Science Driven Lake Level Management to address Flooding in the Yahara Lakes
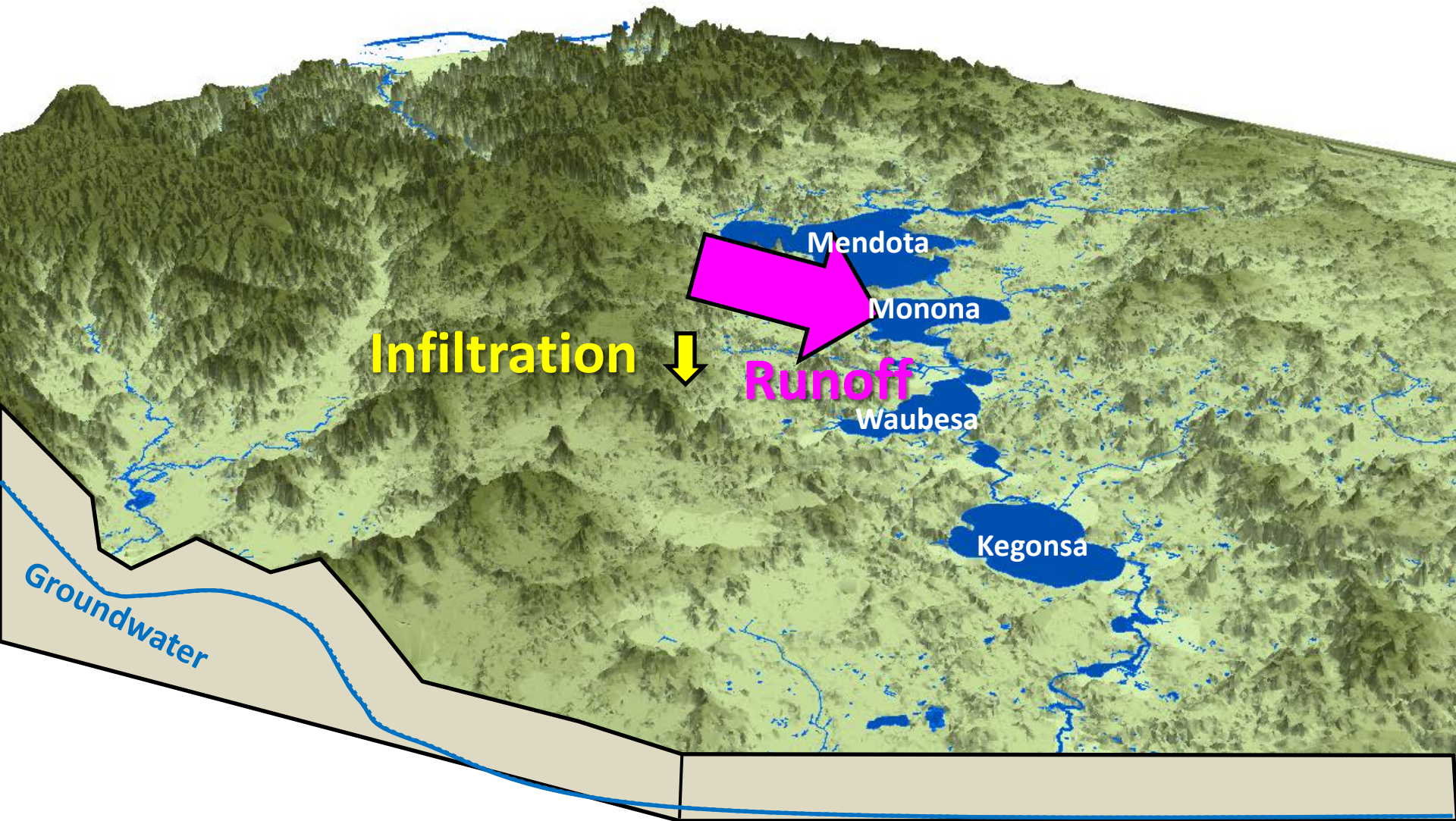

