

**UMIMRA  
Annual  
Meeting**

**February 9, 2019**

**Michael D. Klingner, P.E.**





1973



2008

What is really happening  
in the Upper Mississippi?

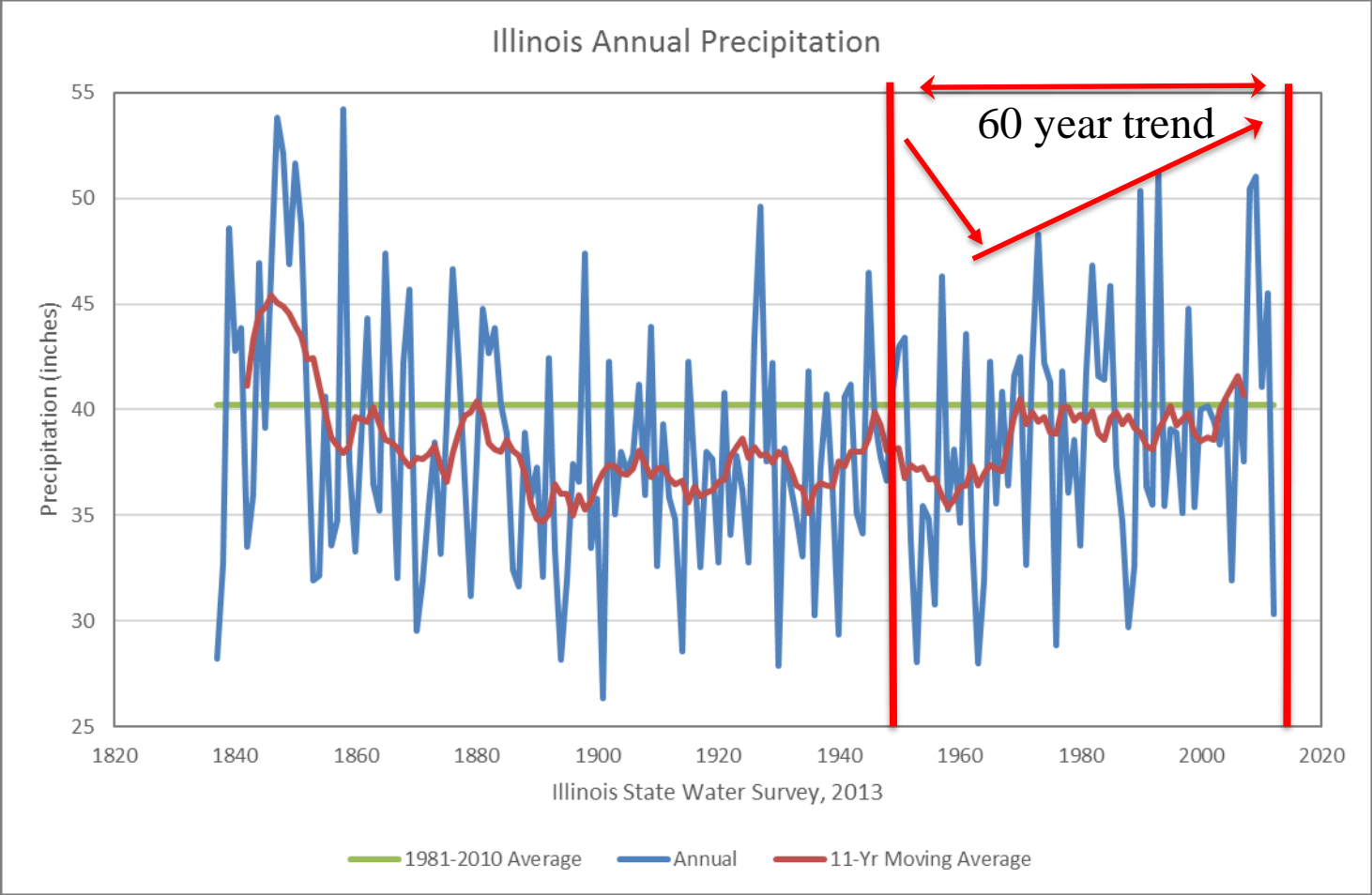


1993

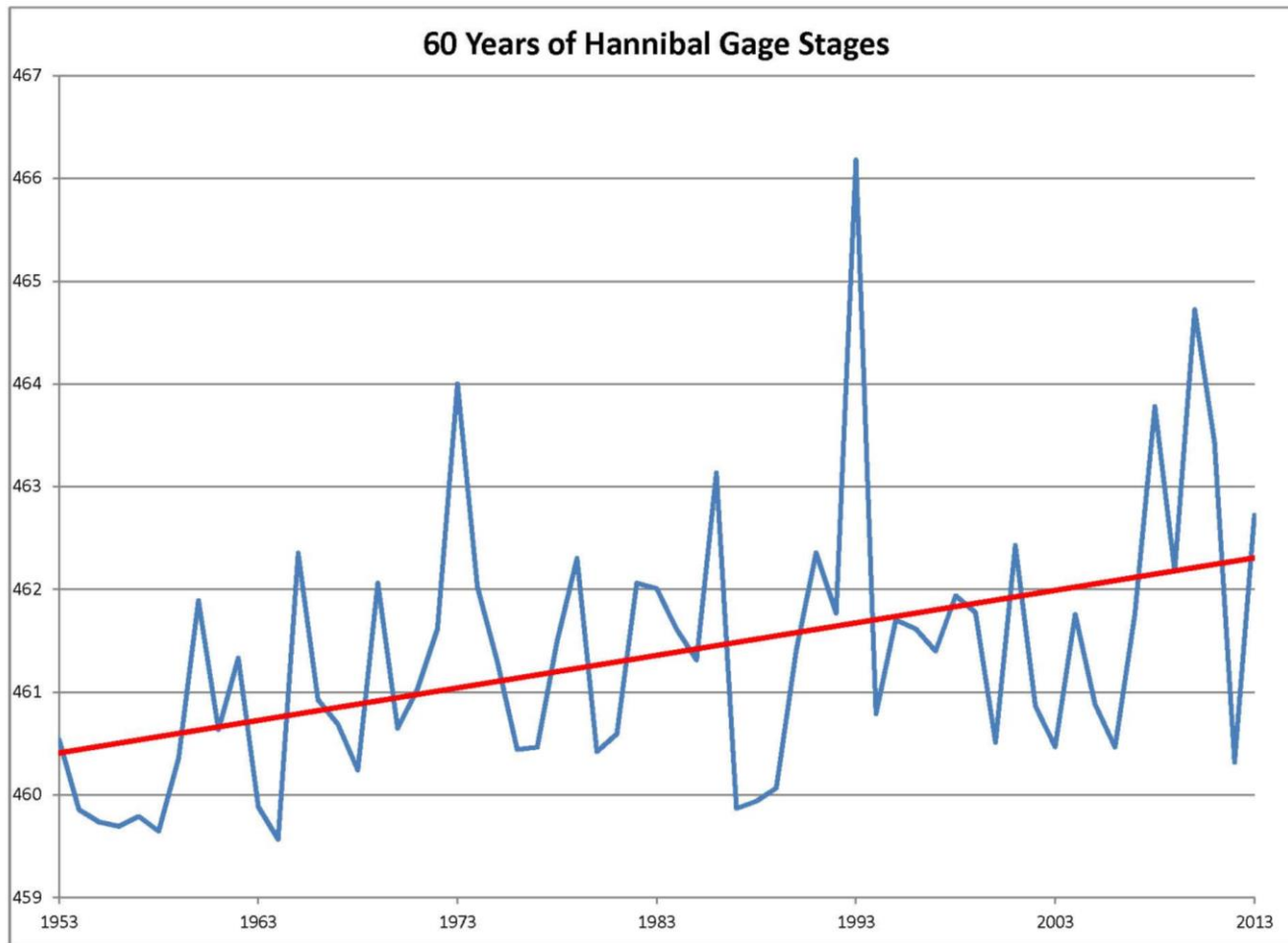


2015

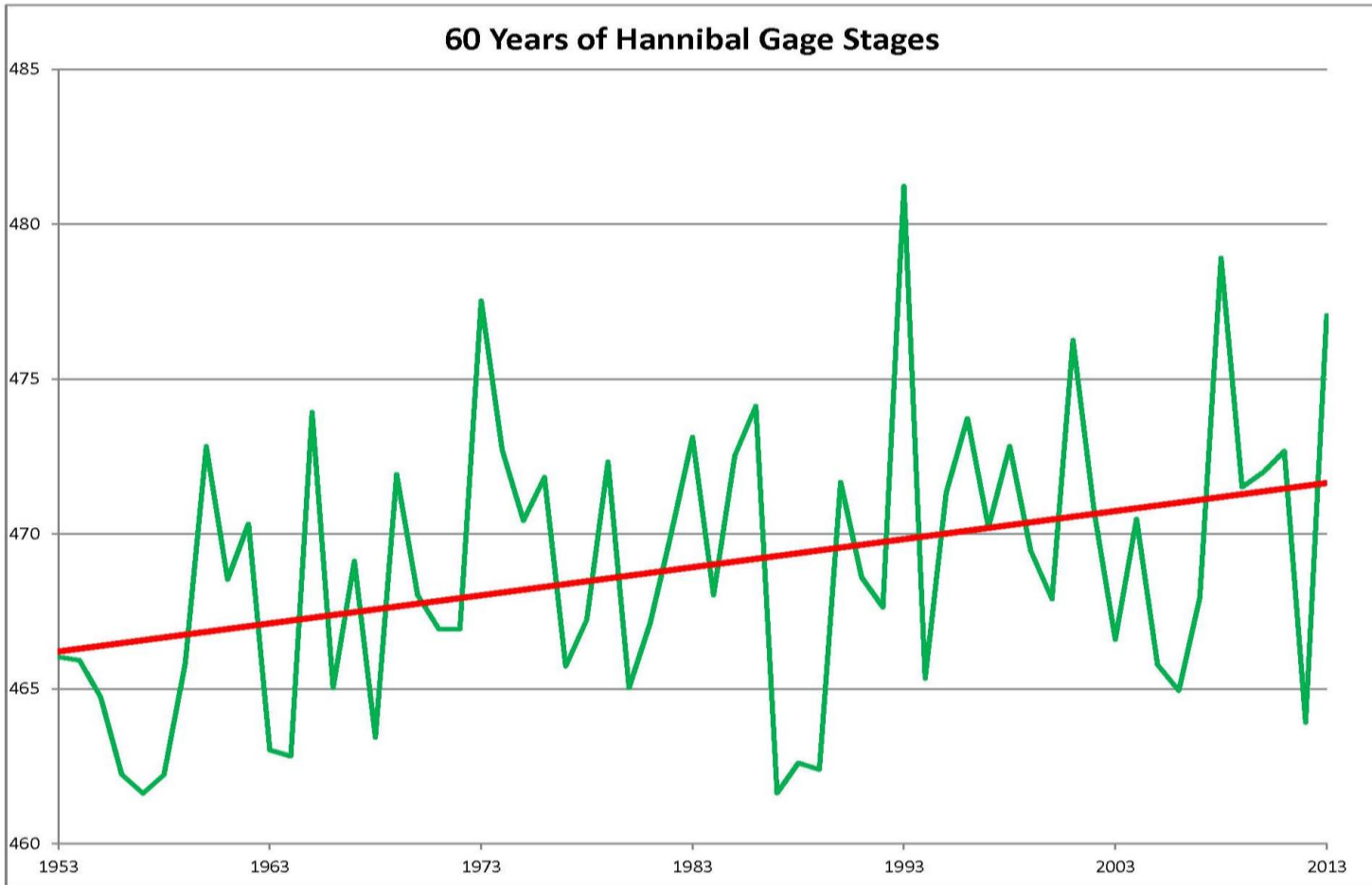
# Rainfall Change



