record.

The additional localized rainfall on April 30 caused a spike in flood levels, pushing the river past the previous 1937 record on the Cairo gage in the early hours of May 1. Later that morning Col. Reichling briefed the commission at the Cape Girardeau Airport regarding floodway activation. After explaining the conditions on the river and

the levee system flanking it were deteriorating rapidly,

Col. Reichling expressed his view that floodway activation was no longer a matter of “if” but “when” and recommended the commission allow him to move to hour minus 3 in the Birds Point-New Madrid operating plan, which equated to moving the barges into place, pumping explosives into the pipes and holding. Maj. Gen. Walsh took the recommendation under advisement and traveled with the commission to Cairo to examine conditions

and flood fight efforts at the beleaguered city.

By the early afternoon, additional heavy rains continued to push river stages higher. The NWS predicted another three to five inches of rain over the following 24 hours. The Memphis District water control office



Birds Point-New Madrid levee pipe



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indicated that the river would surpass 60 feet on the Cairo gage within hours and that the storage capacities at Kentucky and Barkley lakes were predicted to reach their limits. Systems analyses provided by the district also showed rapid deterioration at the Cairo, Hickman, Reelfoot-Obion and



**Birds Point-New Madrid  
floodway activation. 1st blast**

Caruthersville sectors. All ten sectors in the Memphis District had reached, or were on the cusp of reaching, phase II flood fight activities. Armed with this knowledge, Maj. Gen. Walsh approved Col. Reichling's recommendation to move to hour minus 3, proceeded to notify the governors and congressional delegations from Missouri and Illinois of his decision and, along with the commission, held a joint press conference with Missouri Governor Jay Nixon at 6:00 p.m. at Birds Point to notify the media and public.

The commission established its operations center aboard the Motor Vessel *MISSISSIPPI* on the night of May 1. That evening, the commission learned that intense overnight storms,

accompanied by severe lightning, prevented the task force responsible for preparing the floodway for possible activation from making any headway toward hour minus 3 in the operating plan. The MRC meteorologist informed the commission that more localized rainfall than expected fell overnight and that another one to four inches was expected over the following 24 hours.

At 6:00 a.m. the river reached 60.97 on the Cairo gage with a forecasted crest of 63 feet on May 5. Col. Reichling, however, informed the commission in the morning that the task force remained optimistic that it could still fulfill its objective.

Throughout the day levee/floodwall conditions continued to deteriorate at Cairo, Hickman, Fulton County and Caruthersville as the high water levels exerted unprecedented pressure on the system. Despite continued rains, wind and cold temperatures, the task force continued to race the rapidly rising river and prepared the floodway for activation.

Maj. Gen. Walsh began notifying elected officials from Missouri and Illinois that he

*We remember God's Word...I John 1:9 "If we confess our sins, he is faithful and just to forgive us our sins, and to cleanse us from all unrighteousness." Father, in a time like this when we don't know what to pray we ask for you to intercede for us and for all the people who will be helped and harmed by the results of the actions we take. We acknowledge that You are the only One who can forgive sin, restore hope and truly help. In Jesus strong Name we pray, Amen.*

*— Prayer led by Stephen Gambrell for the Mississippi River Commission on May 2 just prior to operation of the floodway.*



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intended to approve operation of the floodway once the task force completed its mission. Maj. Gen. Peabody did the same with the governors of Kentucky and Indiana, and the Memphis District notified elected officials in Tennessee and all other stakeholders. At 5:00 p.m. the commission held a second joint news conference with Governor Nixon to make public Maj. Gen. Walsh's decision to operate the floodway.

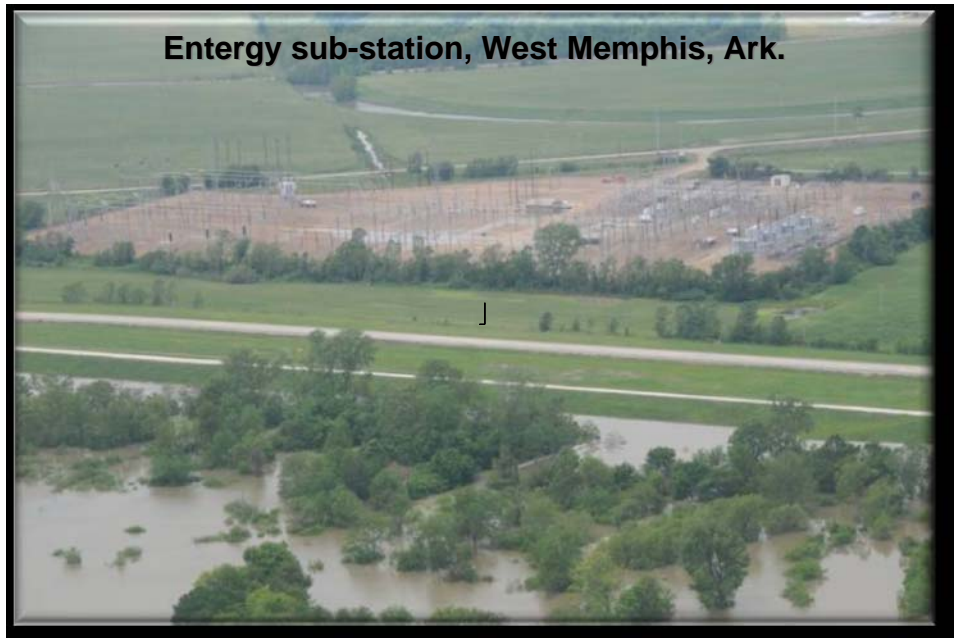
At 10:00 p.m., with the river at the Cairo gage reading 61.72, Walsh and the commission members gave the order to activate the floodway.

Within an hour the river, which had been rising at a rapid clip up to the point of floodway activation, had dropped by one-half a foot on the Cairo gage. By 11:00 a.m. on May 3, the reading was 60.32 feet. The commission remained in New Madrid to observe the opening of Inflow/Outflow Crevasse No. 2 at the lower end of the floodway. Immediately afterwards, the commission conducted an aerial inspection of the floodway and other afflicted sectors aboard a Blackhawk helicopter.

Just hours prior to the operation of the Birds Point-New Madrid floodway on May 2, the MRC meteorologist informed the commission that the NWS had released a preliminary forecast for the lower Mississippi River, which called for record

stages at Vicksburg, Natchez and Red River Landing. Within days, all sectors in both districts were in phase II flood fight operations along the Mississippi River.

On May 3, Col. Jeffrey Eckstein, the Vicksburg District Commander, informed the commission that projected stages would overtop the Yazoo backwater levee and that the district was constructing a water berm at Buck Chute (near Eagle



Lake, Miss.) to combat excessive underseepage and sand boils along the mainline levee. He also passed on the Vidalia, La., mayor's concern that the projected stage might lead to an evacuation of the town.

Col. Edward Fleming, the New Orleans District Commander, notified the commission that based on current forecasts, his water control personnel predicted that the river would reach the 1.25 million cubic feet per second (cfs) trigger for operation of the Bonnet Carré Spillway on May 8 and the 1.5 million cfs

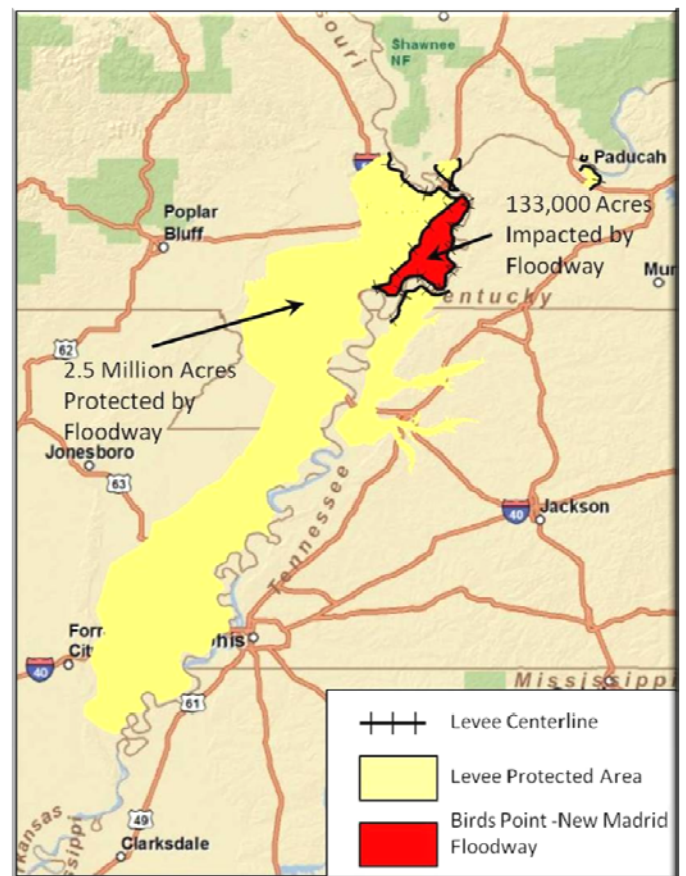


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trigger for operation of the Morganza floodway on May 11.

By May 4, river levels on the Cairo gage dropped below 60 feet and flood fight teams in the Memphis District began reporting that conditions in all sectors, while still grave, had stabilized. The commission conducted another aerial assessment of the floodway, Cairo, Kentucky and Barkley lakes, St. John's Bayou and Fulton County before flying over Wappapello Lake, which had received in excess of 20 inches of rain spanning the previous two weeks, causing lake levels to crest at a record elevation of 400.4 and overtop the emergency spillway on May 2. From there, the commission flew over the St. Francis basin and the White River backwater area before advancing to the W.G. Huxtable Pumping Plant in the St. Francis backwater area, where Steve Higginbotham and Rob Rash of the St. Francis Levee District of Arkansas gave a status report of flood fight operations in their area.

On May 4, Col. Eckstein informed the commission that Mississippi Governor Haley Barbour was putting together a task force with Mississippi National Guard resources to assist the Vicksburg District. He also notified the commission that state and local stakeholders were preparing to ask the district to armor a four-mile stretch of the Yazoo backwater levee and wanted permission to flood fight the area to prevent inundation of the backwater area. Maj. Gen. Walsh indicated that the commission needed to be informed of the impacts of flood fighting at the backwater area on the





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system before it could reach a decision. Later that evening, Col Eckstein briefed the commission on how the backwater area



operates during flood conditions. Eckstein explained that if the levee overtopped at the projected crest, more than 286,000 acres would flood, but if the levee failed, more than 1.2 million acres would flood, thereby impacting 2,000 people who live in the area.

For this reason Eckstein stated that armoring the backwater levee was necessary to prevent levee failure from erosion in the event of overtopping. Maj. Gen. Walsh approved Eckstein's recommendation to flood fight to the authorized elevation of 107 feet and to protect the backside of the levee against erosion.

That same day, the commission gathered on the MV *MISSISSIPPI* to receive a briefing from Col. Fleming on the possible activation of the Morganza floodway. Prior to the briefing, Maj. Gen. Walsh informed

Fleming that the commission had received his formal request to operate the Bonnet Carré Spillway and that the commission had his recommendation under advisement. Fleming proceeded into his discussion of the Morganza floodway, which had only operated once—during the 1973 flood—since its completion in 1953. With a flow of 2.5 million cfs forecasted at the latitude of Old River, Fleming informed the commission that anywhere from 200,000 to 300,000 cfs would need to be diverted through the Morganza floodway (600,000 cfs capacity) to ensure the

integrity of the levee system throughout the lower reaches of the Mississippi River at and below Old River.

Fleming provided the commission with an inundation map and indicated his plans to meet with the Louisiana governor, parish presidents, levee boards and stakeholders





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on May 5 to discuss trigger points and the possibility of floodway activation.

On May 5—the date the river was forecasted to crest above 63 feet on the Cairo gage with activation of the Birds Point-New Madrid floodway—the river had dropped to 59.5 feet.

