



Improving Flood Resiliency



for the Yahara River Chain of Lakes (RCL)



Flood damage exceeds \$154 million in Dane County, officials say

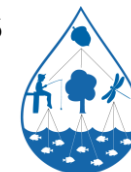
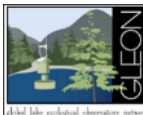


- Floodplain
- Flood Impacts
- Street

John Reimer

Dane County Land & Water Resources

Wisconsin Lakes Partnership Convention April 10, 2019

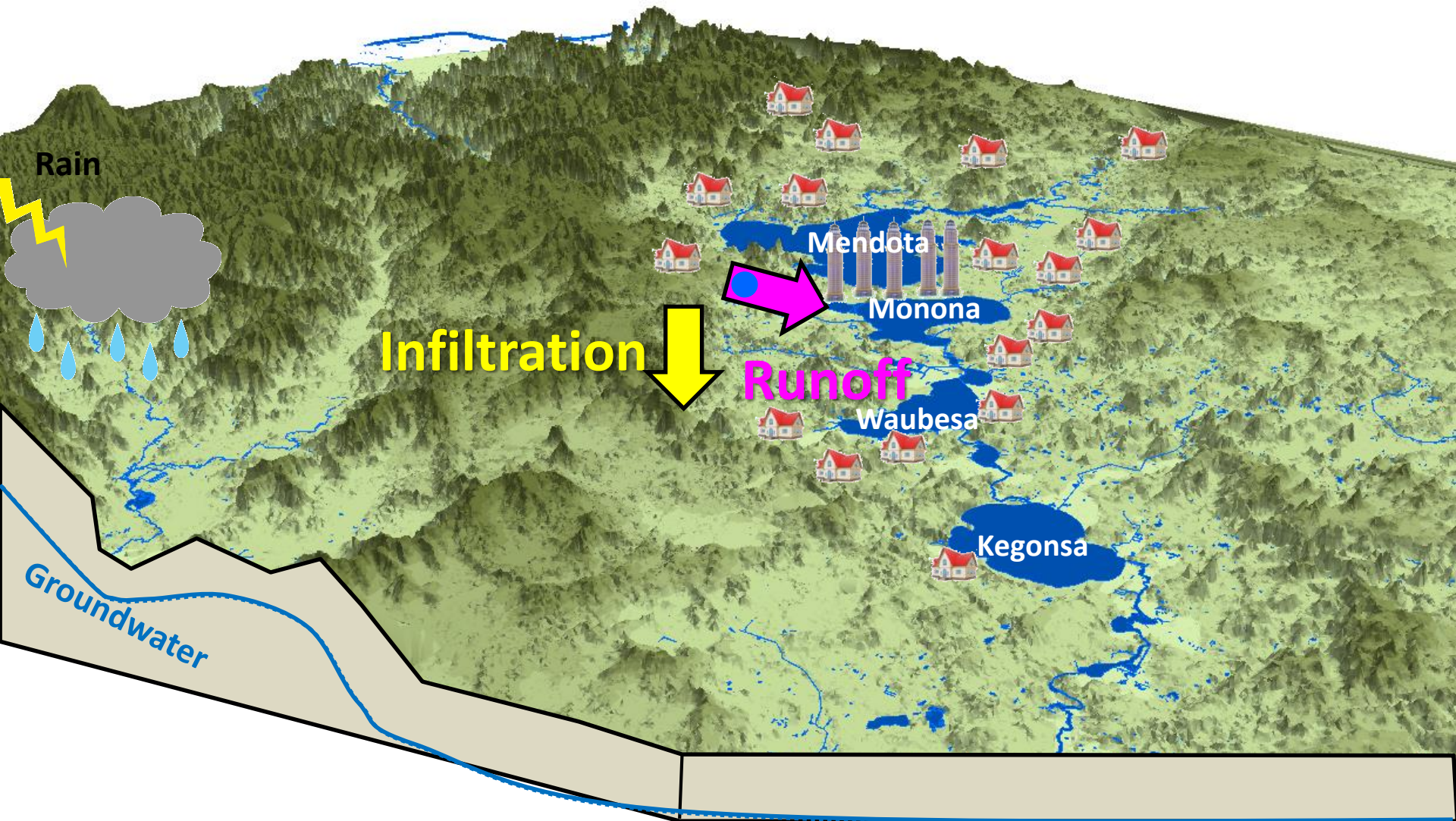


Pay it Forward



THE UNIVERSITY OF WISCONSIN MADISON

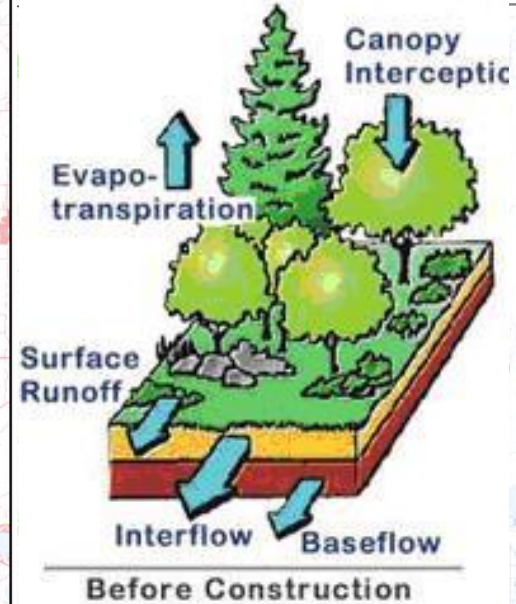
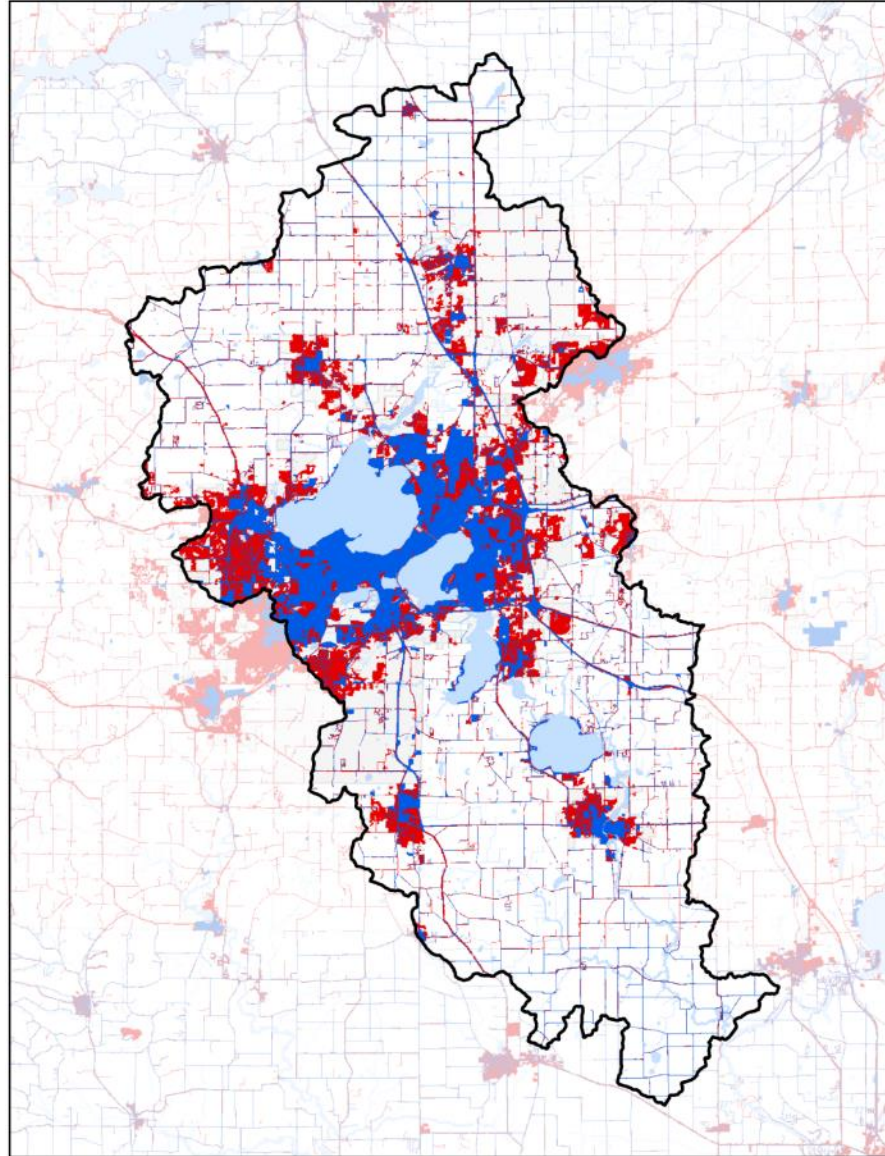
Hydrology of the Yahara Lakes



