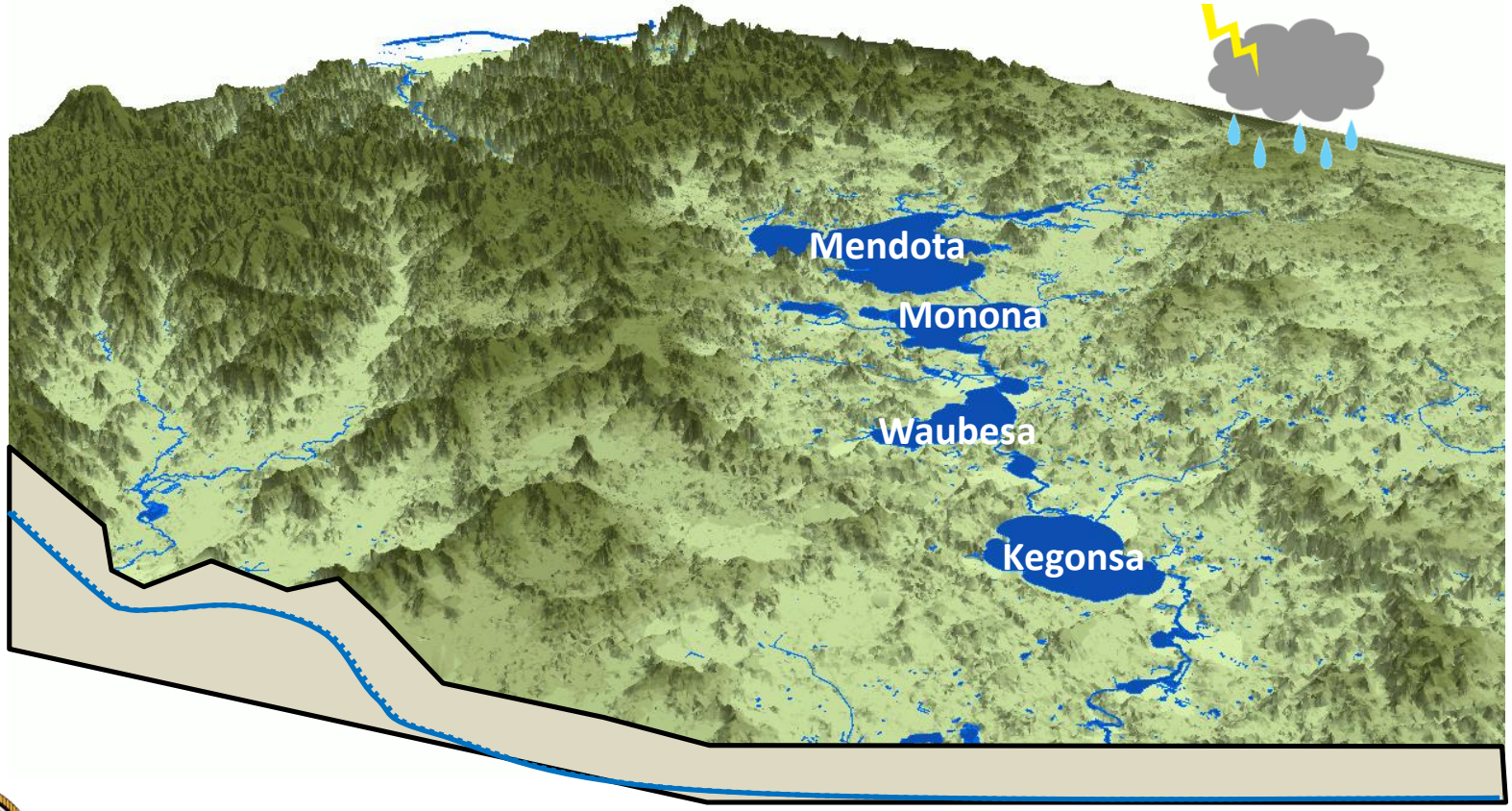
Flood Risk and Warning for the Yahara River Chain of Lakes (RCL)

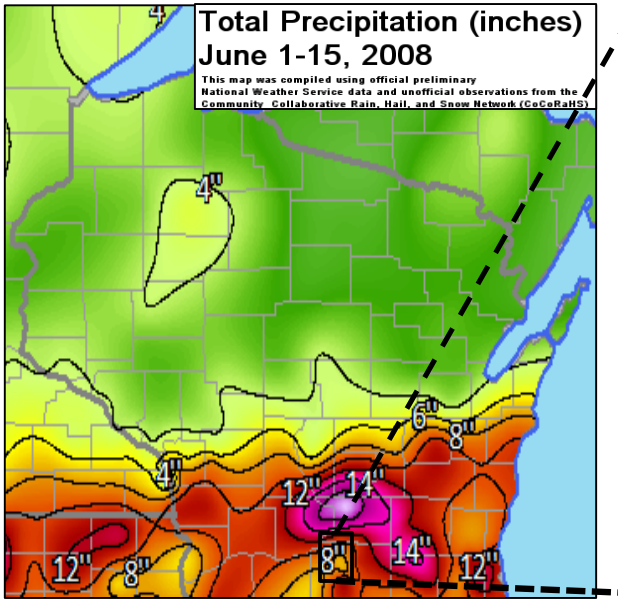


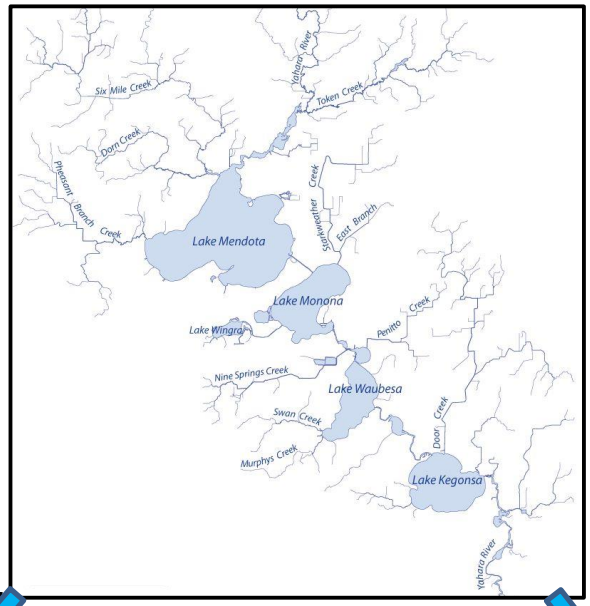
John Reimer, Chin Wu

University of Wisconsin, Madison

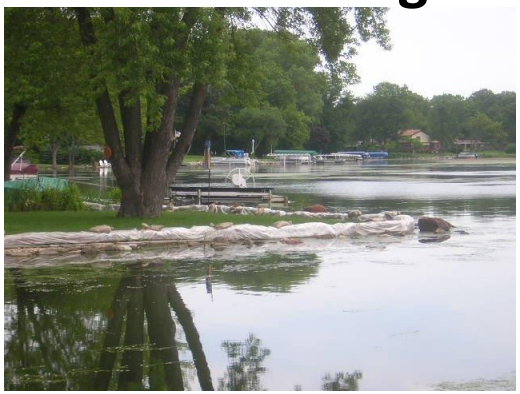
AWRA Wisconsin, 42nd Meeting
March 8, 2018

Motivations





Lake Flooding



Loss

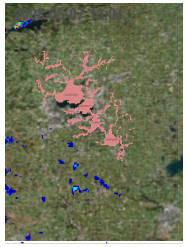
Date	Event	Property Damage ($ Million)	Crop Loss ($ Million)	Total ($ Million)
June, 1993	Flood	$12.6	$10.0	$22.6
May, 1998	Severe Storms	$3.1	$0.15	$3.3
June, 2000	Flood	$6.1	$3.2	$9.3
Summer, 2002	Drought	$0	$4.4	$4.4
June, 2004	Tornado	$1.5	$0	$1.5
August, 2005	Tornado	$34.3	$.75	$35.1
May, 2006	Hail	$5.6	$0	$5.6
July, 2006	Flood	$10.0	$0	$10.0
August, 2007	Flood	$6.8	$5.0	$11.8
June, 2008	Severe Storms and Flooding	$13.5	$64.4	$77.9
	Total	**$93.5**	**$87.9**	**$181.5**

Urban Flooding

Objectives

- **Characterize Flood Risk**

Hazard
(Rainfall)

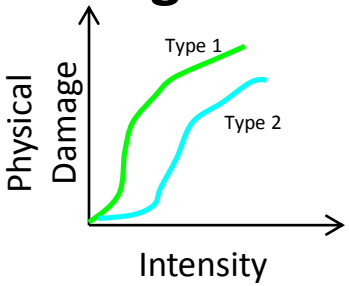


×

Vulnerability
(building)

×

Damage Curve



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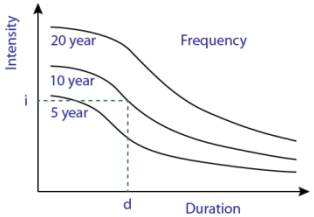
Risk

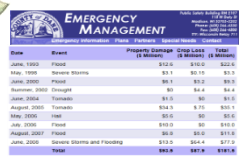
RP	A # B	V*A Eco	V*A #B (10^7)
5	368	32	1.93
10	490	69	3.44
25	699	194	10.00
50	856	375	19.91
100	1588	1096	51.07