The MRC meteorologist notified the commission that floodway operation had knocked the crest at Cairo down by 3.55 feet, at Paducah by 3.52 feet and at Cape Girardeau by 2.5 feet.

Later reports from LRD showed that the Cairo gage would have hit 66.73 feet without floodway activation and water management operations at Kentucky and Barkley lakes. Such stages would have led to the overtopping of the levee systems at Commerce, Cairo, Hickman and Fulton County.

Col. Eckstein informed the commission that he had notified the Mississippi governor of the decision not to flood fight at the Yazoo backwater levee (which is outside the MR&T project footprint) above the authorized elevation of 107 feet in order to protect the levees downstream at Vidalia. Maj. Gen. Walsh advised the New Orleans District that the commission voted

unanimously in favor of operating the Bonnet Carré Spillway as needed. He then proceeded to make the necessary contacts in Louisiana and Mississippi to apprise them of the decision to operate the spillway when conditions dictated. Following the morning briefing, the commission observed the execution of the final component of the Birds Point-New Madrid floodway—the opening of Inflow/Outflow Crevasse No. 1.



MRC with Missouri Governor Jay Nixon

After a brief site visit to observe flood fight activities at Caruthersville, the commission departed the Memphis District area of operations and traveled to the Mississippi River

Commission headquarters in Vicksburg.

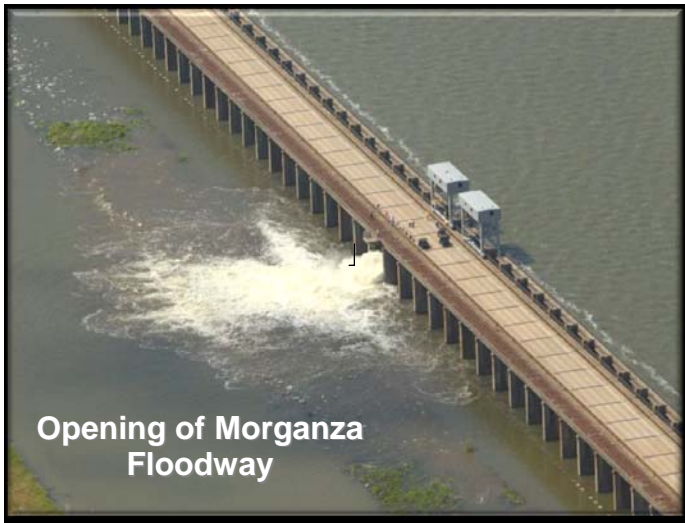
On May 8, the commission traveled to New Orleans in anticipation of the opening of the Bonnet Carré Spillway. On the morning of May 9, the members oversaw the opening of 10 bays at the structure and then inspected river conditions at Baton Rouge, Morganza and Old River before driving the west mainline levee back to Vidalia and returning to Vicksburg.

Col. Reichling reported to the commission during the May 10 morning briefing that levee overtopping was no longer a concern anywhere in the Memphis District, while Col. Fleming reported that the river was less than four feet from the top of the gates



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at the Morganza Floodway. Dennis Norris, the MRC operations chief, also reported that the flood stages at the Old River Lock—the only viable route from the Red and Ouachita rivers to the Mississippi



Opening of Morganza Floodway

River—would force closure of the structure on May 12 through approximately June 1. Later that morning the commission and Col. Eckstein boarded a Blackhawk helicopter to conduct an aerial assessment of the mainline levees in the vicinity of Vicksburg, the Buck Chute water berm and the Yazoo backwater area, and landed on the Yazoo backwater levee to inspect the ongoing effort to armor the levee. While on the over flight, the commission members observed the MR&T project working as designed as water reached high on the mainline levees in Louisiana and Mississippi, but the surrounding towns, planted agricultural fields and Interstate 20 remained protected on the landside of the levee system in drought-like conditions.

On May 12, the commission traveled to Cape Girardeau where Maj. Gen. Walsh

provided a total MR&T systems brief to the Honorable Jo-Ellen Darcy, the Assistant Secretary of the Army for Civil Works, and Maj. Gen. William Grisoli, the Deputy Commanding General for Civil and Emergency Operations. During the briefing, Walsh explained how the MR&T project conveys the project design flood and described the various elements of OPERATION WATERSHED—current operations, future operations and recovery. Following the briefing, the entire contingent conducted an aerial and ground tour of Cairo, the Birds Point-New Madrid floodway and the Fulton County sector.

During the morning briefing on May 13, the MRC staff reported that the flood crest had passed through the entire Memphis District, but was approaching the Vicksburg District area of operations. Forecasts indicated that the Mississippi River would set a record high water mark on the Vicksburg gage within 24 hours.

Col. Eckstein reported new underseepage problems at Rosedale and informed the commission that an abandoned MR&T levee across the river from Mayersville, Miss., overtopped at Wilson Point. Col. Fleming informed the commission that the



MRC commissioner Clifford Smith and Captain Todd Mainwaring



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river was 1.4 feet from overtopping the gates at the Morganza Floodway and that he was prepared to activate the floodway upon order of the commission President.



Following the briefing, Maj. Gen. Walsh called U.S. Senators David Vitter and Mary Landrieu and Louisiana Governor Bobby Jindal to discuss conditions at Morganza, while Col. Shepard, the MRC Secretary, did the same with U.S. Congressman Jeff Landry (LA-3). That afternoon, the commission boarded the MV *MISSISSIPPI* and hosted a press conference at the Vicksburg riverfront.

Following the press conference, the commission and the MV *MISSISSIPPI* embarked for Baton Rouge. While in transit, Maj. Gen. Walsh directed Col. Fleming to be prepared to activate the Morganza floodway within 24 hours and then immediately notified the Louisiana governor, the U.S. senators and Maj. Gen. Grisoli of his order.

On May 14, the commission held its morning briefing on the MV *MISSISSIPPI* and then immediately departed for the main office at the Morganza Floodway, where Col. Fleming and his staff provided a decision brief. After describing the intense pressure the flood was exerting on the system in his area of operations, to include a new record stage at Red River Landing, Fleming requested permission to open the floodway at 3:00 p.m.

The commission members present unanimously concurred with Fleming's recommendation and Maj. Gen. Walsh gave the order to operate. After observing the raising of one gate at the floodway, the commission inspected the Pointe Coupee Loop—a highly productive agricultural area protected by a ring levee.

The commission then inspected conditions at the Old River control structure before returning to the MV *MISSISSIPPI* at Baton Rouge.

The commission spent May 15 in the vicinity of Morgan City, an area at the lower end of the Atchafalaya basin affected by the opening of the Morganza structure.

The commission met with New Orleans District personnel who were working with local partners to provide them with the necessary resources to address gaps in the system. After a brief inspection of the Morgan City floodwall, the commission traveled to Amelia, La., where it boarded boats to observe ongoing emergency

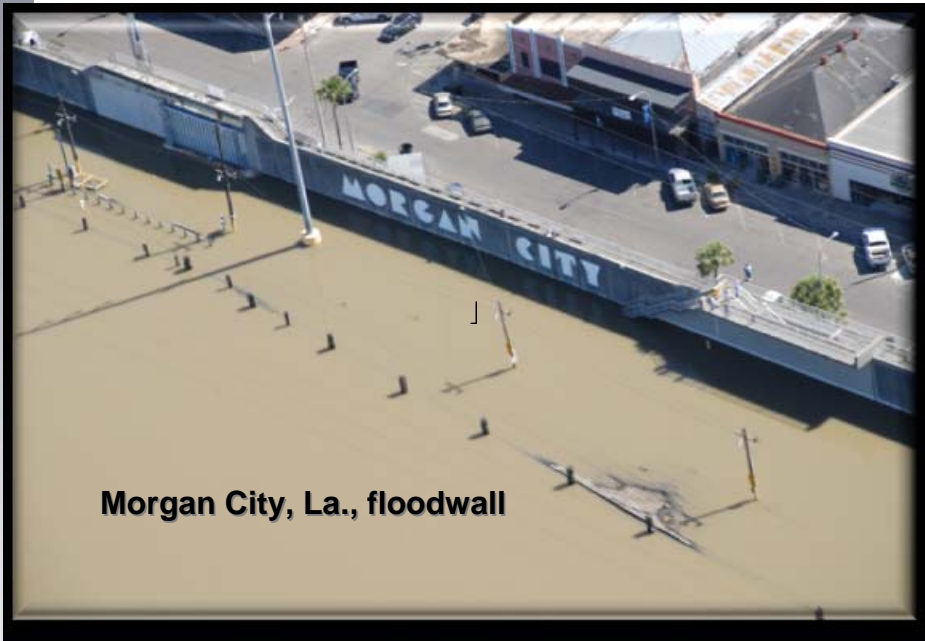




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operations to prevent Atchafalaya backwater from flooding Bayou Chene.

Bill Hildago, of the St. Mary Parish Levee District, explained the process of creating a makeshift dam through the sinking of barges and the use of sheet pile and rock to block the backflow of the Atchafalaya into the bayou.



**Morgan City, La., floodwall**

Following the site visit, the commission held a town hall meeting in Morgan City with Mayors Tim Matte (Morgan City) and Louis Ratcliffe (Berwick), the parish presidents of St. Martin and St. Mary, members of the river transportation industry and representatives from the Chitimache Nation.

The commission then traveled to Houma and met with stakeholders and local elected officials from Terrebonne Parish.

On May 16, the commission briefed U.S. Congressmen John Fleming (LA-4) and Steve Chabot (OH-1) on the ongoing flood situation and provided guidance on what needed to be done to reset and restore the MR&T system after the flood subsided. The commission travelled to Natchez and Vidalia to observe flood fight activities and to meet with local elected officials and city engineers to gage their concerns. As he returned to Vicksburg, Maj. Gen. Walsh called the chief engineers of levee districts throughout the MR&T project footprint to gain perspective on the flood fights in their areas of operation and to ensure they had the necessary resources.

Over the next several days, the commission watched and waited as the flood crest neared Arkansas City, Greenville, Vicksburg and Natchez. The district commanders continued to provide situational reports from the field that emphasized the tremendous pressure on the system, but they remained optimistic that conditions had stabilized and the system would continue to perform as designed.

Finally on May 20, the MRC meteorologist reported that the river had crested at Natchez and Red River Landing, indicating that the Mississippi River had crested everywhere within the MR&T project.

On May 21, the commission again set up its operations center on the MV *MISSISSIPPI*, this time in New Orleans. Maj. Gen. Walsh and Col. Fleming



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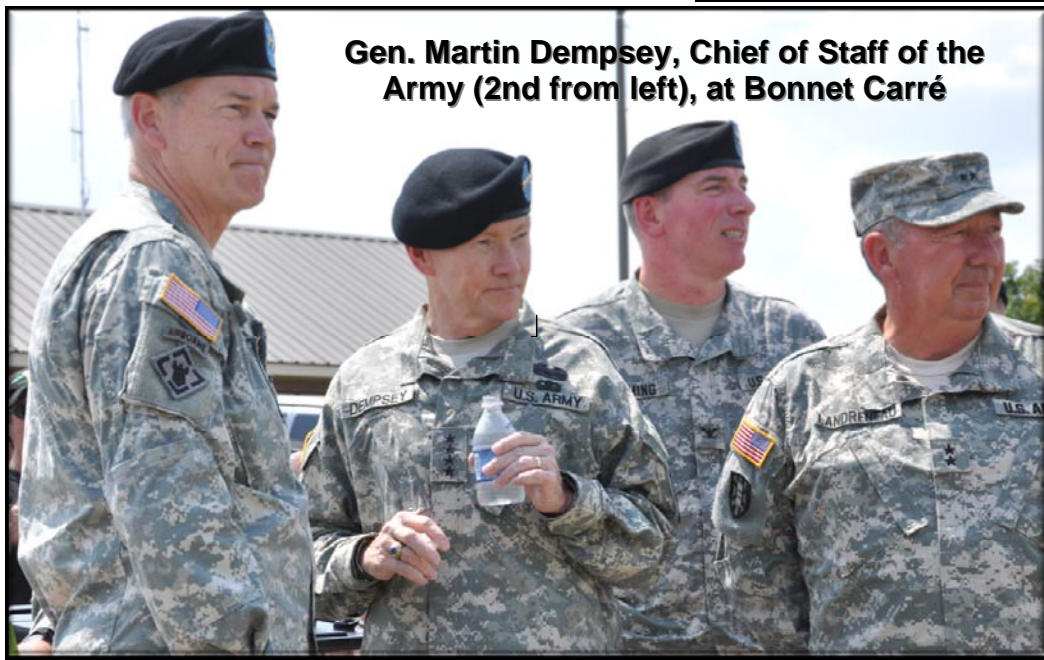
provided a total system brief to Gen. Martin Dempsey, Chief of Staff of the Army, and then accompanied him on an aerial assessment of afflicted areas in the vicinity of New Orleans.

