

# Corps Water Management System (CWMS)

Real-Time Decision Support Modeling & Mapping

## Inter-Agency Flood Risk Characterization Workshop

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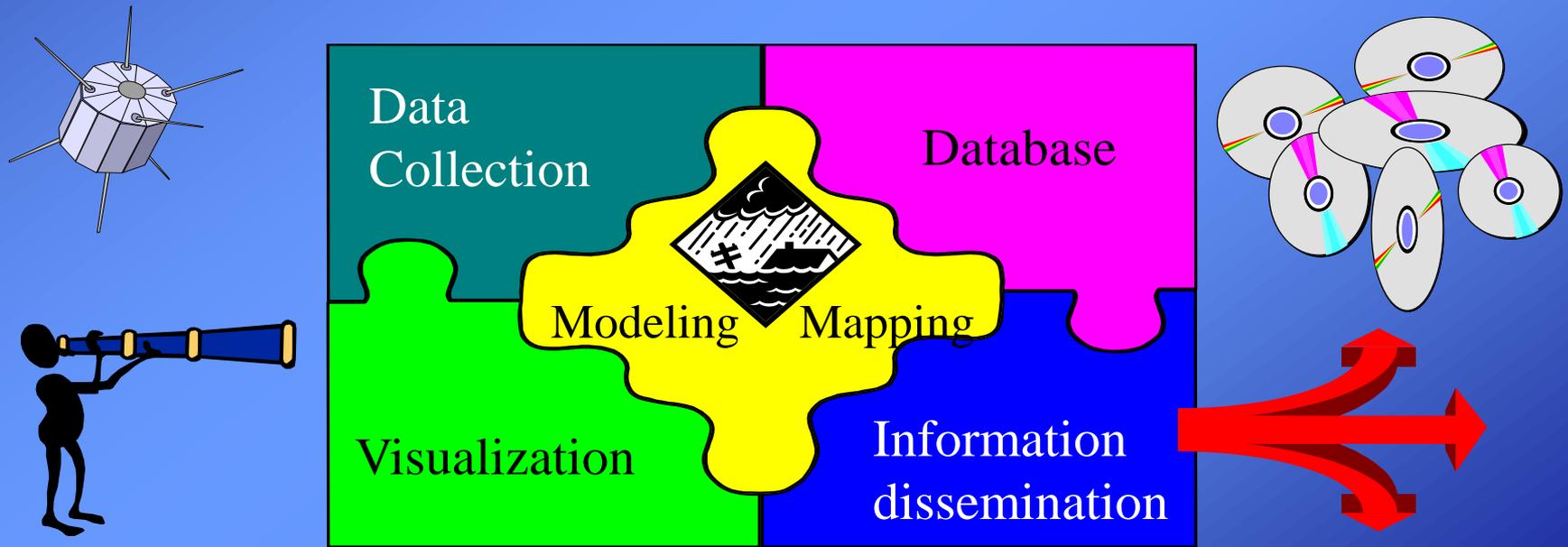
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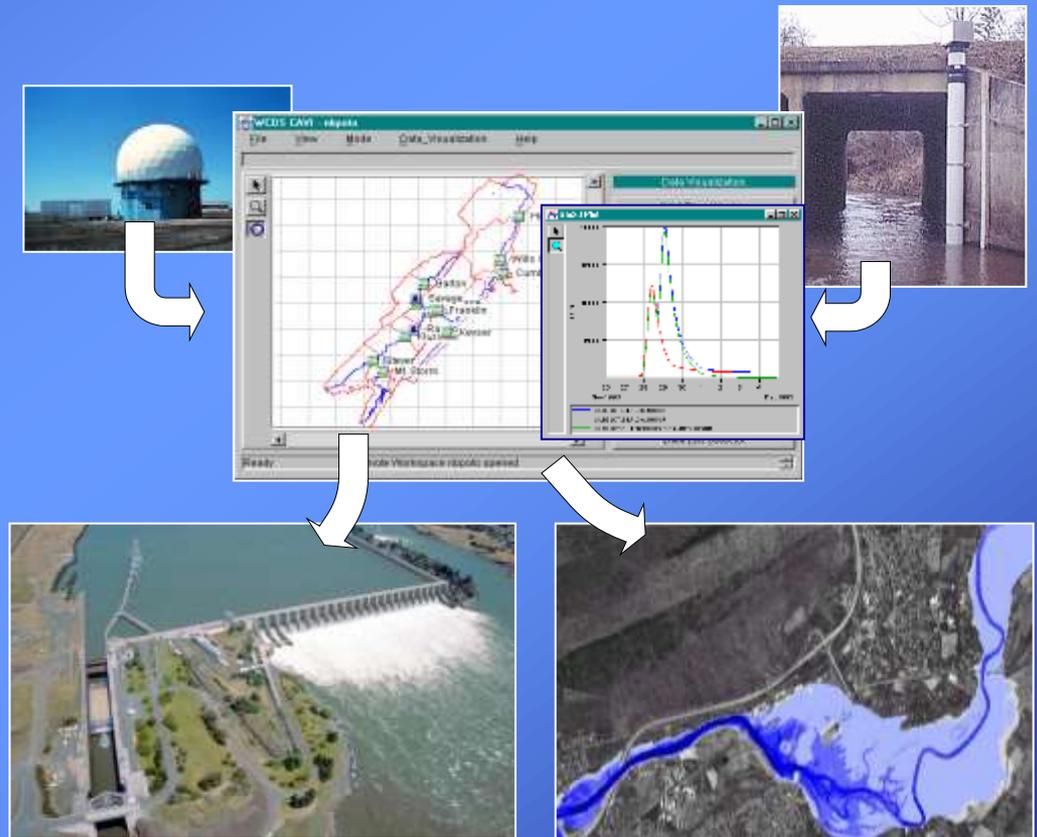
# Corps Water Management System (CWMS) Overview

An integrated suite of hardware, software, and communication resources supporting Corps' real-time water management mission.

