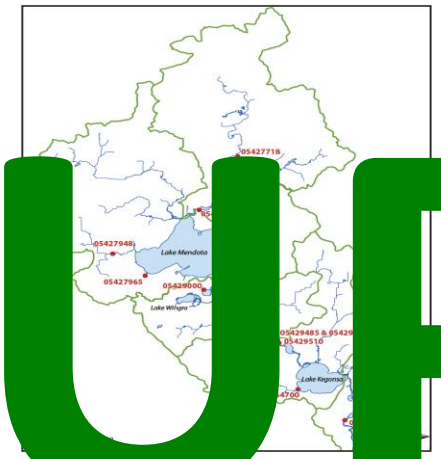
Integrated Nowcast/Forecast Operation System for Yahara Lake Chain System

Observations → Integration ← **Models**



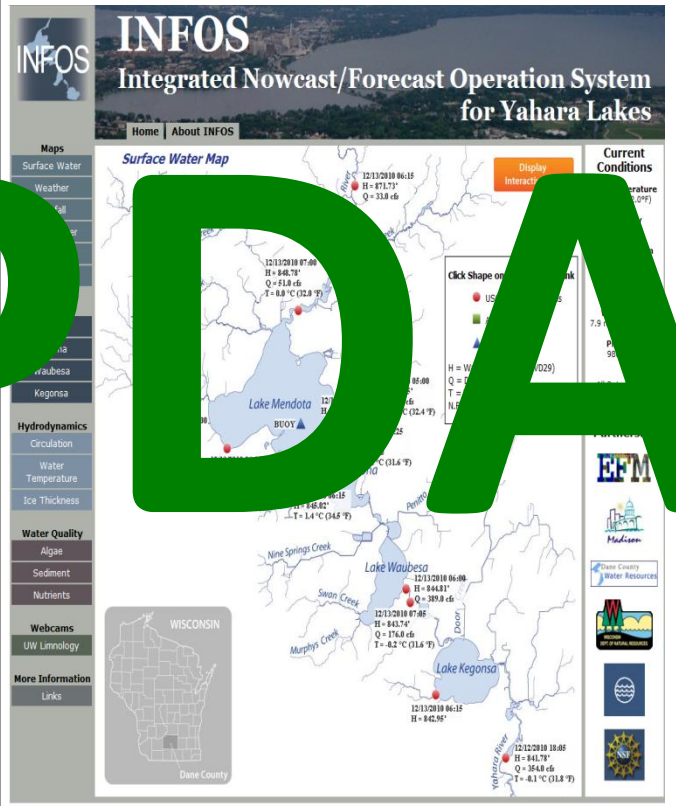
USGS Gauges

Wireless Buoys

AOSS

INFOS Gauges

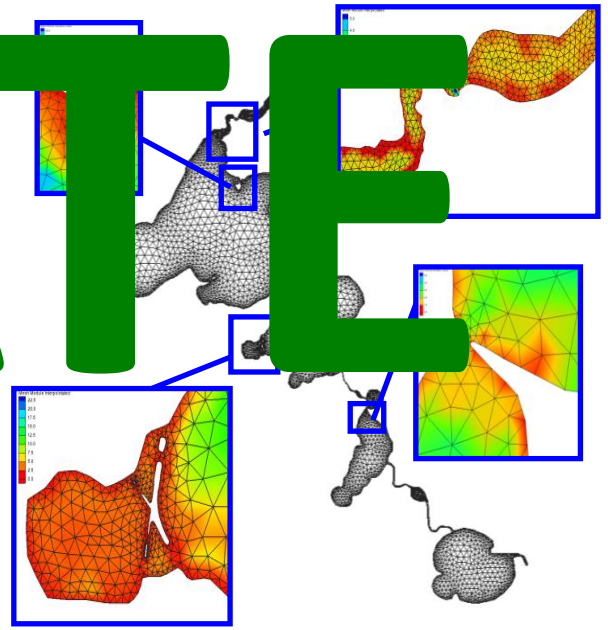
Web Cam



www.infosyahara.org

Hydrology (Runoff)

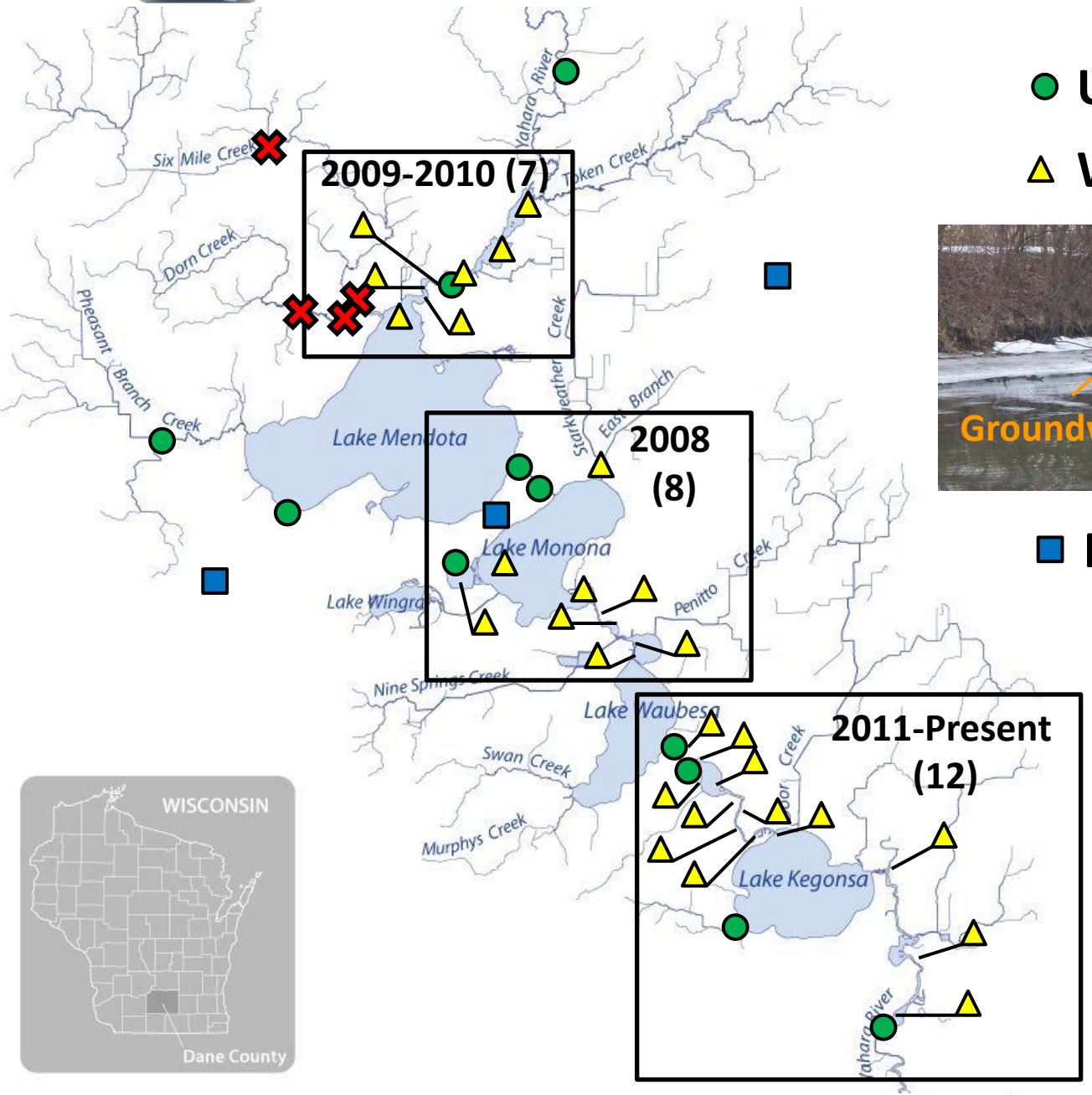
Hydraulics (River/Lake)