Three days later, the commission provided an overview of the MR&T system performance during the flood to the Honorable John McHugh, the Secretary of the Army. Following the briefing, the commission accompanied Secretary McHugh on an aerial tour of flood stricken areas around New Orleans and then hosted a press conference at the Bonnet Carré Spillway.

On May 25, the commission departed the New Orleans area and flew to Sikeston, Mo., where Col. Reichling presented various alternatives for the path forward in resetting the Birds Point-New Madrid floodway. Following the briefing, the commission adjourned.



**Maj. Gen. Walsh with Secretary of the Army John McHugh**



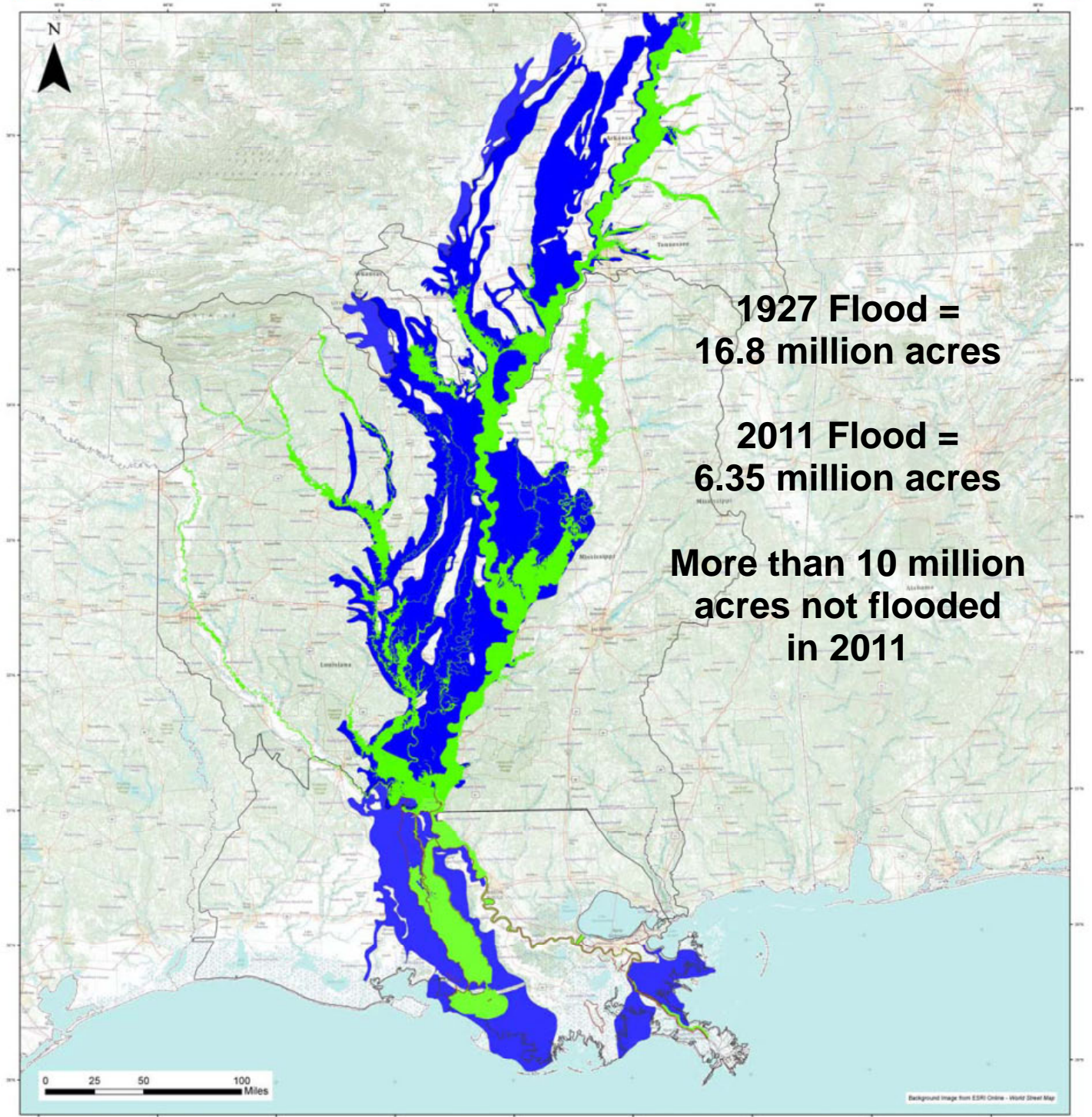
**Gen. Martin Dempsey, Chief of Staff of the Army (2nd from left), at Bonnet Carré**

# 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
  - Protected 62% of the 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**



# ESTIMATED MAXIMUM INUNDATION EXTENTS



### Legend

- 1927 Flood Inundation Extent
- 2011 Flood Inundation Extent
- Levee
- USACE District Boundary

### Disclaimer:

This map has been compiled using the best information available and is believed to be accurate; however, its preparation required many assumptions. Actual conditions during a flood event may vary from those assumed, so the accuracy cannot be guaranteed. The limits of flooding shown should only be used as a guideline for emergency planning and response actions. Actual areas inundated will depend on specific flooding conditions and may differ from the areas shown on the map.

USACE  
US ARMY CORPS OF ENGINEERS

INUNDATION MAP  
Lower MVD  
Estimated  
Inundation

June 18, 2011



# Historical Flows

Station	2011	1927 <sup>6/</sup>	1937 <sup>6/</sup>	1973	PDF <sup>5/</sup>
Cairo, IL <sup>1/</sup>	2,100,000 <sup>c/2/3/</sup>	1,626,000	2,010,000 <sup>4/</sup>	1,536,000	2,360,000 <sup>4</sup>
Memphis, TN	2,213,000 <sup>c</sup>	N/A	2,020,000	1,633,000	2,410,000
Helena, AR	2,130,000 <sup>c</sup>	1,756,000	1,968,000	1,627,000	2,490,000
Arkansas City, AR	2,293,000 <sup>c</sup>	1,712,000	2,159,000	1,879,000	2,890,000
Vicksburg, MS	2,320,000 <sup>c</sup>	1,806,000	2,060,000	1,962,000	2,710,000
Natchez, MS	2,260,000 <sup>c</sup>	N/A	2,046,000	2,024,000	2,720,000
Red River Landing, LA	1,641,000 <sup>c</sup>	1,461,000	1,467,000	1,498,000	2,100,000
Baton Rouge, LA	1,436,000 <sup>c</sup>	N/A	1,400,000	1,381,000	1,500,000
N. Orleans, LA	1,230,000 <sup>c/8/</sup>	1,360,000	1,342,000	1,248,000	1,250,000
Morgan City, LA <sup>7/</sup>	512,000 <sup>c</sup>	741,000	493,000	692,000	920,000
Wax Lake Outlet, LA <sup>7/</sup>	323,000 <sup>c</sup>	N/A	N/A	292,000	580,000

C - Peak Discharge, Provisional

1/ Discharge Range at Hickman, KY

2/ Total Confluence Flow of 1,936,000 cfs measured at approximate mile 950.8 at 1400 CDT 5/02/2011 near Wickliffe, KY, prior to operation of Birds Point-New Madrid

3/ Peak Flow Measured 4 May 2011 = 1,730,000 cfs at Hickman plus 370,000 cfs flow through Birds Point-New Madrid Floodway

4/ Includes flow through Birds Point-New Madrid Floodway

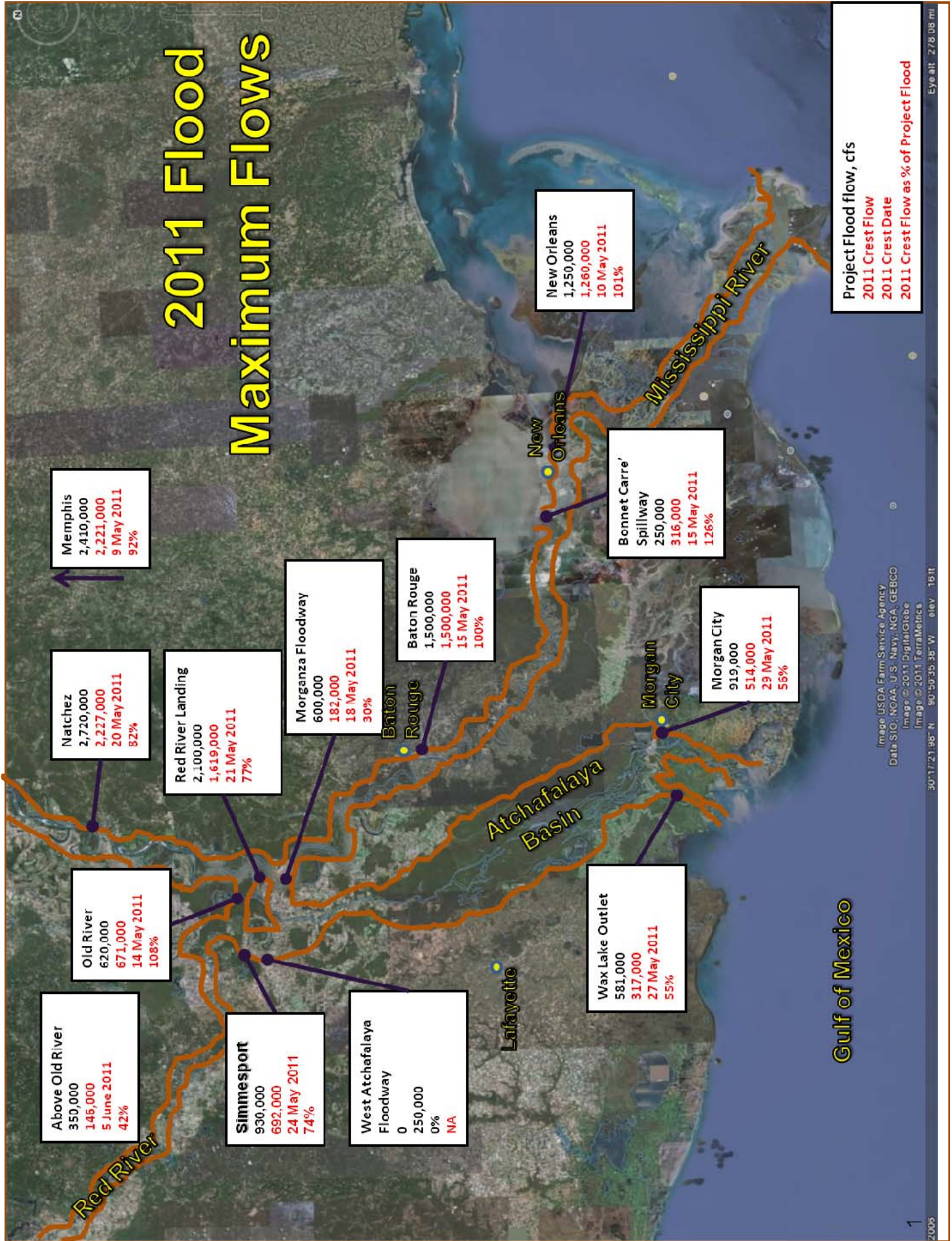
5/ Project Design Flood (PDF) provides design flows for MR&T project. Prior to 2011 Flood, MR&T Project was 89% complete. 2011 Flood Flows ~ 80-85% of MR&T PDF Flows.