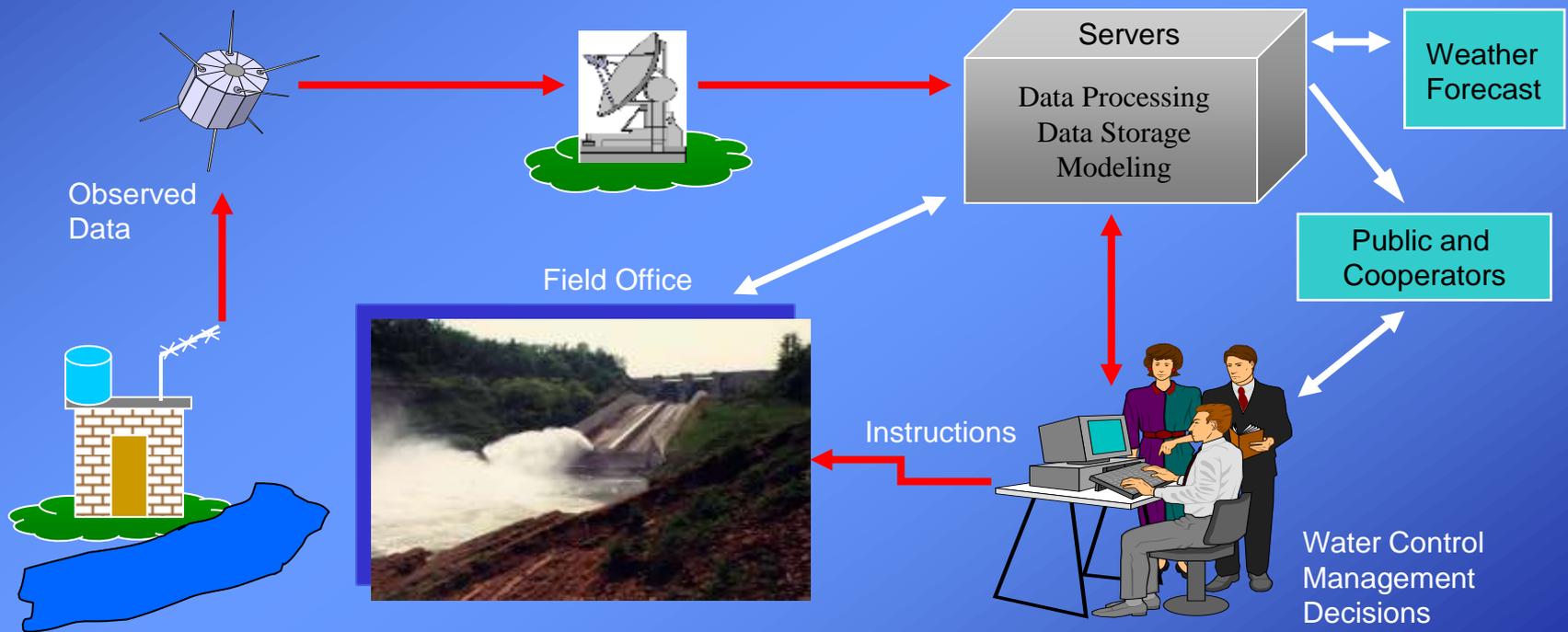


# Corps Real-Time Water Management Mission

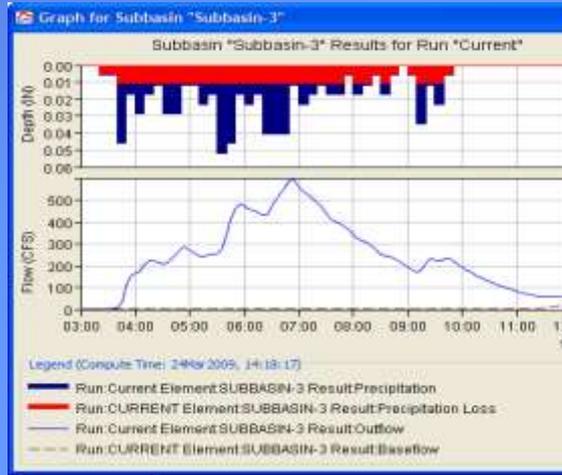
- Real-Time Decision Support for Water Management
- 700+ Multipurpose Reservoirs and Flow Control Structures, Thousands of Miles of Levees
- 120+ Section 7 Projects
- To achieve the full range of authorized purposes from all of our projects for floods droughts and everything in between