Urban Development



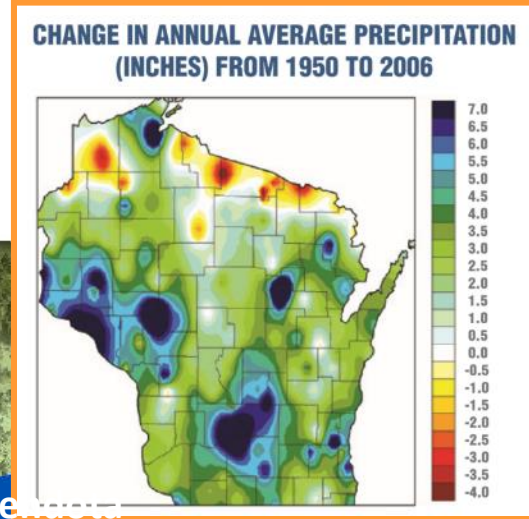
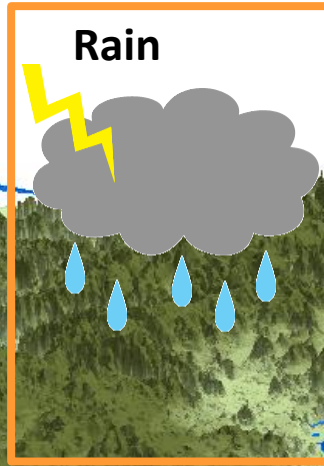
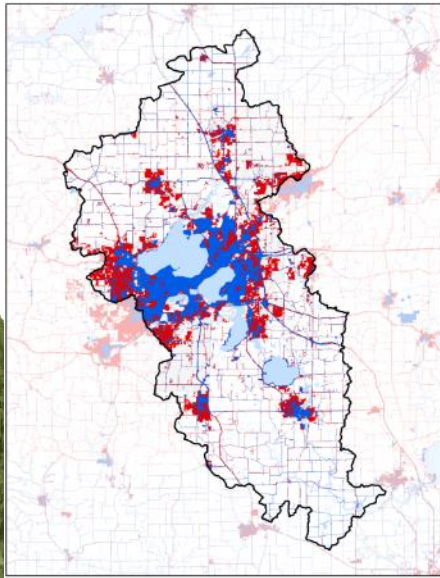
2018
75,000 Acres