6/ Reference - "Annual Maximum, Minimum, and Mean Discharges of the Mississippi River and Its Outlets and Tributaries to 1963"

7/ Wax Lake Outlet was constructed from 1937-1942. Prior to that, Lower Atchafalaya River was the major outlet.

8/ New Orleans Mean Daily Flow Measured at Belle Chasse in 2011, Readings at this site are tidally influenced. An instantaneous measurement of 1,320,000 cfs was made on 17 May 2012

# 2011 Flood Maximum Flows



Gulf of Mexico

Image USDA Farm Service Agency  
 Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
 Image © 2011 DigitalGlobe  
 Image © 2011 TerraMetrics  
 30°17'21.88" N 90°50'35.38" W elev 16 ft



**MISSISSIPPI RIVER COMMISSION**  
VICKSBURG, MISSISSIPPI

April 30, 2011

MISSISSIPPI RIVER COMMISSION  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

**OPERATION WATERSHED**

**PRESIDENT and MEMBER**

**\*\*Maj. Gen. Michael J. Walsh**  
*Commander, Mississippi  
Valley Division*  
Vicksburg, Mississippi

**MEMBERS**

Honorable Sam E. Angel  
*Civilian*  
Lake Village, Arkansas

Honorable R. D. James  
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Web site: [www.mvd.usace.army.mil/mrc](http://www.mvd.usace.army.mil/mrc)

\* Designee  
\*\* Nominee

To all Corps team-mates and to the people, their elected officials, their local levee boards, and the members of the many local, state, and federal agencies engaged in the current flood fight with us. The nation is truly fortunate to have such dedicated and resourceful men and women.

We stand at the threshold of a monumental point in the storied history of the Mississippi Valley watershed. Multi-agency teams from across the entire watershed--the Missouri, Ohio, Tennessee, Cumberland, and Mississippi rivers--are doing everything possible to manage the water coming our way and minimize flood impacts throughout the basin. Yet, with more rain in the forecast, the combined swollen waters of the Mississippi and Ohio rivers are rising to historic levels -- along with the sheer volume and velocity of the floodwaters, are placing unprecedented pressure on the system. Forecasts indicate that flood heights could reach new high-water marks and remain there for many days.

The decision about what to do is not about one isolated decision; it is about hundreds, if not thousands, of decisions to be made in each community affected by this historic flood event. Likewise, the decisions at hand are not about a single location, town, or state. How we, as Americans, respond will impact how history reflects on us. We already have reports of strangers delivering food and water to tired and hungry workers, of farmers upstream keeping their land wet longer to keep stages downstream as low as possible.

This is the American spirit--neighbors helping neighbors, Americans helping Americans, human beings helping human beings. To everyone involved in the fight--no matter how big or small your role--you epitomize what is best about America. We are proud to stand with you in this historic effort.

**BUILDING STRONG®**

Michael J. Walsh  
Major General, U.S. Army

Since 1879, the seven-member Presidentially appointed Mississippi River Commission has developed and matured plans for the general improvement of the Mississippi River from the Head of Passes to the Headwaters. The Mississippi River Commission brings critical engineering representation to the drainage basin, which impacts 41% of the United States and includes 1.25 million square miles, over 250 tributaries, 31 states, and 2 Canadian provinces.

*Listening, Inspecting, Partnering and Engineering since 1879*



**MISSISSIPPI RIVER COMMISSION**  
VICKSBURG, MISSISSIPPI

May 2, 2011

*— 150 hrs*

MISSISSIPPI RIVER COMMISSION  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

**OPERATION WATERSHED**

Everyone I have talked with -- from boat operators, to laborers, scientists and engineers, and truck drivers have all said the same thing -- "I never thought I would see the day that the river would reach these levels".

We have exceeded the record stage already at Cairo. We are on a course to break records at many points as the crest moves through the system. Sometimes people celebrate with "records" -- but not this time. Making this decision is not easy or hard -- it's simply grave -- because the decision leads to loss of property and livelihood -- either in a floodway -- or in an area that was not designed to flood. The state of Missouri has done a superb job of helping people escape the ravages of water in the floodway. But other places -- not designed to flood, have had no warning if their areas succumb to the pressures of this historic chocolate tide.

I spent last night on the river ... lashed to an anchor barge in the current near the top of the floodway. The rains continued to pound the deck of the Motor Vessel. The cold winds moved us around -- and the current and water levels kept increasing as the rain storms continue to grow over the AR/MS/OH/TN Watershed.

So, with the tool that has withstood many tests: the test of operation in 1937; decades of challenges that resulted in the 1986 Operation Plan; reviews and numerous unsuccessful court challenges -- I have to use this tool. I have to activate this floodway to help capture a significant percentage of the flow.

I don't have to like it, but we must use everything we have in our possession in the system to prevent a more catastrophic event. So, today, I give the order to operate the Floodway.

**BUILDING STRONG®**

Michael J. Walsh  
Major General, U.S. Army

**PRESIDENT and MEMBER**

**\*\*Maj. Gen. Michael J. Walsh**  
*Commander, Mississippi Valley Division*  
Vicksburg, Mississippi

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Web site: [www.mvd.usace.army.mil/mrc](http://www.mvd.usace.army.mil/mrc)

\* designee  
\*\* nominated

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**DEPARTMENT OF THE ARMY**  
MISSISSIPPI RIVER COMMISSION, CORPS OF ENGINEERS  
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO  
ATTENTION OF:

PRESIDENT, MISSISSIPPI RIVER COMMISSION  
CORPS OF ENGINEERS  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

CEMRC

2 May 2011

MEMORANDUM FOR Colonel Vernie L. Reichling, Commander, U.S. Army  
Corps of Engineers, Memphis District

SUBJECT: Birds Point - New Madrid (BP-NM) MR&T Floodway  
Operation

1. Reference CEMVM-DE brief to President Nominee, Mississippi River Commission, 2 May 2011, subject as above.
2. Based on current and predicted stage and discharge hydrographs, I concur with your recommendation for operation of the BP-NM Floodway in accordance with the approved Plans and the Mississippi Valley Division Operations Plan for Floods. It is noted that the floodway operation is a necessity due to the rising water levels at the Cairo gage and the increasing pressure on the MR&T flood control system.
3. The Cairo, IL, gage reading of 61 feet and rising was passed at 8:00 a.m. on 02 May 2011, and is forecasted to crest above 63.0 on 5 May 2011.
4. Execute the operation of the BP-NM floodway.

A handwritten signature in black ink, appearing to read "Michael J. Walsh", is written over the signature line.

MICHAEL J. WALSH  
Major General, USA  
President Nominee, Mississippi  
River Commission



**DEPARTMENT OF THE ARMY**  
MISSISSIPPI RIVER COMMISSION, CORPS OF ENGINEERS  
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO  
ATTENTION OF:

PRESIDENT, MISSISSIPPI RIVER COMMISSION  
CORPS OF ENGINEERS  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

CEMRC

4 May 2011

MEMORANDUM FOR Colonel Jeffrey Eckstein, Commander, U. S. Army  
Corps of Engineers, Vicksburg District

SUBJECT: Yazoo Backwater Levee (MR&T)

1. Reference MR&T Project 88<sup>th</sup> Congress, House Document #308;  
(Flood Control Act of 18 August 1941), subject as above.
2. Approval to use standard measures to protect the Backwater  
Levee System without raising the levees above the limiting  
elevation established in law.

A handwritten signature in black ink, appearing to read "Michael J. Walsh", written over a large, stylized circular flourish.

MICHAEL J. WALSH  
Major General, USA  
President Nominee, Mississippi  
River Commission

Attachment:  
Briefing by MVK - 4 May 2011



**DEPARTMENT OF THE ARMY**  
MISSISSIPPI RIVER COMMISSION, CORPS OF ENGINEERS  
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO  
ATTENTION OF:

PRESIDENT, MISSISSIPPI RIVER COMMISSION  
CORPS OF ENGINEERS  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

CEMRC

5 May 2011

MEMORANDUM FOR Colonel Edward R. Fleming, Commander, U. S. Army  
Corps of Engineers, New Orleans District

SUBJECT: Bonnet Carre' Spillway Operation

1. Reference CEMVN-DE memorandum to President Nominee, Mississippi River Commission, 3 May 2011, subject as above.
2. Based on current and predicted stage and discharge hydrographs, I concur with your recommendation for operation of Bonnet Carre' Spillway in accordance with the approved Water Control Manual and the Mississippi Valley Division Operations Plan for Floods. It is noted that the recommended latitude in spillway operation is a practical necessity due to the inability to precisely measure river flows or precisely control the spillway discharge.
3. The present prediction is that a discharge of approximately 1,250,000 cfs at New Orleans will be exceeded on 10 May 2011 without operating the spillway. Please provide me your schedule for initiating operation of the spillway.

MICHAEL J. WALSH  
Major General, USA  
President Nominee, Mississippi  
River Commission



**DEPARTMENT OF THE ARMY**  
MISSISSIPPI RIVER COMMISSION, CORPS OF ENGINEERS  
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO  
ATTENTION OF:

PRESIDENT, MISSISSIPPI RIVER COMMISSION  
CORPS OF ENGINEERS  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

125-001

5 May 2011

Birds Point - New Madrid (BP-NM) Floodway Operation and Memphis District Flood Fight Task Force

Announcement is made of the following General Order:

Dates: 24 April thru 5 May, 2011

Authority: Mississippi River Commission Act, 28 June 1879

Reason: Recognition is made for the successful operation of the Birds Point-New Madrid Floodway on 2-5 May 2011, as part of Operation Watershed in response to historic rainfall and flooding on the Mississippi River and tributaries and unprecedented stresses on the complex Mississippi River and Tributaries Flood Control.

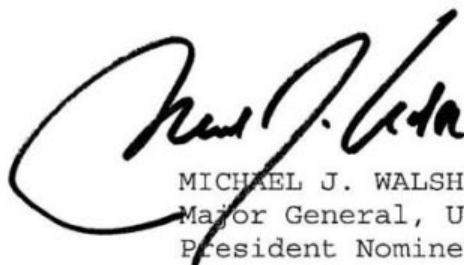
Last executed in 1937, the Birds Point-New Madrid Task Force, under the command of Colonel Vernie Reichling, overcame incredible challenges to safely move the fleet of over 15 barges and floating plant and nearly 200 employees to execute the opening of the floodway. Facing a rapidly rising river, extreme weather with driving rain, lightning, and 60 mph winds, night operations, and technical challenges, the task force successfully executed all three breaches of the mainline levee.

Using over 200 tons of explosives, the task force safely crevassed a two-mile section of levee south of Cairo, and two one-mile sections east of New Madrid, allowing record floodwaters to spread into the 130,000 acre floodway, relieving the historic loads and pressures begin placed on the system both north and south of the floodway and attenuating the record crest by almost four feet at several gages, protecting the lives and property of the thousands of people who live, work, and play in the four states bordering the Mississippi River in this region.

Birds Point - New Madrid (BP-NM) Floodway Operation and Memphis District Flood Fight Task Force

All members of the task force are commended for their impressive dedication to mission accomplishment in the face limited rest over the course of the operation, their sound problem solving, and the superb leadership displayed throughout.

On behalf of the Mississippi River Commission, We commend each and every one of you.