Climate Council Meeting – October 16, 2018
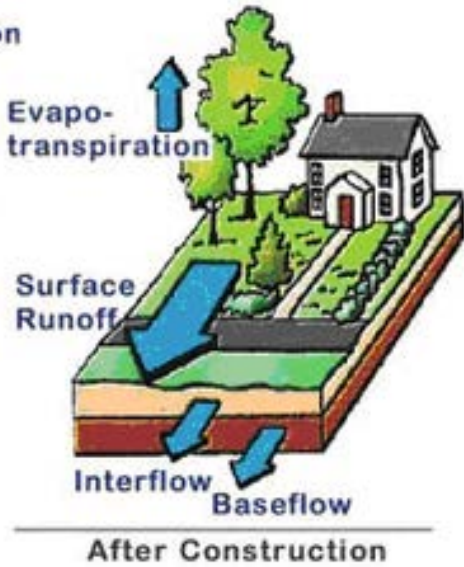
John Reimer
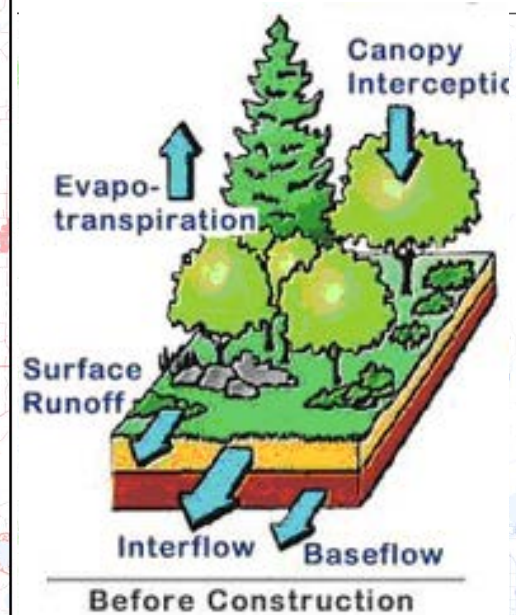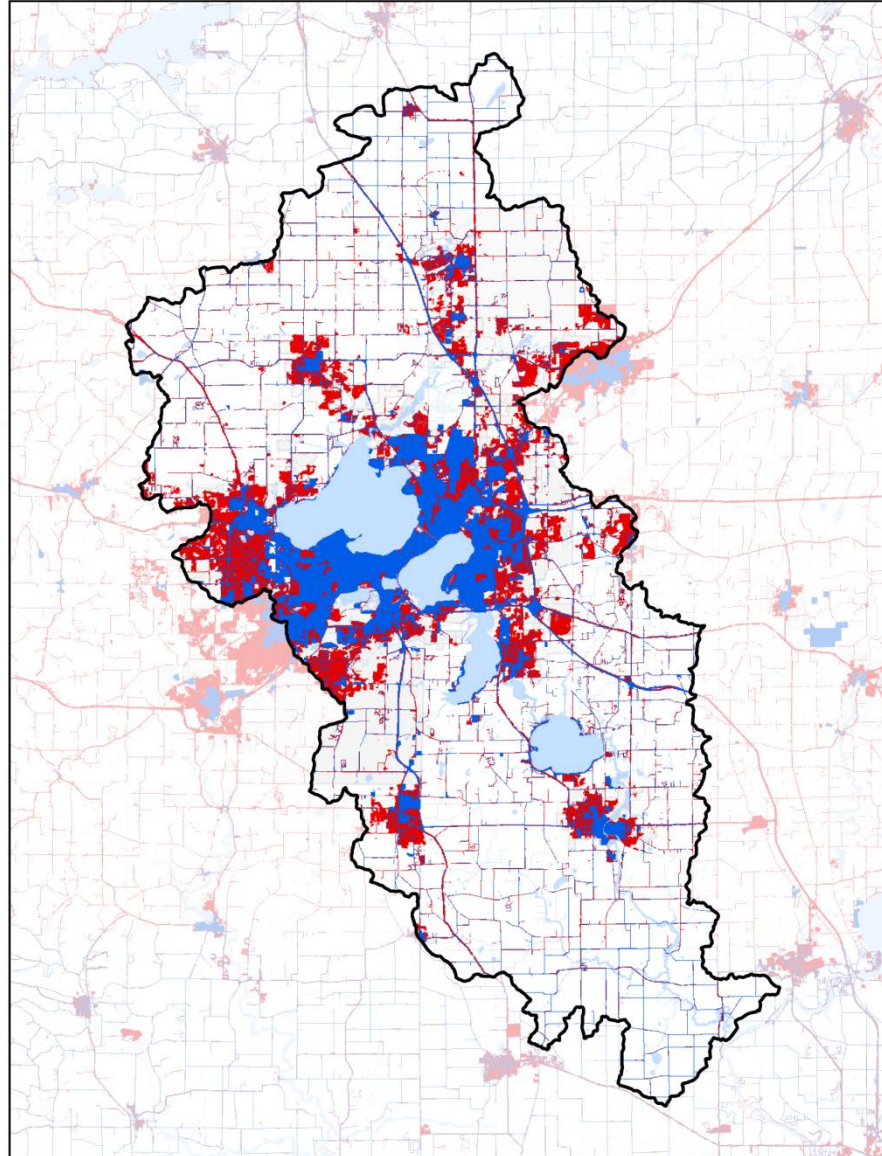**Land & Water Resources Department**

Hydrology of the Yahara Lakes

Urban Development
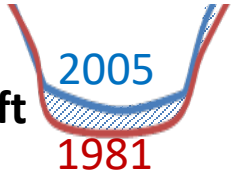

2017

75,000 Acres

1970

41,000 Acres

In 2017 we have 2 times more area of development than 1970

Hydraulics of the Yahara Lakes

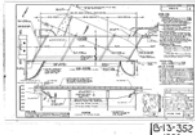**Sediment Accumulation** **Constriction Points** **Aquatic Plants**