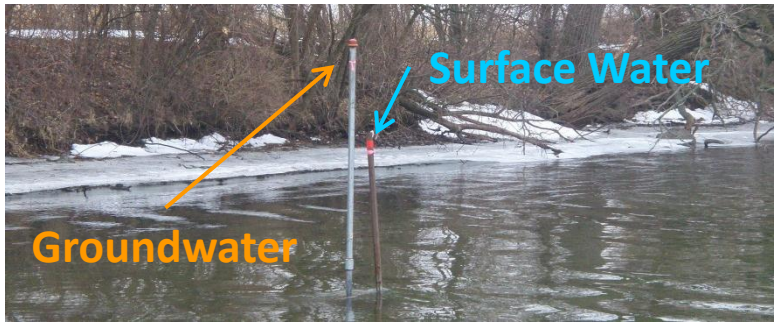
Groundwater

UPDATE

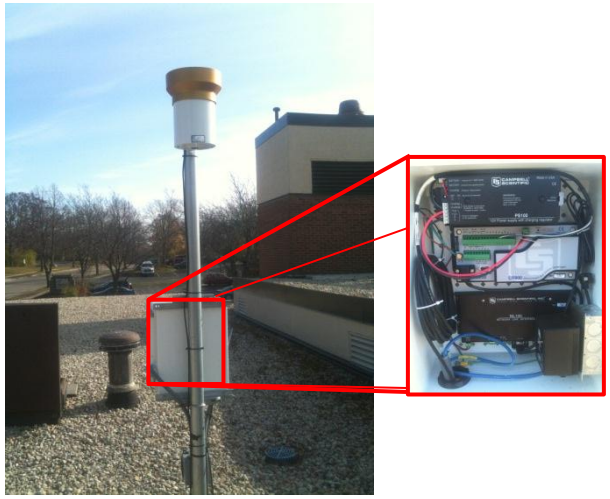
Water Observation Network



- USGS
- USGS/MMSD
- Water Level

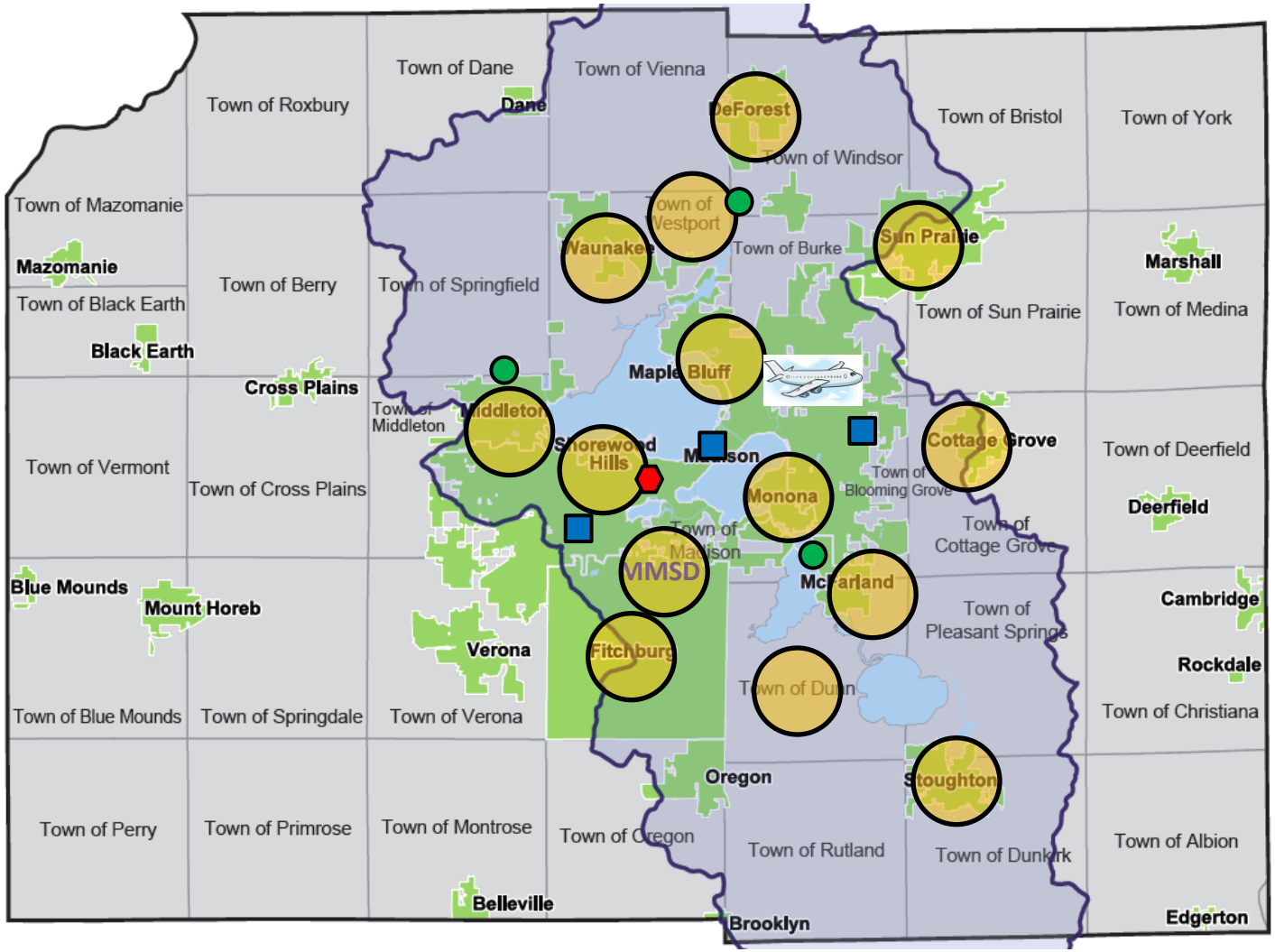


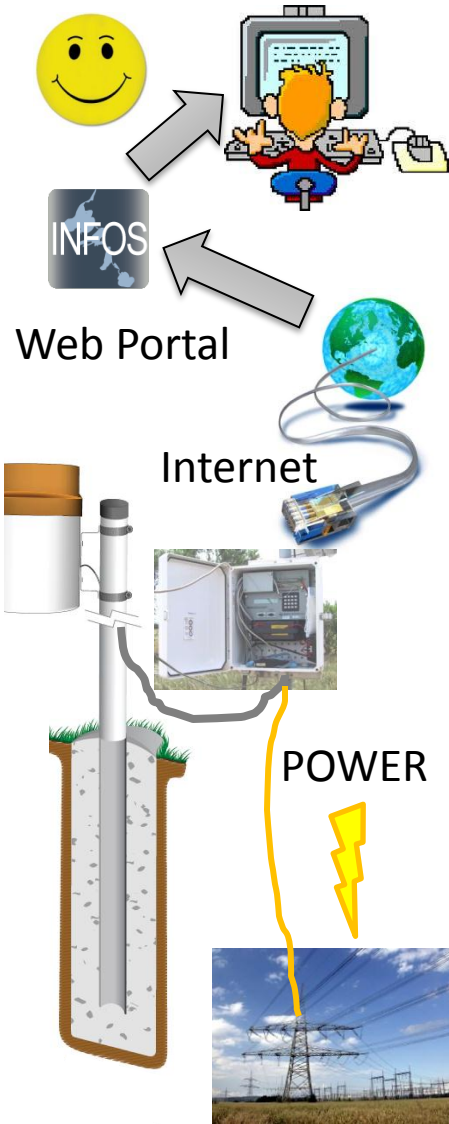
- Rainfall



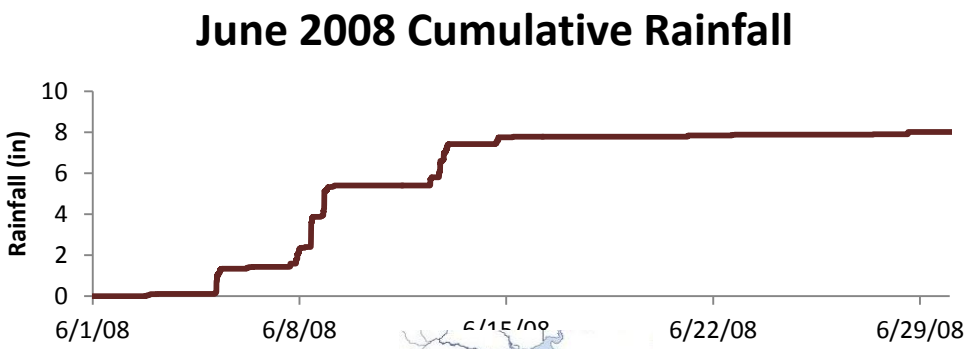
Community Network

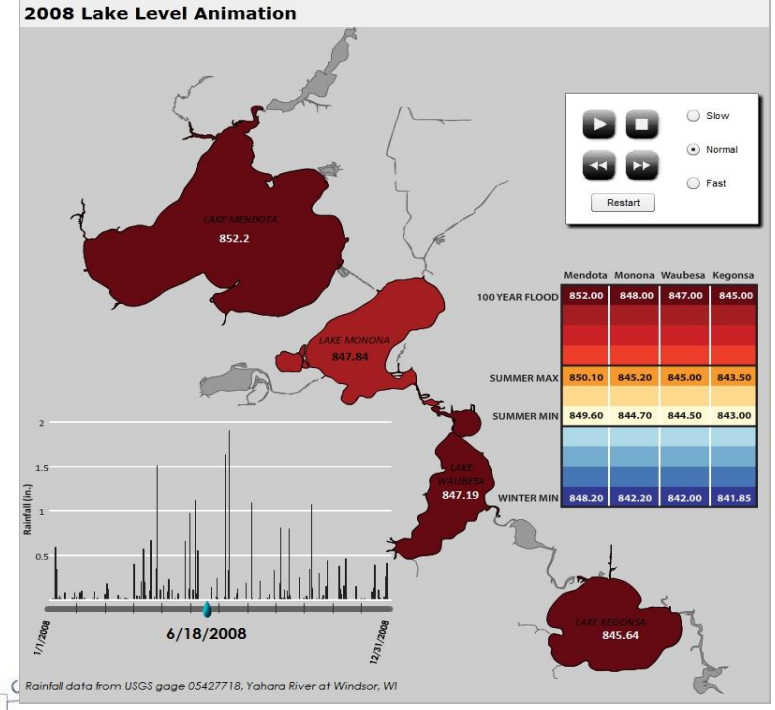
Potential Site
AOSS
USGS
Airport
Madison