# CWMS Software Integrates the Processing from Data to Water Management Decisions

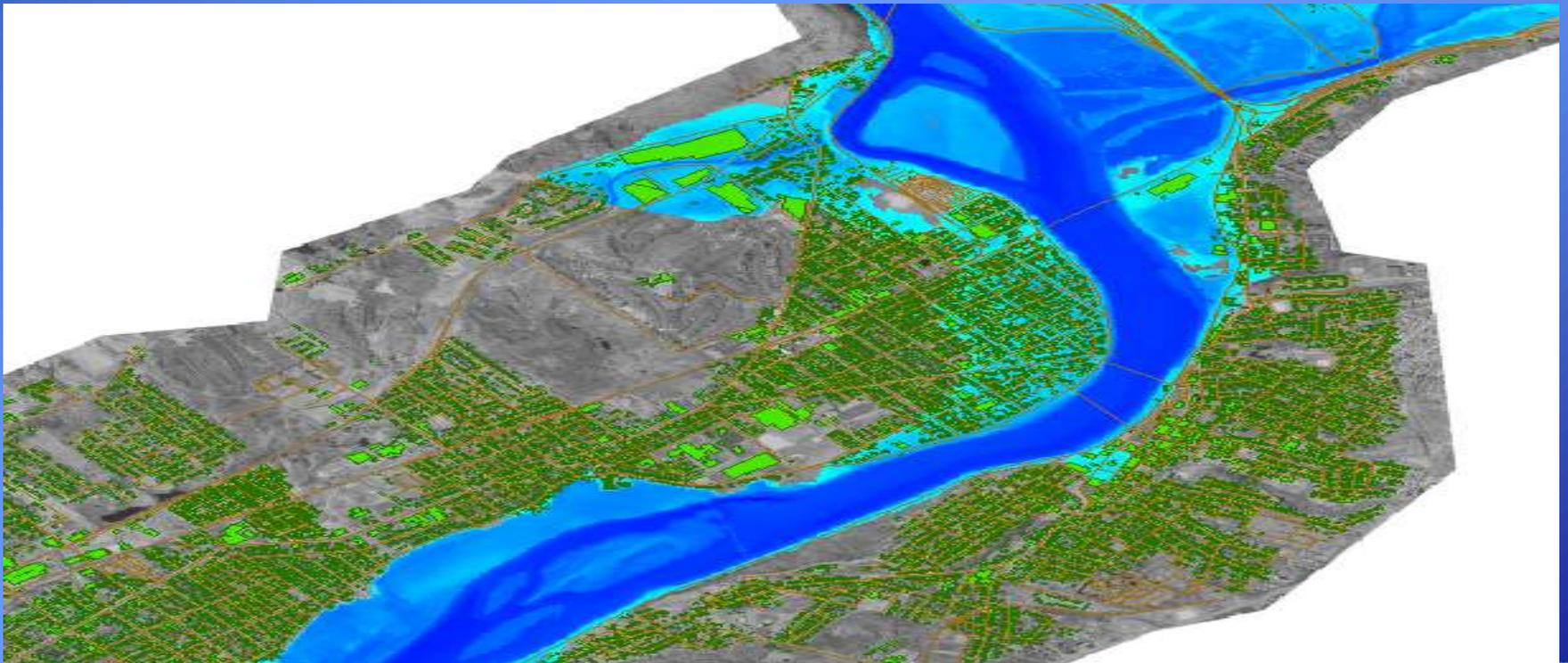


# CWMS Modeling



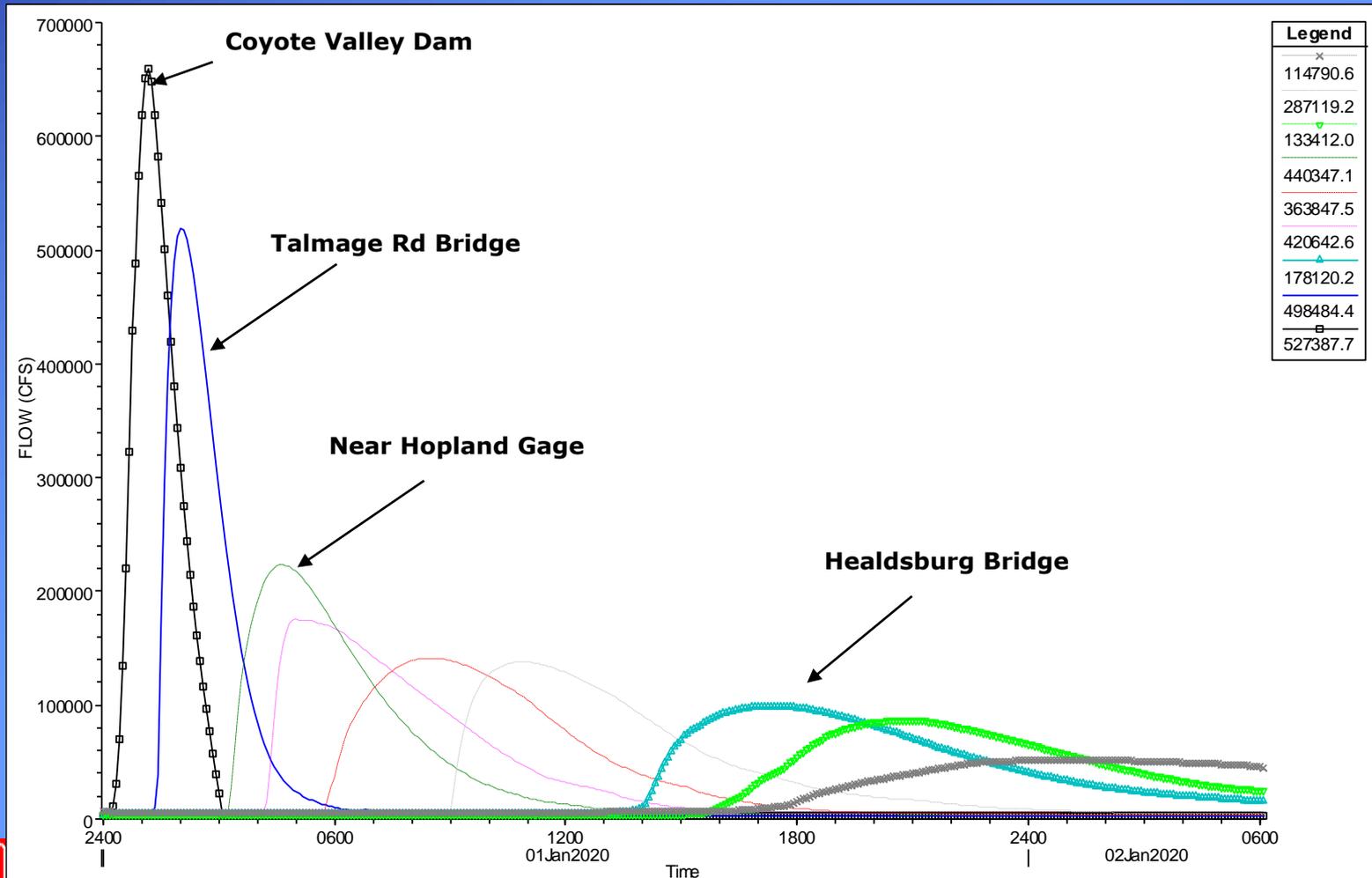
# Inundation Mapping

- Delineates geographic extent of flooding using model results and topography
- Inundation boundaries and depth maps are computed then viewed



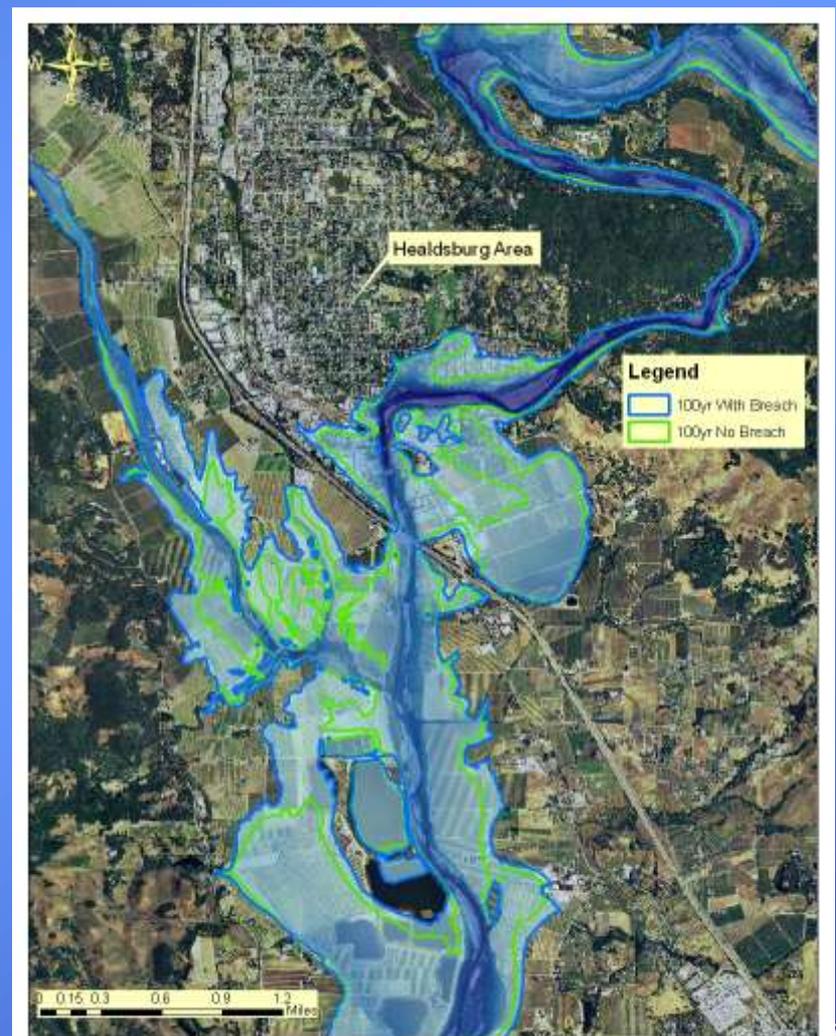
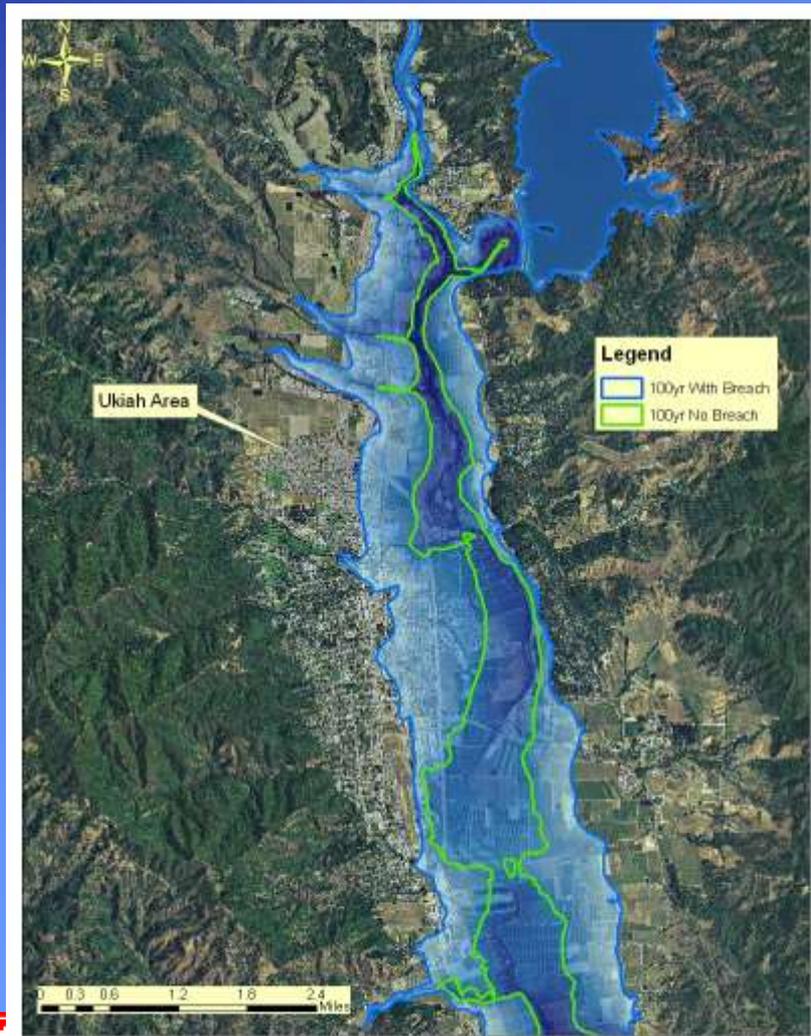
# Model Results