Probability

×

Loss



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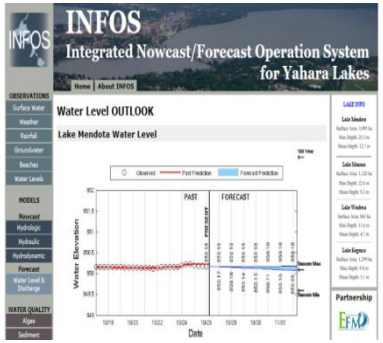
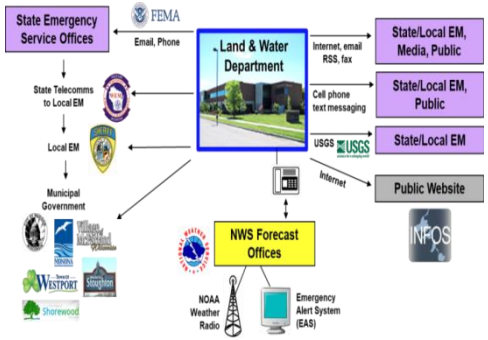
Probability of Loss

- **Develop Flood Forecast and Warning**



INFOS



COMMER Procedure

COmpiling Data

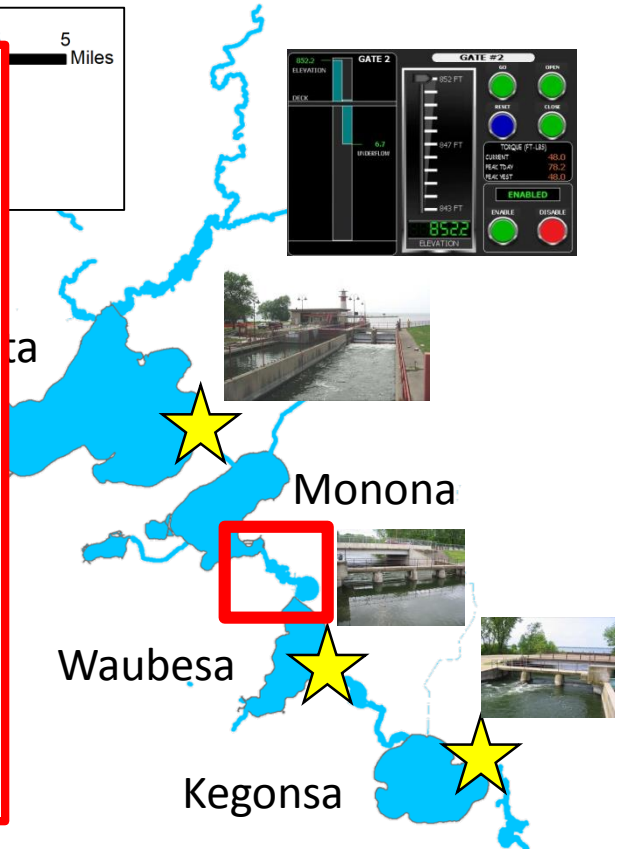
Dam Operation

Rainfall Hazard