~2 ft   2005   1981   Exchange Street

↓ **Area**   ↓ **Flow**   ↓ **Slope** ↓ **Flow**   ↑ **Friction** ↓ **Flow**

NO SWIMMING

Observations

Observations & Models

INFOS

- ● Flow Gage
- ★ Lake Level Gage
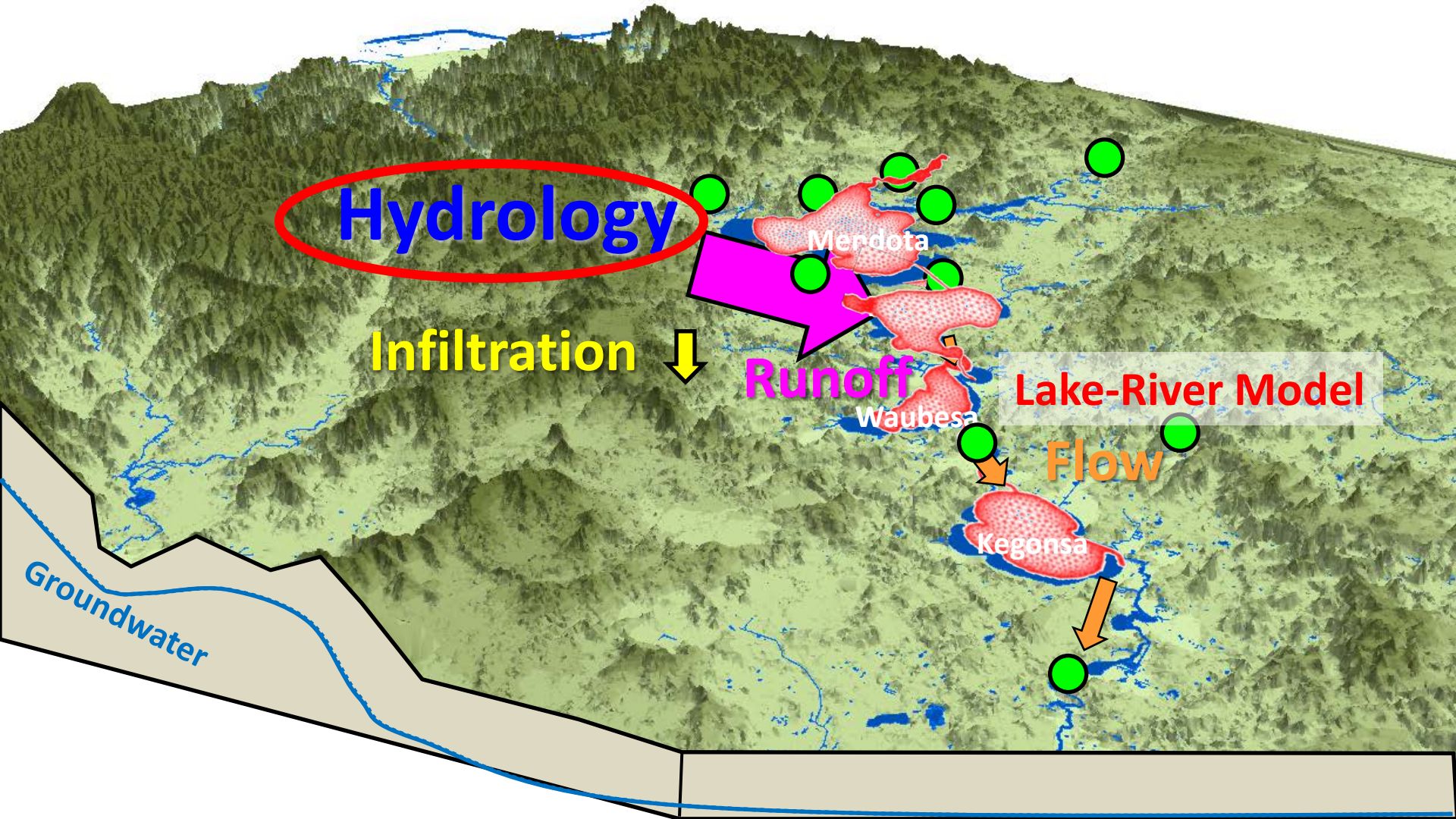
Hydrology