## Sunny Day Failure of Coyote Dam



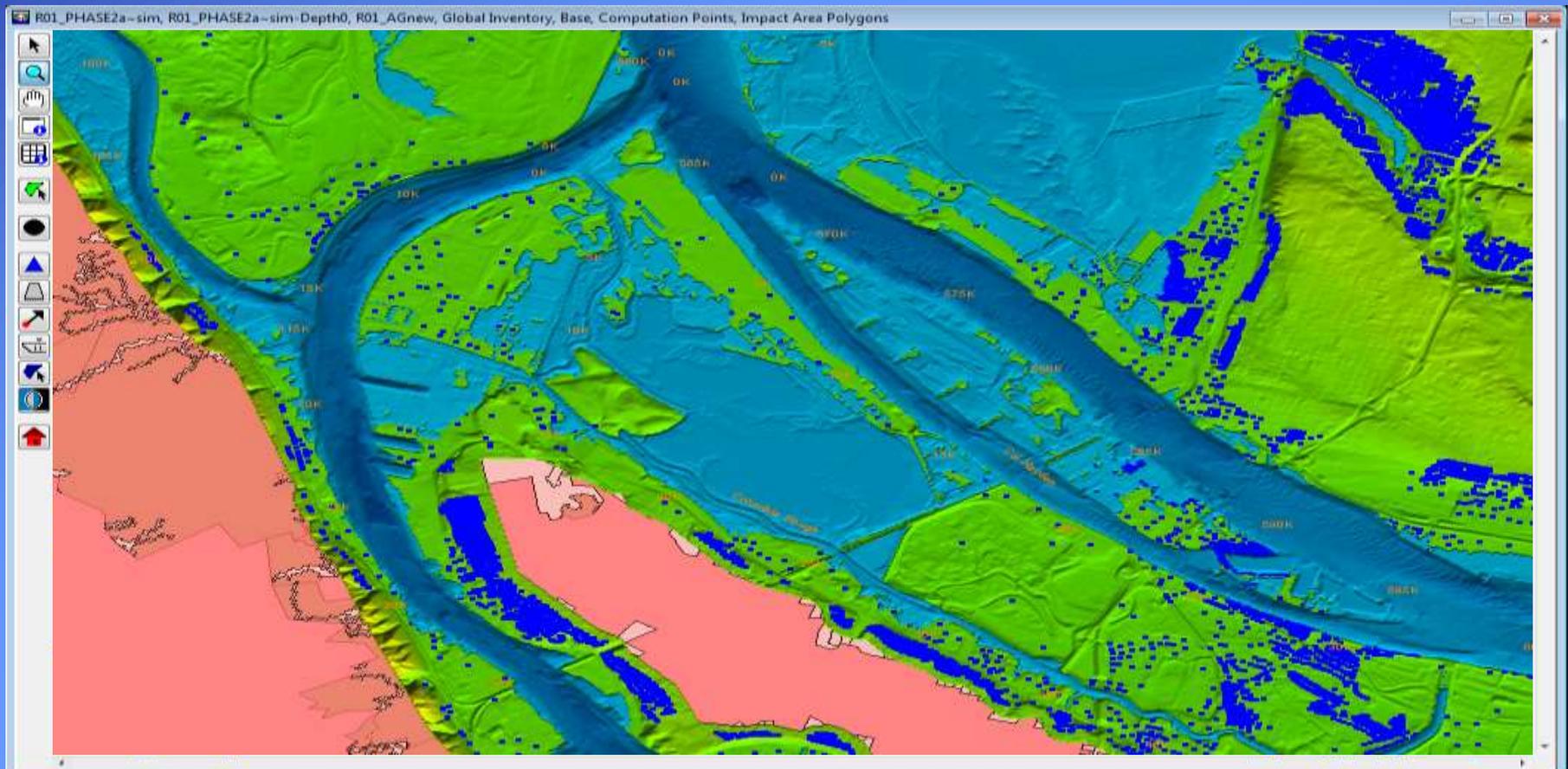
# Model Results

## 1% Event With/Without Failure of Coyote Dam

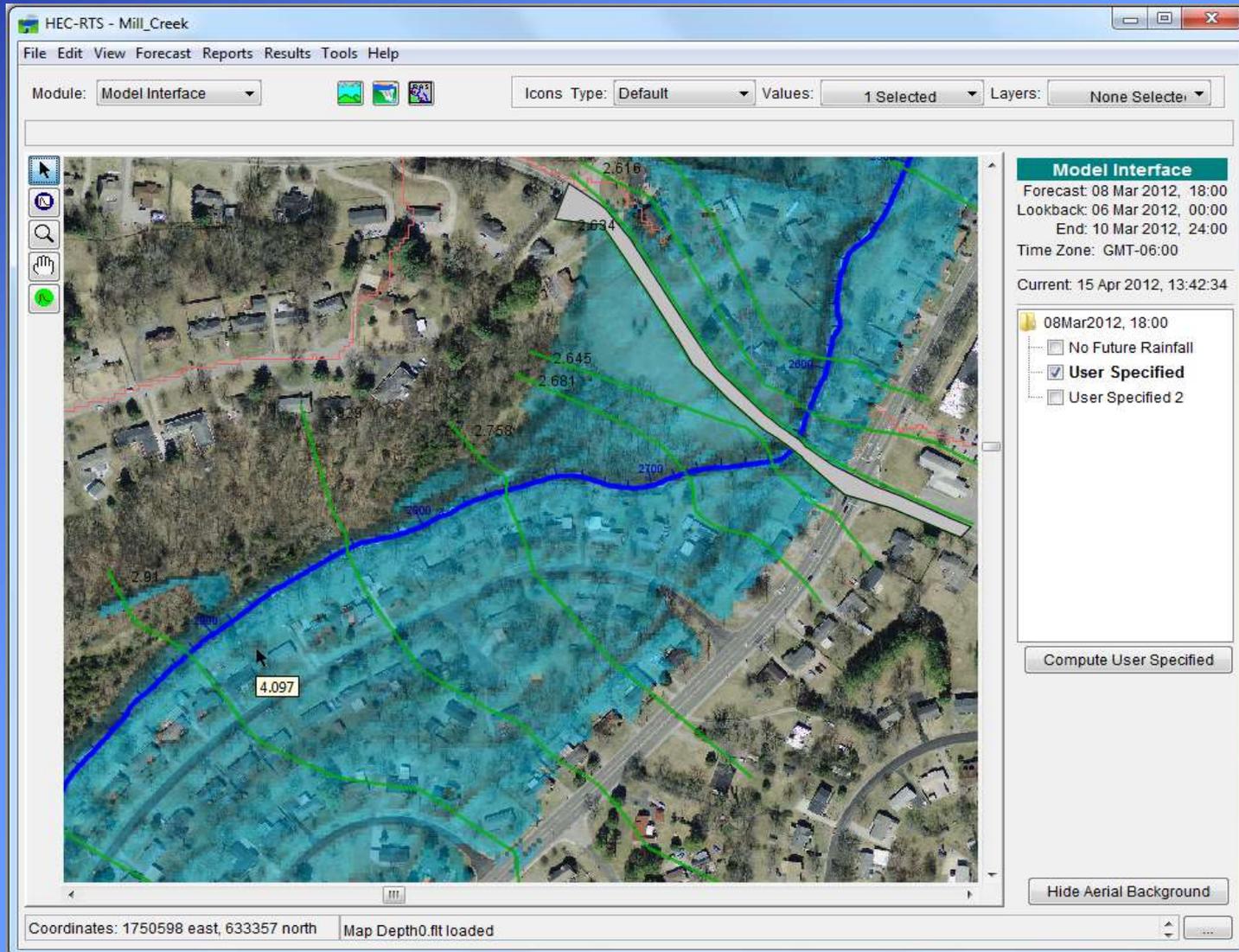


# Explaining Risk thru Inundation Maps

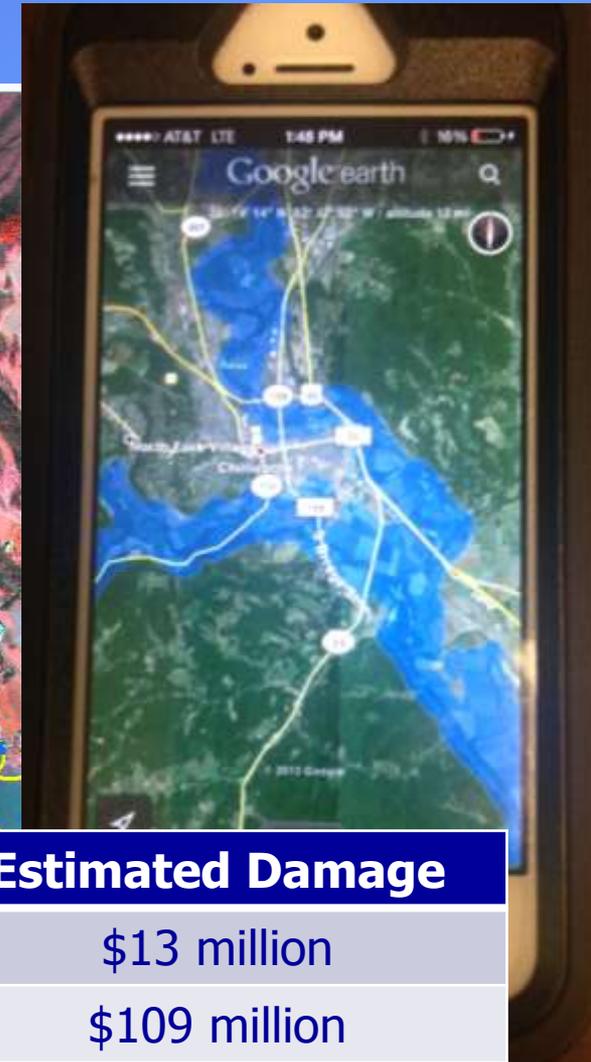
Inundation boundaries and depth maps are viewed and used for consequence estimates but also great way to inform public of risk.



# Viewing Inundation Depths



# Consequence Estimation



Scenario	Structures Flooded	Estimated Damage
Normal Operation	140	\$13 million
Without Projects	740	\$109 million
Damage Prevented	600	\$96 million



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# Nashville Flooding – May 2010



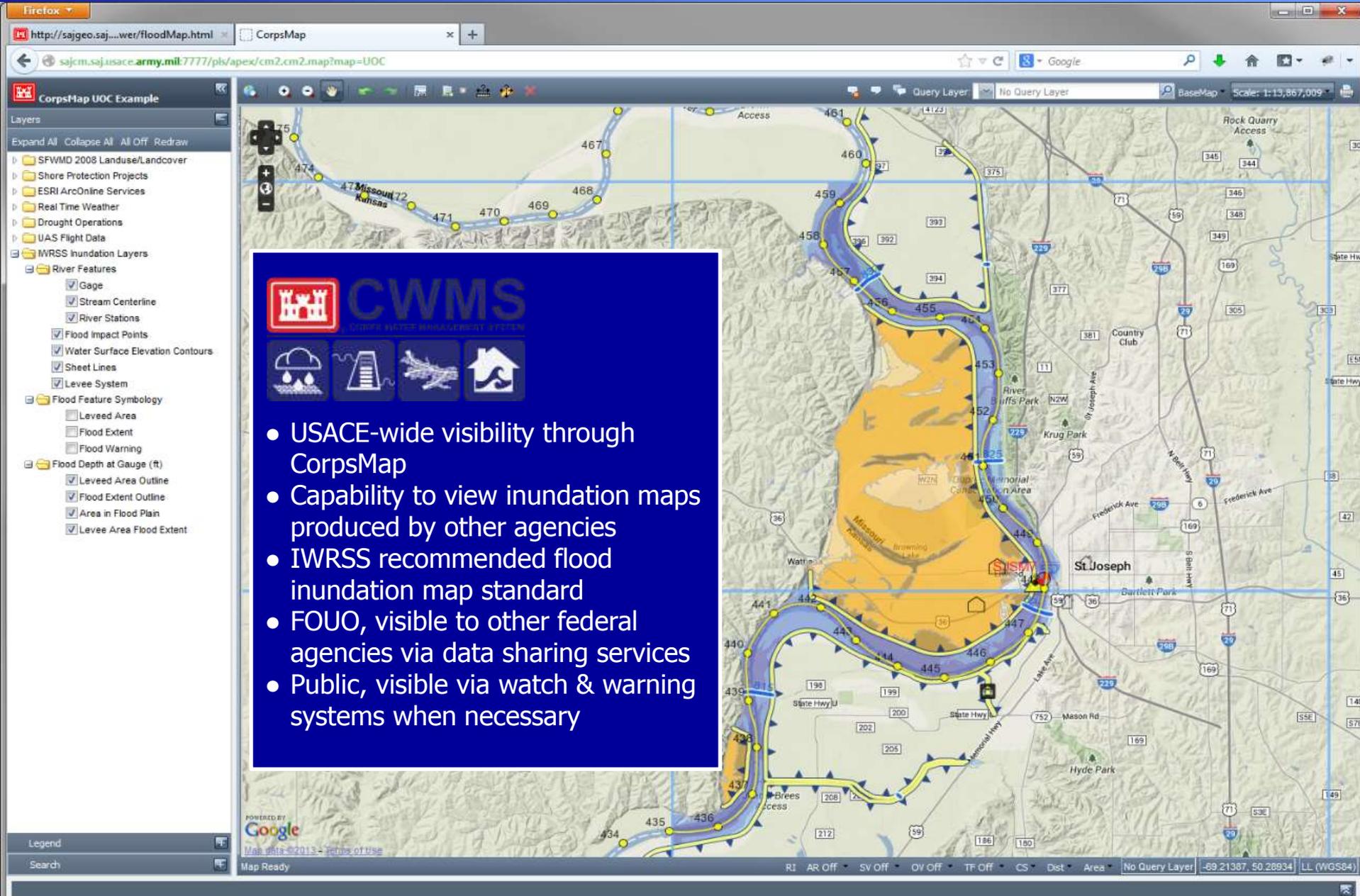
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# Nationally Consistent Viewing of Inundation Maps



The screenshot shows a web browser window with the URL `http://sajgeo.saj.usace.army.mil:7777/pls/apex/cm2.cm2.map?map=UOC`. The browser title is "CorpsMap". The page content is a map interface for "CorpsMap UOC Example". The map displays a river system with a yellow inundation area. The left sidebar shows a "Layers" panel with various map layers, including "SFWMD 2008 Landuse/Landcover", "Shore Protection Projects", "ESRI ArcOnline Services", "Real Time Weather", "Drought Operations", "UAS Flight Data", and "IWRSS Inundation Layers". The "IWRSS Inundation Layers" section is expanded, showing "River Features" (Gage, Stream Centerline, River Stations), "Flood Impact Points" (Water Surface Elevation Contours, Sheet Lines, Levee System), "Flood Feature Symbology" (Leveed Area, Flood Extent, Flood Warning), and "Flood Depth at Gauge (ft)" (Leveed Area Outline, Flood Extent Outline, Area in Flood Plain, Levee Area Flood Extent). A blue overlay box in the center of the map contains the CWMS logo and a list of bullet points.