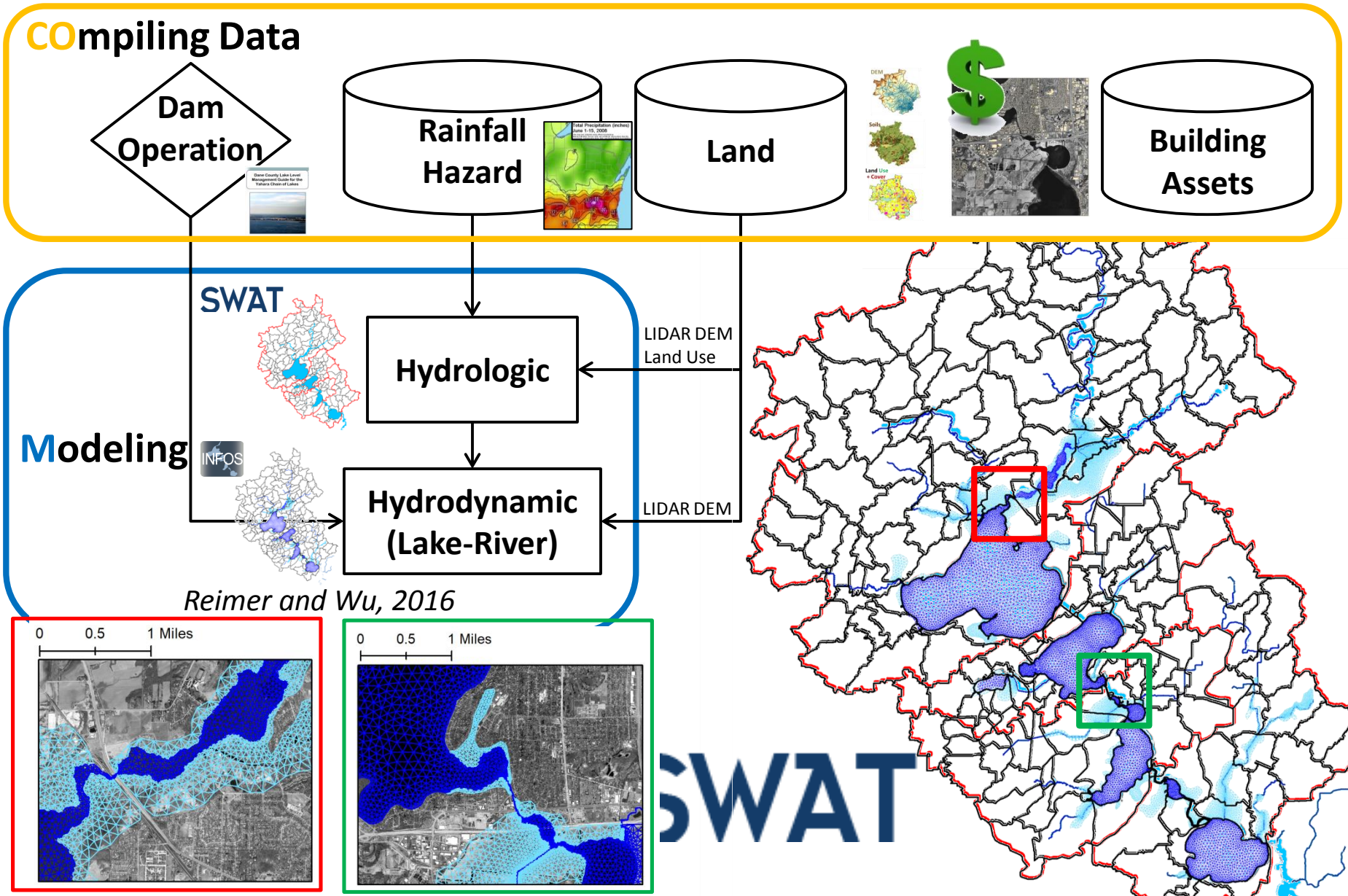
Land

Building Assets

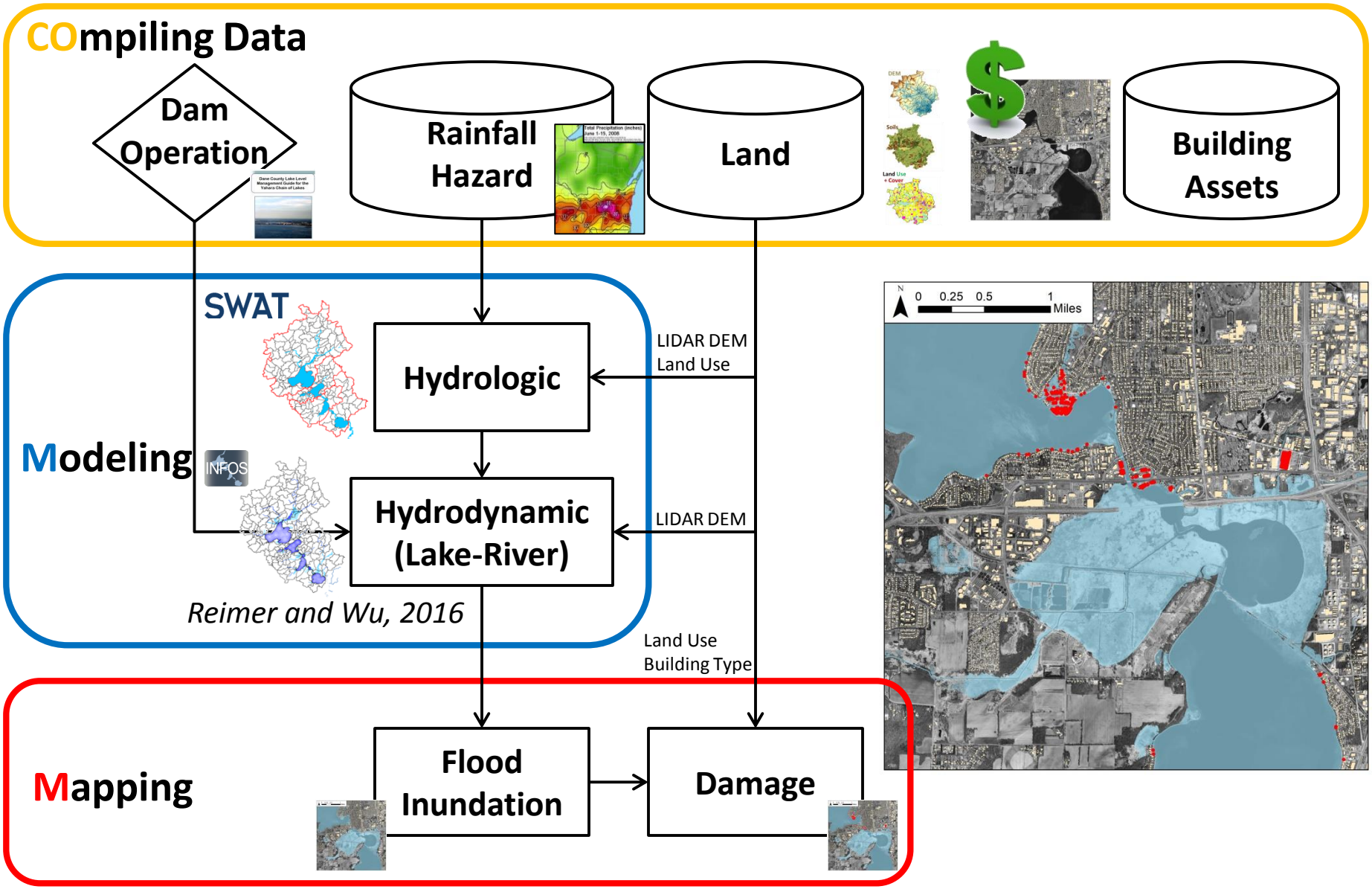
2008 Storm



COMMER Procedure



COMMER Procedure



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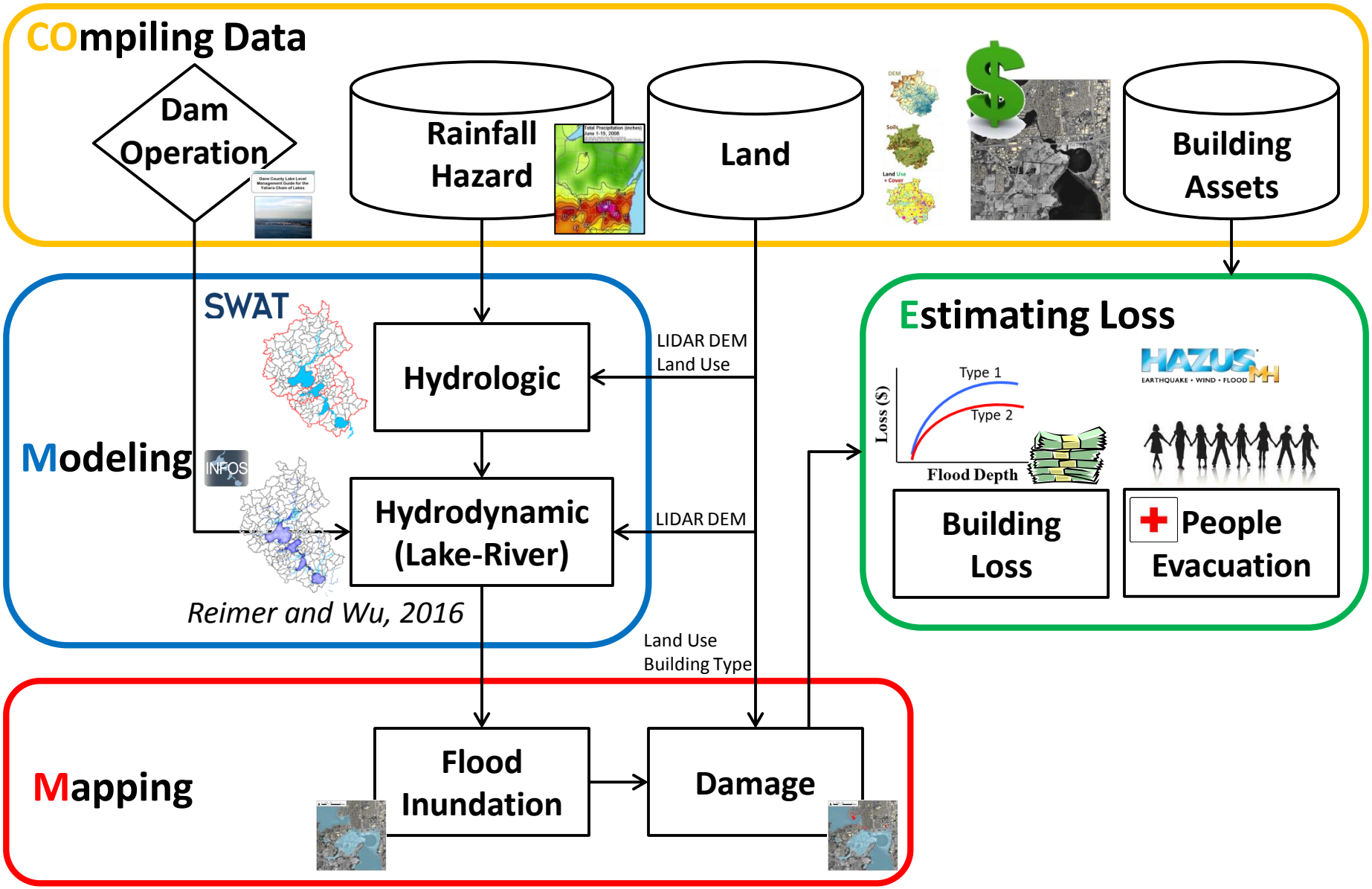
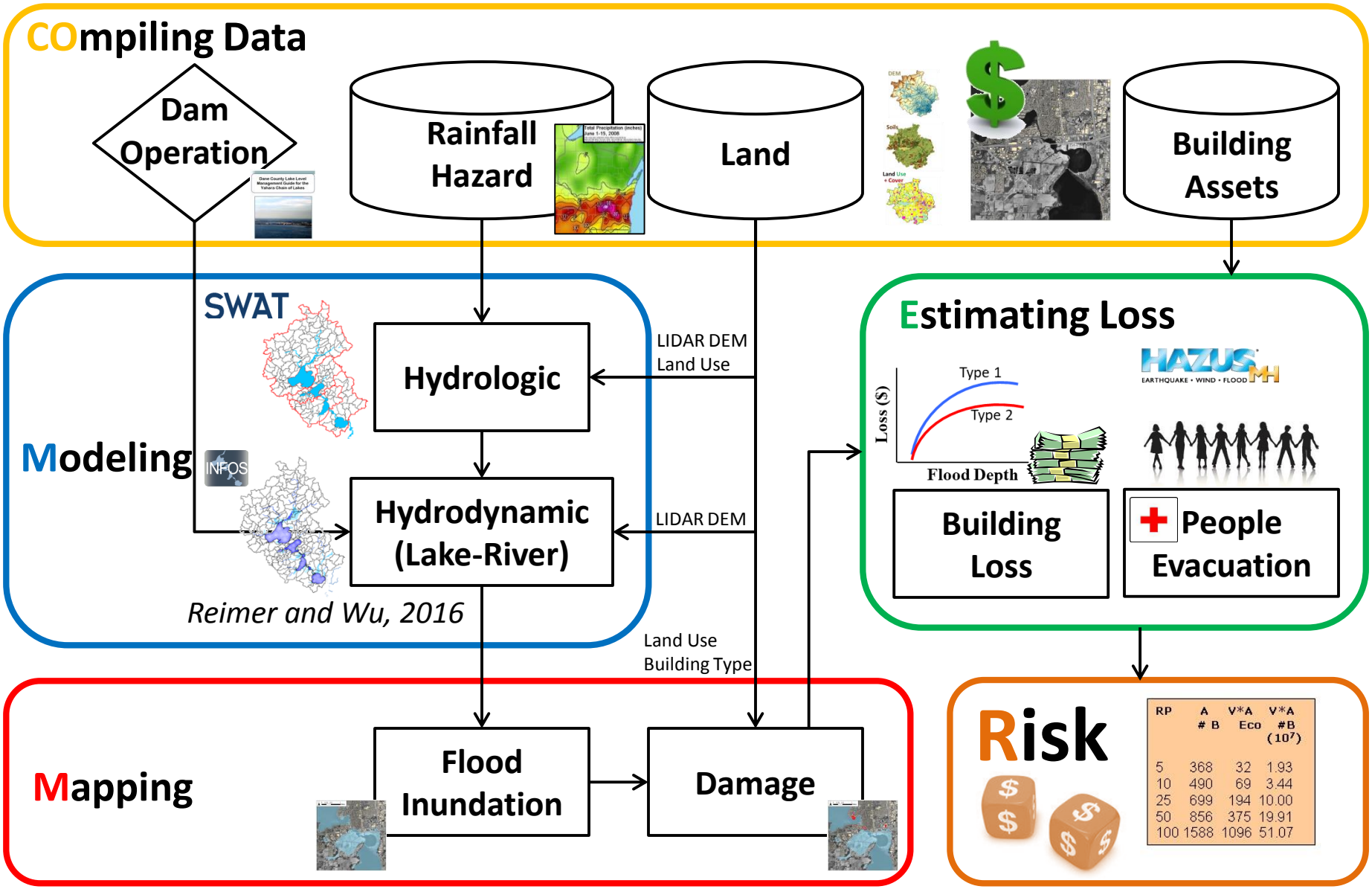
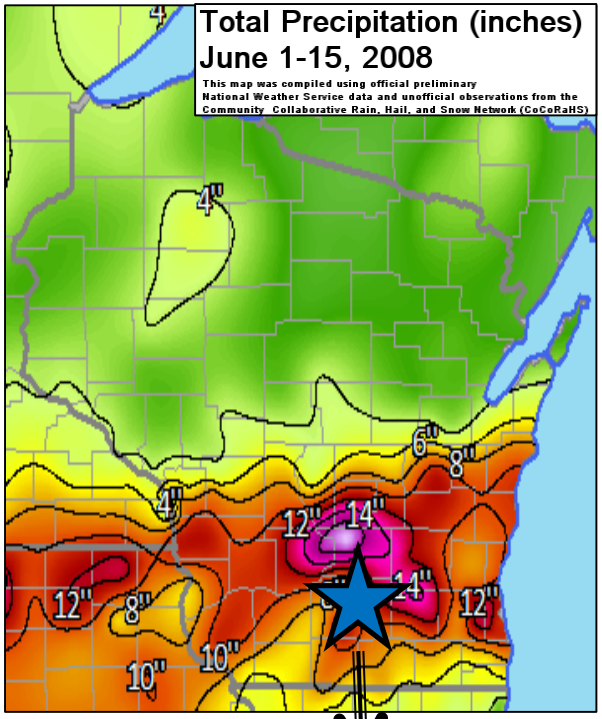
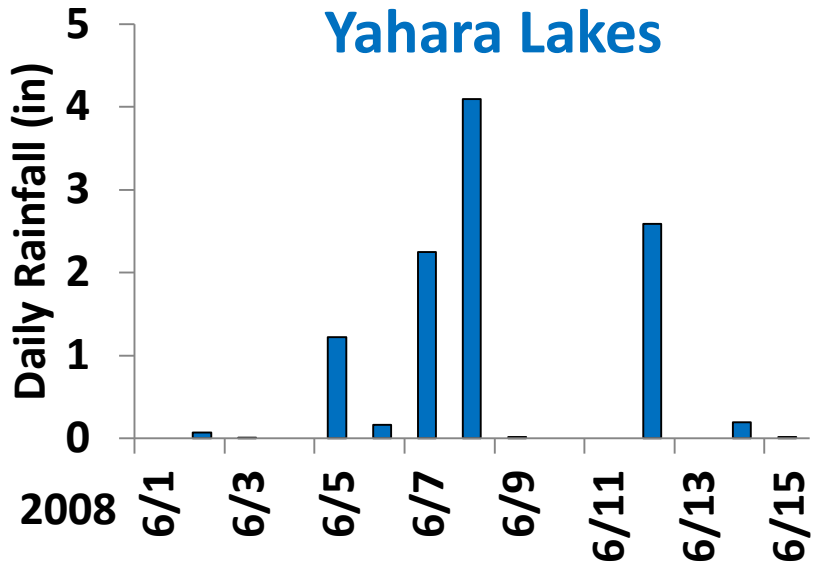