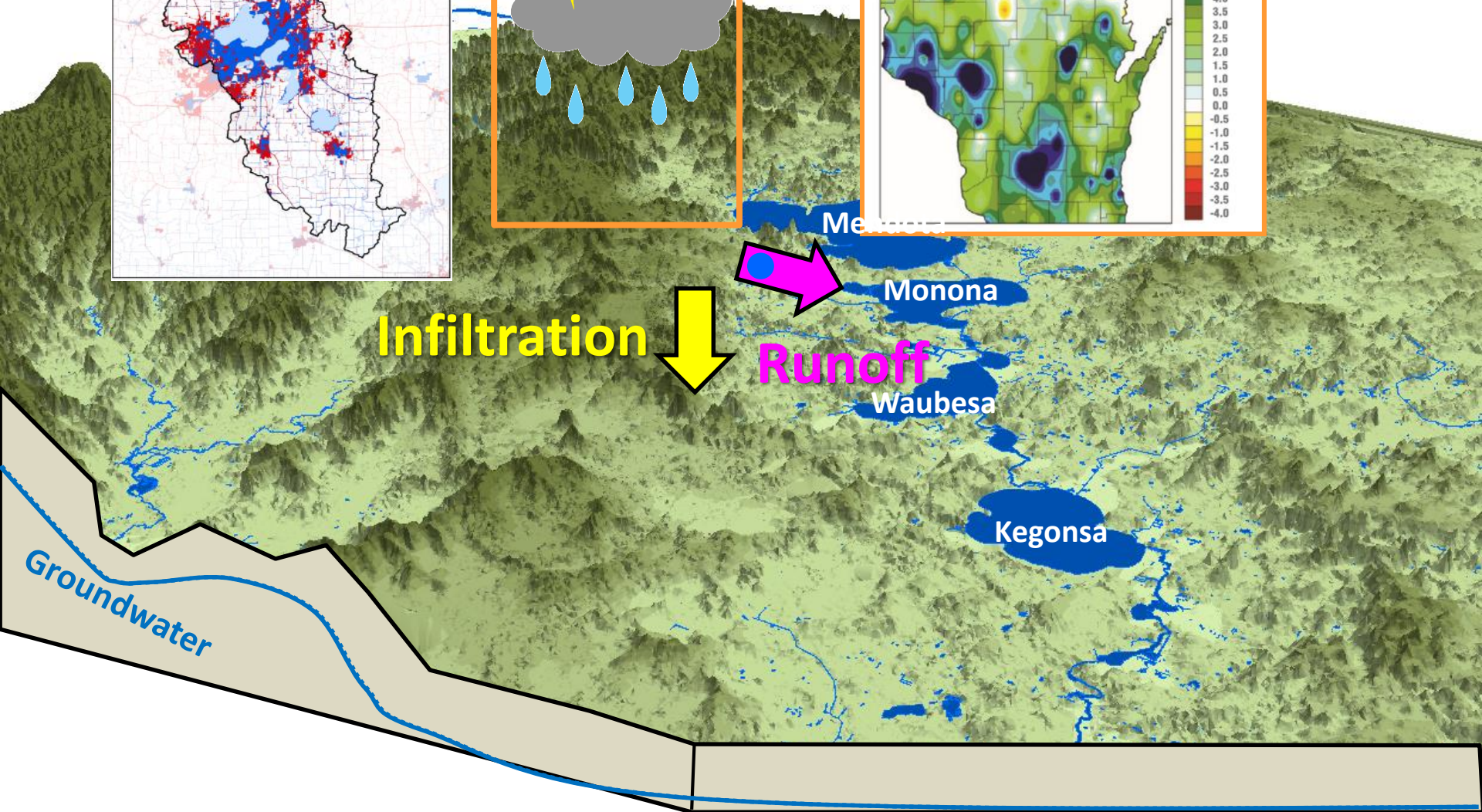
1970
41,000 Acres

In **2018** there is **2** times more area of development than **1970**

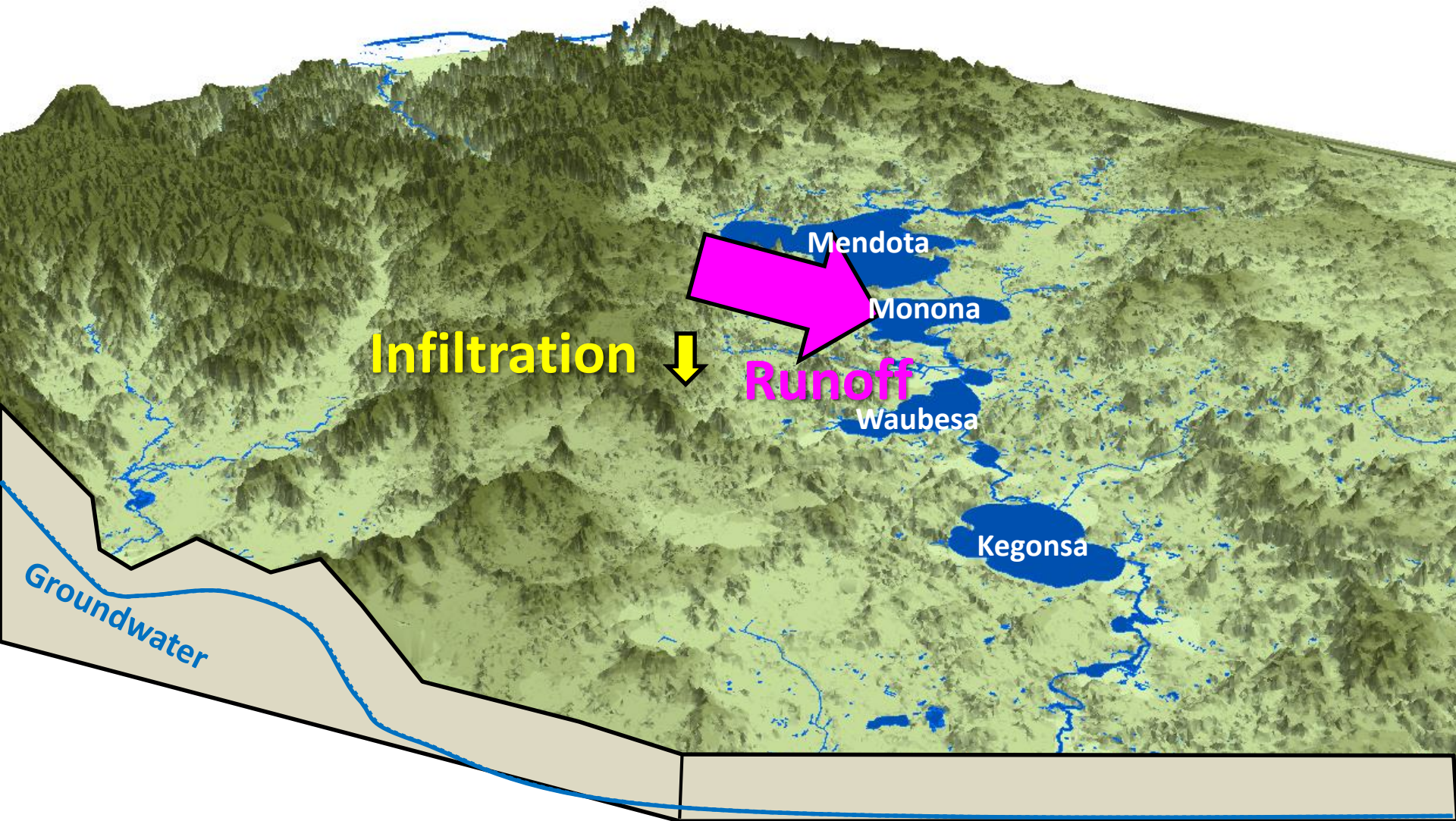
Hydrology of the Yahara Lakes



WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS



Hydrology of the Yahara Lakes



Hydraulics of the Yahara Lakes

Sediment Accumulation

Constriction Points

Aquatic Plants



Exchange Street



~2 ft

2005

1981

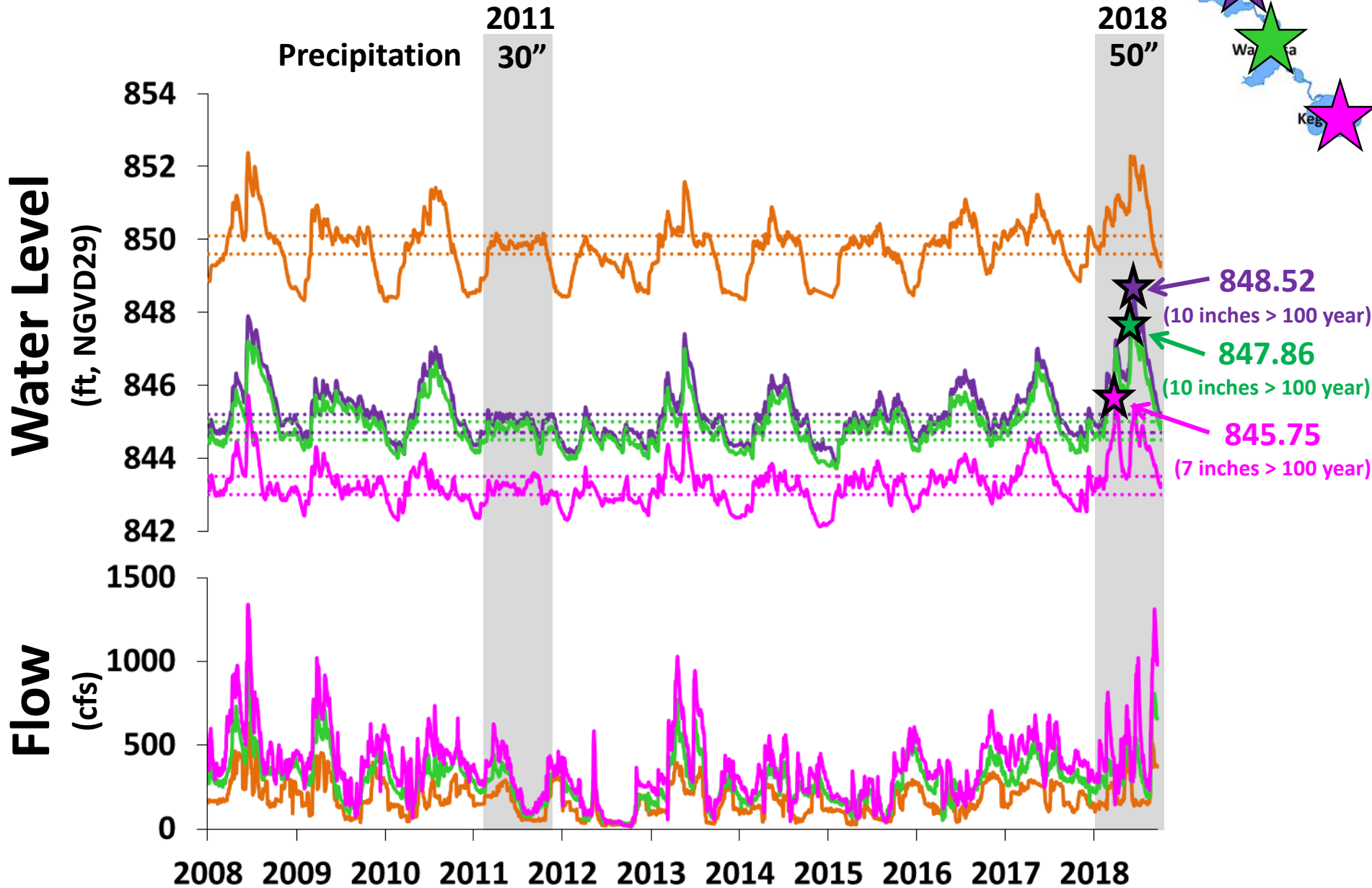
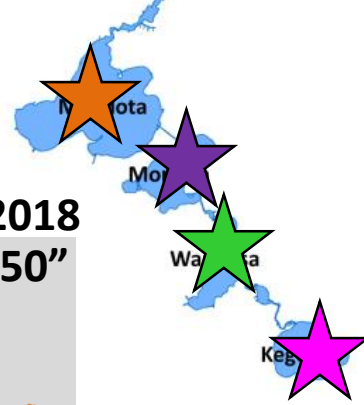
↓ Area ↓ Flow