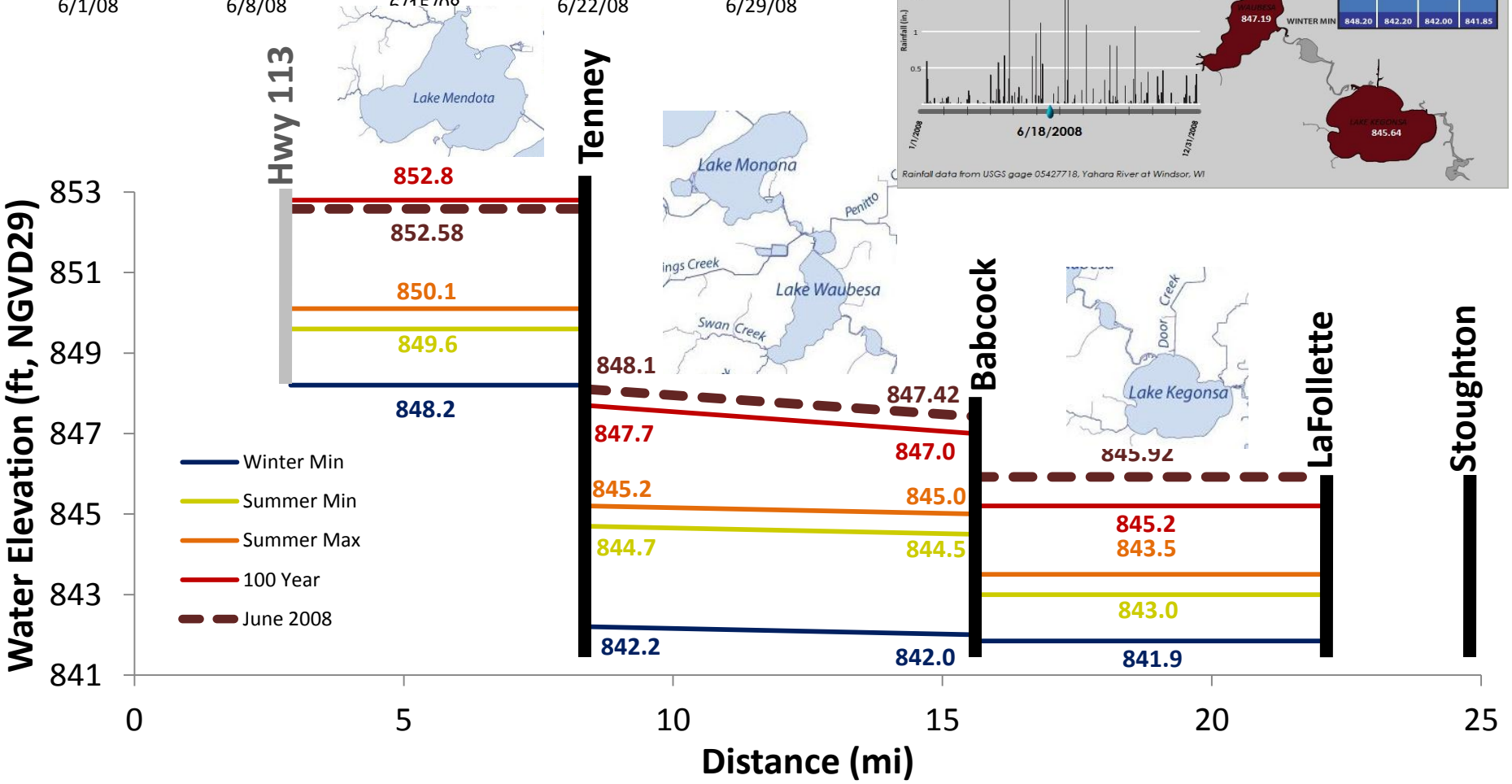




Yahara Water Level Orders

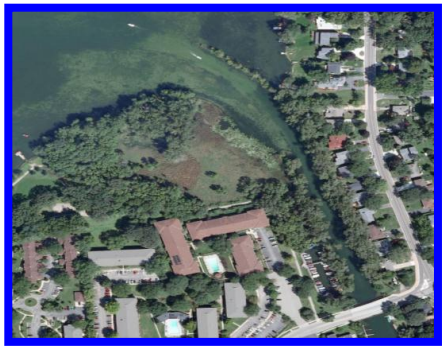






Scenarios

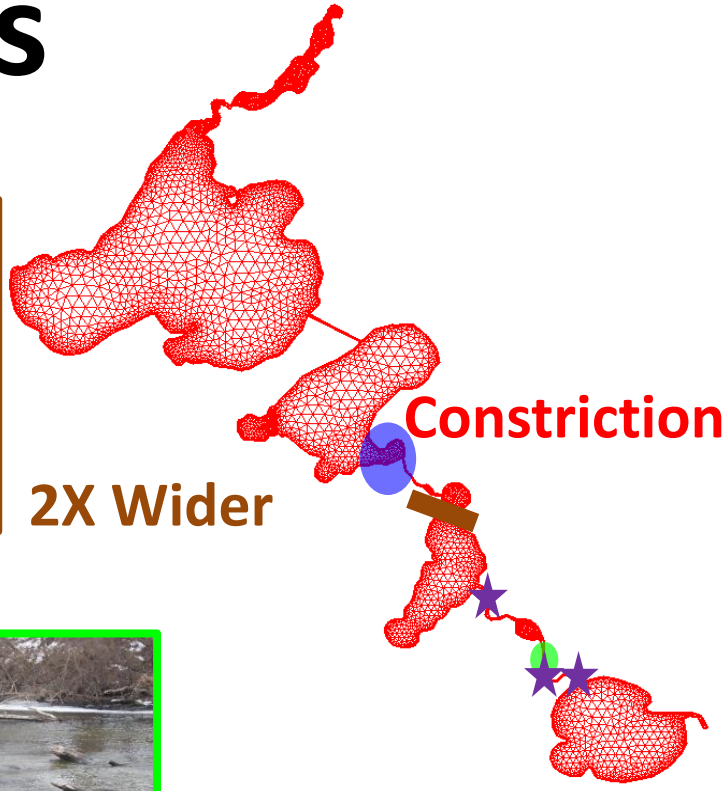
Monona Outlet



3 Feet Deeper

Railroad Trestle

2X Wider



Fish Weir/Douglas Dam

1 Foot Deeper

Bridges

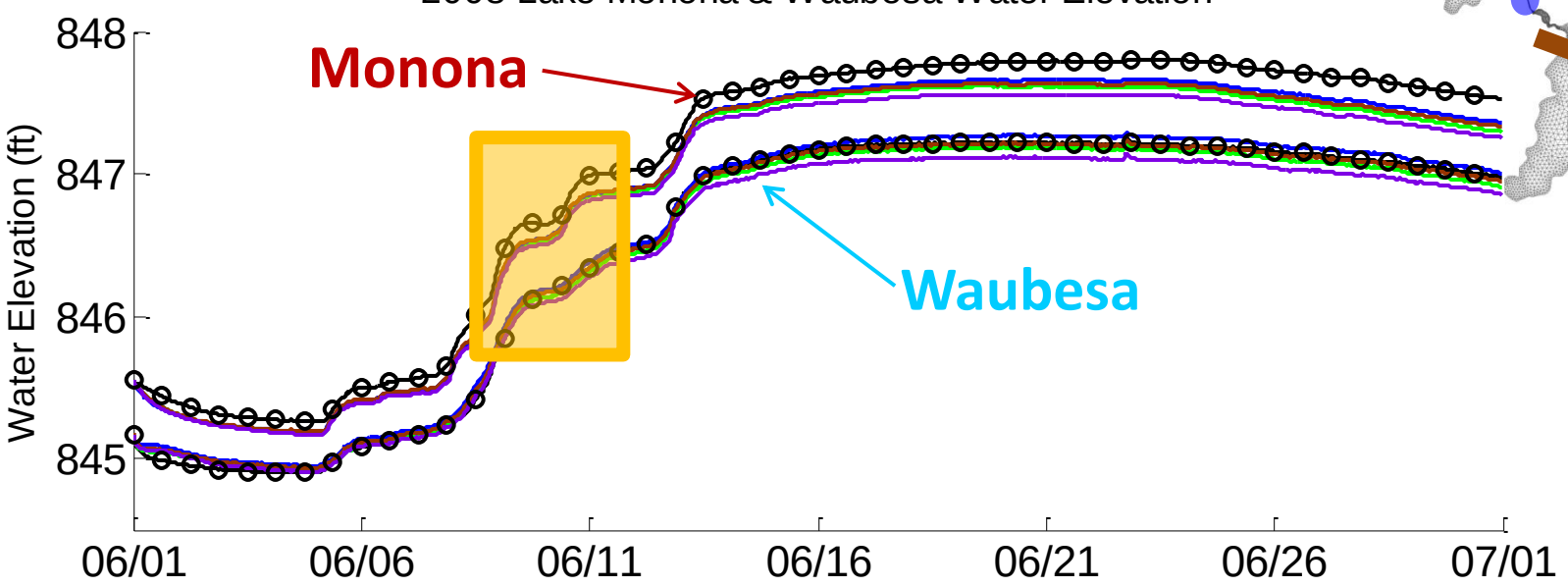
Exchange Street

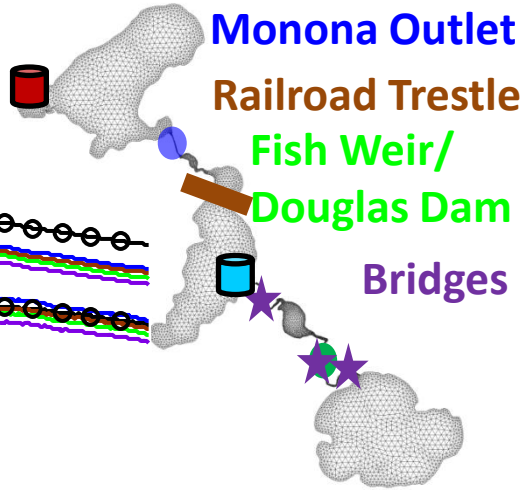