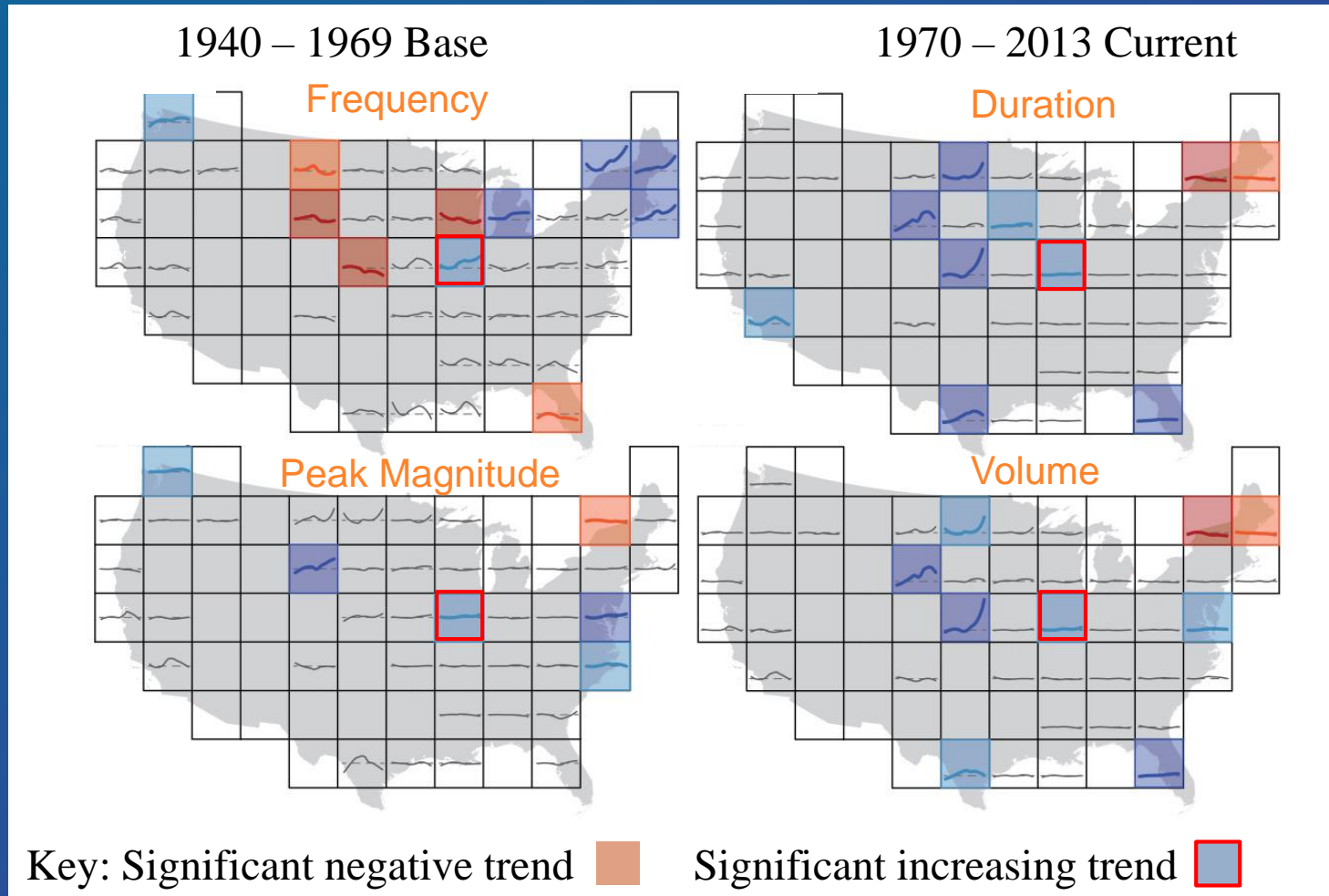
# Average Water Elevations



# Maximum Water Elevations



# 2016 Fragmented patterns of flood change across the USA





For Example:

Change in 100 year Event at Hannibal Missouri

1979 – 475.7

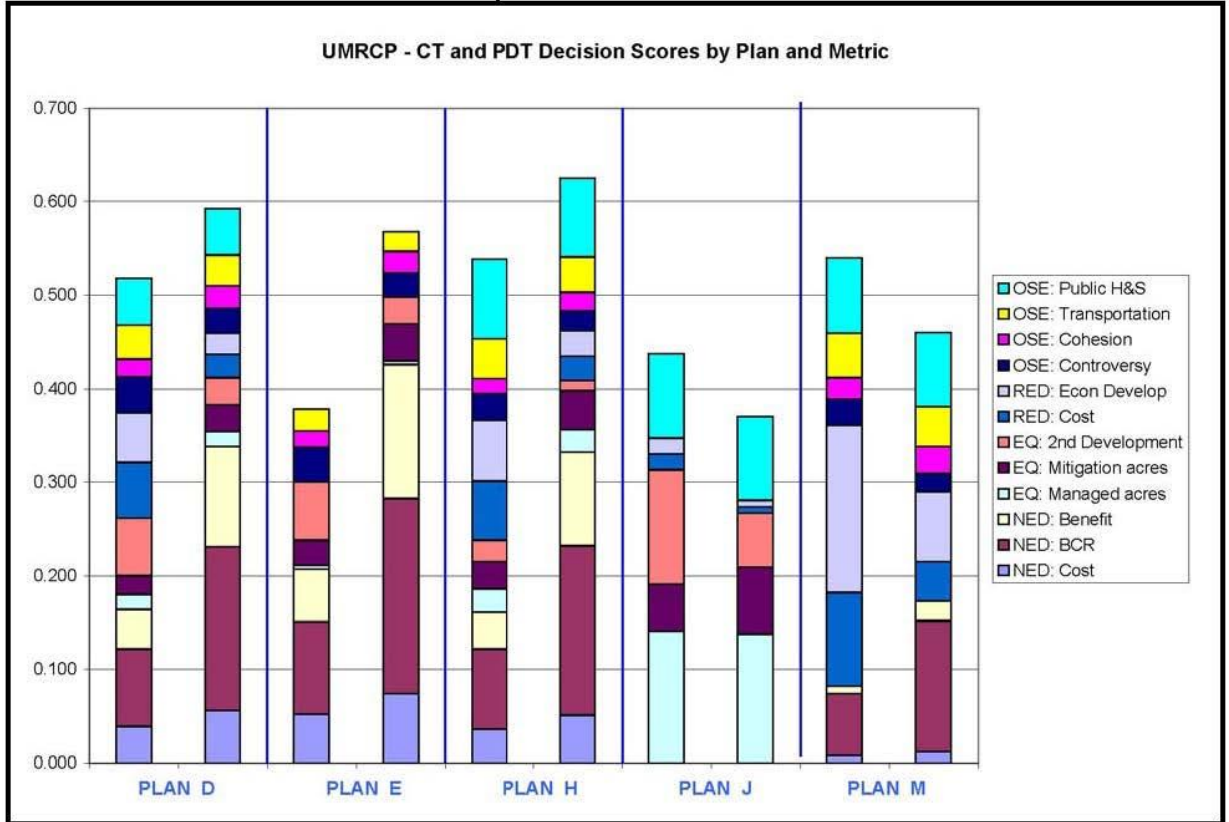
2004 – 477.5

Today – 478.4

**2.7 Feet Higher!**

# Risk Informed Decision Framework (RIDF)







**FIGURE 4 RIDF Decision Scores by Plan and Metric**

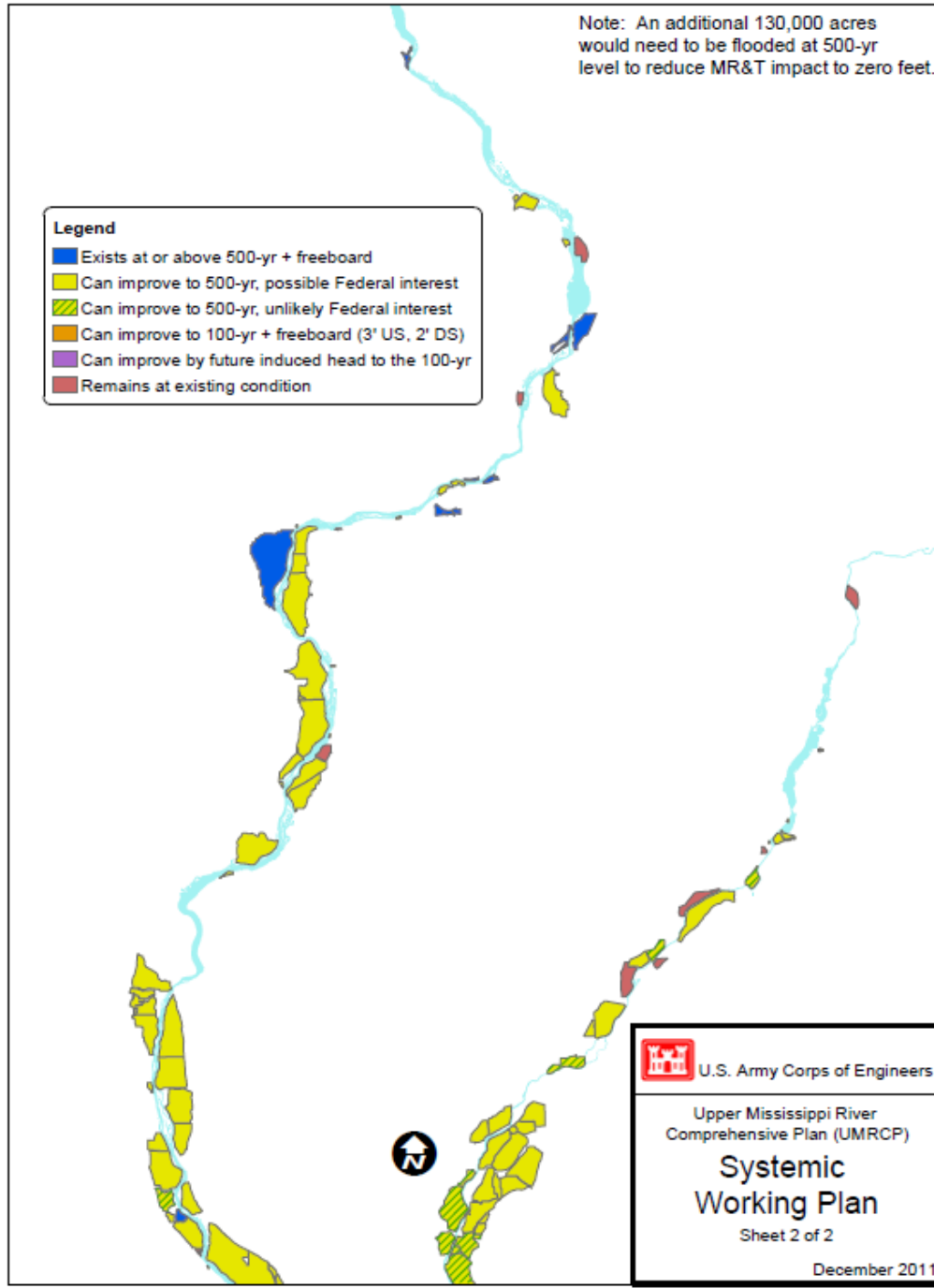