COMMER Procedure







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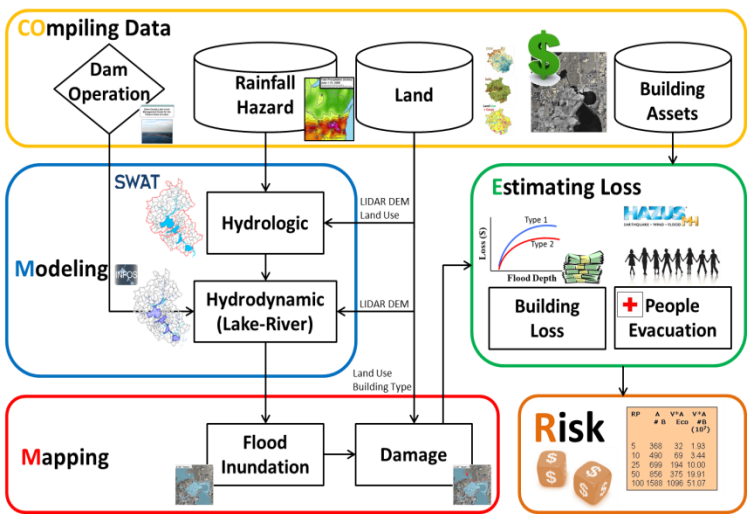
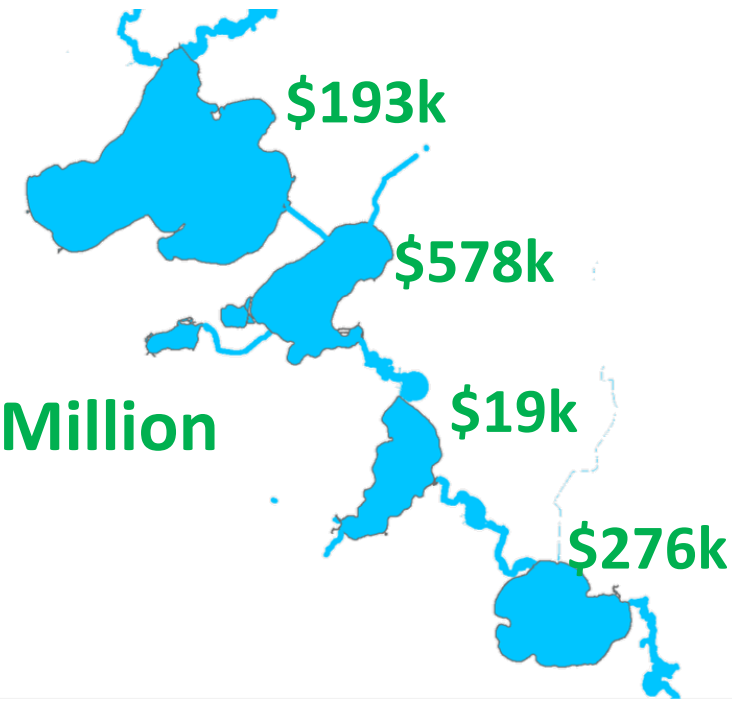
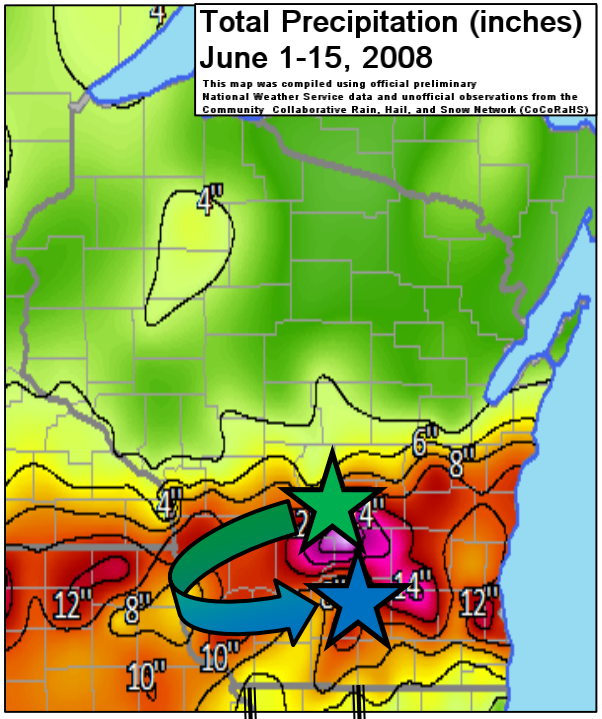