↓ Slope ↓ Flow

↑ Friction ↓ Flow



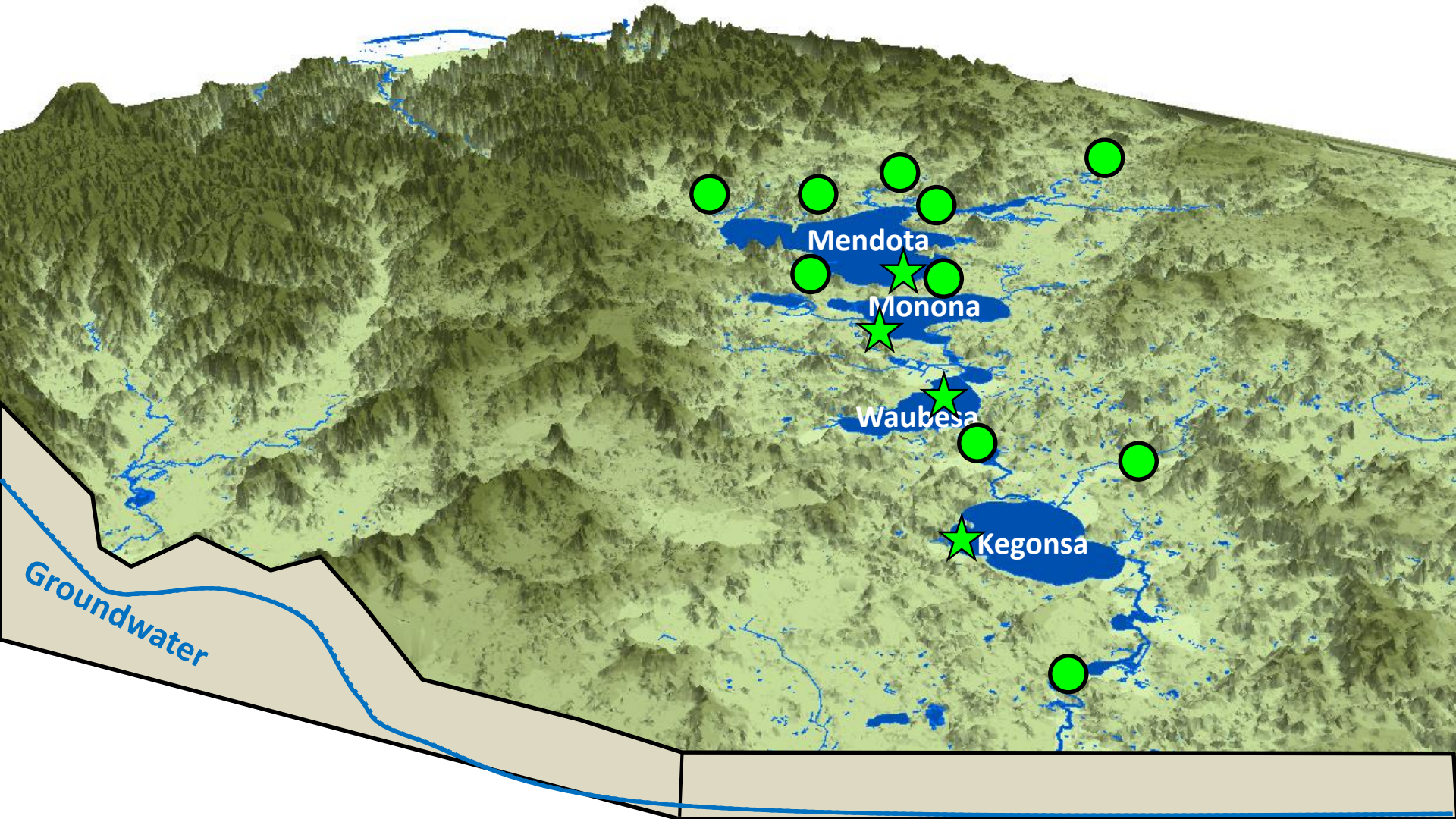
Recent Lake Levels and Flows



Observations

● Flow Gage

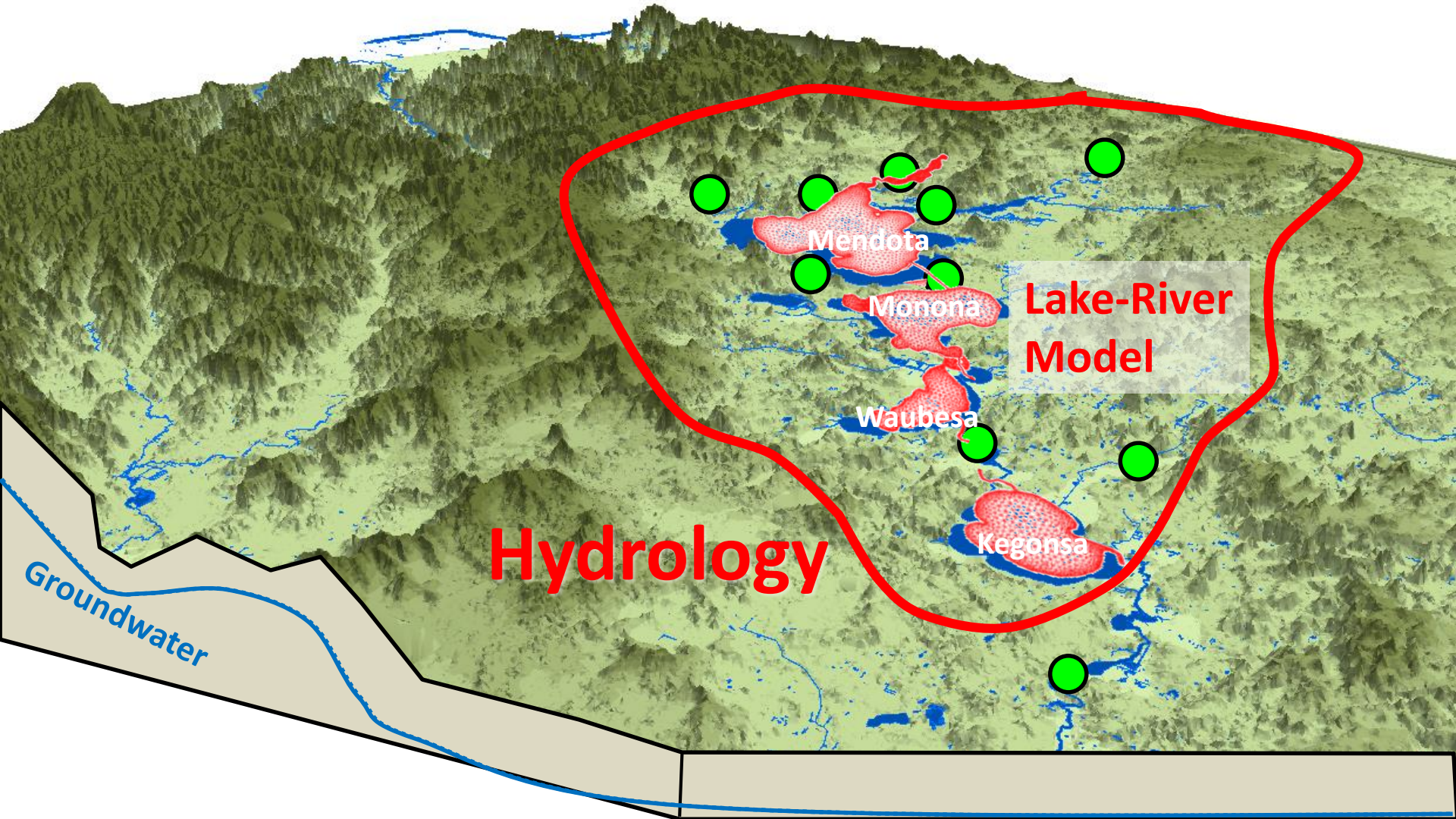
★ Lake Level Gage



Observations & Models

● Flow Gage

★ Lake Level Gage



Hydrology

Lake-River Model

Mendota

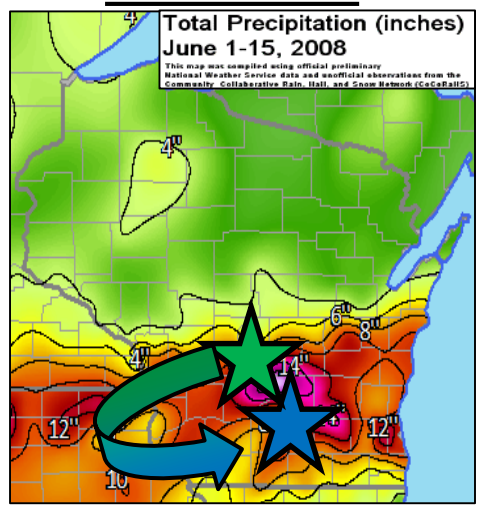
Monona

Waubesa

Kegonsa

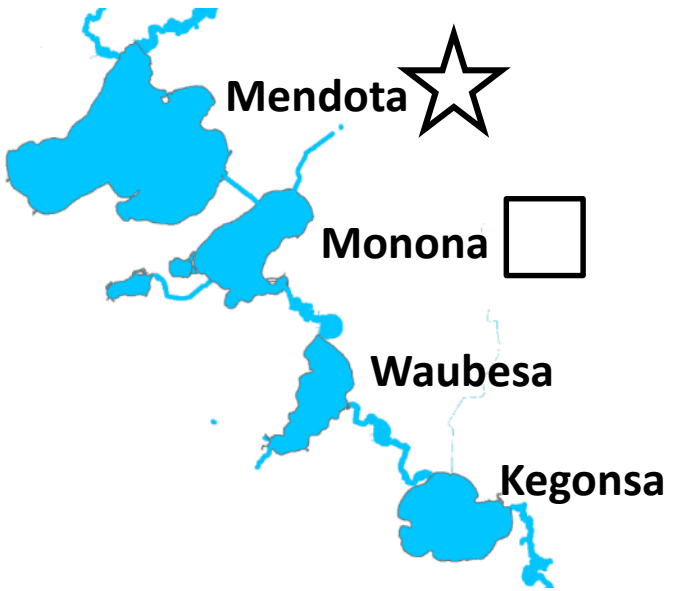
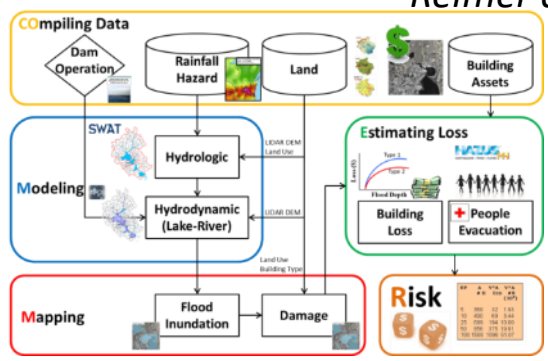
Groundwater