Note: An additional 130,000 acres would need to be flooded at 500-yr level to reduce MR&T impact to zero feet.

**Legend**

-  Exists at or above 500-yr + freeboard
-  Can improve to 500-yr, possible Federal interest
-  Can improve to 500-yr, unlikely Federal interest
-  Can improve to 100-yr + freeboard (3' US, 2' DS)
-  Can improve by future induced head to the 100-yr
-  Remains at existing condition



 U.S. Army Corps of Engineers

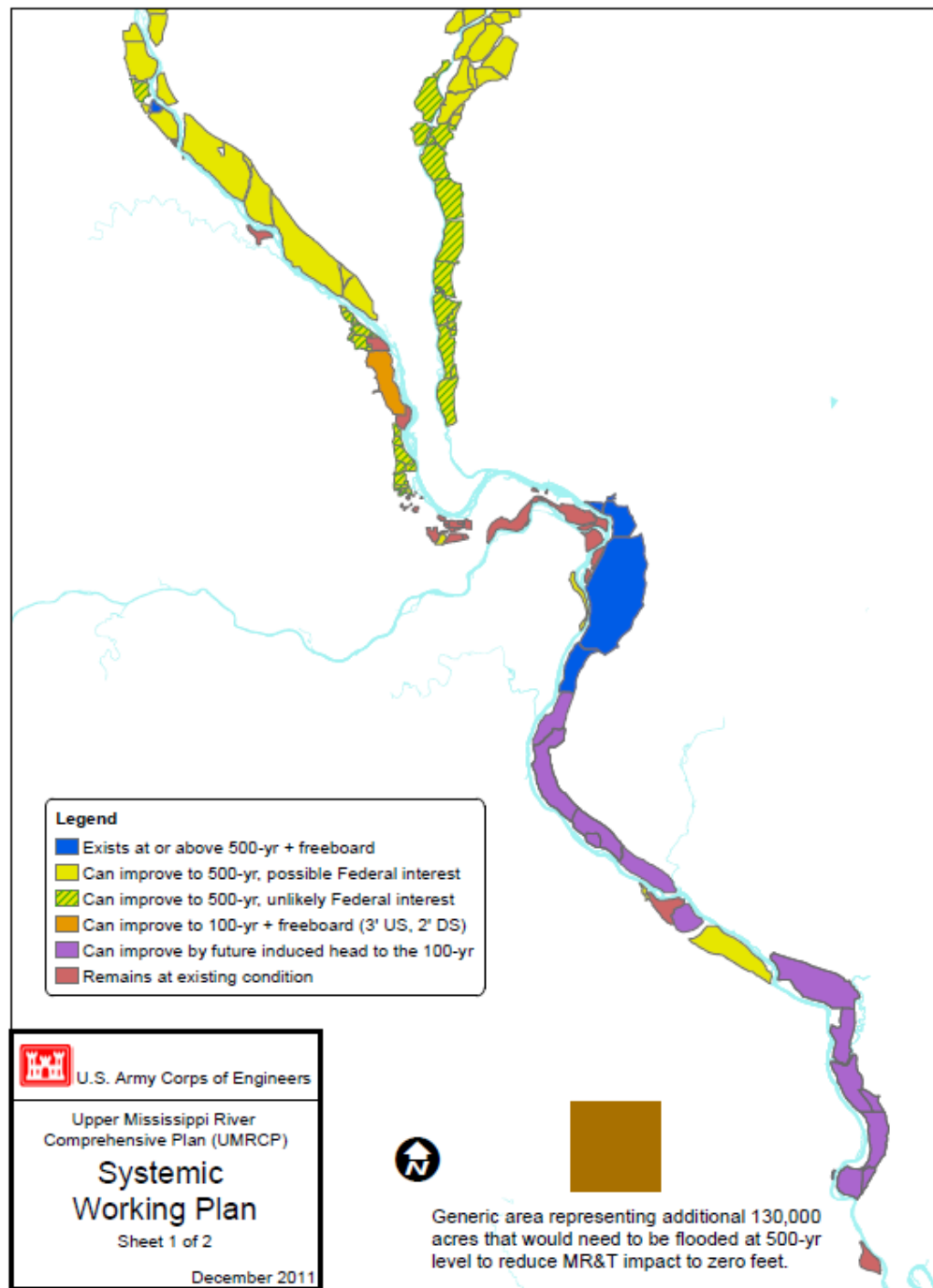
Upper Mississippi River  
Comprehensive Plan (UMRCP)