Reimer and Wu, 2016



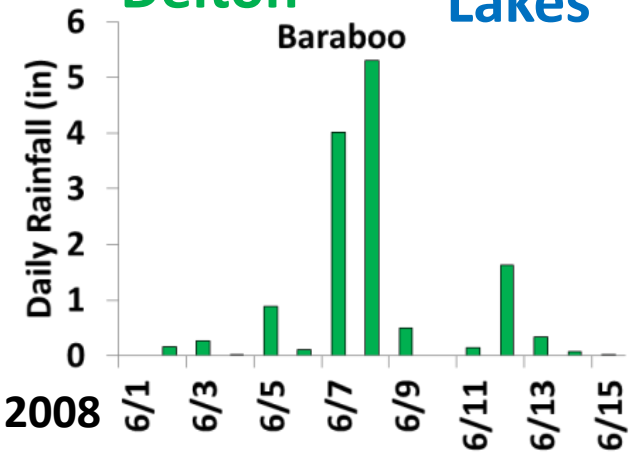
$1.07 Million

Storm Transposition



Deterministic

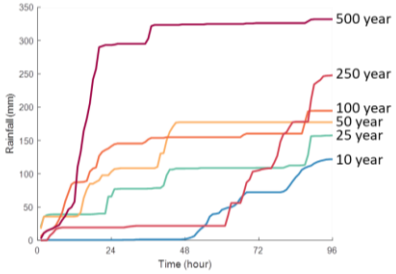
Lake Delton → Yahara Lakes

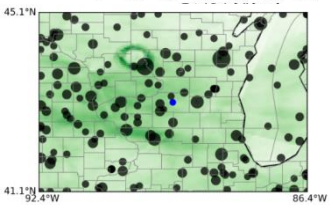


Hayden et al., 2016

Stochastic

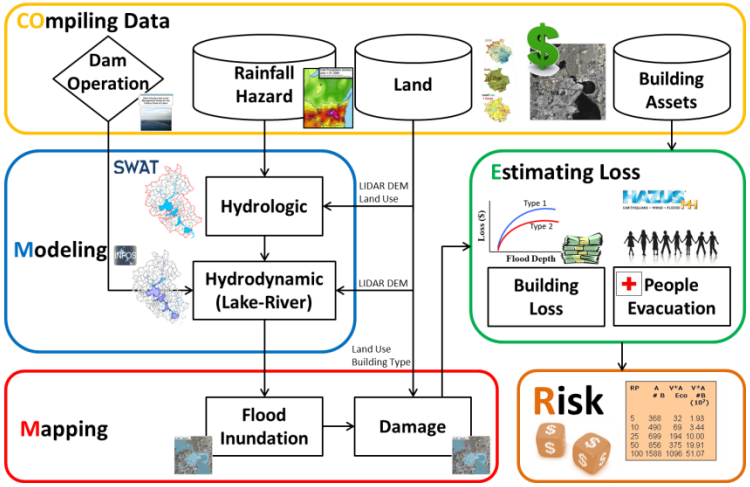
RAINY DAY





Wright et al., 2017

COMMER



Reimer and Wu, 2016

$2.51 Million

$??? Million

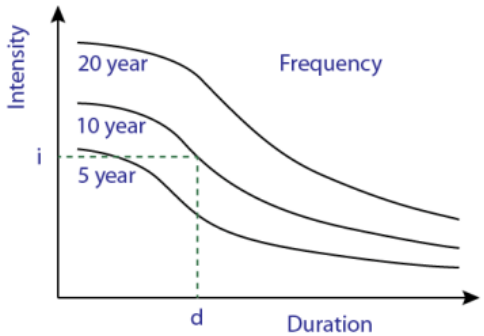
Rainfall Probability

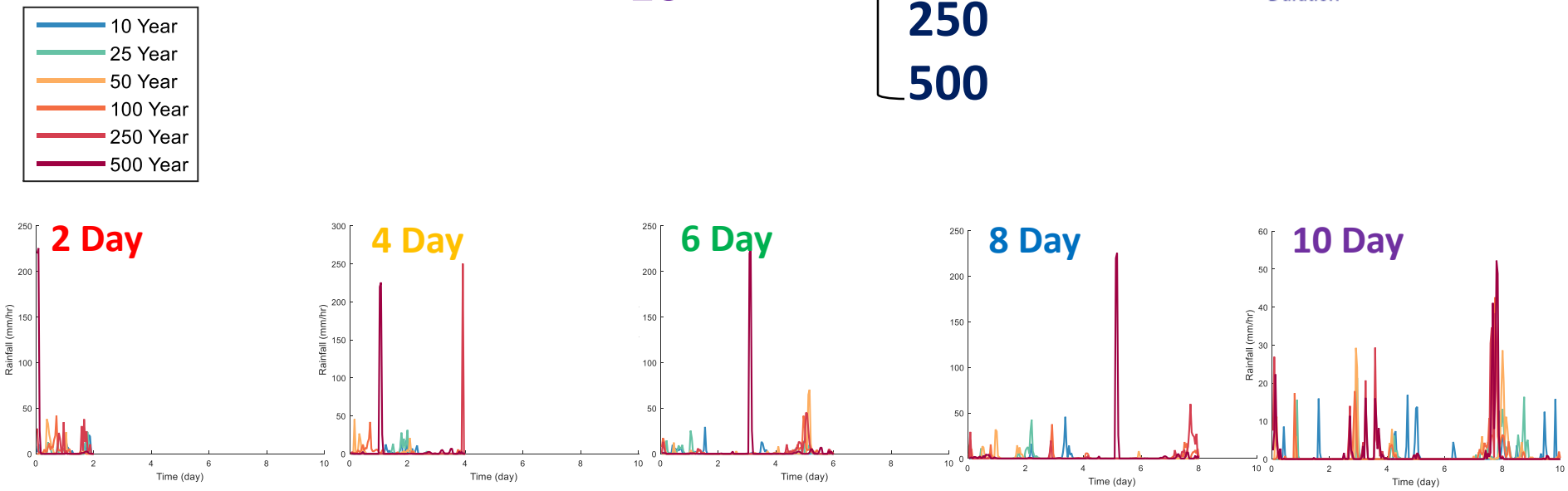
Rainfall Duration (days)

2
4
6
8
10

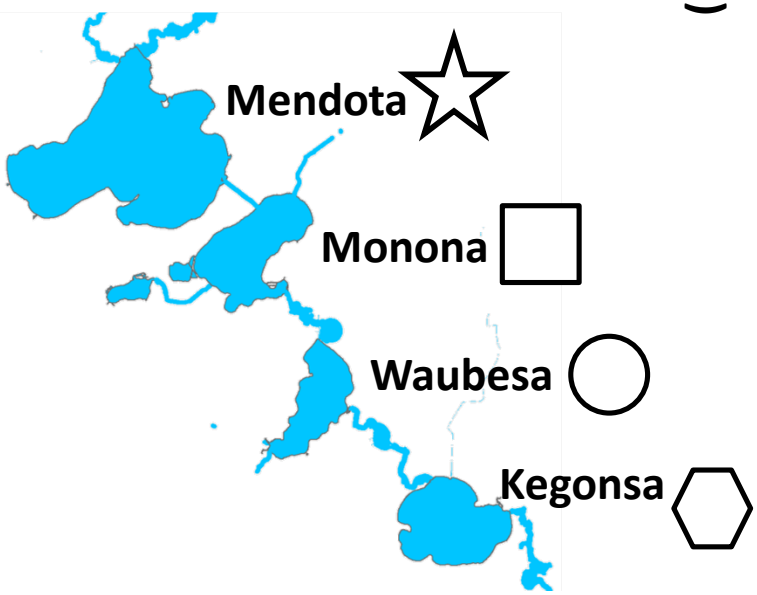
Return Period (years)

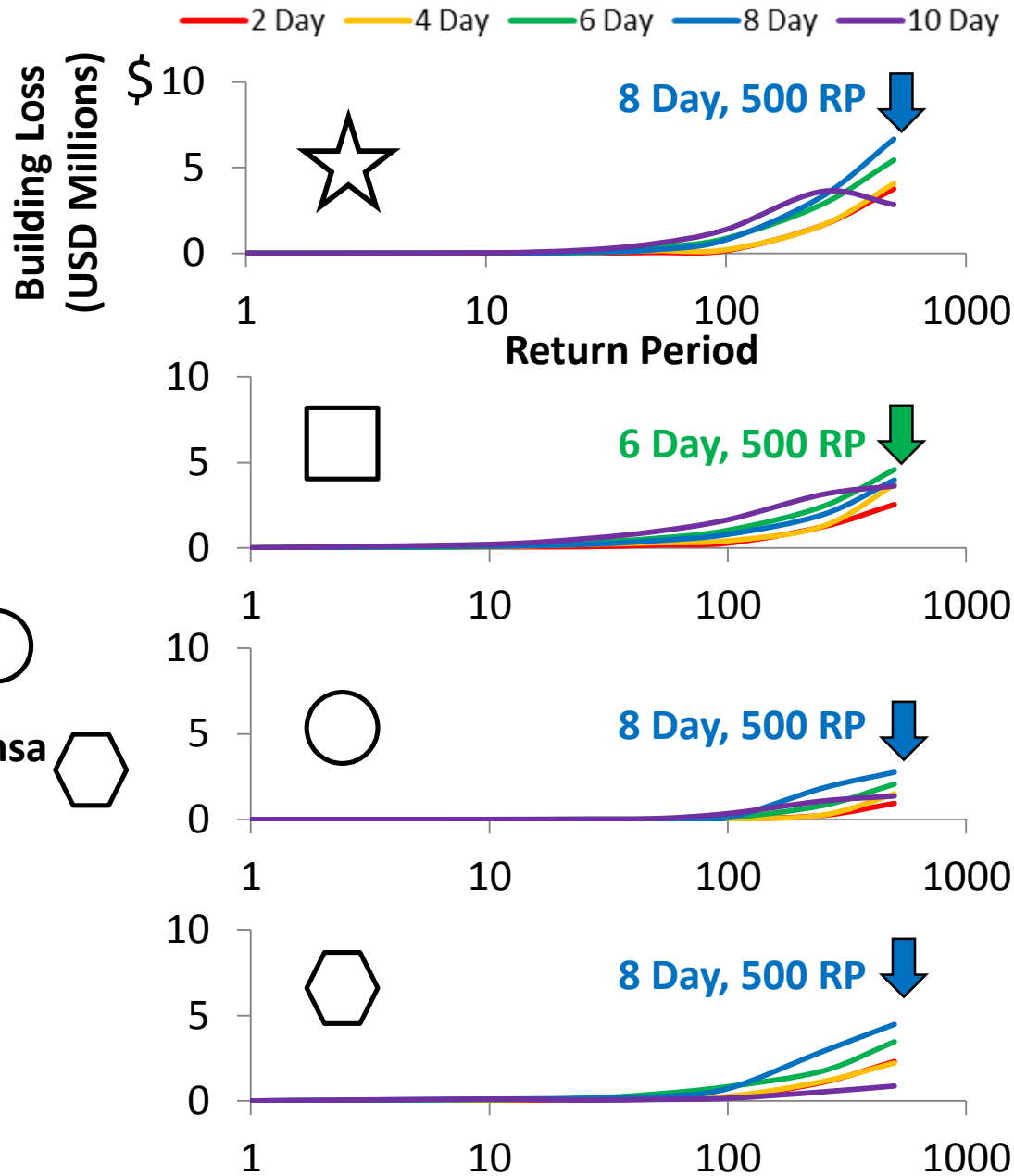
1
10
25
50
100
250
500



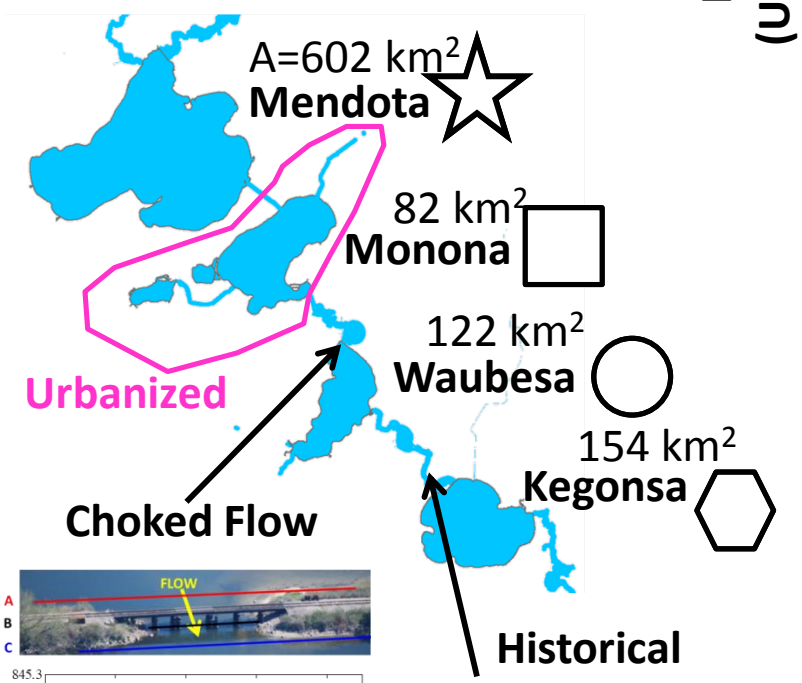


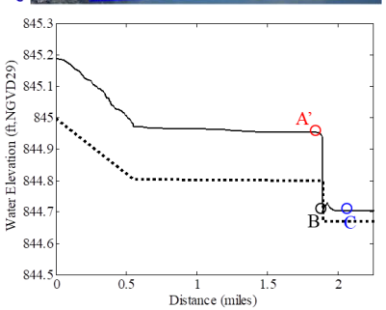
Results: Loss of Building Infrastructure