MICHAEL J. WALSH  
Major General, USA  
President Nominee, Mississippi  
River Commission

Commander, U.S. Army Corps of Engineers, Memphis District  
Commander, U.S. Army Corps of Engineers, St. Louis District  
Commander, U.S. Army Corps of Engineers, Vicksburg District  
Director, U.S. Army Corps of Engineers, Engineer Research and  
Development Center  
Commander, U.S. Coast Guard  
Commander, Missouri National Guard



## MISSISSIPPI RIVER COMMISSION

VICKSBURG, MISSISSIPPI

May 12, 2011

MISSISSIPPI RIVER COMMISSION  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

### OPERATION WATERSHED

#### PRESIDENT and MEMBER

**\*\*Maj. Gen. Michael J. Walsh**  
*Commander, Mississippi  
Valley Division*  
Vicksburg, Mississippi

#### MEMBERS

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*Civilian*  
Lake Village, Arkansas

Honorable R. D. James  
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*Commander, Great Lakes &  
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Cincinnati, Ohio

**\*Brig. Gen. John R. McMahon**  
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Portland, Oregon

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Vicksburg, Mississippi

#### EXECUTIVE DIRECTOR

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Web site: [www.mvd.usace.army.mil/mrc](http://www.mvd.usace.army.mil/mrc)

\* designee  
\*\* nominated

The performance of the Mississippi River and Tributaries (MR&T) system to date, in accommodating the historic 2011 Flood, validates the wise investment this nation made to prevent another calamitous natural disaster like the 1927 Flood--the devastating event that changed America and forcibly unified its people to support protection of lives and property from the fury of the river.

The MR&T system is functioning as designed, despite rainfall exceeding 600 to 1,000 percent of the normal average rainfall in a 2-week period over a significant portion of six states in the project area. The rain fell simultaneously as the spring snowmelt from the north converged on the lower valley. Projects, systems, and people are being tested as never before, and we are using every flood control tool and MR&T resource to help states and locals protect threatened communities. These tools include the use of levees, flood walls, floodways, and outlets; designed overtopping of backwater areas; intensive flood control reservoir management along the major tributaries; and the benefits of channel improvement techniques all put in place over the last 84 years. The difference today is that many more people, communities, and a worldwide economic engine would be devastated if the MR&T system had an unanticipated failure or breach. The result of an uncontrolled failure would be in the hundreds of billions of dollars in recovery and restoration costs.

At the worst of the devastating Great Flood of 1927, the Mississippi River stretched from Vicksburg, MS, to Monroe, LA, -- a swath 80 miles wide. Due to the destructive forces of the chocolate tide that swept over the valley, up to 500 people lost their lives, with another 600,000 seeking shelter in Red Cross refugee camps. More than 41,000 buildings were obliterated. Rail lines were severed, east-west communications, postal service, and commerce left in shambles.

In the aftermath of that horrific event, with more than 26,000 square miles of land (16 million acres) in seven states along the Mississippi River underwater, the nation galvanized and made a commitment to never allow a similar tragedy to happen again. The manifestation of that commitment is the comprehensive MR&T system that helps protect the valley and the more than four million people that live within it.

BUILDING STRONG®

Michael J. Walsh  
Major General, U.S. Army

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**DEPARTMENT OF THE ARMY**  
MISSISSIPPI RIVER COMMISSION, CORPS OF ENGINEERS  
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO  
ATTENTION OF:

13 May 2011, 1500 hrs

PRESIDENT, MISSISSIPPI RIVER COMMISSION  
CORPS OF ENGINEERS  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

CEMRC-DE

MEMORANDUM FOR Commander, New Orleans District

SUBJECT: Morganza Floodway Operation

1. Reference memorandum CEMVN-DE, 6 May 2011, subject as above.
2. Based on current and predicted stage and discharge hydrographs, I concur with your recommendation for operation of the Morganza Floodway in accordance with the approved Water Control Manual and the Mississippi Valley Division Operations Plan for Floods. It is noted that the recommended latitude in the floodway operation is a practical necessity due to the inability to precisely measure river flows or precisely control the spillway discharge.
3. On 13 May 2011, the current National Weather Service forecast, predictions, multiple scenario considerations, and other conditions warrant the operation of the floodway. The Mississippi River Commission was presented 3 scenarios by Colonel Fleming and his Team. There are significant impacts to the system with scenarios 2 and 3.
4. You are directed to be prepared to operate the floodway within 24 hours. After the execute order - operate the floodway within the conditions of the plan with a slow release.
5. Inform me when you are within 2 hours of the opening of the first set of gates for my release order.

MICHAEL J. WALSH  
Major General, USA  
President Nominee, Mississippi  
River Commission



## MISSISSIPPI RIVER COMMISSION

VICKSBURG, MISSISSIPPI

May 14, 2011

### OPERATION WATERSHED

#### Morganza Floodway

MISSISSIPPI RIVER COMMISSION  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

#### PRESIDENT and MEMBER

\* **Maj. Gen. Michael J. Walsh**  
*Commander, Mississippi  
Valley Division*  
Vicksburg, Mississippi

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Silver Spring, Maryland

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Web site: [www.mvd.usace.army.mil/mrc](http://www.mvd.usace.army.mil/mrc)

\* designee  
\*\* nominated

For the first time in the storied history of the Mississippi River Commission and the Mississippi River and Tributaries (MR&T) project, we have three floodways in simultaneous operation. Over the past few weeks, members of the Commission and I have been asked many times to compare this current flood to the past great historic floods on the lower Mississippi Valley. Truth be told, there are not many differences in the floods. The difference is the engineering solutions employed to address the flood challenges.

The success of the comprehensive MR&T system to date is rooted in the lessons learned. Perhaps the most important lesson was the necessity to accommodate the Mississippi River by not attempting to exclude it entirely from its natural floodplain. We implemented the floodway and backwater features of the MR&T system for this very purpose—to accommodate the natural tendencies of the river during times of flood. And to help relieve the enormous stress on the levee system and the danger to people, their homes, and the businesses that bolster our economy. Nowhere in the valley is that need to allow the river to expand more evident than at the Morganza Spillway. The controlled intake structure at the head of the floodway is located directly on the Mississippi River at a place where the levees historically crevassed under the relentless pressure of rampaging floodwaters during the floods of the 19th and early 20th centuries.

The Great Flood of 1927 overwhelmed an overmatched levee system. Like a series of dominos, one levee after another burst under the then unprecedented pressure exerted as the flood crest swept down the river, leaving many lives lost, shattered, and scarred. The performance of the MR&T system to date during this great flood validates the wise investment this nation made to help prevent another calamitous flood like the great 1927 disaster. The difference today is that many more people, communities, and a world-wide economic engine would be devastated if the MR&T system had an uncontrolled failure or breach. The result would be in the hundreds of billions of dollars in recovery and restoration costs.

BUILDING STRONG®



MICHAEL J. WALSH  
Major General, USA  
President Nominee, Mississippi  
River Commission

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## MISSISSIPPI RIVER COMMISSION

VICKSBURG, MISSISSIPPI

May 21, 2011

MISSISSIPPI RIVER COMMISSION  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

### OPERATION WATERSHED

#### Channel Improvement

#### PRESIDENT and MEMBER

**\*\*Maj. Gen. Michael J. Walsh**  
*Commander, Mississippi  
Valley Division  
Vicksburg, Mississippi*

#### MEMBERS

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(601) 634-5766*

Email: [cemvd-ex@usace.army.mil](mailto:cemvd-ex@usace.army.mil)  
Web site: [www.mvd.usace.army.mil/mrc](http://www.mvd.usace.army.mil/mrc)

\* designee

\*\* nominated

Damages prevented in the flood of 2011 are in the tens of billions of dollars to date. The levees, floodways, spillways, and backwater areas of the Mississippi River and Tributaries Project are preserving lives, communities and industry from the impacts of catastrophic flooding.

Channel improvements on the Mississippi are serving as a critical part of the flood control system in this historic event. Without river bend cutoffs, dikes and revetments, the ongoing flood would overwhelm the MR&T project and the communities it protects.

From Memphis to Vicksburg, the continued flood control benefit of the channel improvement program is evident. Flood stage records have been broken during this epic event from Cairo to Baton Rouge. However, where channel improvements have been made – at Memphis, Helena, and Arkansas City – river crests have stayed well below prior record levels. This is despite flows near or above those experienced during the 1927 and 1937 floods. Likewise, despite record discharges, the stage at Vicksburg peaked five feet below the potential stage had the levees held in 1927.

Despite record flows in the system, stages have been kept well below those seen in previous events. This is a testament to the continued successful performance of Channel Improvements constructed as part of the MR&T project in the 1930's.

All the features (floodways/spillways, backwater, channel improvement, levees/floodwalls, gates, pumps, reservoirs, relief wells, intensive multi-state water management) of the project are working in concert to pass historic flows while accommodating the natural tendencies of the mighty Mississippi River. The MR&T system is performing as designed.

BUILDING STRONG®

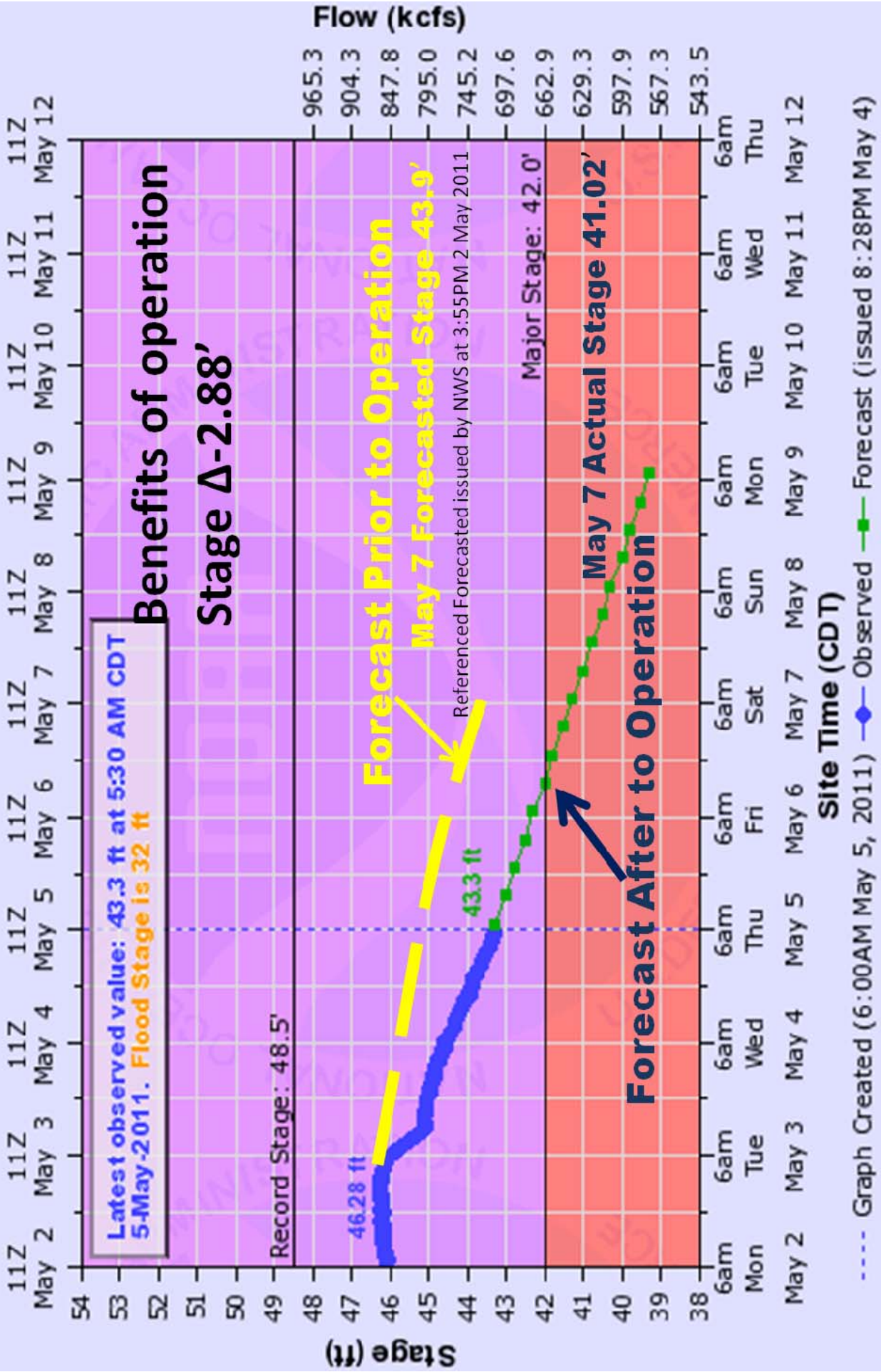
Michael J. Walsh  
Major General, U.S. Army

Since 1879, the seven-member Presidentially appointed Mississippi River Commission has developed and matured plans for the general improvement of the Mississippi River from the Head of Passes to the Headwaters. The Mississippi River Commission brings critical engineering representation to the drainage basin, which impacts 41% of the United States and includes 1.25 million square miles, over 250 tributaries, 31 states, and 2 Canadian provinces.