Scenarios



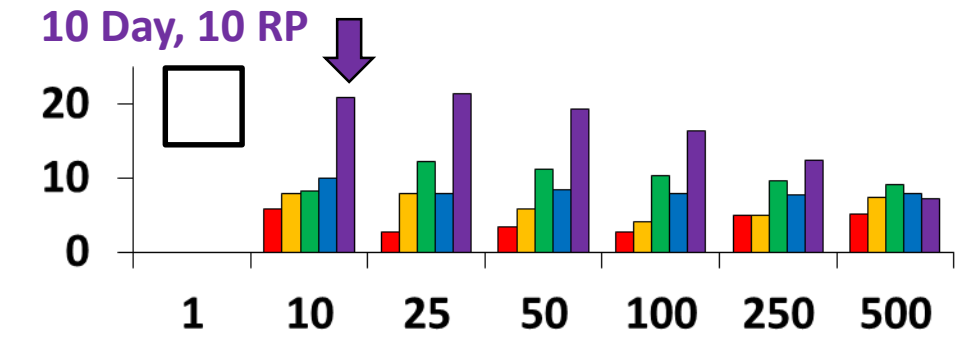
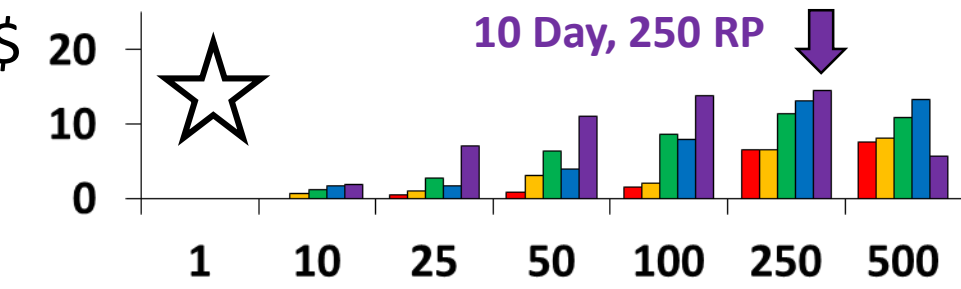
Flood Risk

Reimer and Wu, 2016



Building Risk
(USD Thousands)

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



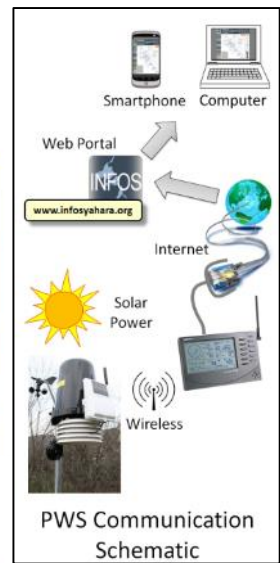
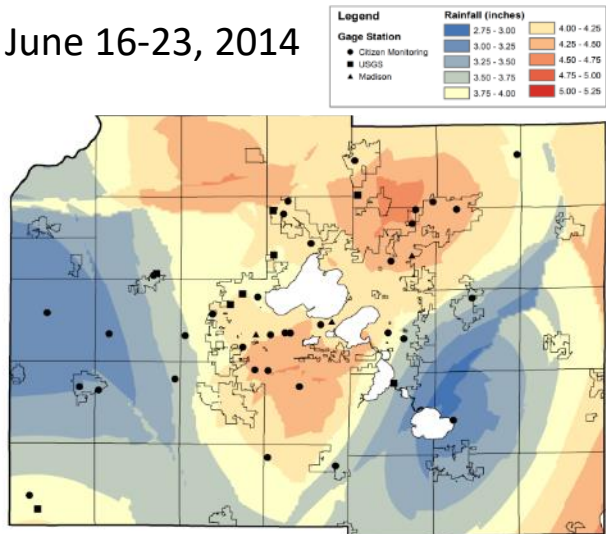
Loss

Are we prepared for tomorrow's flood?

Flood Forecasts

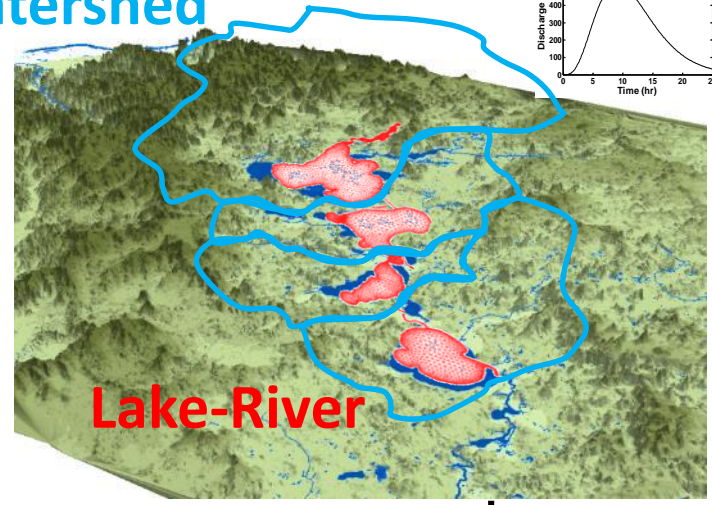
Past Rainfall

June 16-23, 2014



Integrated Models

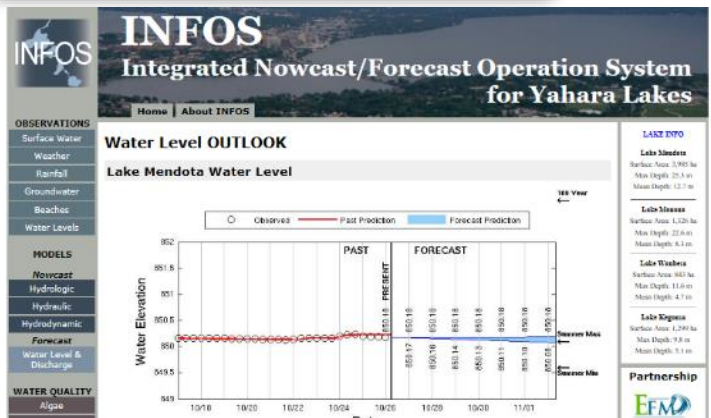
Watershed



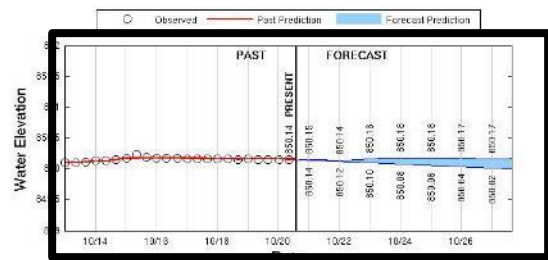
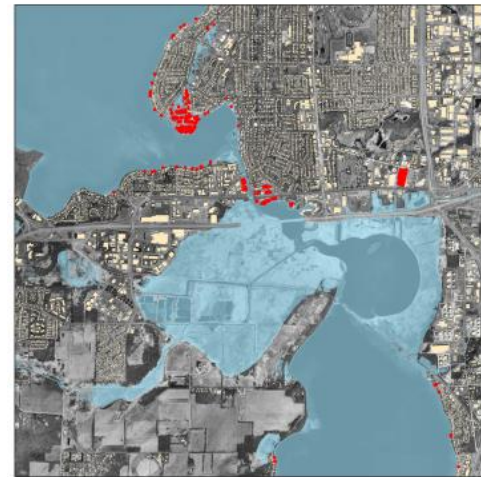
www.infosyahara.org