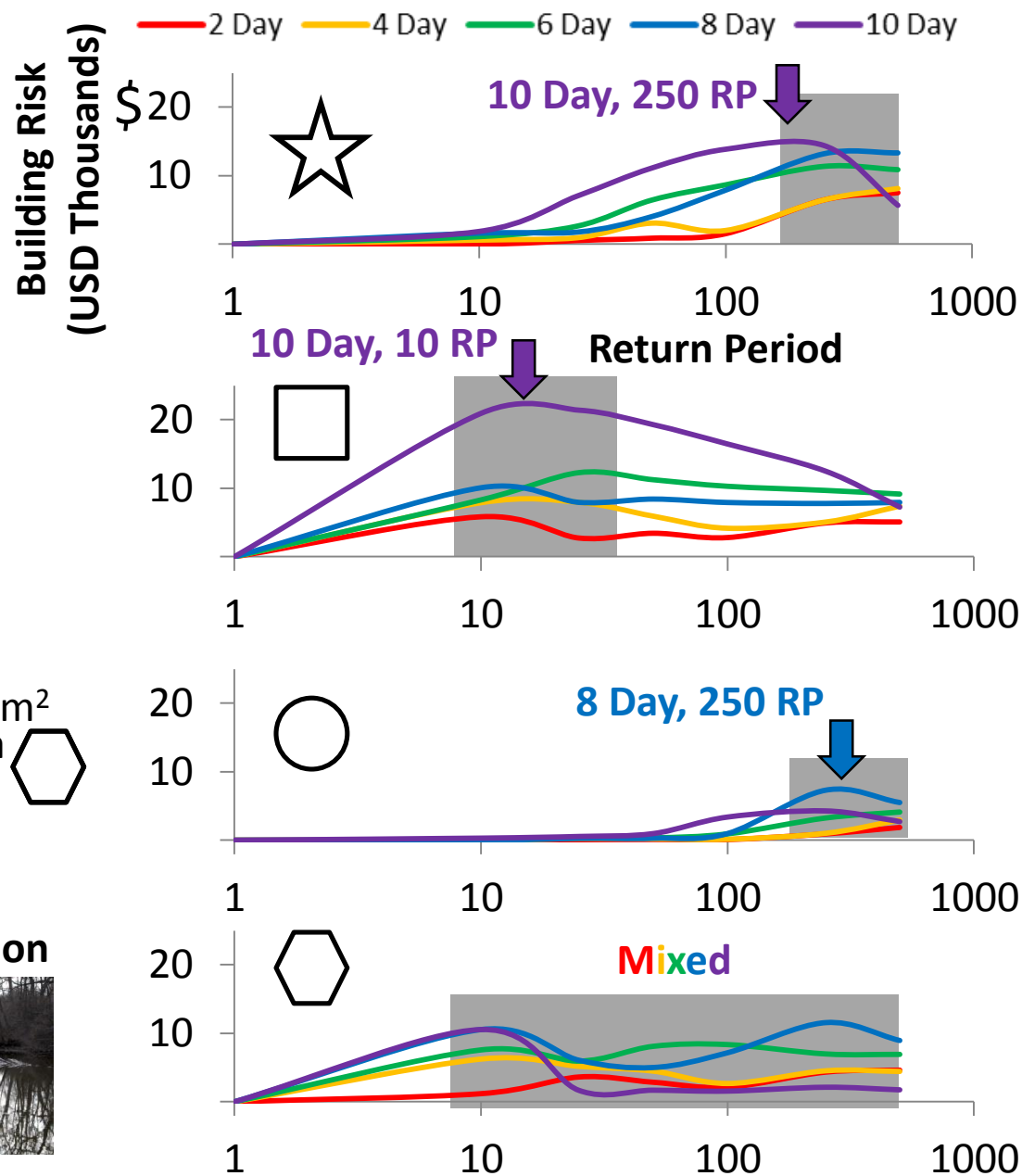




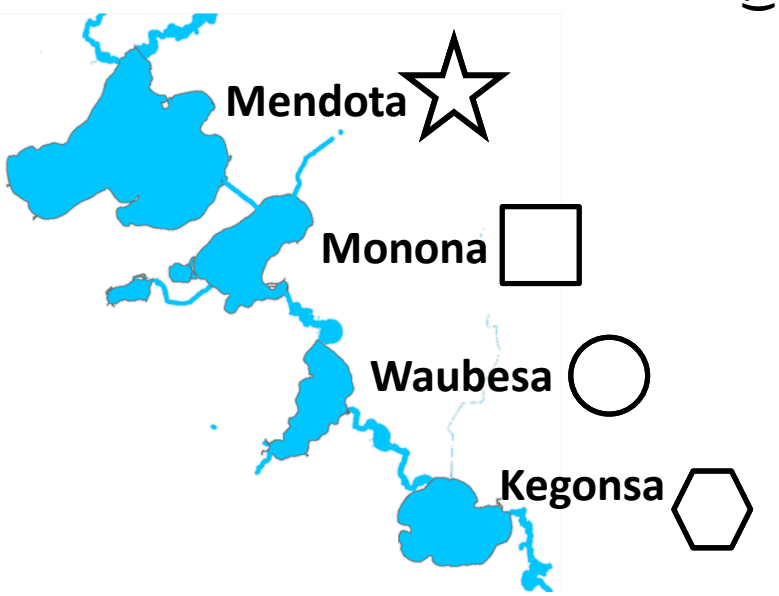
Results: Risk of Building Infrastructure