*Listening, Inspecting, Partnering and Engineering since 1879*

# MISSISSIPPI RIVER AT CAPE GIRARDEAU

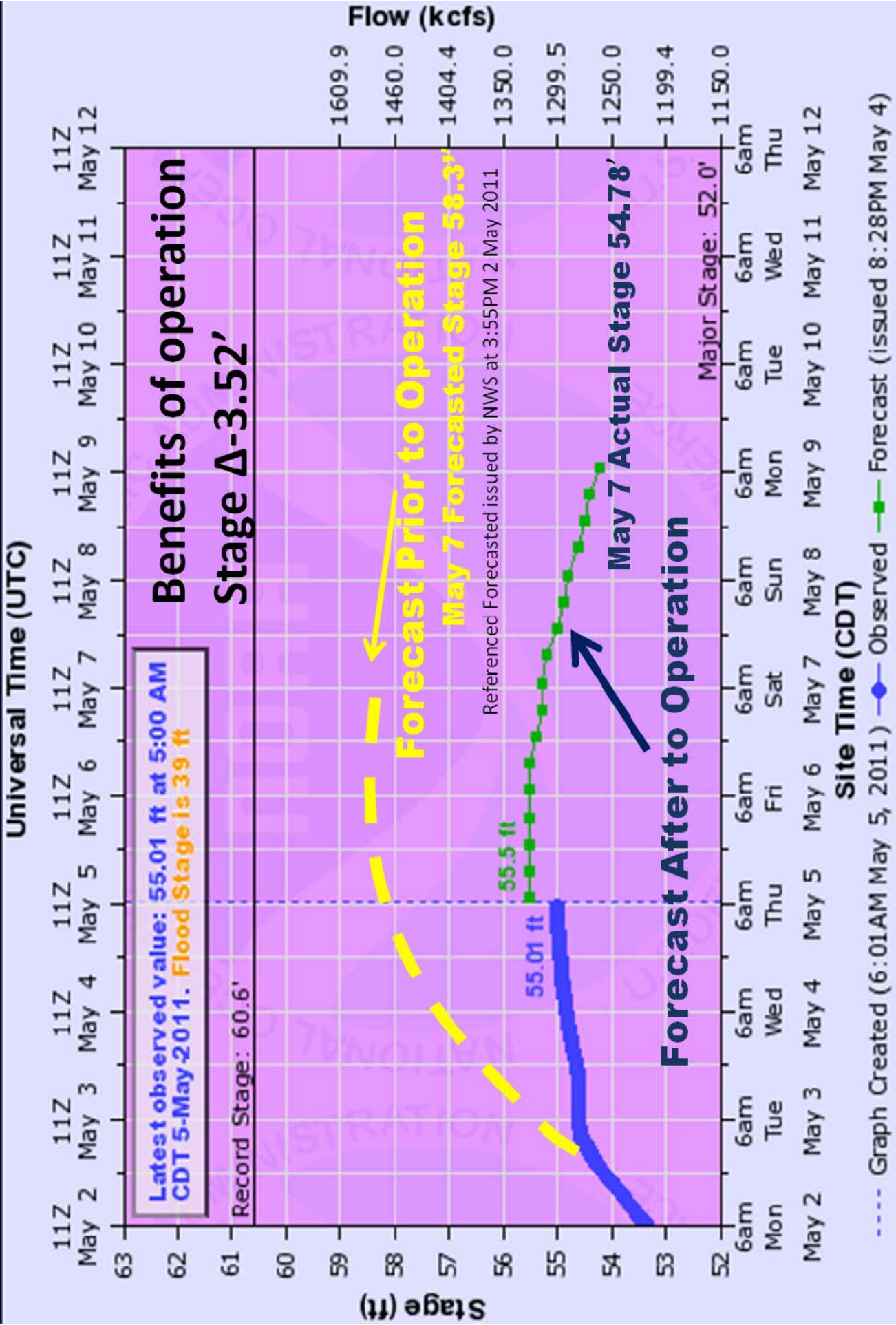
Universal Time (UTC)



CPGM7(plotting HGIRG) "Gage 0" Datum: 304.65'

Observations courtesy of US Geological Survey

# OHIO RIVER AT PADUCAH

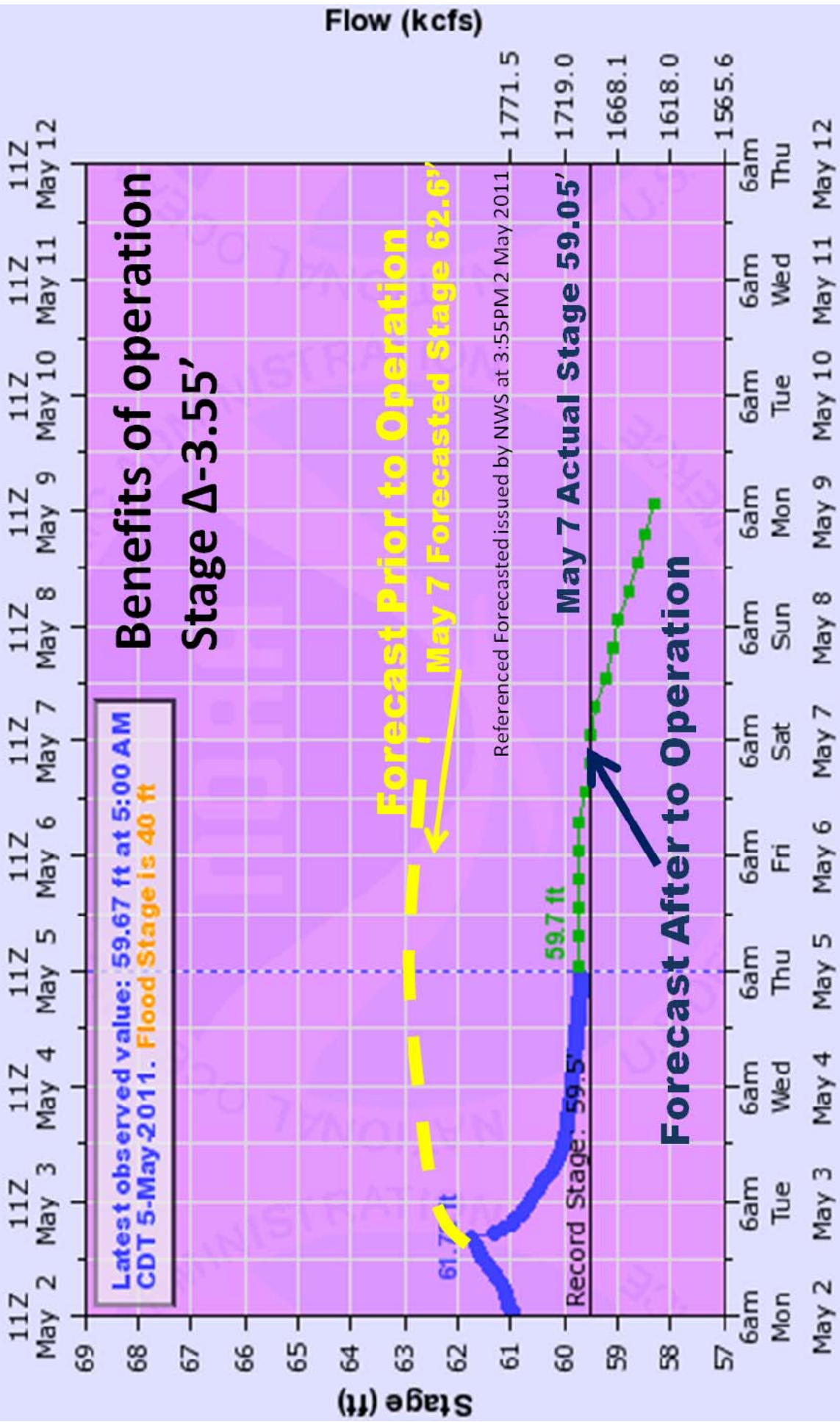


PAHK2(plotting HGIRG) "Gage 0" Datum: 286.26'

Observations courtesy of US Geological Survey

# OHIO RIVER AT CAIRO

Universal Time (UTC)



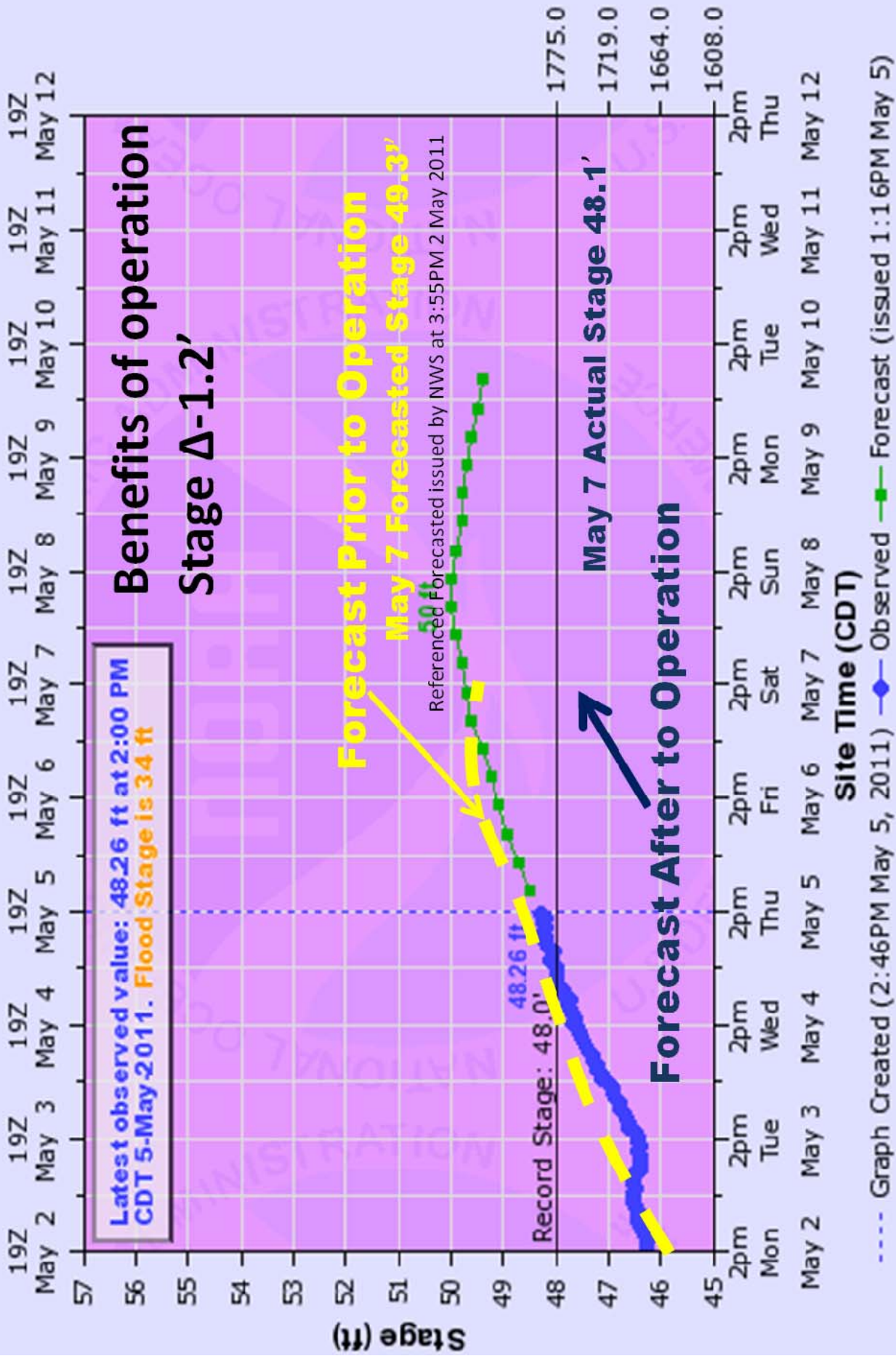
Site Time (CDT)