Dyreson Road

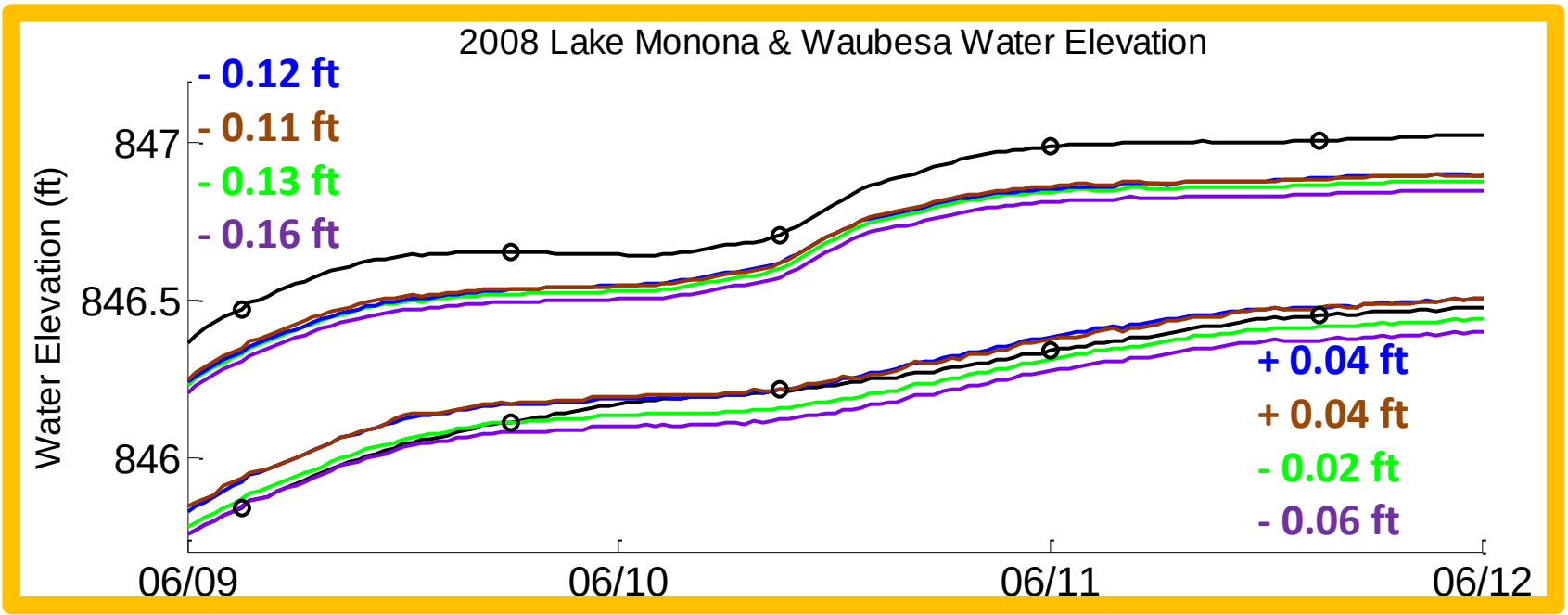
Co Hwy AB

1.5X Wider

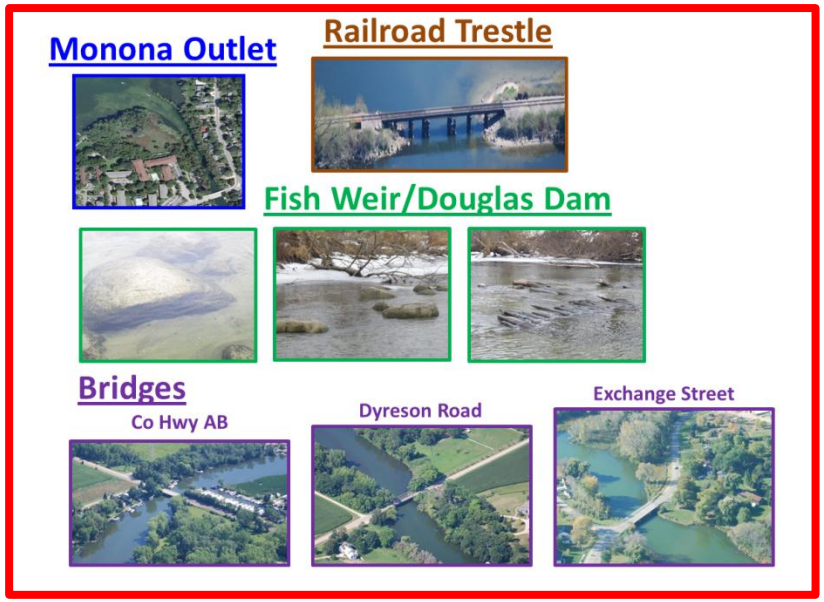
Water Level

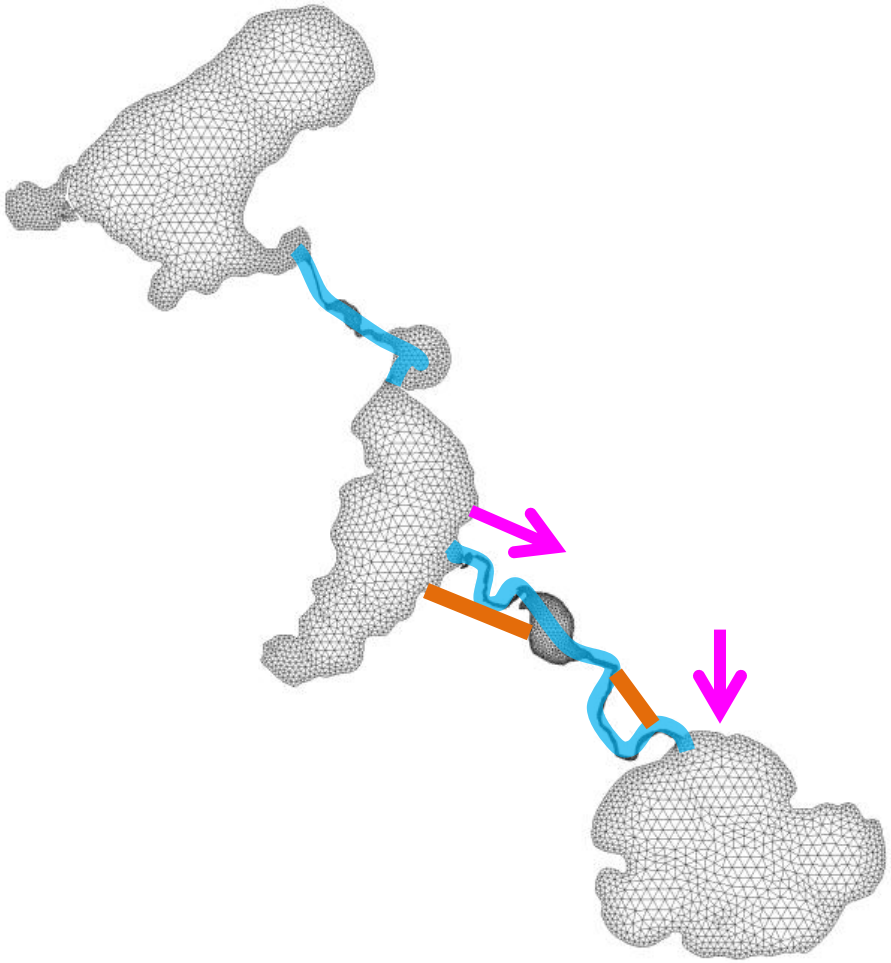

2008 Lake Monona & Waubesa Water Elevation
Monona
Waubesa
Water Elevation (ft)
848
847
846
845
06/01
06/06
06/11
06/16
06/21
06/26
07/01


Monona Outlet
Railroad Trestle
Fish Weir/
Douglas Dam
Bridges