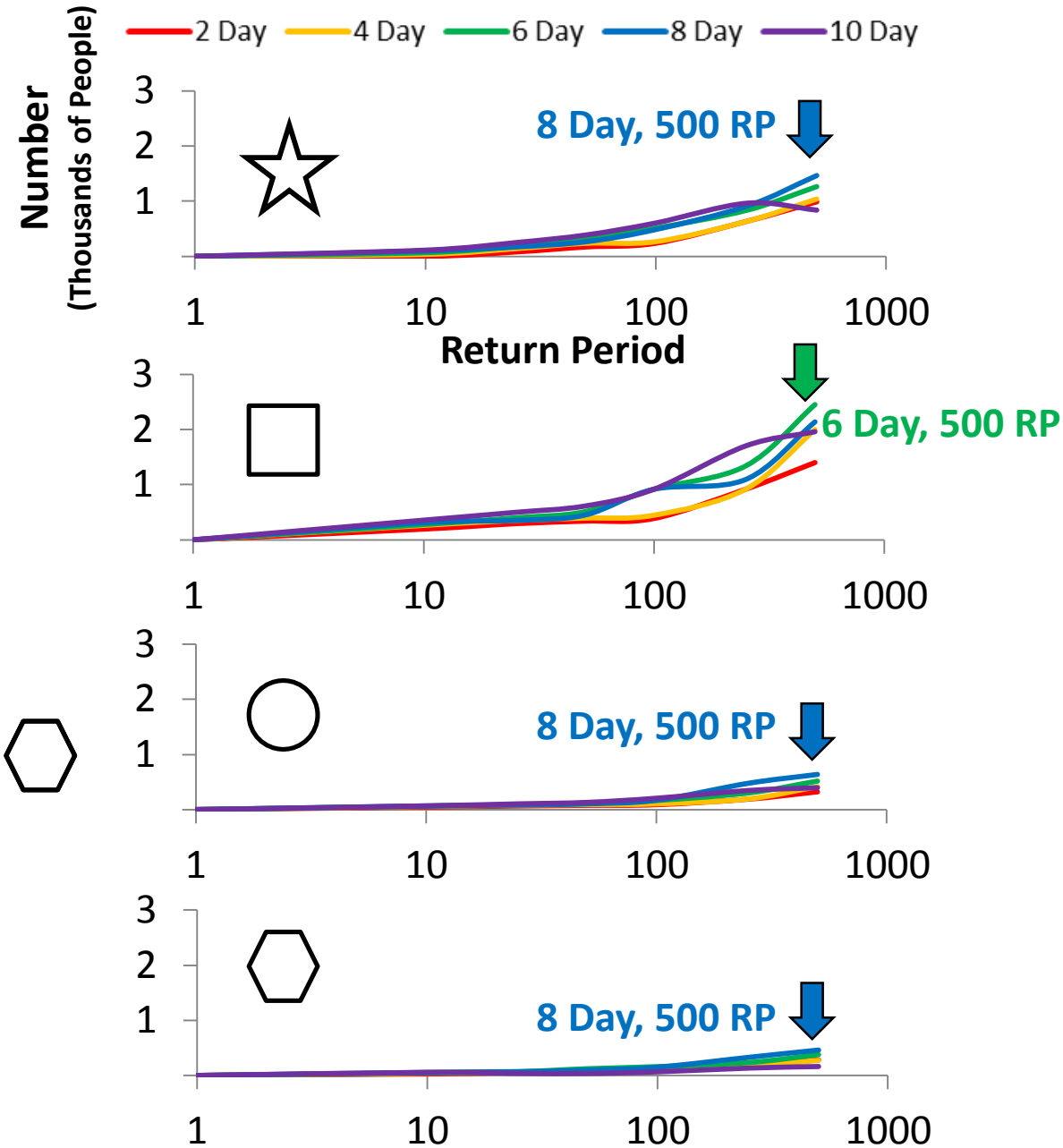






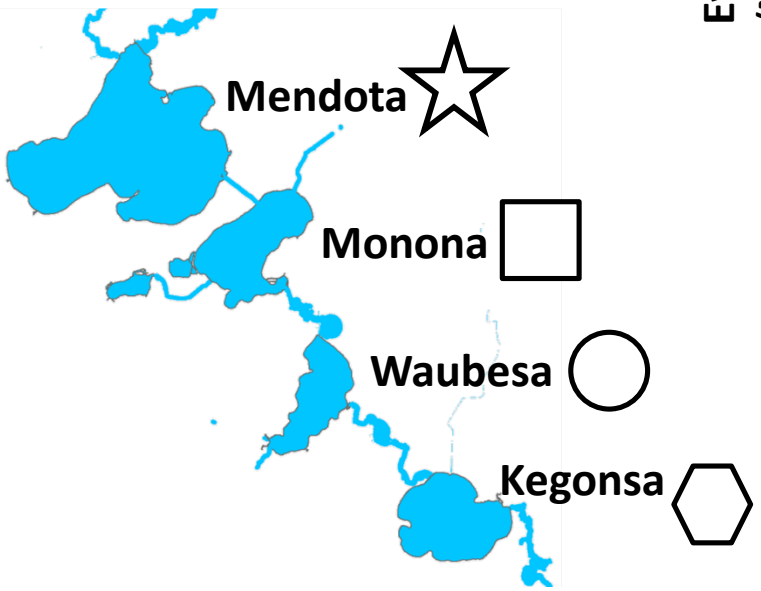
Results: Evacuation of People

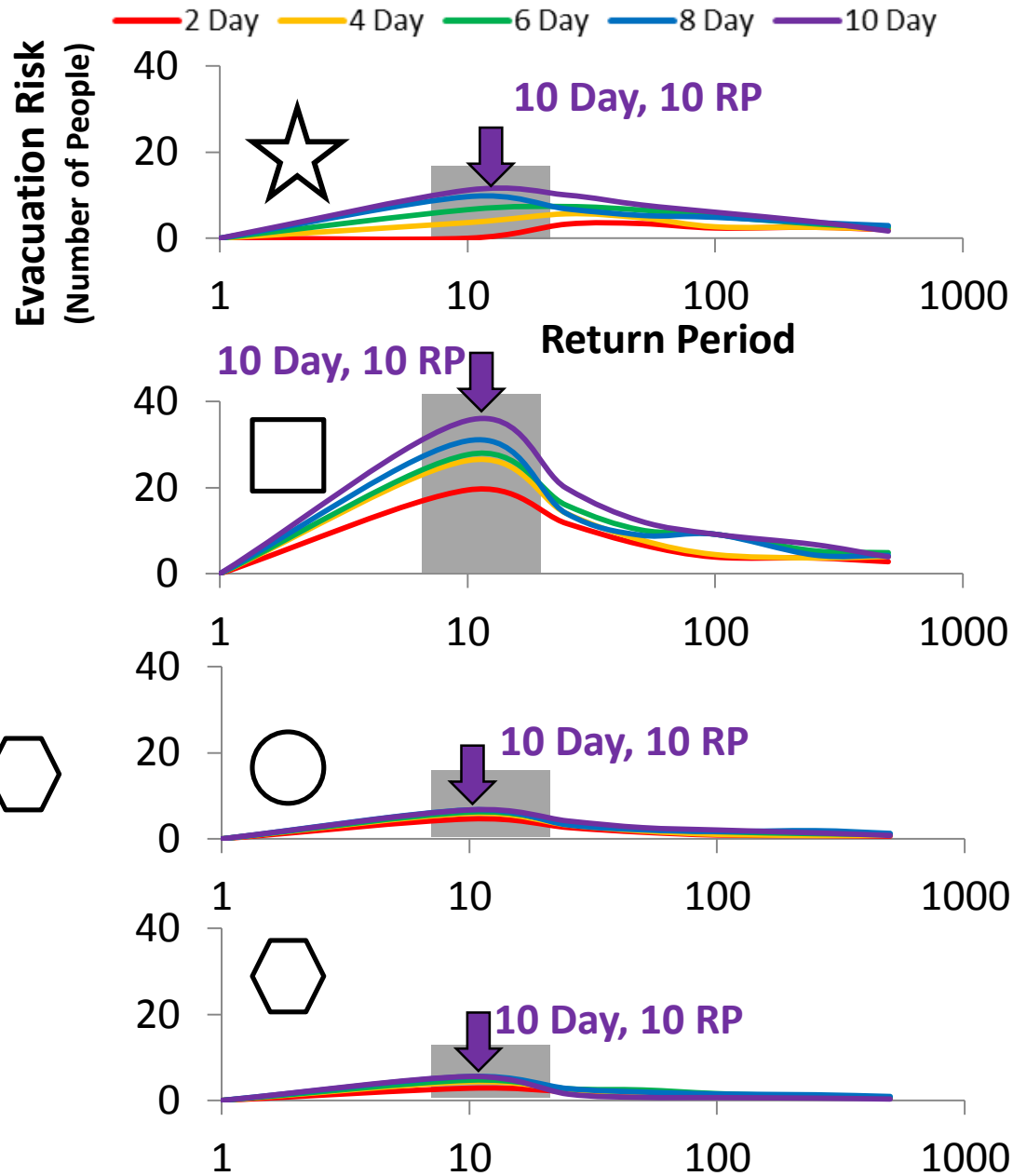




Results:

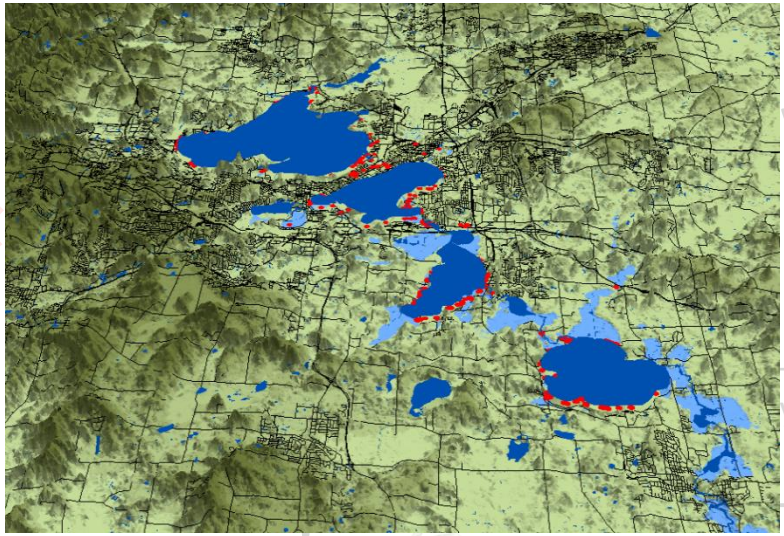
Risk of Evacuation





RECALL: Objectives

- Characterize **Flood Risk**



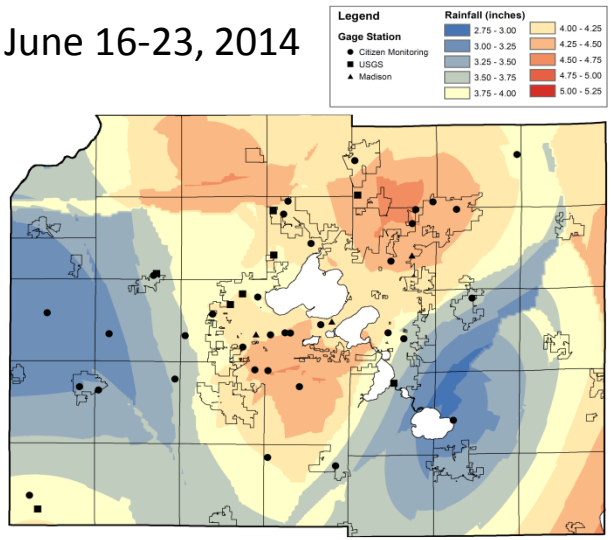
Vulnerability Mitigation

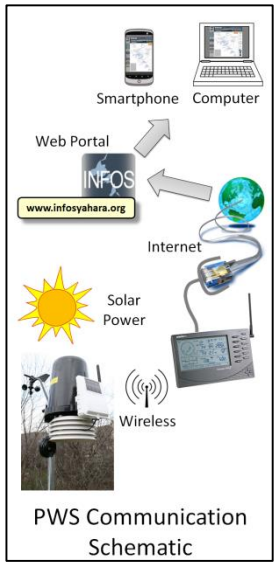
Are we prepared today for tomorrow's flood?

Flood Forecasts

Past Rainfall

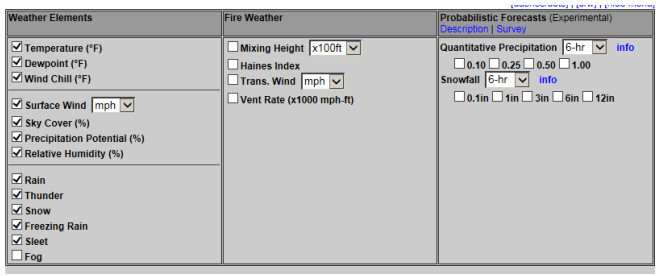
June 16-23, 2014





PWS Communication Schematic

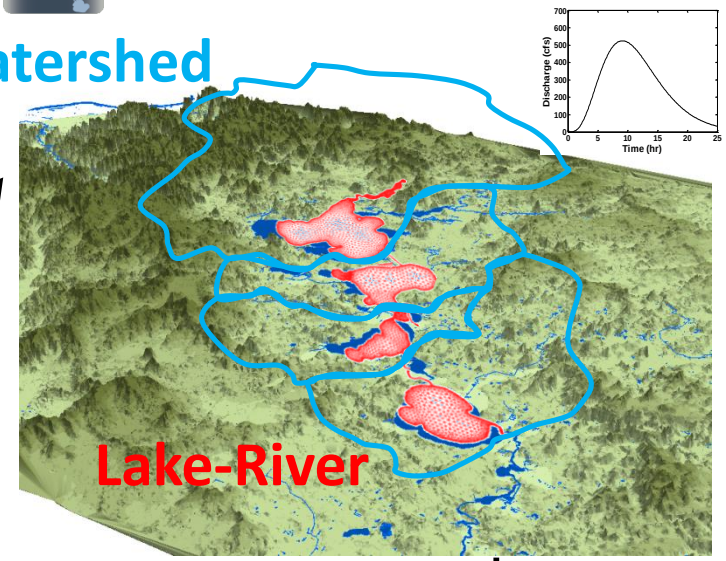
Forecast Rainfall



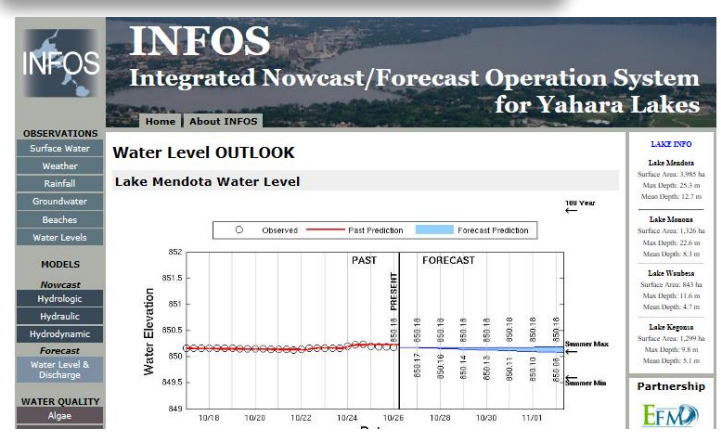
NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