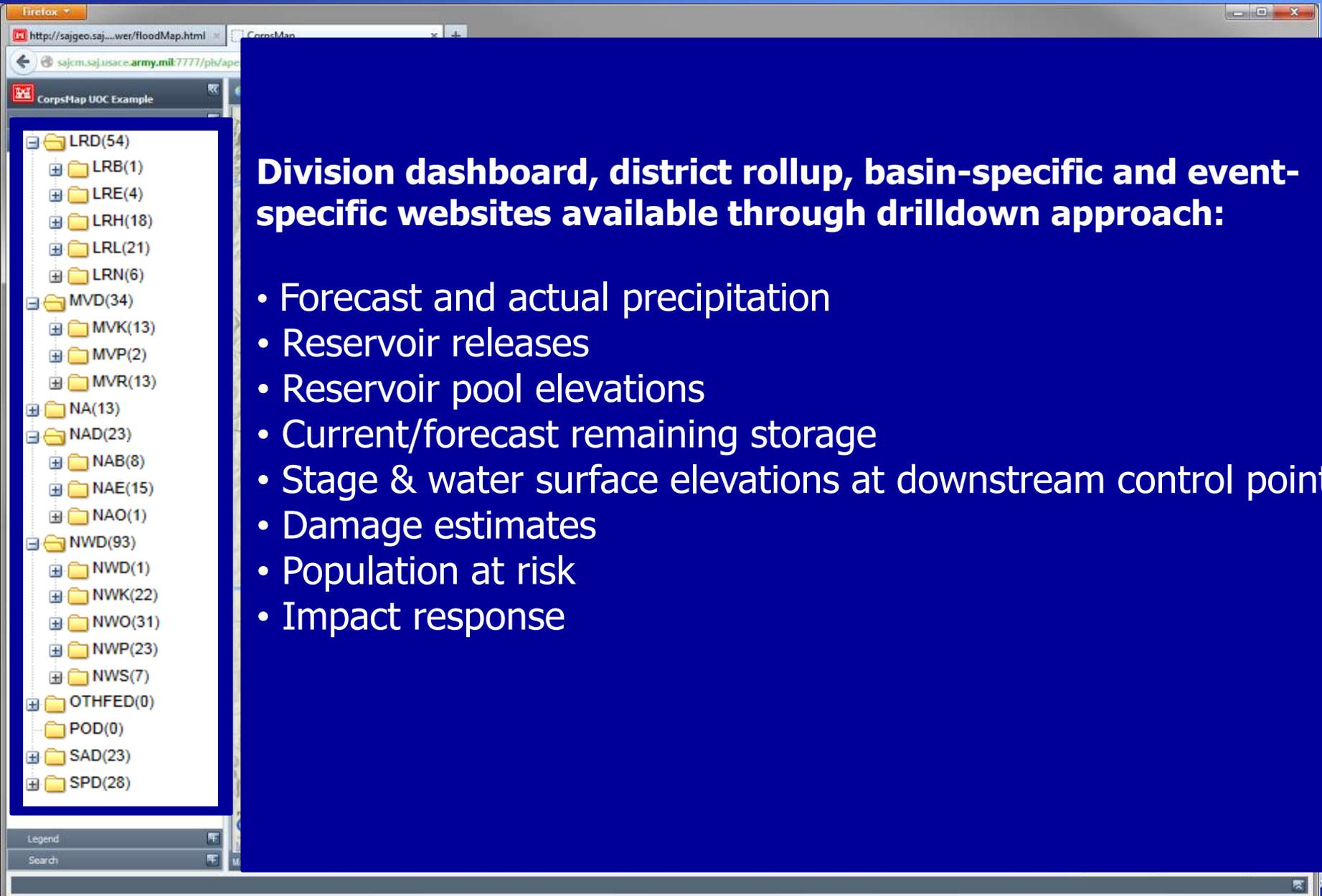
**CWMS**  
CORPS WATER MANAGEMENT SYSTEM

- USACE-wide visibility through CorpsMap
- Capability to view inundation maps produced by other agencies
- IWRSS recommended flood inundation map standard
- FOUO, visible to other federal agencies via data sharing services
- Public, visible via watch & warning systems when necessary

# Nationally Consistent CWMS Reporting

**Division dashboard, district rollup, basin-specific and event-specific websites available through drilldown approach:**

- Forecast and actual precipitation
- Reservoir releases
- Reservoir pool elevations
- Current/forecast remaining storage
- Stage & water surface elevations at downstream control points
- Damage estimates
- Population at risk
- Impact response



# Other Flood Risk Metrics

- Economic and Environmental Performance
- Annual Exceedance Probability
- Conditional Non-Exceedance Probability
- Long-Term Exceedance Probability
- Risk Maps
- Loss-of-life