Forecast Rainfall

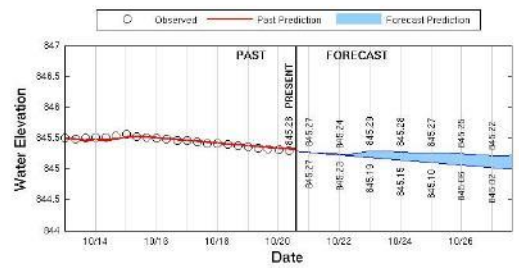
Weather Elements <input checked="" type="checkbox"/> Temperature (°F) <input checked="" type="checkbox"/> Dewpoint (°F) <input checked="" type="checkbox"/> Wind Chill (°F) <input checked="" type="checkbox"/> Surface Wind [mph] <input checked="" type="checkbox"/> Sky Cover (%) <input checked="" type="checkbox"/> Precipitation Potential (%) <input checked="" type="checkbox"/> Relative Humidity (%) <input checked="" type="checkbox"/> Rain <input checked="" type="checkbox"/> Thunder <input checked="" type="checkbox"/> Snow <input checked="" type="checkbox"/> Freezing Rain <input checked="" type="checkbox"/> Sleet <input type="checkbox"/> Fog	Fire Weather <input type="checkbox"/> Mixing Height [x100ft] <input type="checkbox"/> Haines Index <input type="checkbox"/> Trans. Wind [mph] <input type="checkbox"/> Vent Rate (x1000 mph-ft)	Probabilistic Forecasts (Experimental) Description Summary <input type="checkbox"/> Quantitative Precipitation [6-hr] info <input type="checkbox"/> 0.10 <input type="checkbox"/> 0.25 <input type="checkbox"/> 0.50 <input type="checkbox"/> 1.00 <input type="checkbox"/> Snowfall [6-hr] info <input type="checkbox"/> 0.1in <input type="checkbox"/> 1in <input type="checkbox"/> 3in <input type="checkbox"/> 6in <input type="checkbox"/> 12in
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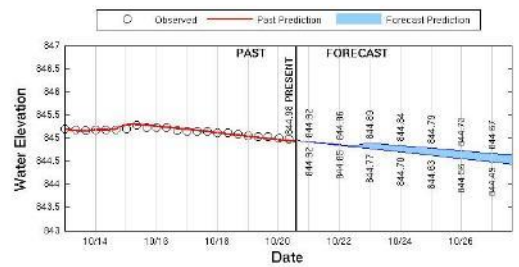
Flood Warning



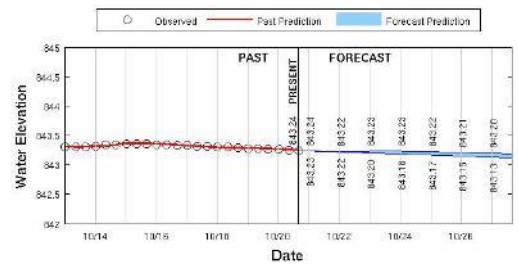
Lake Mendota



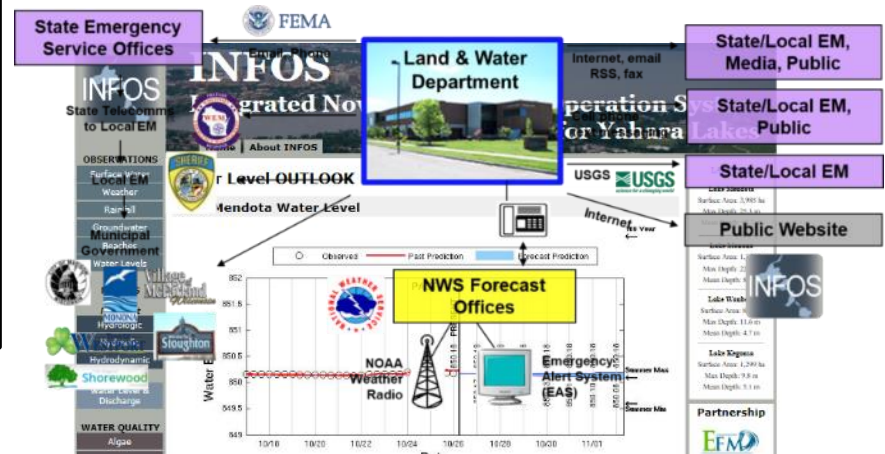
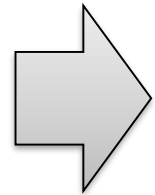
Lake Monona



Lake Waubesa



Lake Kegonsa

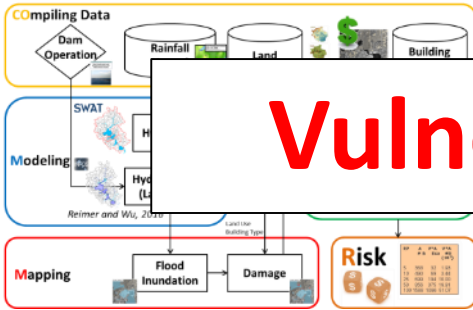


Science Driven Lake Level Management



- Characterize **Flood Risk**

COMMER Procedure

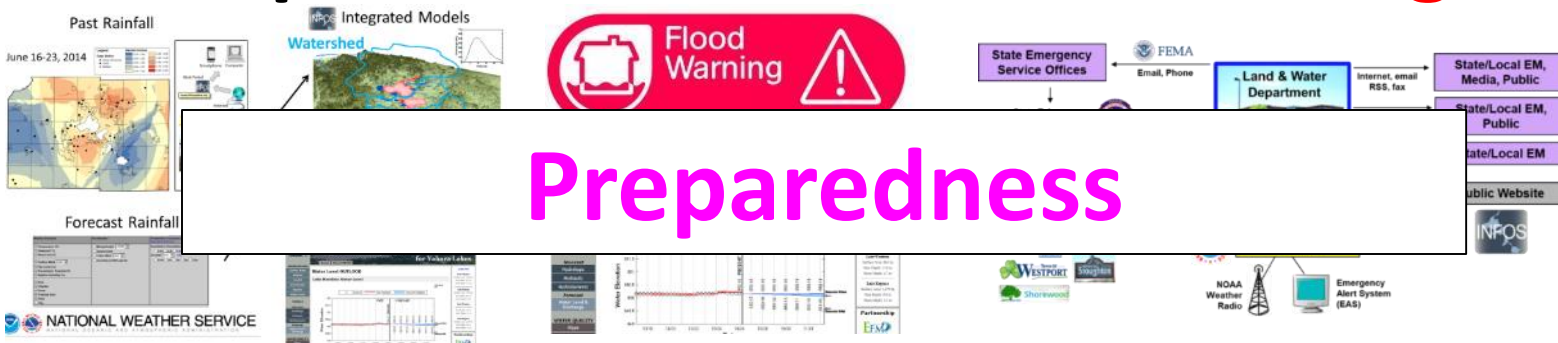


Vulnerability Mitigation

	LOSS	RISK
	Building	Building
Waubesa	500	250
Kegonsa	500	Mixed



- Develop **Flood Forecast and Warning**



NATIONAL WEATHER SERVICE

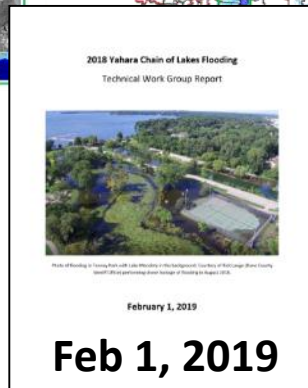
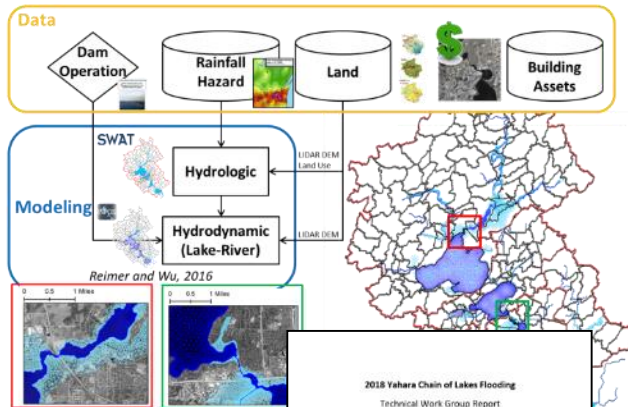