--- Graph Created (6:00AM May 5, 2011) —●— Observed —■— Forecast (issued 8:28PM May 4)

CIR.I2(plotting HGIRG) "Gage 0" Datum: 270.9'

# MISSISSIPPI RIVER AT NEW MADRID

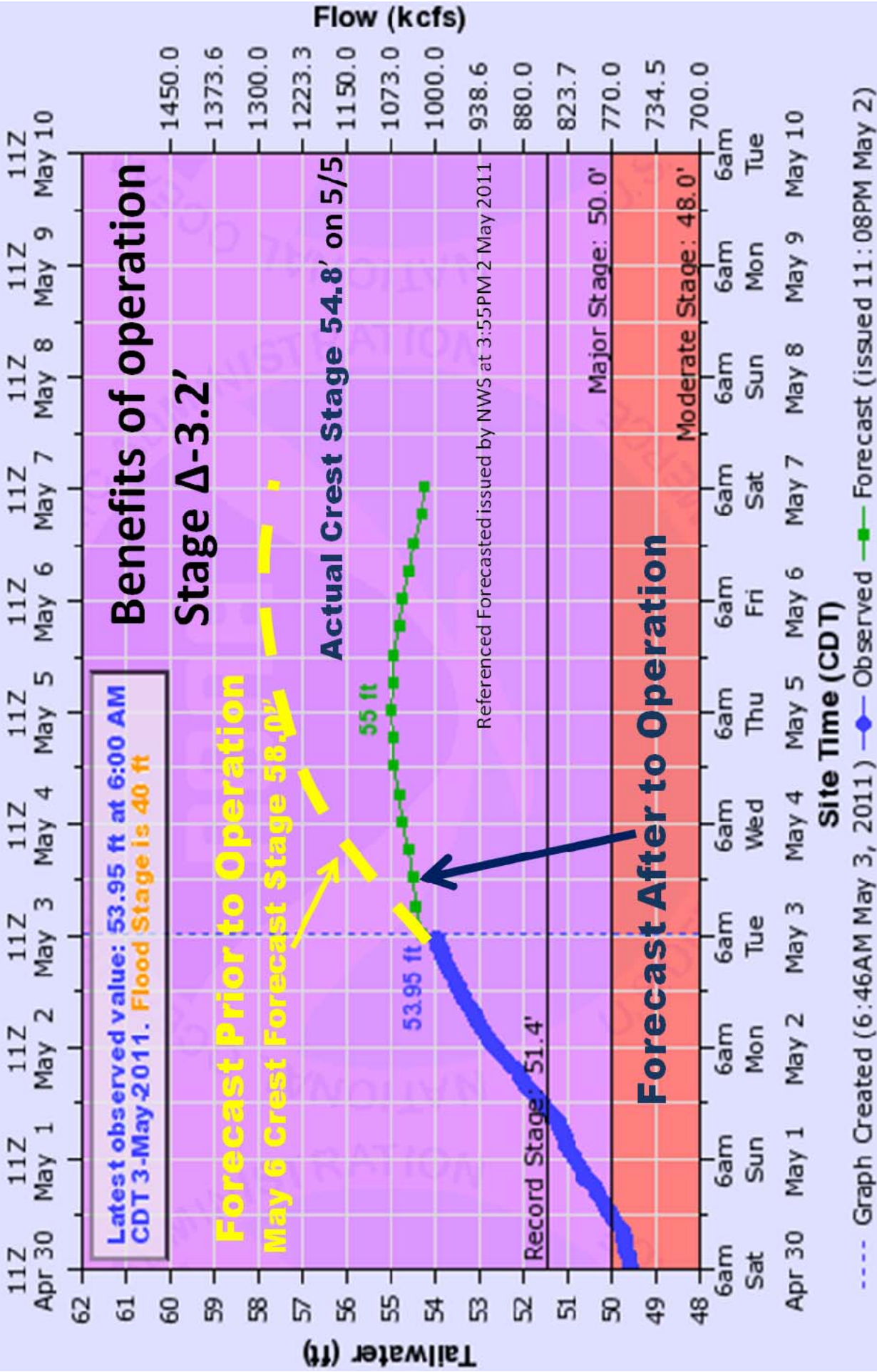
Universal Time (UTC)



NMDM7(plotting HGIRG) "Gage 0" Datum: 255.48'

# OHIO RIVER AT SMITHLAND LOCK AND DAM

Universal Time (UTC)

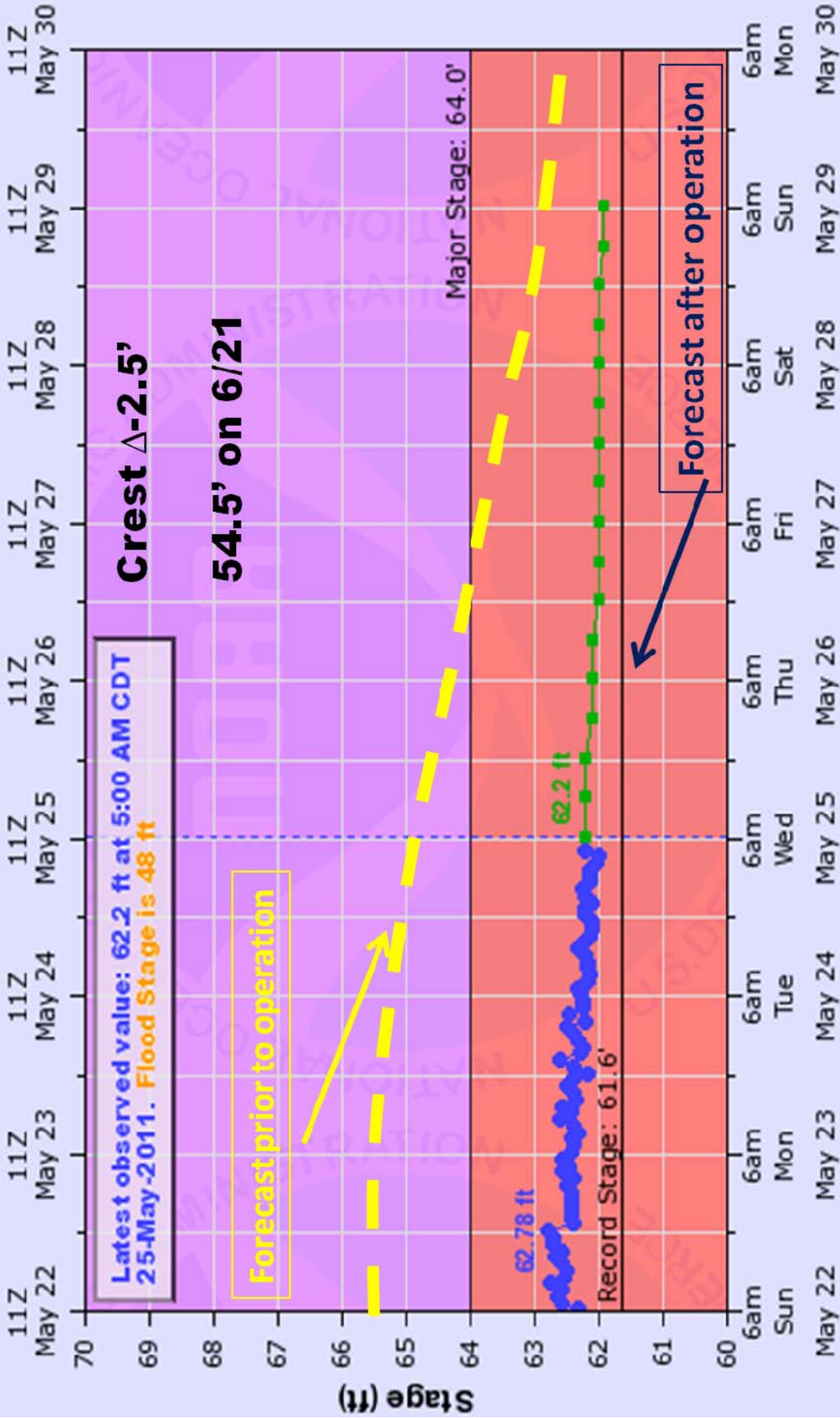


SMLI2(plotting HTRIG) "Gage 0" Datum: 290'

Observations courtesy of US Geological Survey

# MISSISSIPPI RIVER AT RED RIVER LANDING

Universal Time (UTC)



Site Time (CDT)

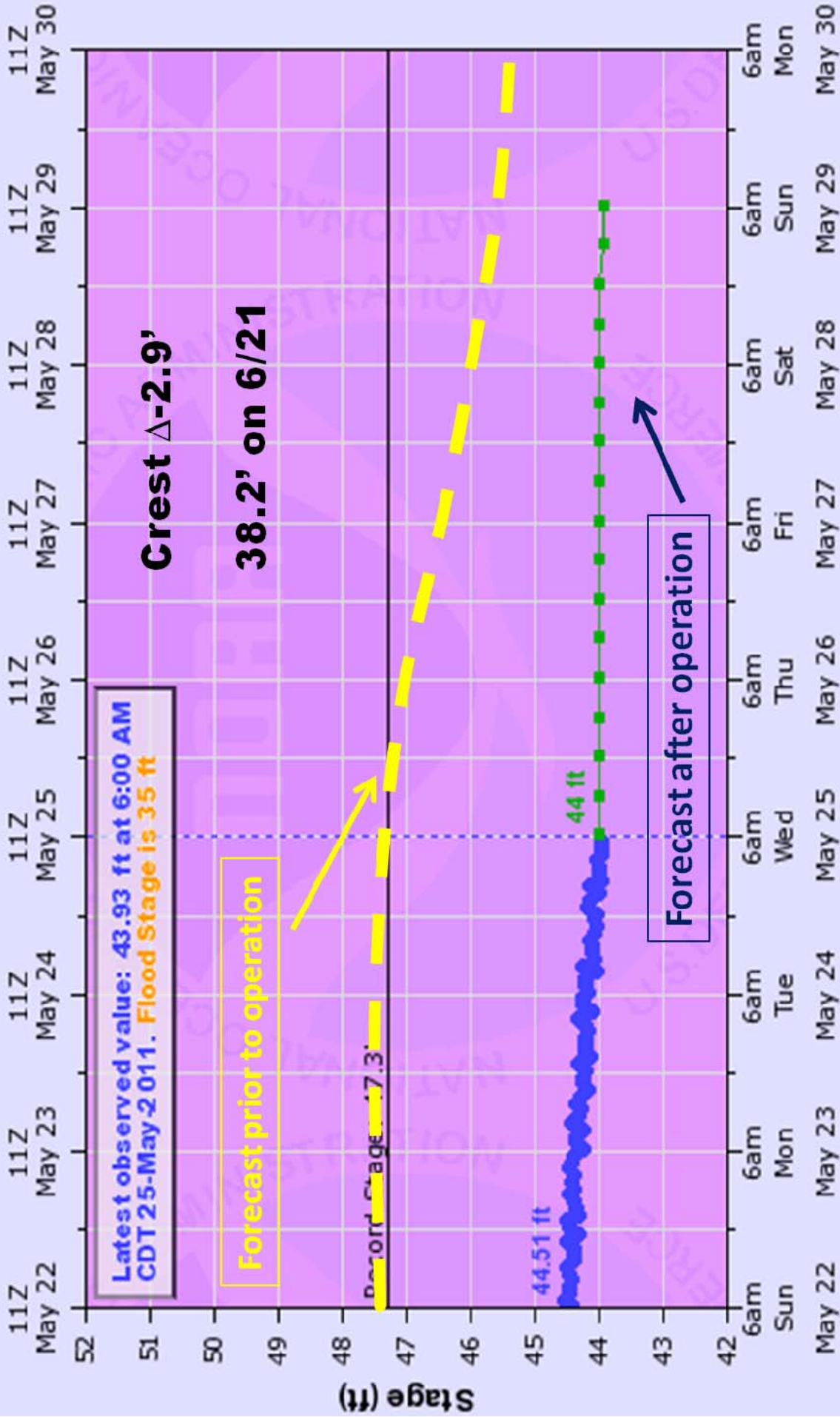
--- Graph Created (6:48AM May 25, 2011) —●— Observed —■— Forecast (issued 8:14PM May 24)