2008 Lake Monona & Waubesa Water Elevation
- 0.12 ft
- 0.11 ft
- 0.13 ft
- 0.16 ft
+ 0.04 ft
+ 0.04 ft
- 0.02 ft
- 0.06 ft
Water Elevation (ft)
847
846.5
846
06/09
06/10
06/11
06/12

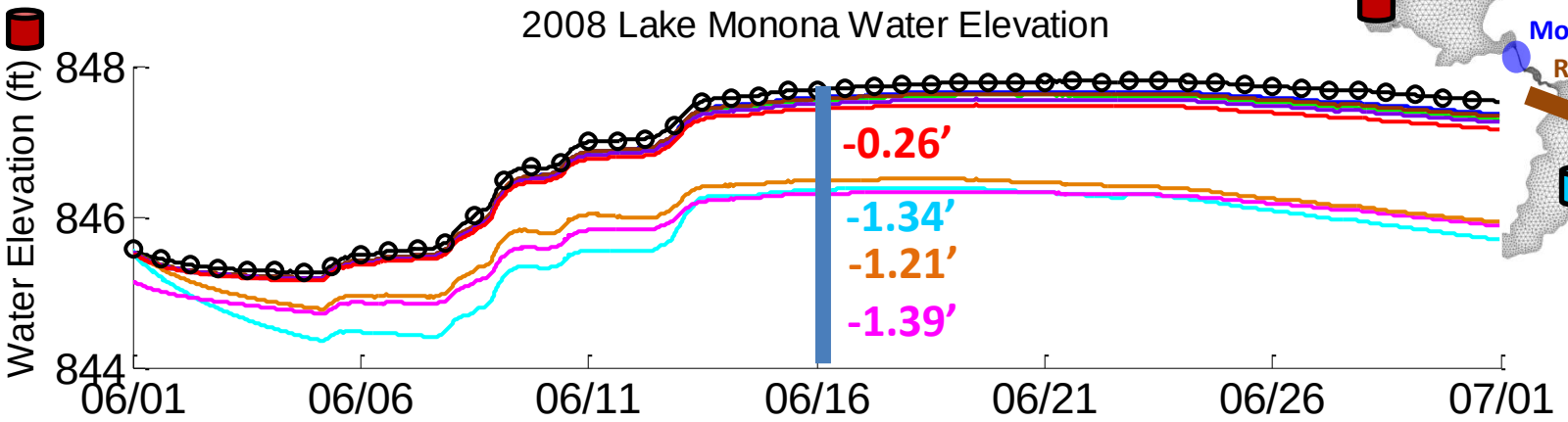
Possible Scenarios

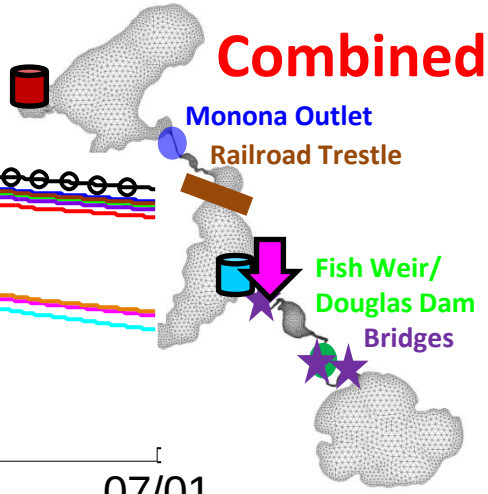




- **Combined**
  (constriction removal)
- **System Dredge**
- **Channel Reroute**
- **Water Bypass (Pumping)**