New Development:

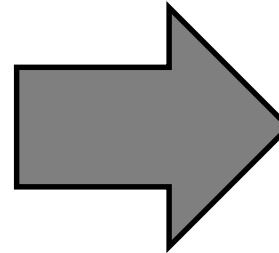
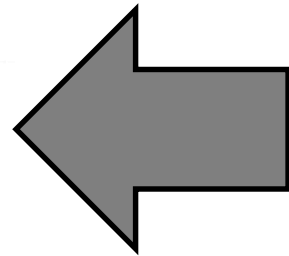
Improve Flood Resiliency

➤ Reduce the Number of **Flood Disasters**

➤ If Flood Disaster, **Recover Quickly**
Approach



Technical Work Group



Wisconsin Lakes

Stoughton

EFM

YLA

DANE COUNTY OFFICE OF LAKES & WATERSHEDS

MAZANET MARINE

Pleasant S

LAND & WATER RESOURCES DEPARTMENT

WISCONSIN DEPT. OF NATURAL RESOURCES

WISCONSIN DEPT. OF TRANSPORTATION

WISCONSIN UNIVERSITY OF WISCONSIN-MADISON

2019 Yahara Chain of Lakes Flooding Policy Task Force

Final Recommendations - March 18, 2019

- Meeting with the County Board of Supervisors to align the task force process with the "Tugue Deal" relations.
- Establishing a common methodology for all meetings.
- Establishing a common methodology for data and related materials.
- Establishing a common methodology for all meetings.
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- Establishing a common methodology for all meetings.

Task Force Members

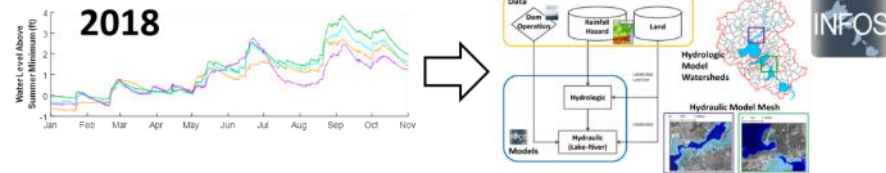
Supervisor Marilyn (Liz) Ober	Ben Pfeifer
Supervisor Steve Papp	Supervisor Steve Papp
Supervisor Steve Papp	Supervisor Steve Papp
Supervisor Steve Papp	Supervisor Steve Papp
Supervisor Steve Papp	Supervisor Steve Papp
Supervisor Steve Papp	Supervisor Steve Papp

Public Comment

- County to review the annual status review of adopted task force recommendations as determined by County Supervisors, County Board of Supervisors, County Board of Supervisors.
- Provide quarterly updates to the Land Conservation Committee, Environment, Agriculture & Natural Resources Committee and the Lake & River Conservation Committee on status of task force recommendations, current water levels, flow and other lake status, aquatic plant harvesting, control of invasive species and other related information.
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Policy Task Force

Scenarios



Adaptation

- a. Lower Lake Mendota one foot (flood storage or maintain lower)
- b. Safely Manage Lake Mendota at 100 year water level
- c. Remove all dams from the Yahara Lakes

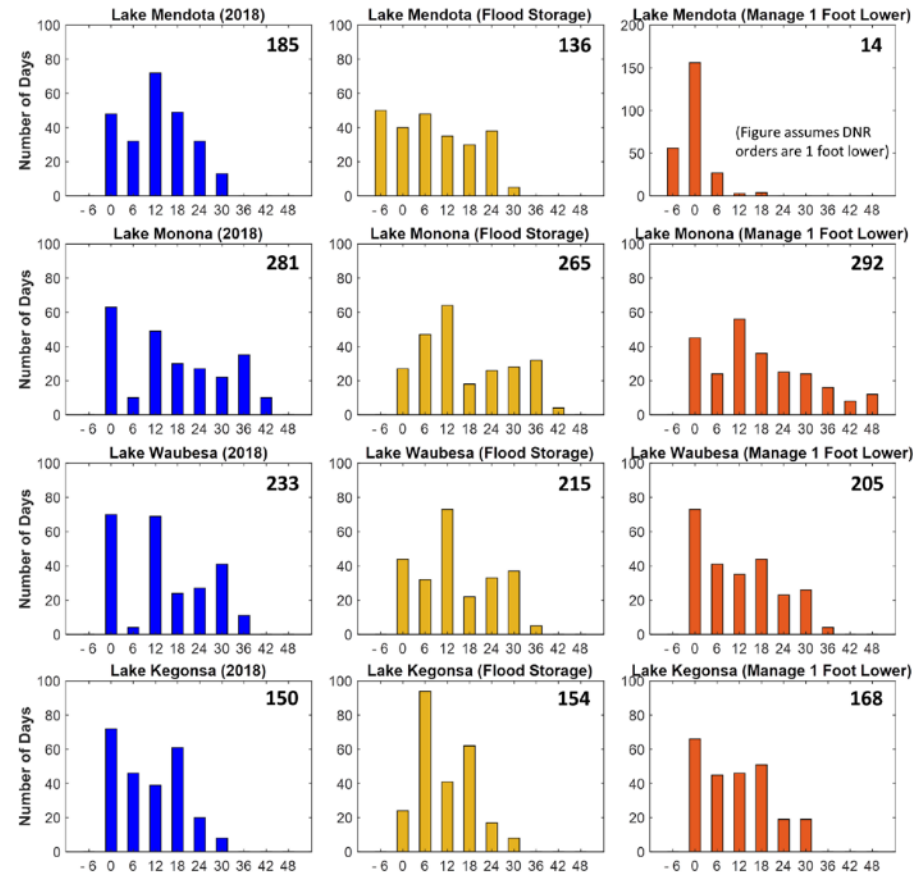
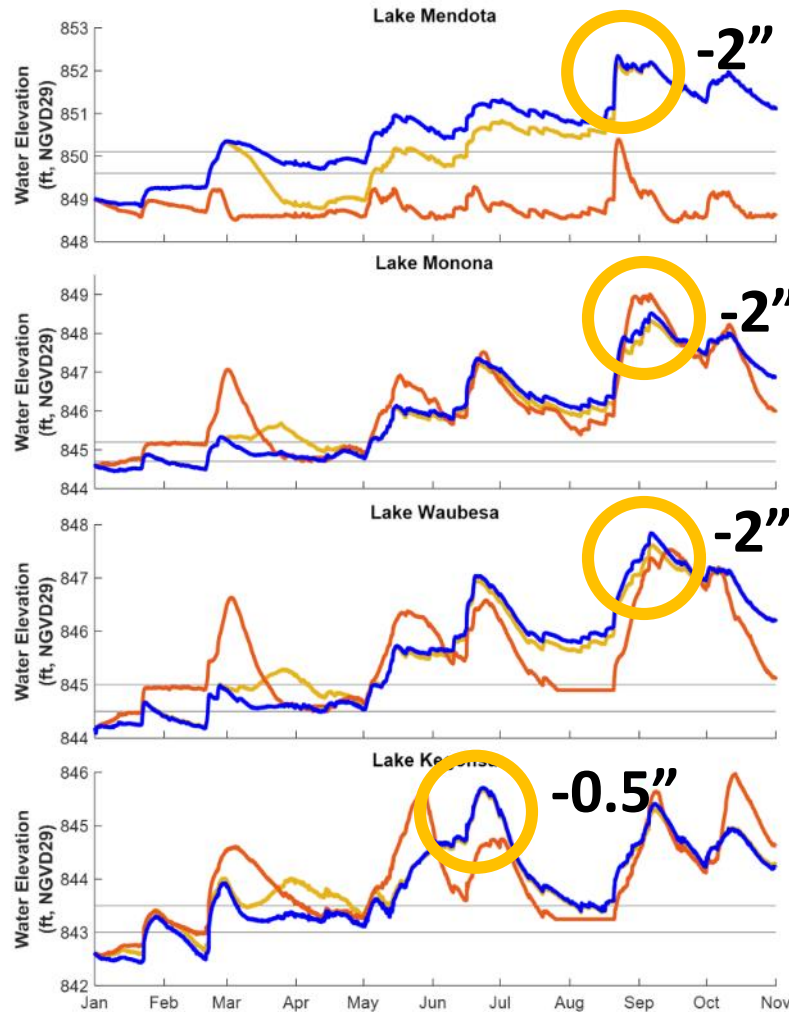
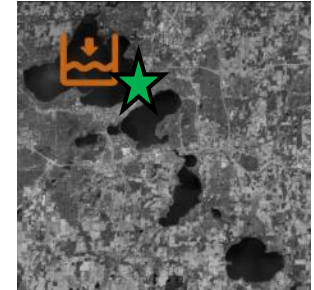
Mitigation