# Fortunately CWMS Supports

Prepare for Tomorrow

Transform Civil Works



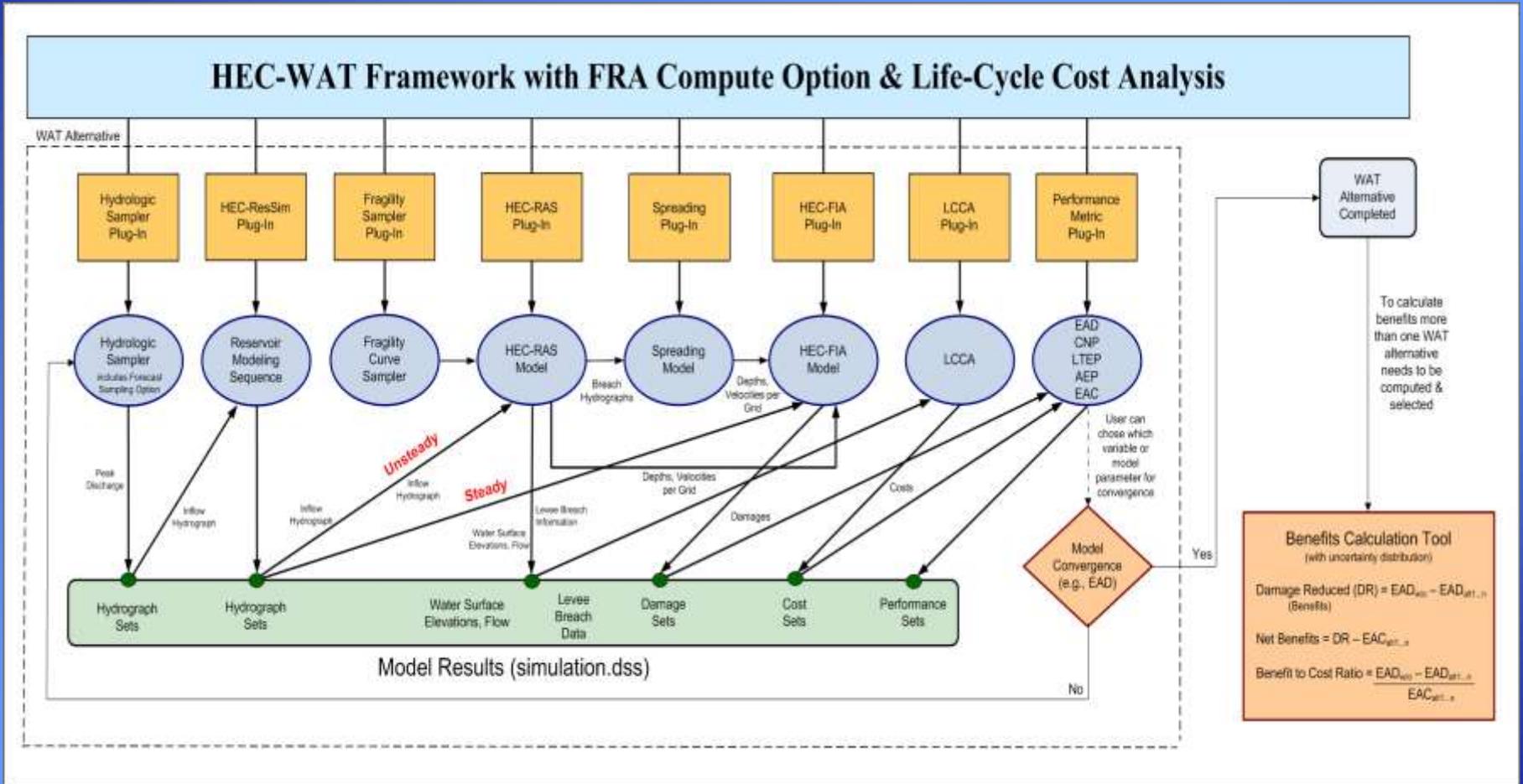
Reduce Disaster Risks

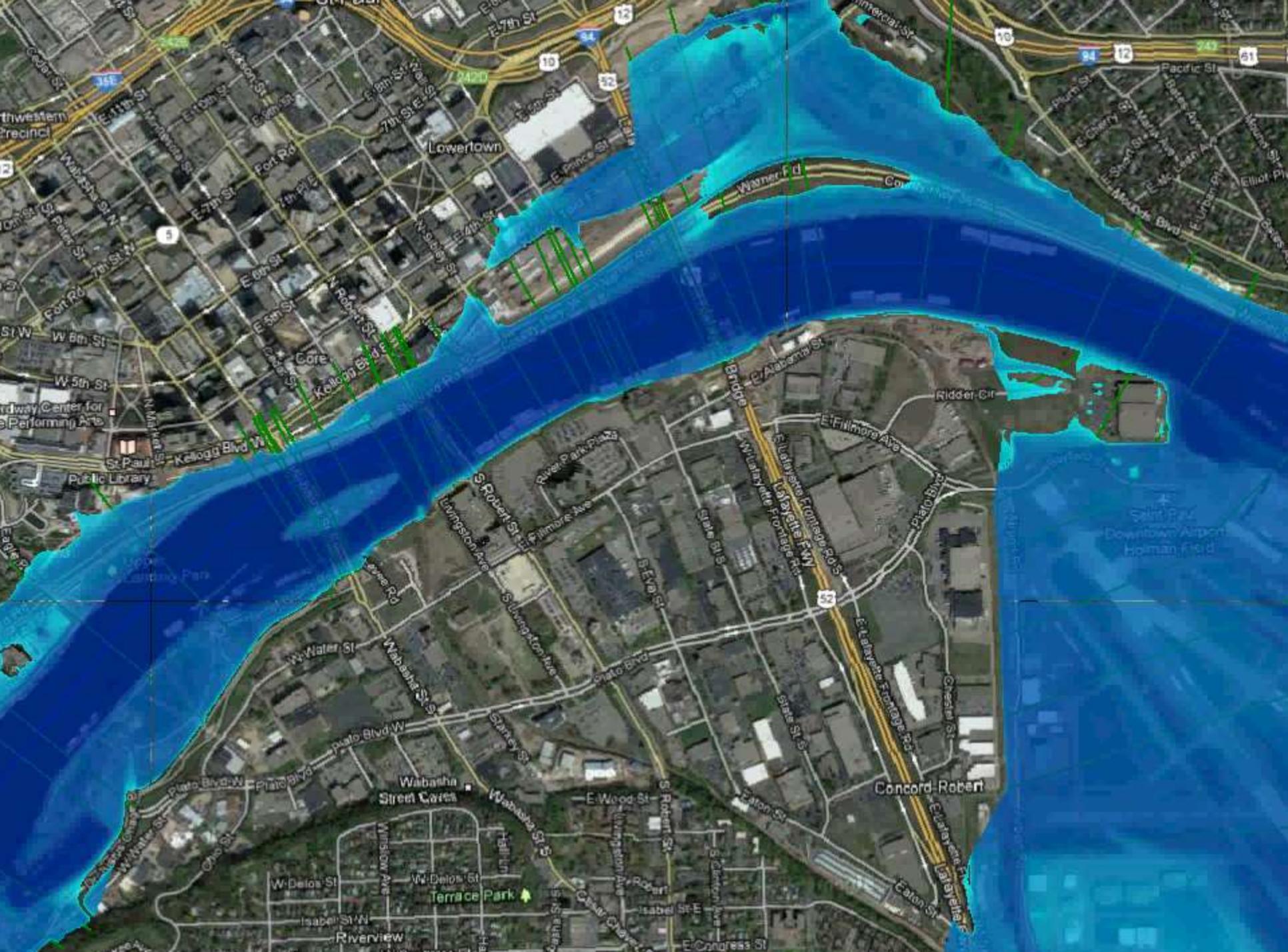


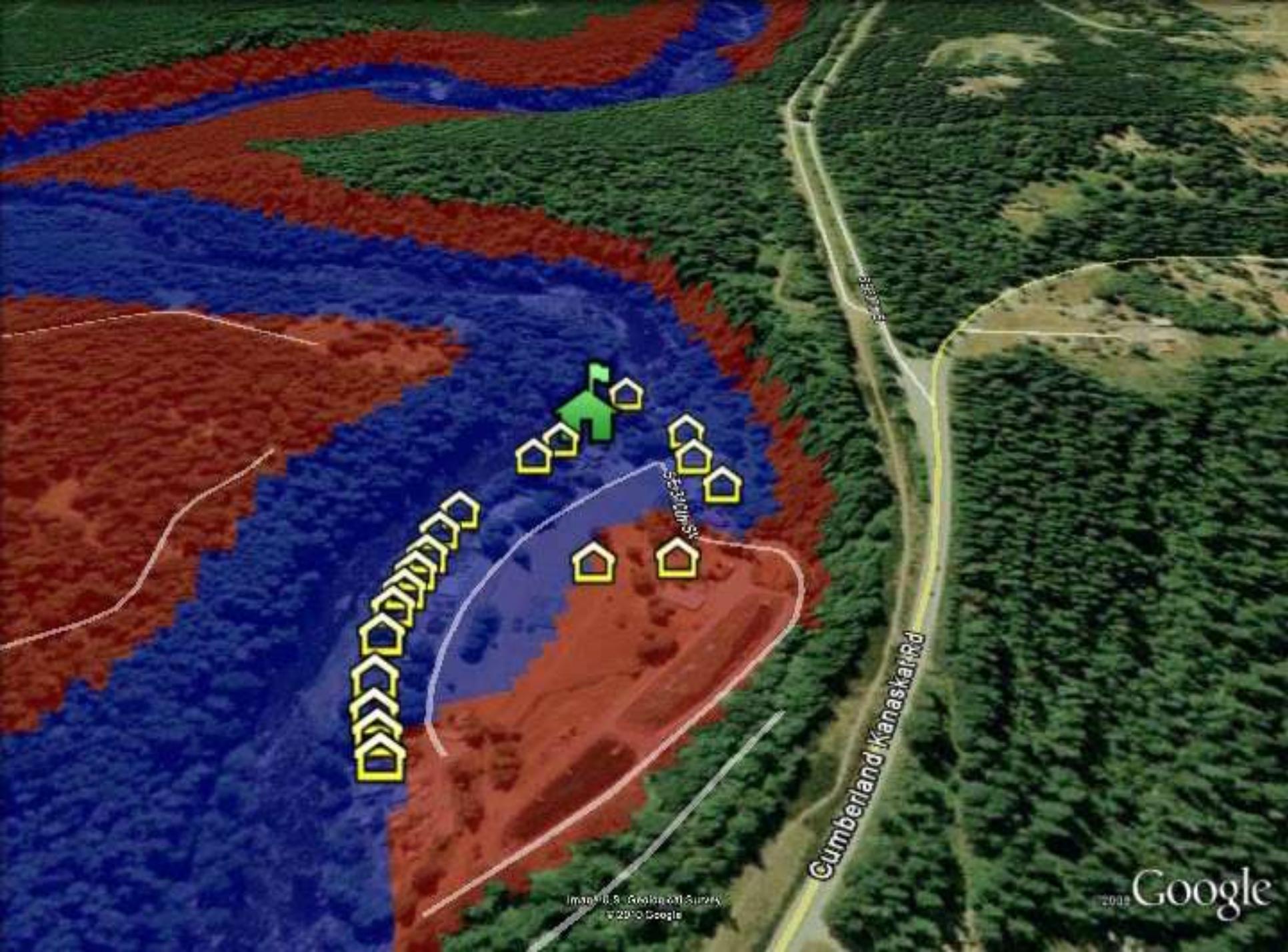
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# HEC-WAT to Perform Watershed, System, Risk and Life-Cycle Evaluations







# CWMS

Corps Water Management System

Questions?