Water Level

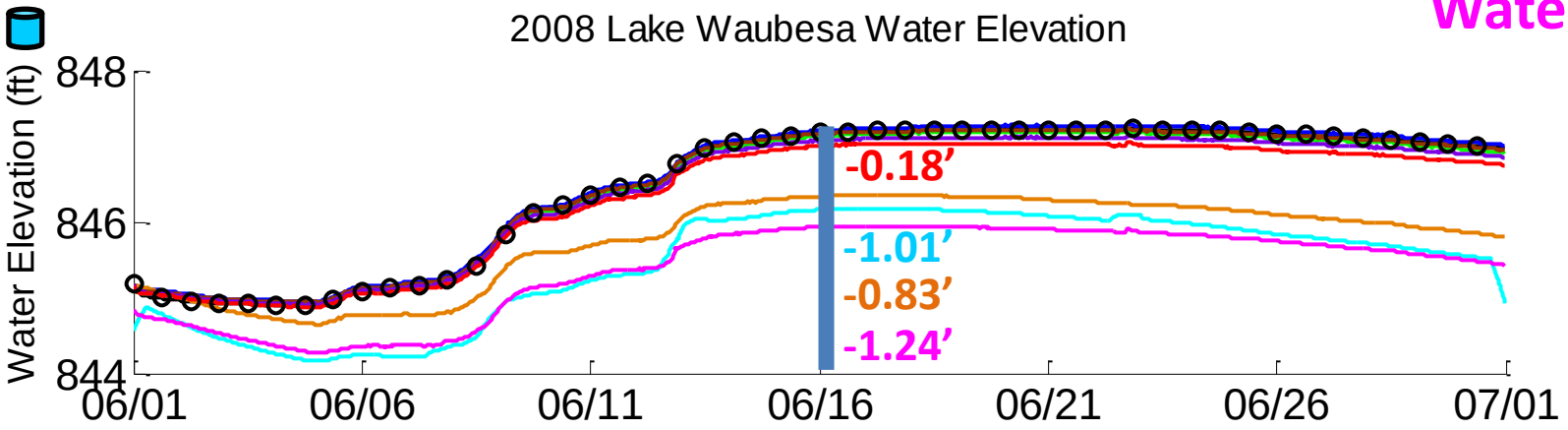




System Dredge

Channel Reroute

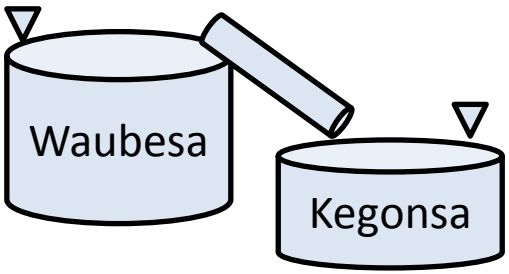
Water Bypass



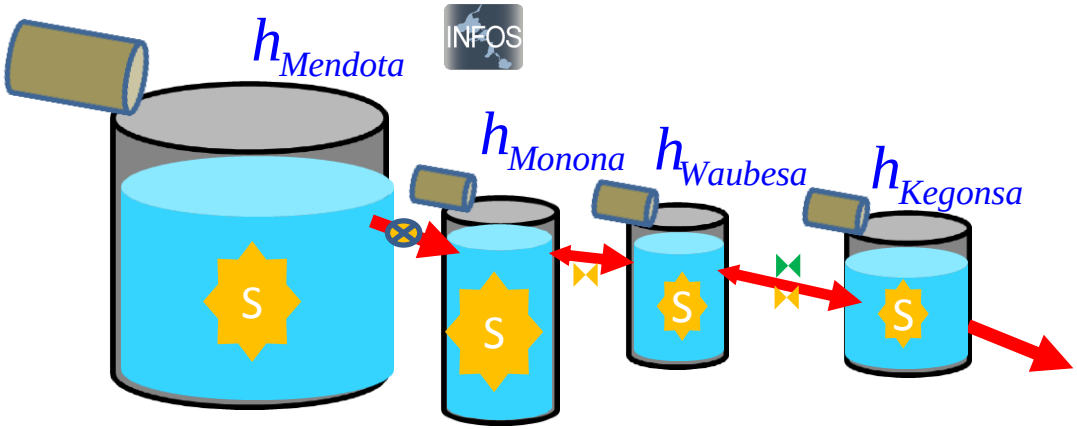
Update for Recommendation

(i) Weed Cutting

(ii) Optimal Water Level

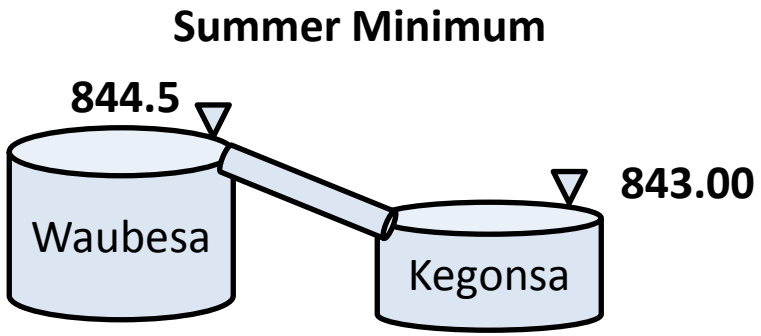


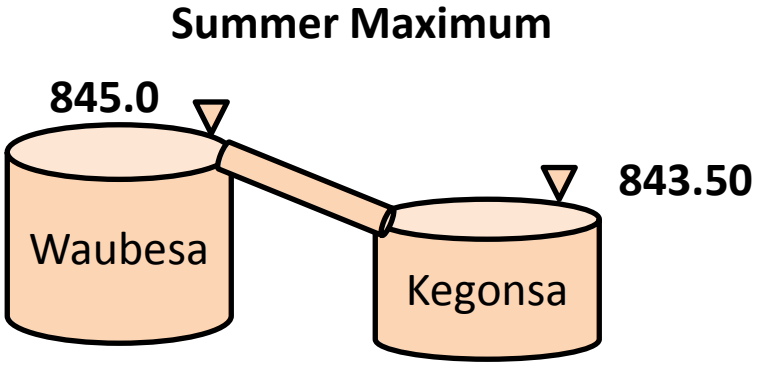
(iii) Storage/Delivery Optimization

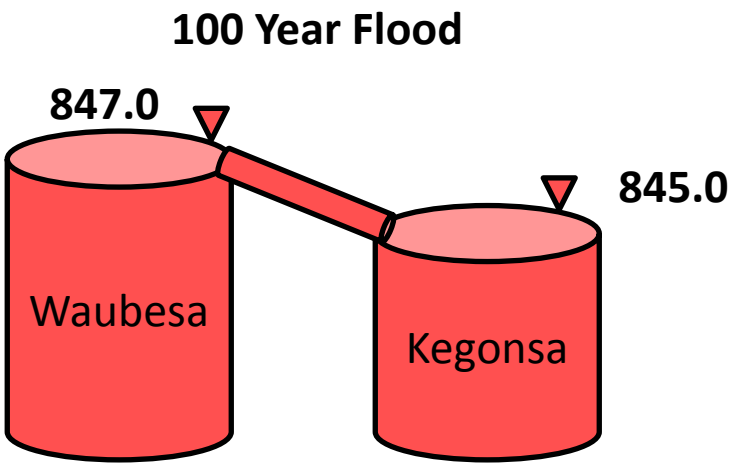


$$\begin{cases} \text{minimize } f_1 = \sum_{d=1}^{|D|} O_d \\ \text{minimize } f_2 = \sum_{d=1}^{|D|} (PC_d^{dc} + LC_d^{dc} + CC_d^{k} + K_d^{O} + K_d^{L}) \\ \qquad + \sum_{d=1}^{|D|} \sum_{c=1}^{|C|} \sum_{f=1}^{|F|} H_{cf} F_{dcf} \end{cases}$$