- a. Bridge Modifications
- b. Yahara River Dredging
- c. Flow Reroute and Pumping
- d. Combined (b) and (c)

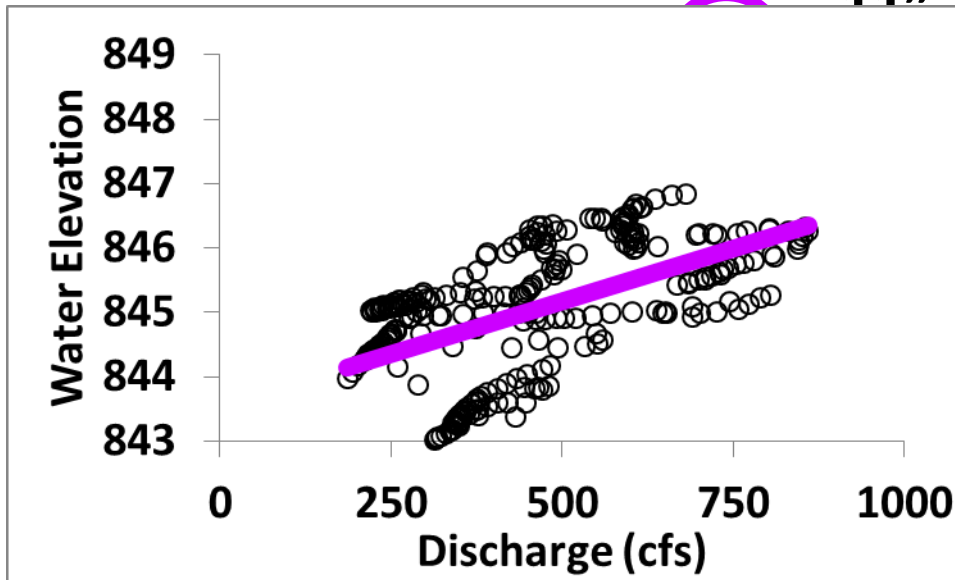
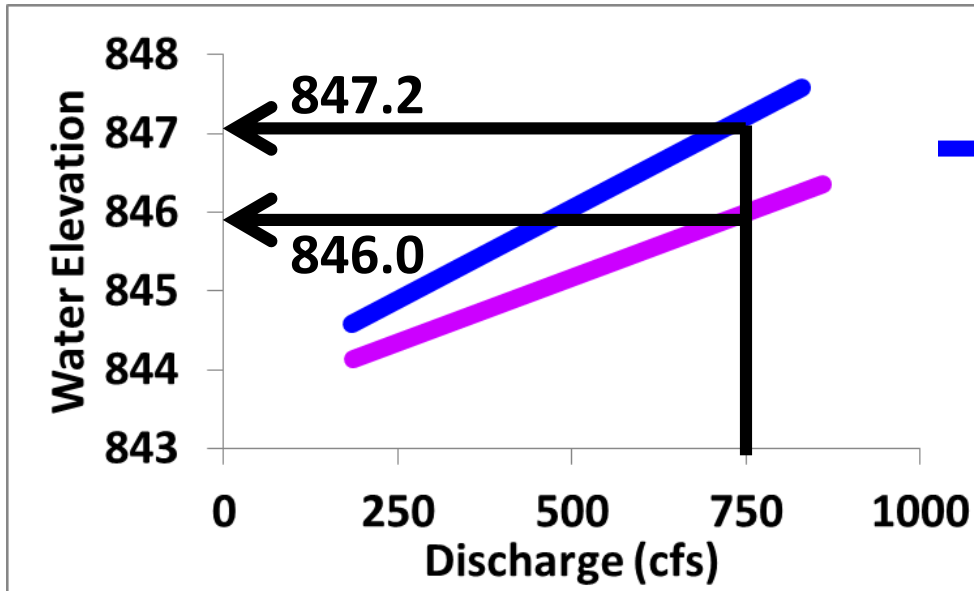
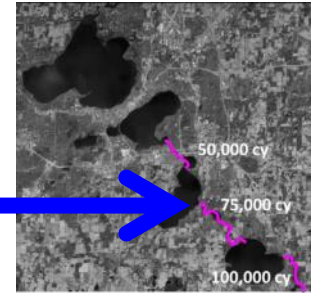


Adaptation – Lower Lake Mendota

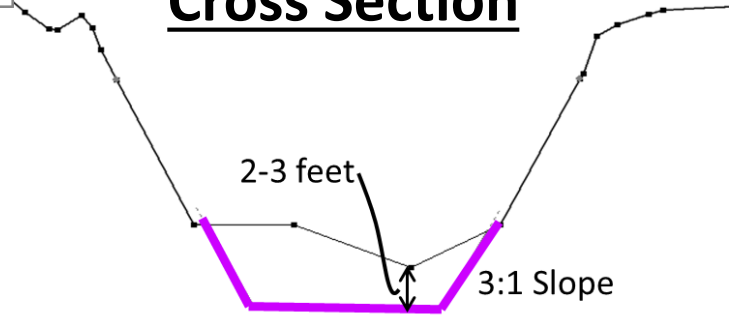
Flood Storage or Maintain Lower



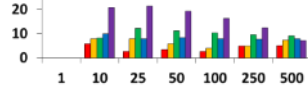
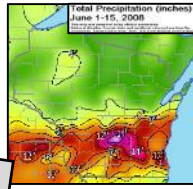
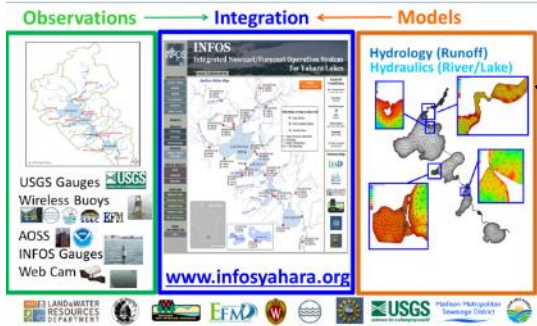
Mitigation – Yahara River Dredging



Cross Section



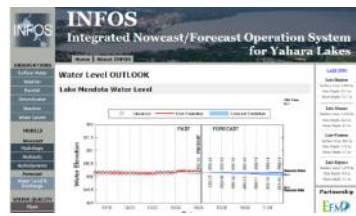
Thank You



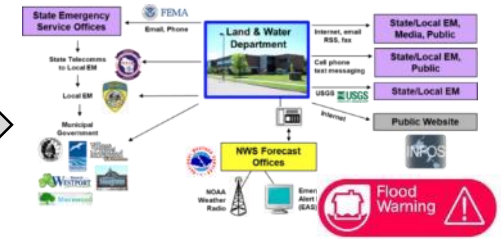
Flood Risk



Vulnerability Mitigation

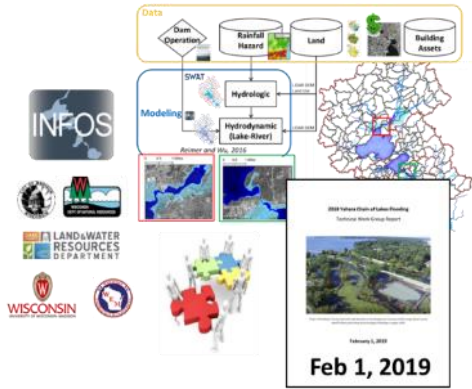


Flood Forecast



Preparedness

Technical Work Group



Flood Resiliency



Policy Task Force