RRL1(plotting HGIRG) "Gage 0" Datum: n/a

Observations courtesy of US Geological Survey

# MISSISSIPPI RIVER AT BATON ROUGE

Universal Time (UTC)



Site Time (CDT)

--- Graph Created (6:48AM May 25, 2011) — Observed — Forecast (issued 8:14PM May 24)

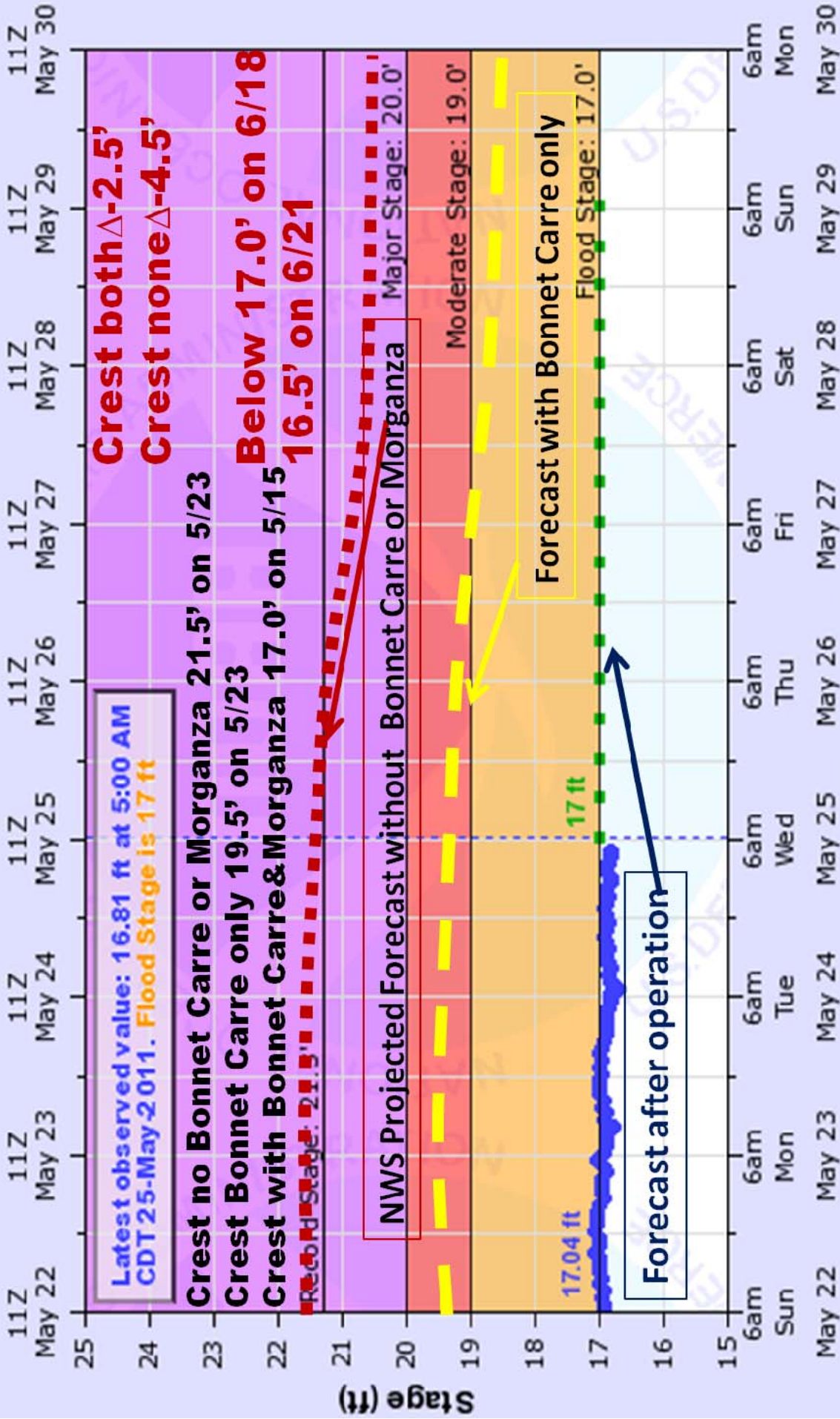
BTRL1(plotting HGIRG) "Gage 0" Datum: n/a

Observations courtesy of US Geological Survey



# MISSISSIPPI RIVER AT NEW ORLEANS

Universal Time (UTC)



NORL1(plotting HGIRG) "Gage 0" Datum: n/a

Observations courtesy of US Geological Survey



## MISSISSIPPI RIVER COMMISSION

VICKSBURG, MISSISSIPPI

October 11, 2011

MISSISSIPPI RIVER COMMISSION  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

### Statement of the Mississippi River Commission Mississippi River and Tributaries Project

*Top tier things discovered in the Historic Flood of 2011*

#### PRESIDENT and MEMBER

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Commander, Mississippi  
Valley Division  
Vicksburg, Mississippi

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\* Designee  
\*\* Nominee

Since 1928, successive administrations and congresses teamed with the nation's engineers and local project sponsors to authorize, fund, construct, and maintain a comprehensive world-class engineering marvel known as the Mississippi River and Tributaries (MR&T) project. The performance of the MR&T system during the 2011 flood on the lower Mississippi and Ohio Rivers validated that wise investment of more than \$13 billion by protecting the lives and livelihoods of 4 million people living in the lower Mississippi Valley, preventing more than \$200 billion in damages to vital infrastructure. For every dollar the nation has invested in the MR&T project, it has received more than \$34 as a return on investment.

The national investment and the determination of a countless number of people were involved in making the MR&T a truly comprehensive project and can be described as disciplined and courageous. The project is not just about levees and floodways. It is a comprehensive project that involves many other critical, but lesser known, components -- channel improvements, diversions, flood control reservoirs, pumps, and backwater areas -- that all reduce pressure on the system during large floods. It is easy to fall into that trap of not knowing what you need until you need it and then realizing that it is too late. That was not the case in the lower Mississippi watershed this past spring, thanks to the team of teams that led and nurtured the continued development of the project over the past 83 years.

It is extremely challenging and rewarding to live with the diversity and the dynamics of a comprehensive system that assimilates water from the 3rd largest watershed in the world. Impacting people's land, lives, and livelihood is hard politics, but has long-term benefits. We, as a nation, must recognize, value, and engage the larger watershed approach -- it is an intergenerational approach that the Mississippi River Commission embraces and champions. Enclosed is the MRC's working vision "America's Watershed - a 200-Year Vision."

Since 1879, the seven-member Presidentially appointed Mississippi River Commission has developed and matured plans for the general improvement of the Mississippi River from the Head of Passes to the Headwaters. The Mississippi River Commission brings critical engineering representation to the drainage basin, which impacts 41% of the United States and includes 1.25 million square miles, over 250 tributaries, 31 states, and 2 Canadian provinces.

*Listening, Inspecting, Partnering and Engineering since 1879*

The Mississippi River Commission is not satisfied with great. We continue to seek ways to address the multi-use, high-benefit, and comprehensive system approach in the watershed. A few of the critical areas observed by the Commission for action and system improvements follow:

### **System Thinking**

- **There is Room for the River.** During the 2011 flood, more than 1.5 million acres of available storage in the project's floodways and backwater were not used:
  - Only 85% of the project design flood system was used to reduce flood stages
  - 3 of 4 floodways activated (366,000 acres available; 212,000 acres used)
  - 20% of backwater storage areas activated (1.65 million acres available; 335,000 acres used by interior drainage system)
- **The MR&T system operation plan must address post operation activities.** When the system is operated, we must have an "after the flood plan" that puts life safety features back immediately – to help reduce future less drastic high-water events from becoming a national physical and economic disaster.

### **System Investment**

- **Proper Resources.** The trained, ready, resourced, and available people are essential to the emergency operation of the system. It is impossible to manage the system without strong partnerships, mature local and regional relationships with states, levee boards, and non-government organizations.
- **Infrastructure Investment.** Continued investment must be made in the Nation's aging levees and reservoirs to ensure their readiness and safe operation during flood fights. In addition to the MR&T system features, the reservoirs within the Ohio River watershed critical to the flood fight must be maintained.

### **System Leadership**

- **Central Leadership.** Successful management of a comprehensive system covering multiple states requires central leadership with clear, unambiguous, and reviewed authority.

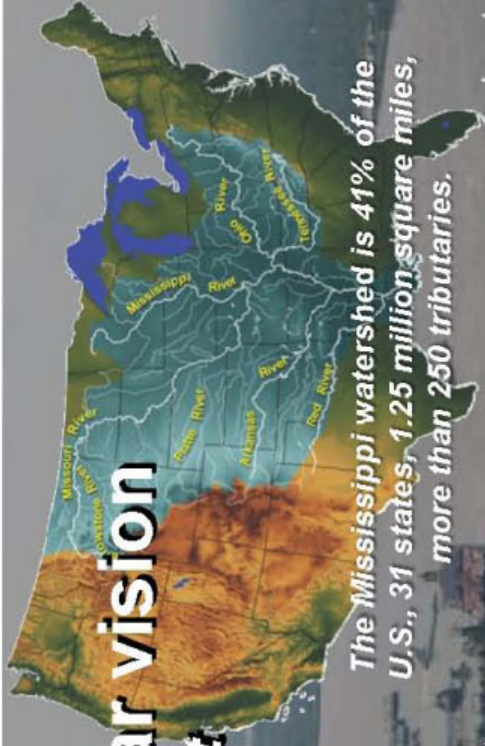
**System Leadership (continued)**

- **Unambiguous Authority.** Central leadership must have clear and unambiguous authority to operate the system with processes and plans that are thoroughly vetted with local partners, states, and governmental and non-governmental agencies over a number of years to help with stand criticism and legal challenges.
- **A Team of Teams.** Strong long-term relationships make the project work. Local entities cannot do it by themselves, due to the large geographic footprint of the drainage system. The river and its tributaries do not respect political boundaries. Likewise, the federal government cannot make the project work without state and local engagement, long-term partnerships, and vigilance.
- **State Participation.** State leadership and participation is essential to the success of comprehensive system development and its operation.

The Mississippi River Commission and our strong partners in the world's third largest watershed continue to keep an ear to the past, a hand on the present, and a steady voice for our nation's bright and productive future.

# America's Watershed: A 200-year vision

## An Intergenerational Commitment



**Our people enjoy a quality of life unmatched in the world. We ...**

- **Lead secure lives along the river or tributary.**

- **Enjoy fresh air and the surrounding fauna, flora, and forests while hunting, fishing, and recreating.**

- **Travel easily, safely, and affordably.**

- **Drink from and use the abundant waters of any river, stream, or aquifer.**

- **Choose from an abundance of affordable basic goods and essential supplies that are grown, manufactured, and transported along the river to local and world markets.**

**Balancing the Nation's needs for ...**

- ❖ **National Security & Flood Damage Reduction**
- ❖ **Environmental sustainability & recreation**
- ❖ **Infrastructure & energy**
- ❖ **Water supply & water quality**
- ❖ **Movement of goods; agriculture & manufacturing**

***Leveraging science, engineering, technology, and public policy***