Infiltration ↓

Runoff

Merdota

Waubesa

Lake-River Model

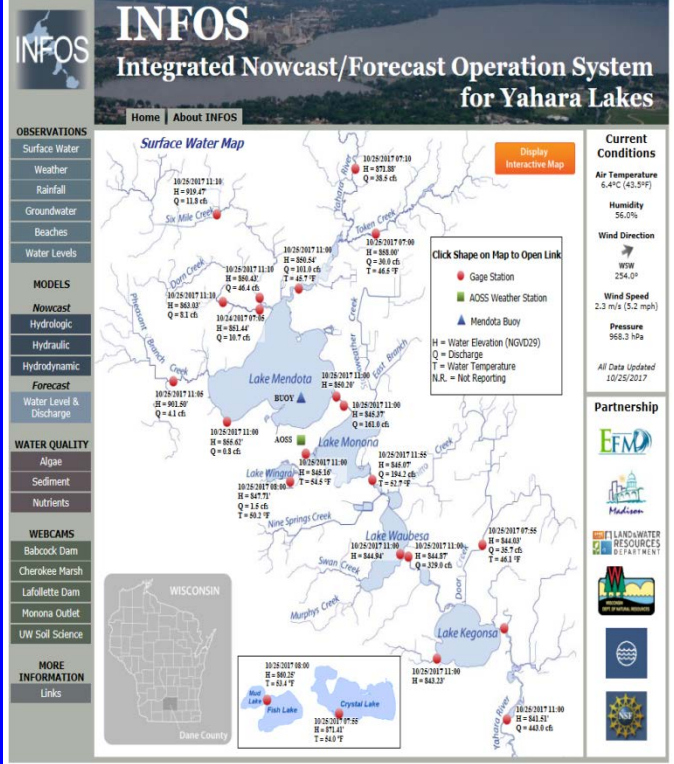**Flow**

Kegonsa

Groundwater

Integrated **N**owcast/**F**orecast **O**peration **S**ystem
for Yahara Waters

Observations → Integration ← Models
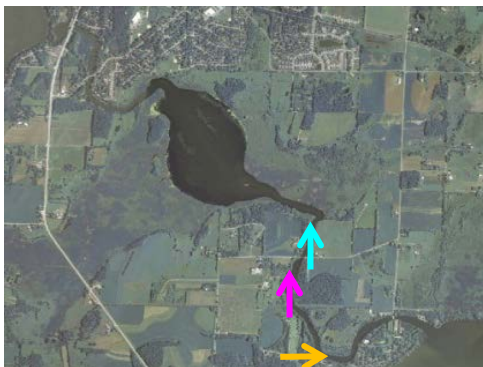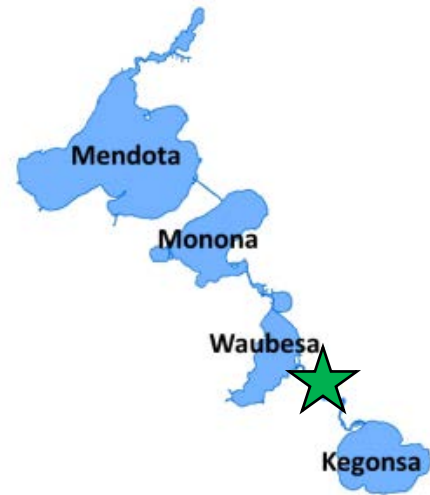
USGS Gauges

Wireless Buoys

AOSS

INFOS Gauges

Web Cam

Hydrology (Runoff)
Hydraulics (River/Lake)

www.infosyahara.org
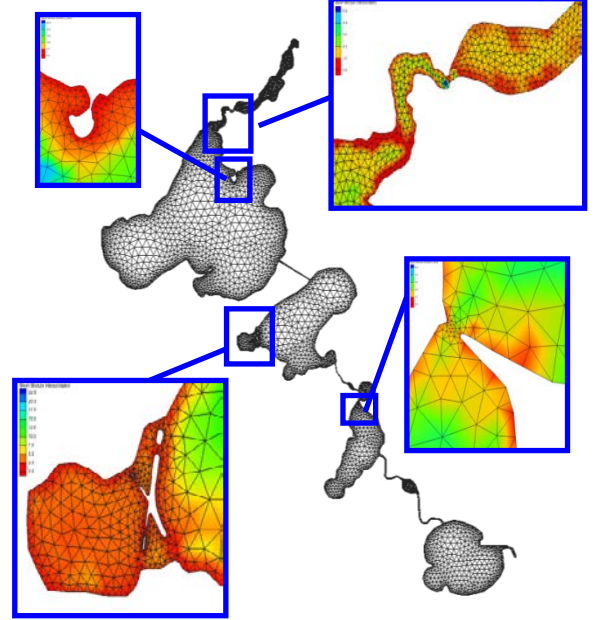
Case Study
(i) Aquatic Plant Harvesting

Herling

2.5 times

	Flow - **No Vegetation**	Flow - **Vegetation**
Summer Minimum	350.2 cfs	144.8 cfs
Summer Maximum	500.8 cfs	207.5 cfs
100 Year Flood	1000.8 cfs	400.3 cfs

New Developments
Integrated **N**owcast/**F**orecast **O**peration **S**ystem
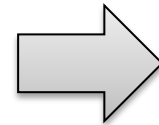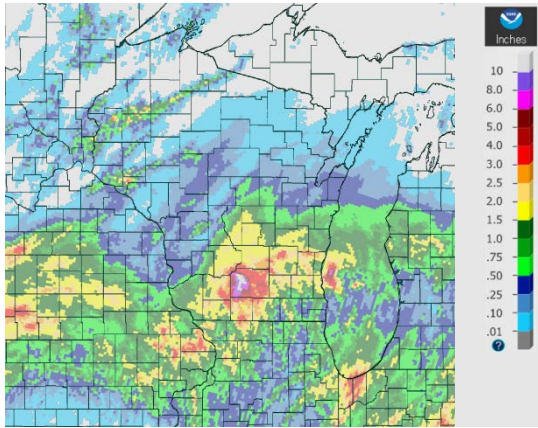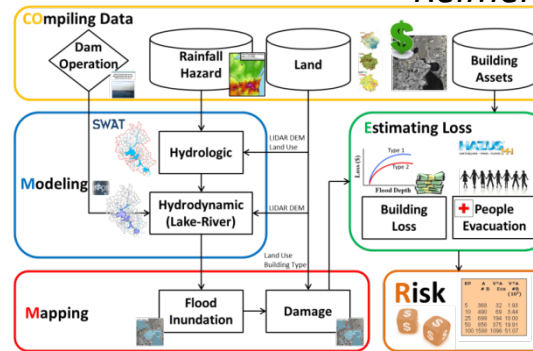## for the Yahara River Chain of Lakes