### Systemic Working Plan

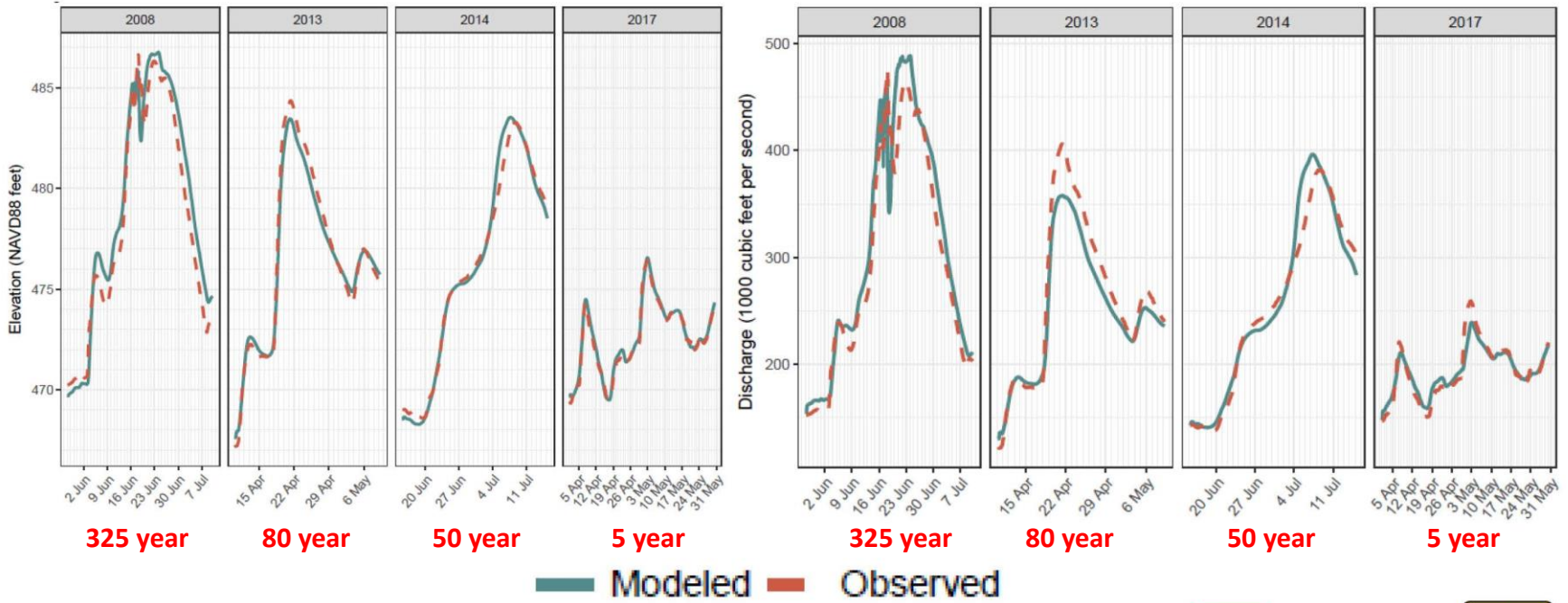
Sheet 2 of 2

December 2011

# 2011 Working Plan



## Mississippi River, Wyaconda to Fabius Reach River Station 324.81, Gauge L&D 21 Tail Existing Levee Elevation Calibration