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# Risk Analysis Hang-ups

- Design Standard Paradigm. (People tend to be risk adverse.)
- It can't be done. (i.e. Lack of understanding by the practitioners.)
- What is the value added? (How do we make decisions differently?)
- It costs too much.
- How do we communicate to the Stakeholders?
- How do we communicate to the Decision Makers?

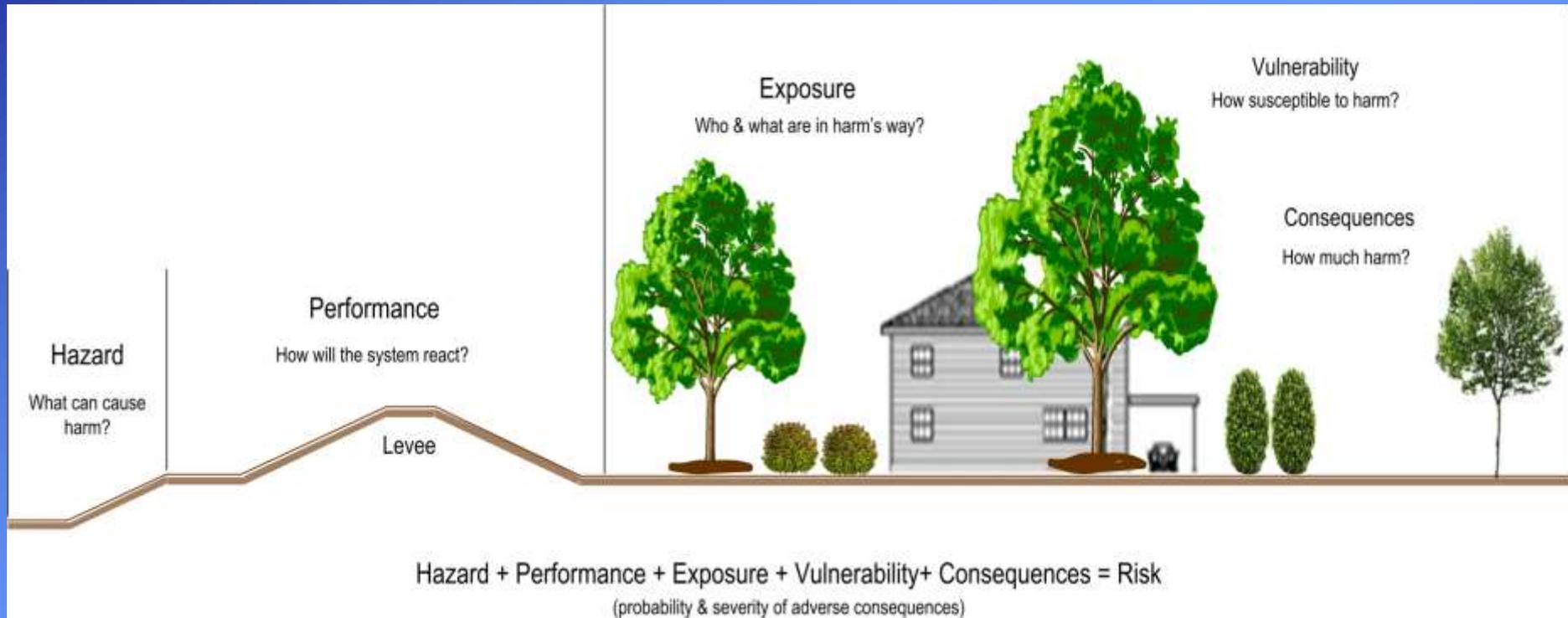
# Risk Analysis Hang-ups

Even for the well informed, terminology/practice continues to change.

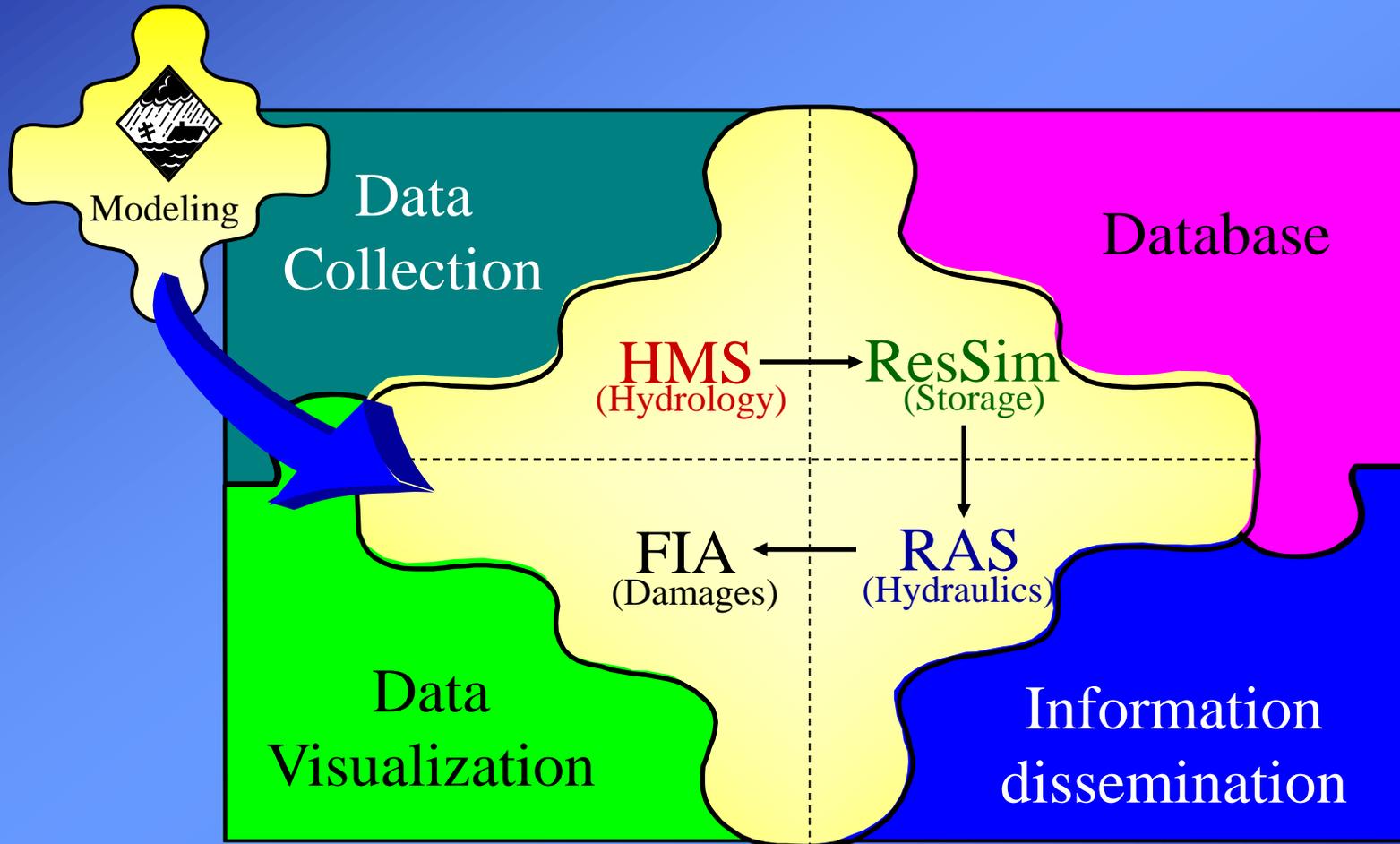
- Risk Based
- Risk Analysis
- Risk and Uncertainty
- Risk Management
- Risk Assessment
- Risk Informed
- Residual Risk
- Probabilistic Risk Assessment
- Probabilistic Flood Risk Assessment
- Tolerable Risk



# Risk Conceptualized



# Watershed Modeling



# Data and Model Results Visualization