Flood Risk & Forecasting

Flood Risk

Scenarios

August 21, 2018

Reimer and Wu, 2016

Loss

Mendota ☆

Monona ☐

Waubesa

Kegonsa
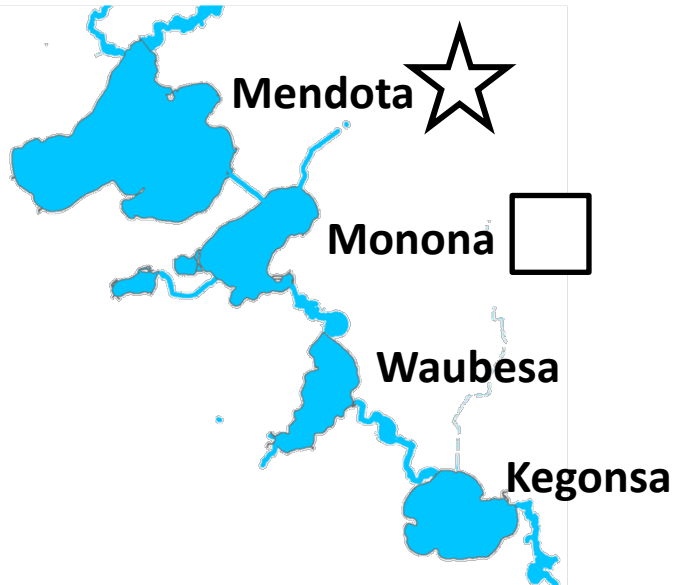
Building Risk (USD Thousands) $

10 Day, 250 RP

10 Day, 10 RP
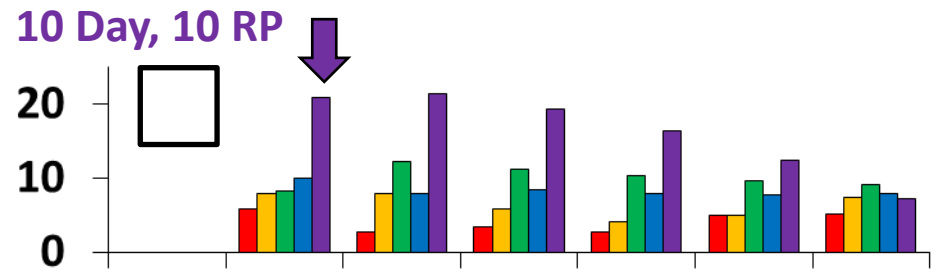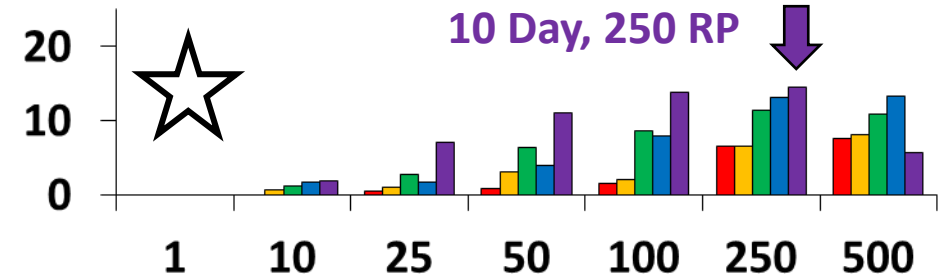
Return Period

Flood Forecasts

Past Rainfall

June 16-23, 2014

PWS Communication Schematic

Forecast Rainfall

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
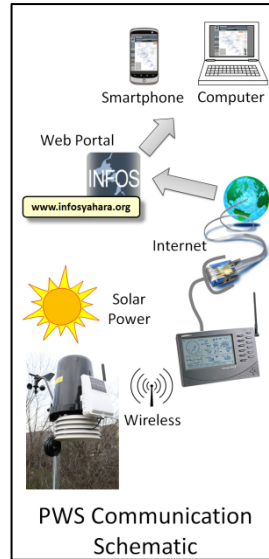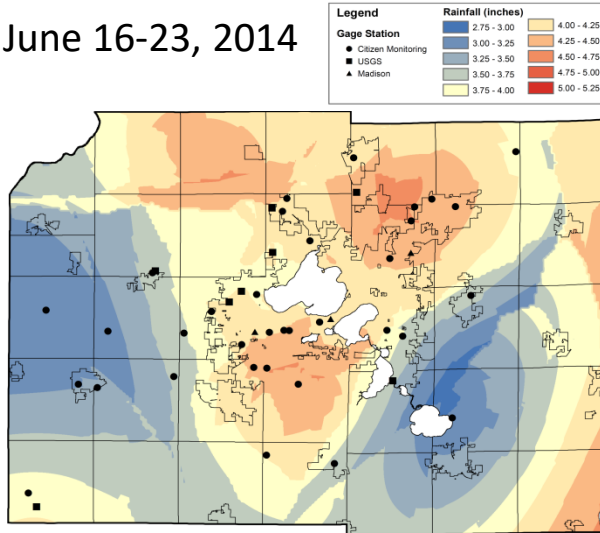
INFOS Integrated Models