(i) Weed Cutting



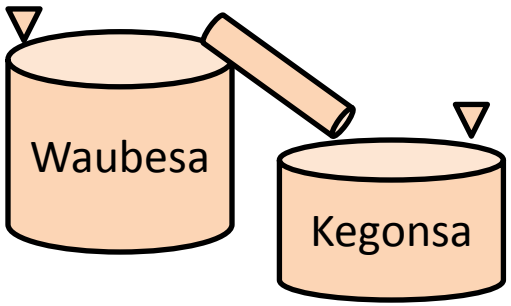


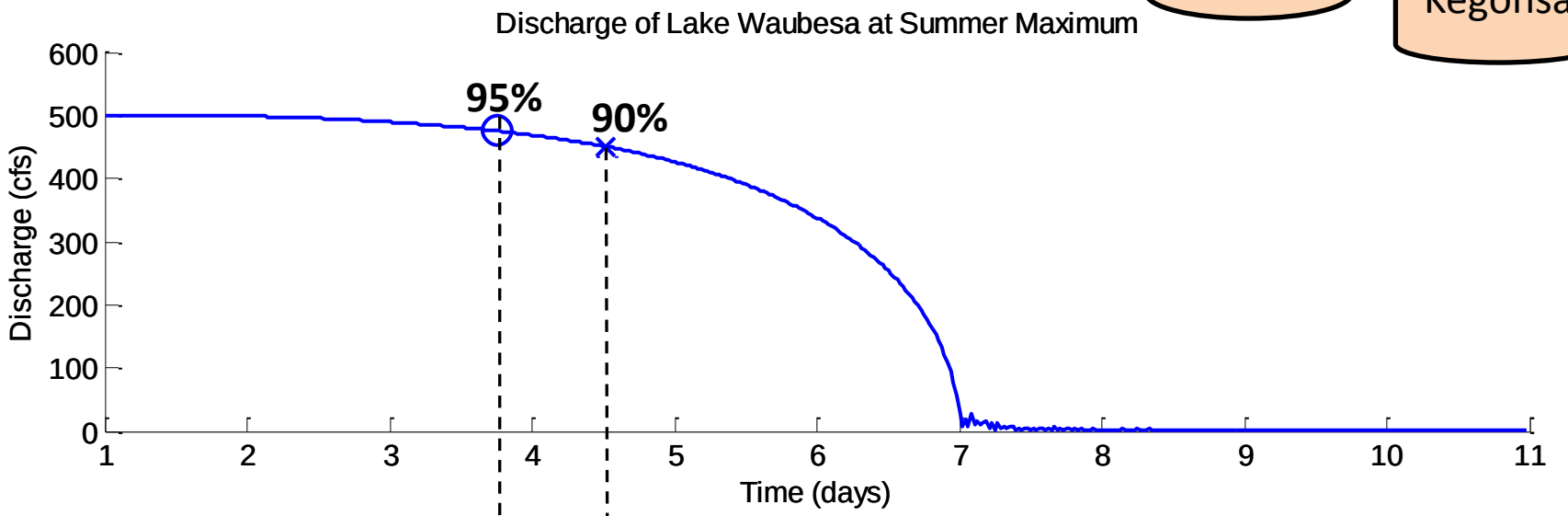


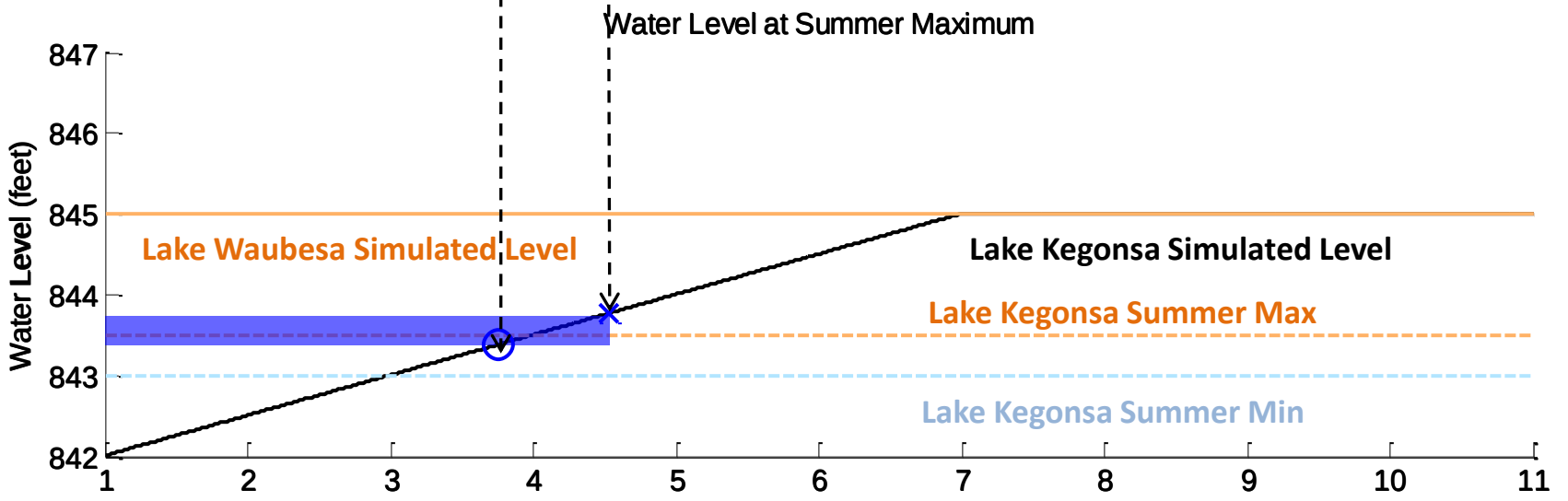
2.5 times

	Discharge - No Vegetation	Discharge - Vegetation
Summer Minimum	350.2 cfs	144.8 cfs
Summer Maximum	500.8 cfs	207.5 cfs
100 Year Flood	1300.8 cfs	550.1 cfs