INFOS Integrated Models

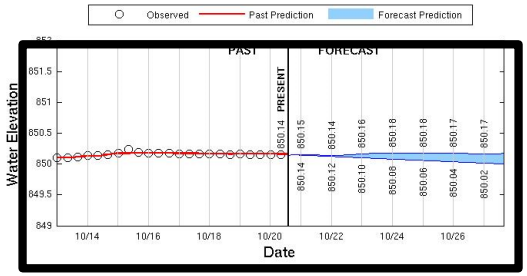
Watershed



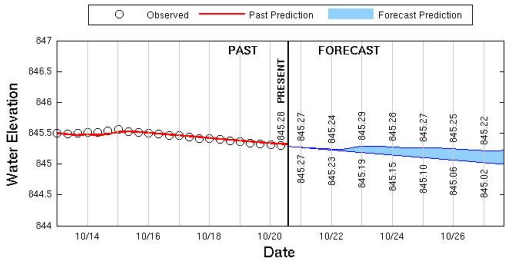
www.infosyahara.org



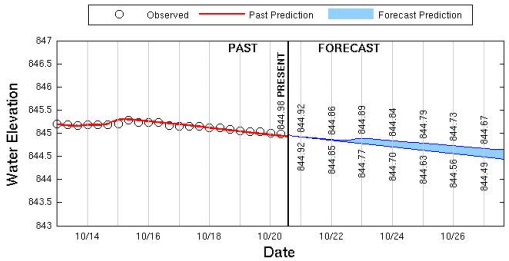
Flood *Warning*



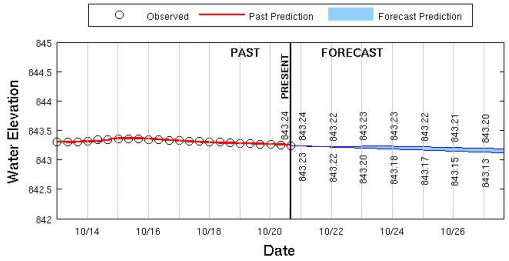
Lake Mendota



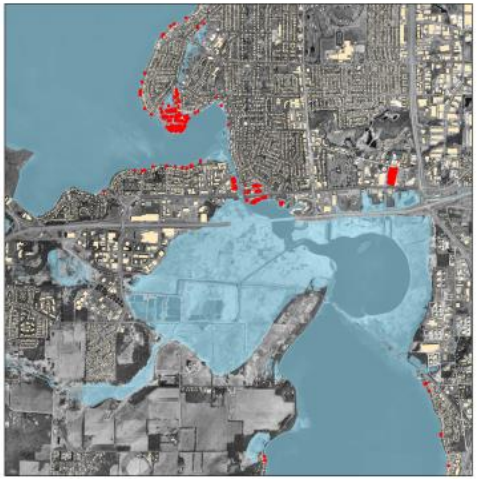
Lake Monona

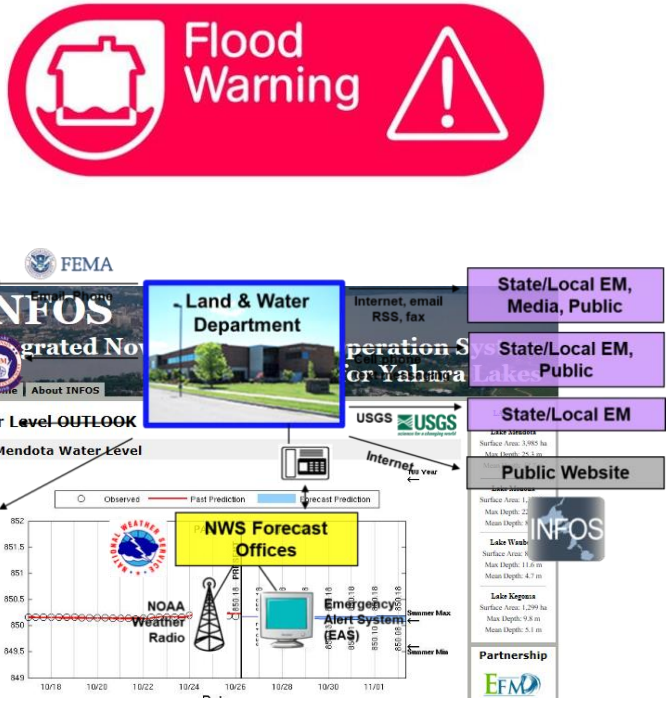


Lake Waubesa



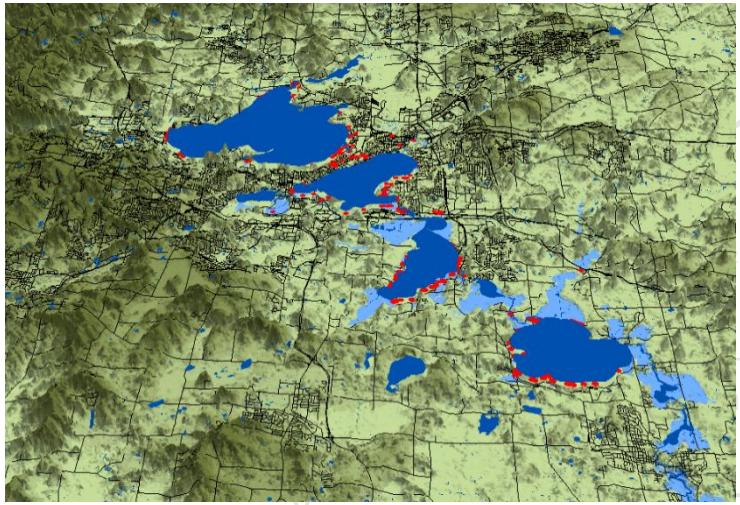
Lake Kegonsa





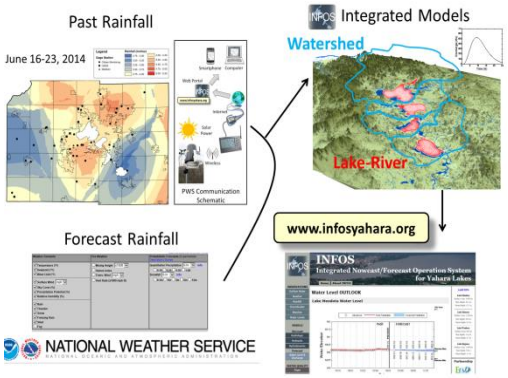
RECALL: Objectives

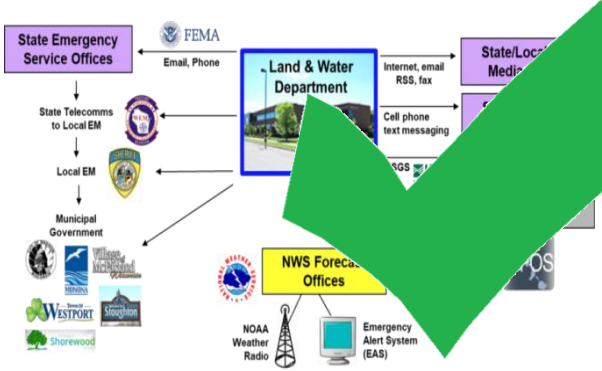
- Characterize Flood Risk



Vulnerability Mitigation

- Develop Flood Forecast and Warning





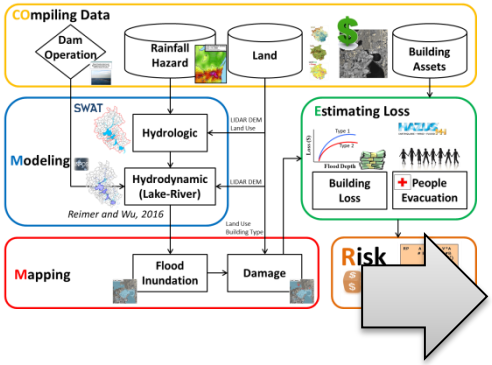
Resilience & Preparedness

Summary

- **Characterize Flood Risk**
  Vulnerability Mitigation

2 Day — 4 Day — 6 Day — 8 Day — 10 Day

COMMER Procedure



	LOSS		RISK	
	Building	Evacuation	Building	Evacuation
Mendota	500 Year	500	250	10
Monona	500	500	10	10
Waubesa	500	500	250	10
Kegonsa	500	500	Mixed	10

- **Develop Flood Forecast and Warning**
  Resilience & Preparedness