Watershed

Lake-River

www.infosyahara.org

Summary

Science Driven Lake Level Management

Adaptation Strategies

(i) Aquatic Plant Harvesting
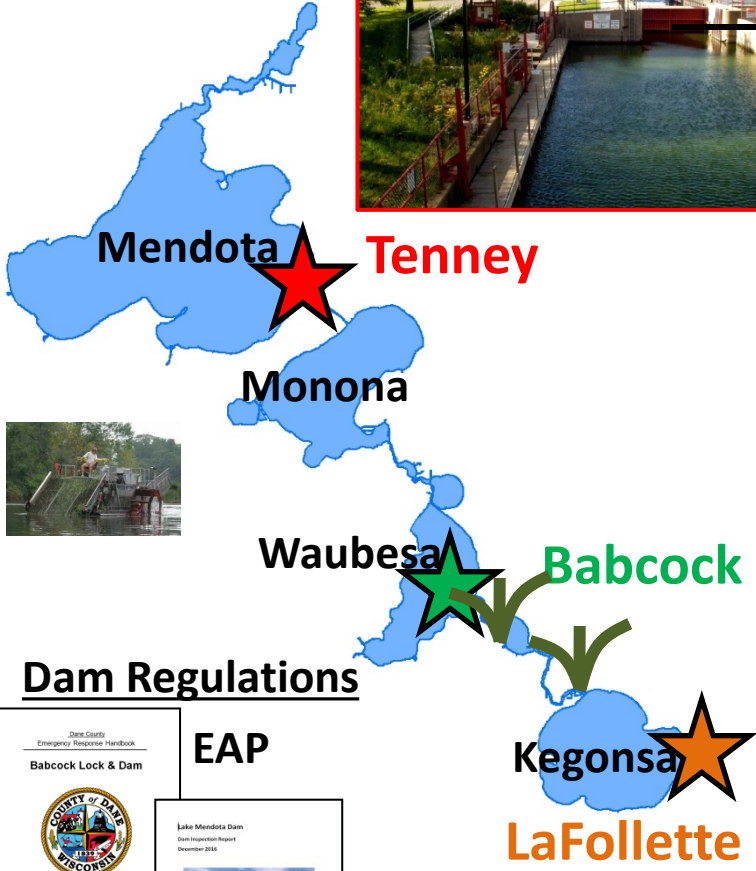

- **Characterize Flood Risk   LOSS**

Vulnerability Mitigation

- **Develop Flood Forecast and Warning**

Preparedness
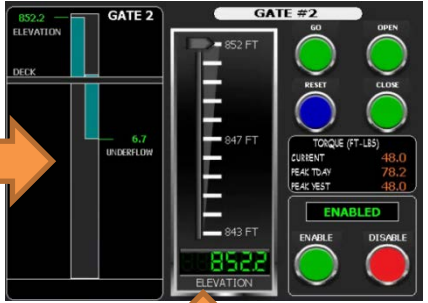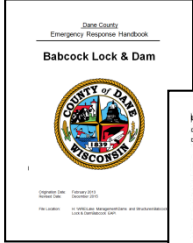
Lake Level Management