## **Model Conclusions:**

**The model becomes unstable & uncertain on higher flood events, above the 100 years.**

**Too many uncertainties in our current system with or without flood fighting**

**Sand levees need to be 2 feet above projected crests. Failure in sand levees an extreme expensive to repair, and any failure rapidly alters model.**

**For a reliable system we need a PLAN!**

# We have a choice:

## **DO NOTHING**

and continue with uncontrolled, high cost disasters

## **WORK TOGETHER**

to create a plan for reliable conveyance of major flood waters

**Vision: An Upper Mississippi that  
can convey a Project Flood  
(similar to the respective  
magnitude of the Lower  
Mississippi MR &T)  
through the Upper Valley**

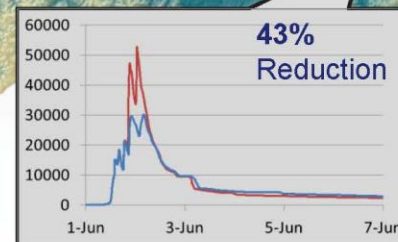
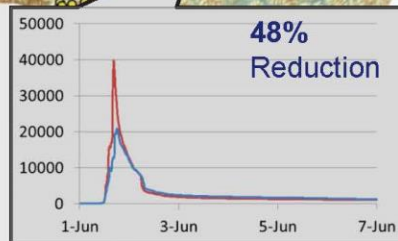
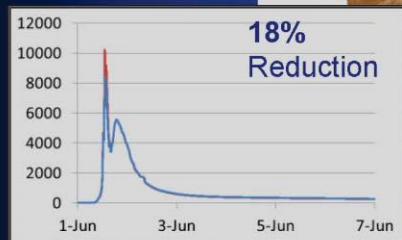
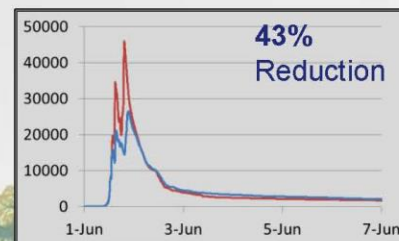
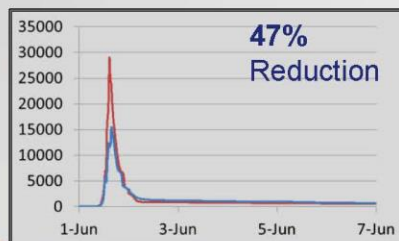
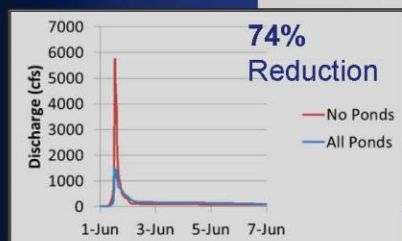
**The project flood shall: have minimal property damage and no loss of life, keep property in private ownership to the fullest extent possible, provide adequate compensation for voluntary storage, and be concurrent with a sedimentation plan to optimize channel maintenance for navigation.**

# Key Objectives of the Vision

1. Establish an Upland Storage Program in ALL five (5) upper states (via UMRBA Watershed study)
2. Provide a mechanism to compensate those for flood storage (via WRDA 18)
3. Develop distributed Levee Designs based on location, stakeholder participation, and regional benefits – a true PPP (fine tune Working Plan)
4. Assure sand levee sections are higher than the 500 year design, with hardened low end closure levees.
5. Authorize a governing body to execute the plan – recommending the MRC (via WRDA once plan is authorized)

# Reduction in Peak Flow

100 yr Storm, 7.5" inches of rain in 24 hours





Let's get the Plan authorized while  
we have a pro-growth  
Administration



**Thank you!**

*Michael D. Klingner, P.E.  
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[www.UMIMRA.org](http://www.UMIMRA.org)*