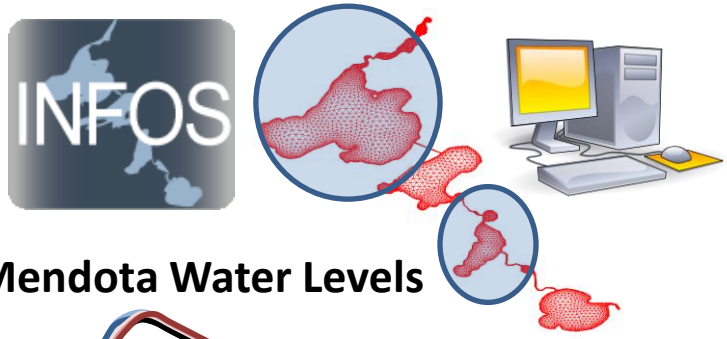
(ii) Optimal Water Level at Kegonsa





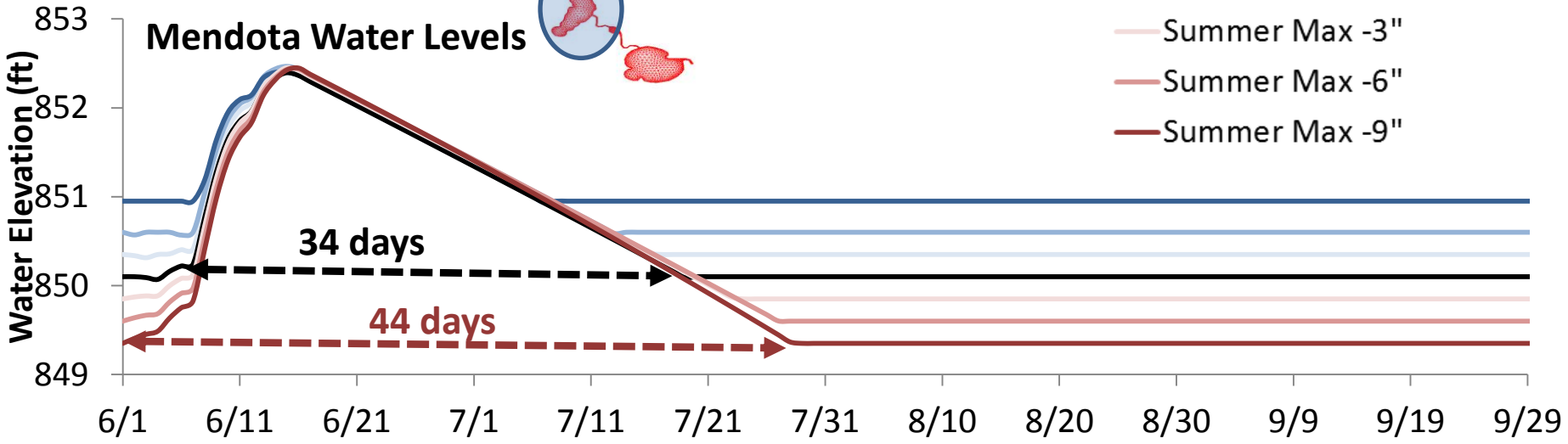


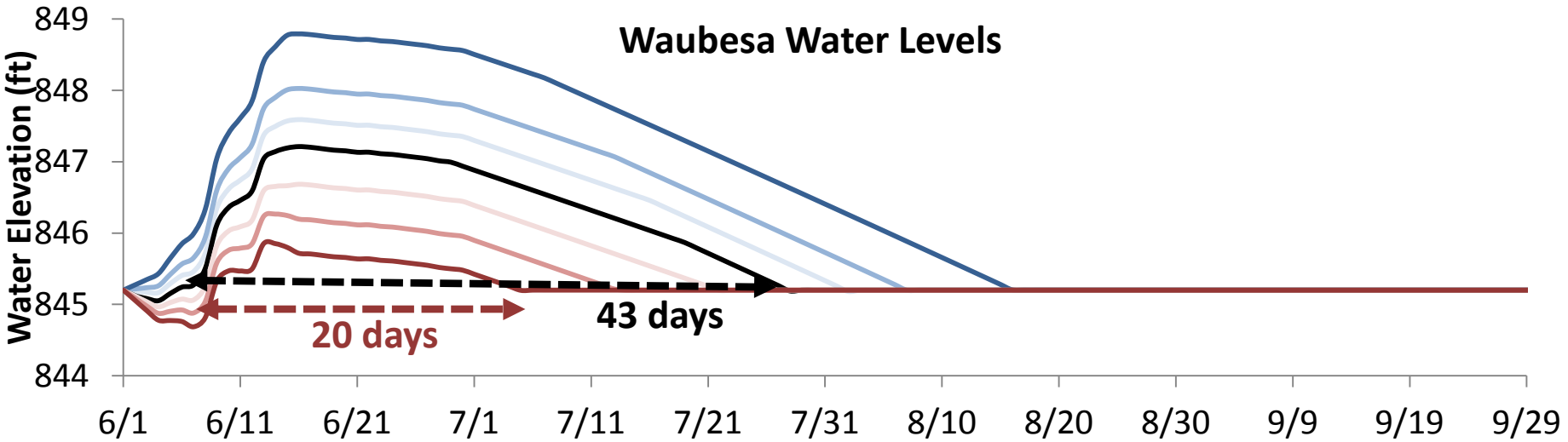
(iii) Storage/Delivery



Scenarios

- Summer Max +3"
- Summer Max +6"
- Summer Max +9"
- Summer Max
- Summer Max -3"
- Summer Max -6"
- Summer Max -9"



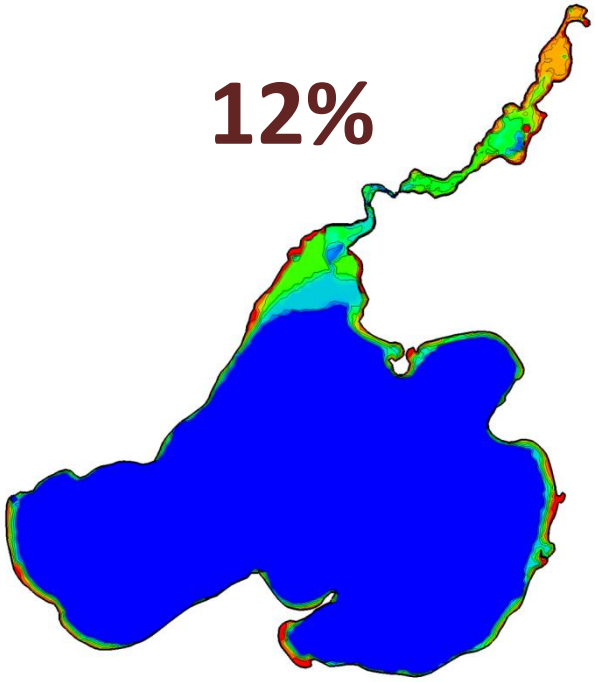


Navigation Concerns

Water Depth

Summer Max - 1 Foot

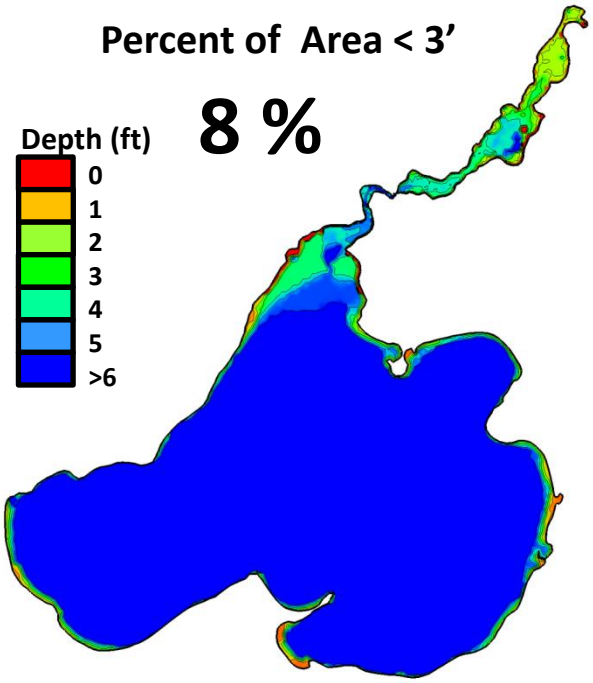
12%



Summer Max

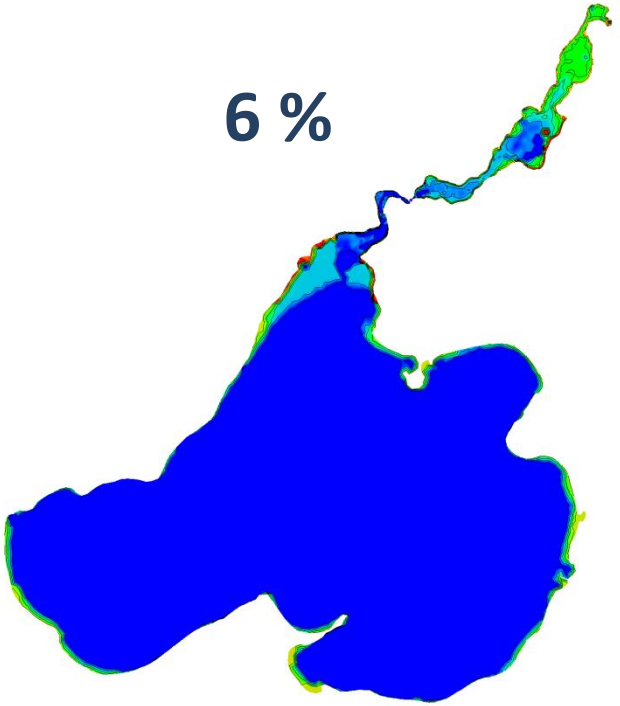
Percent of Area < 3'

8 %

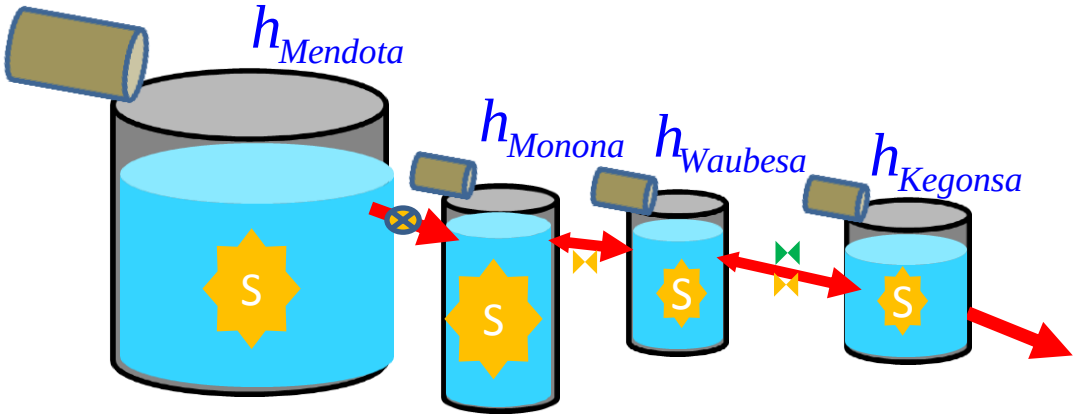


Summer Max + 1 Foot

6 %



Storage/Delivery Optimization



INFOS

$$\begin{cases} \text{minimize } f_1 = \\ \text{minimize } f_2 = \end{cases}$$