2017 Upgrades

Automation
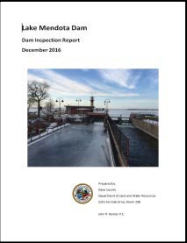
Mendota **Tenney**

Monona

Waubesa **Babcock**

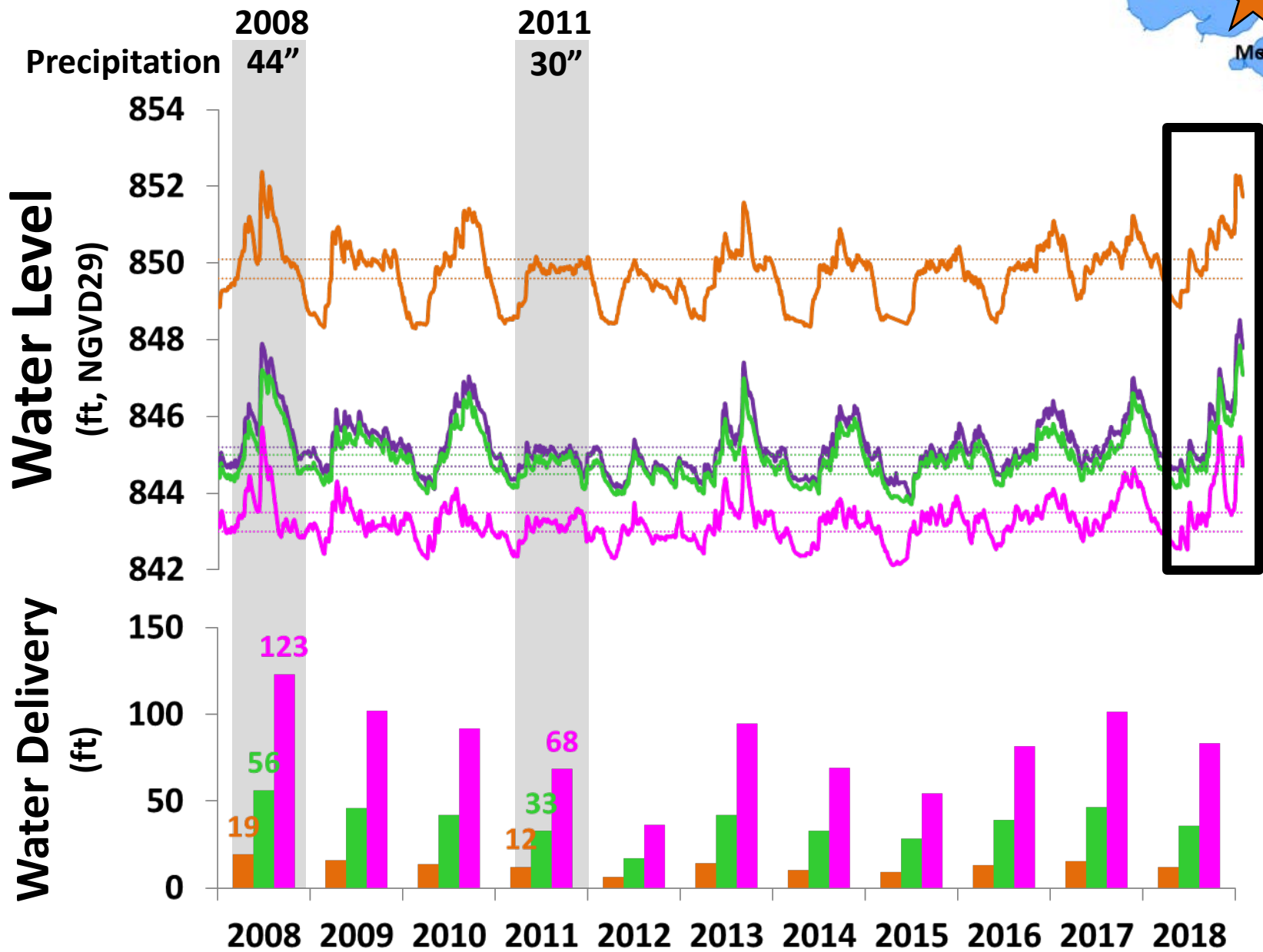**2013 Rehabilitation**

Dam Regulations

EAP

Kegonsa

LaFollette

IOM

Past Lake Levels and Flows

Recap 2018 Flooding

EAP

Flow (cfs)

1500

1000

6/27/18

92 Loads in 5 days!

500

Storage Mode

FLASH FLOOD AREA

0

Delivery Mode
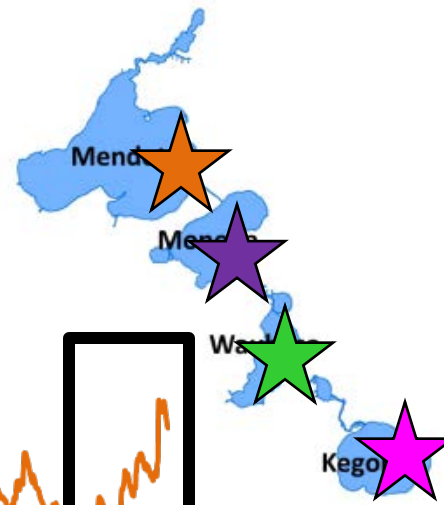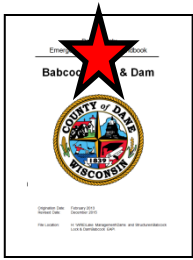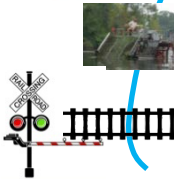
Water Level above Summer Min (ft)

5

Monona Historic
848.52 (10 inches > 100 year)

4

Kegonsa Historic
845.75 (7 inches > 100 year)

Waubesa Historic
847.86 (10 inches > 100 year)

3

2

1

0
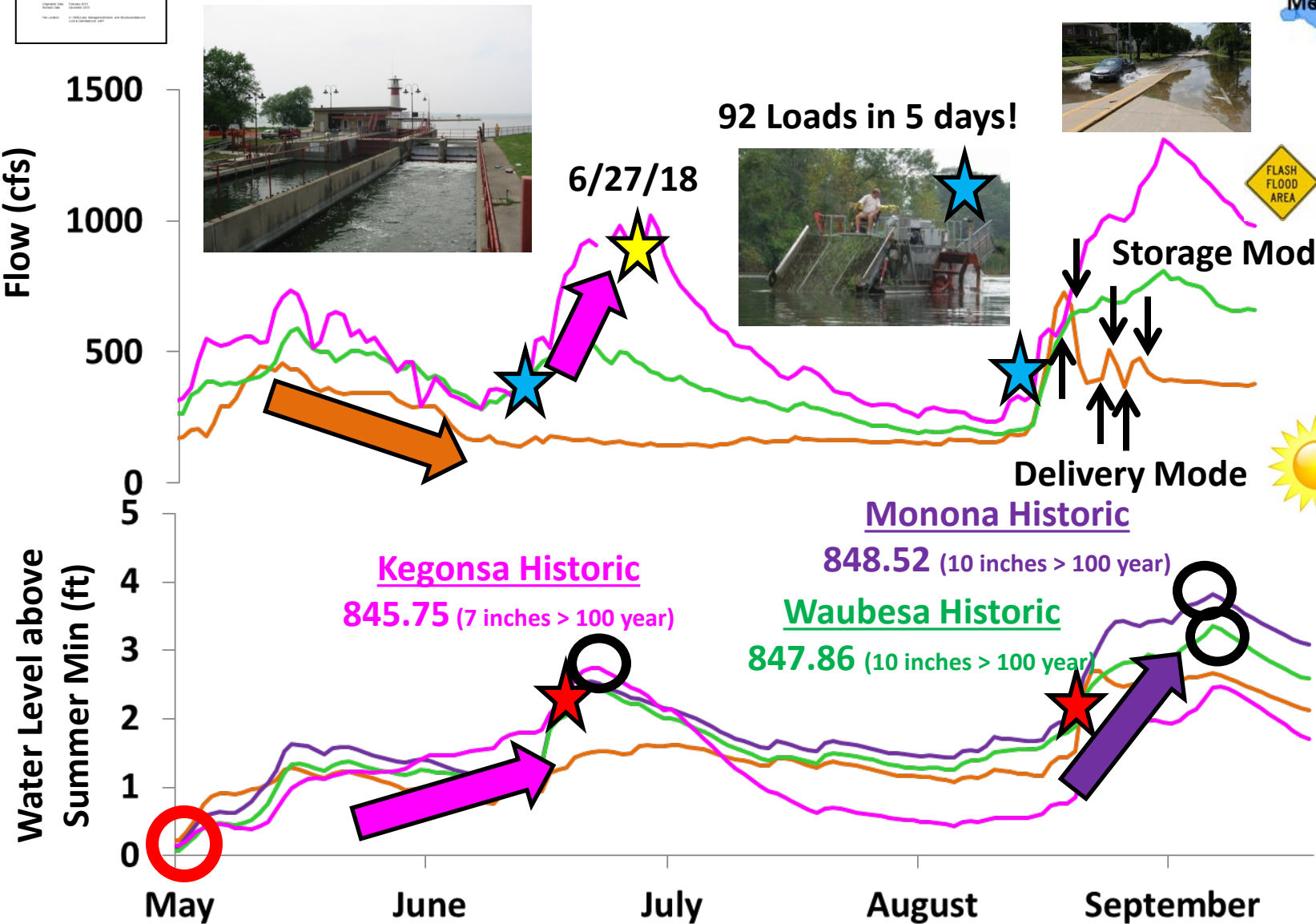
May   June   July   August   September

Improve our Flood Resiliency

➢ **Reduce** the Number of **Flood** **Disasters**

➢ If Flood Disaster, **Recover Quickly**

Technical Review

Examples for Technical Review

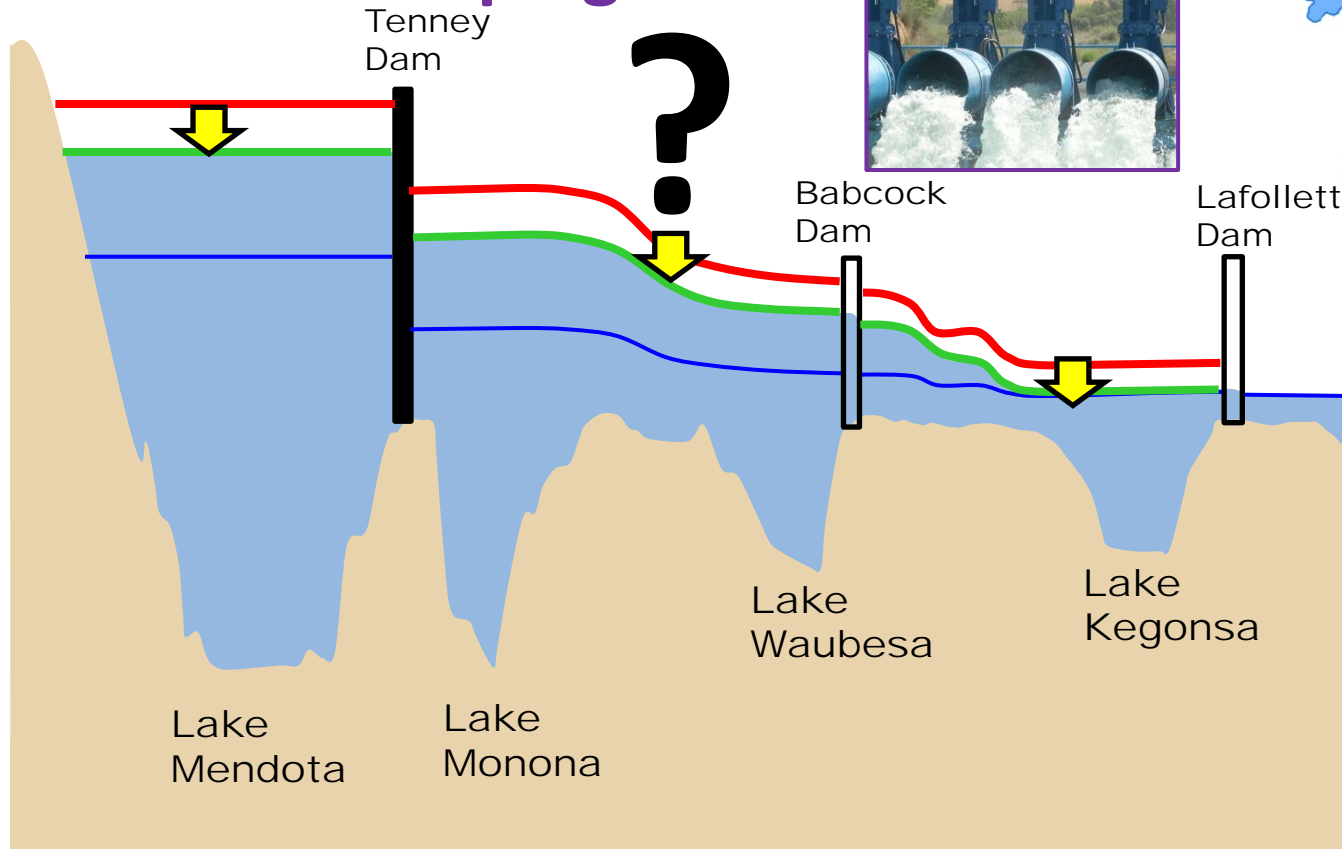- **Lower Lake Mendota Water Level** Uncertainty?
- **Remove Constriction Points/Dredge** Water Levels?
- **Flood Control Pumping**

Tenney Dam

?

Babcock Dam

Lafollette Dam

Lake Waubesa

Lake Kegonsa

Lake Mendota

Lake Monona

Improve our Flood Resiliency

➢ **Reduce** the Number of **Flood Disasters**

➢ If Flood Disaster, **Recover Quickly**

Technical Review

Community Engagement

Questions?