



Water Use Assessments

Wawona and Yosemite Valley Water Supplies



Purpose of Studies

Protect instream aquatic resources and wetlands from adverse effects of :

Surface water withdrawal for public water supply in Wawona

Groundwater withdrawal for public water supply in Yosemite Valley



Why an updated assessment for Wawona?

- Current conservation plan based on 1983 analysis for non-native trout
- Current analysis uses modern flow model and applies to native fauna
- Recently completed similar analysis on the Dana Fork in the Tuolumne Meadows area



Current Water Conservation Plan

River Flow (cfs)		Withdrawal Limit (cfs)	Withdrawal Limit (gallons per day)
5		0.5	323158
4		0.4	258526
3		0.3	193895
2		0.2	129263
1		0.1	64632
Wawona Average Monthly Use 2001-2006 (gallons/day)			
July	Aug	Sep	Oct
134637	119993	95819	68293

Wawona – Minimum instream flows assessment



Examine the effects of withdrawing water from South Fork Merced on aquatic organisms

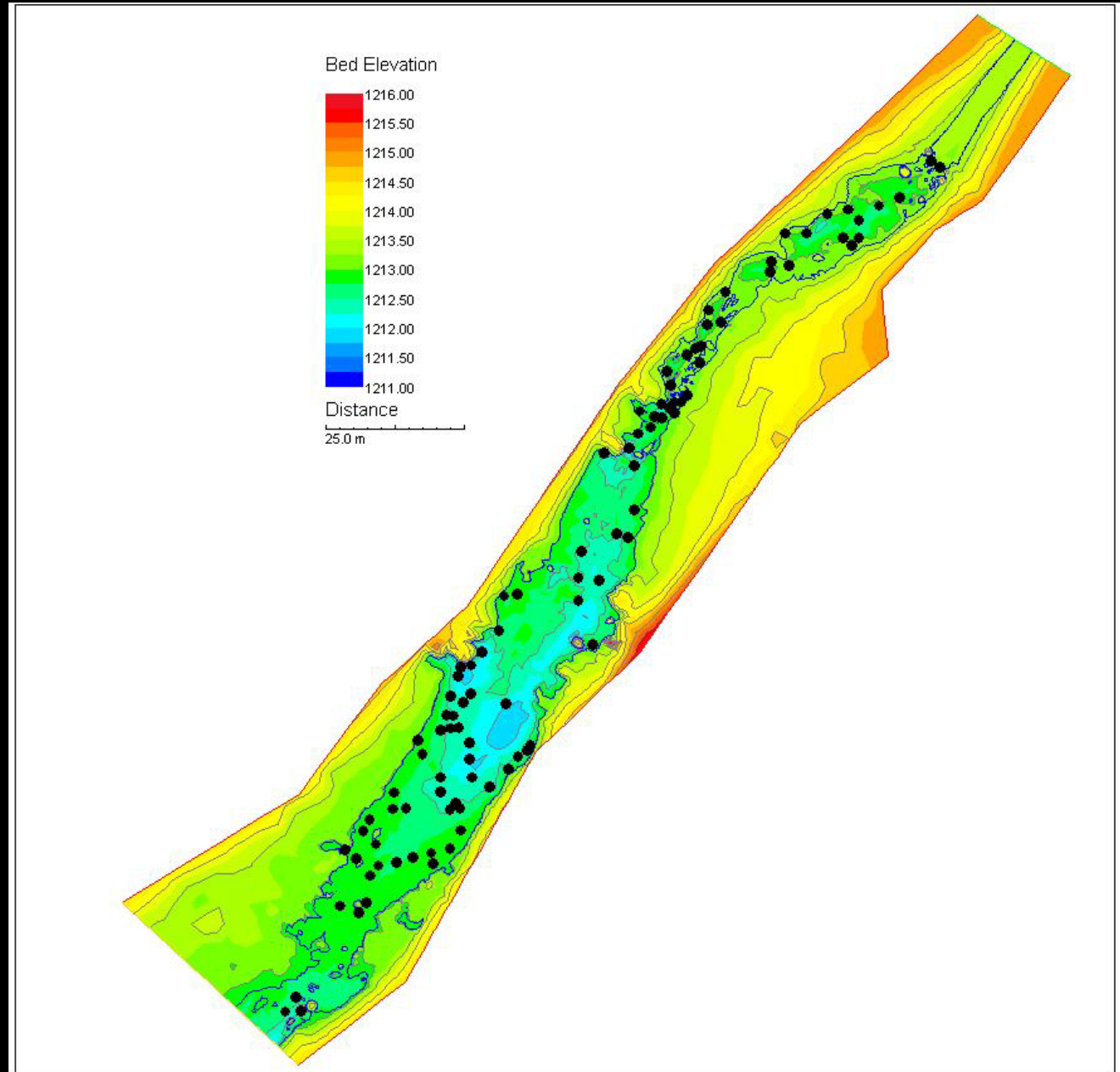


STEP 1: Collect detailed topographic and substrate data

Step 2: Develop flow model

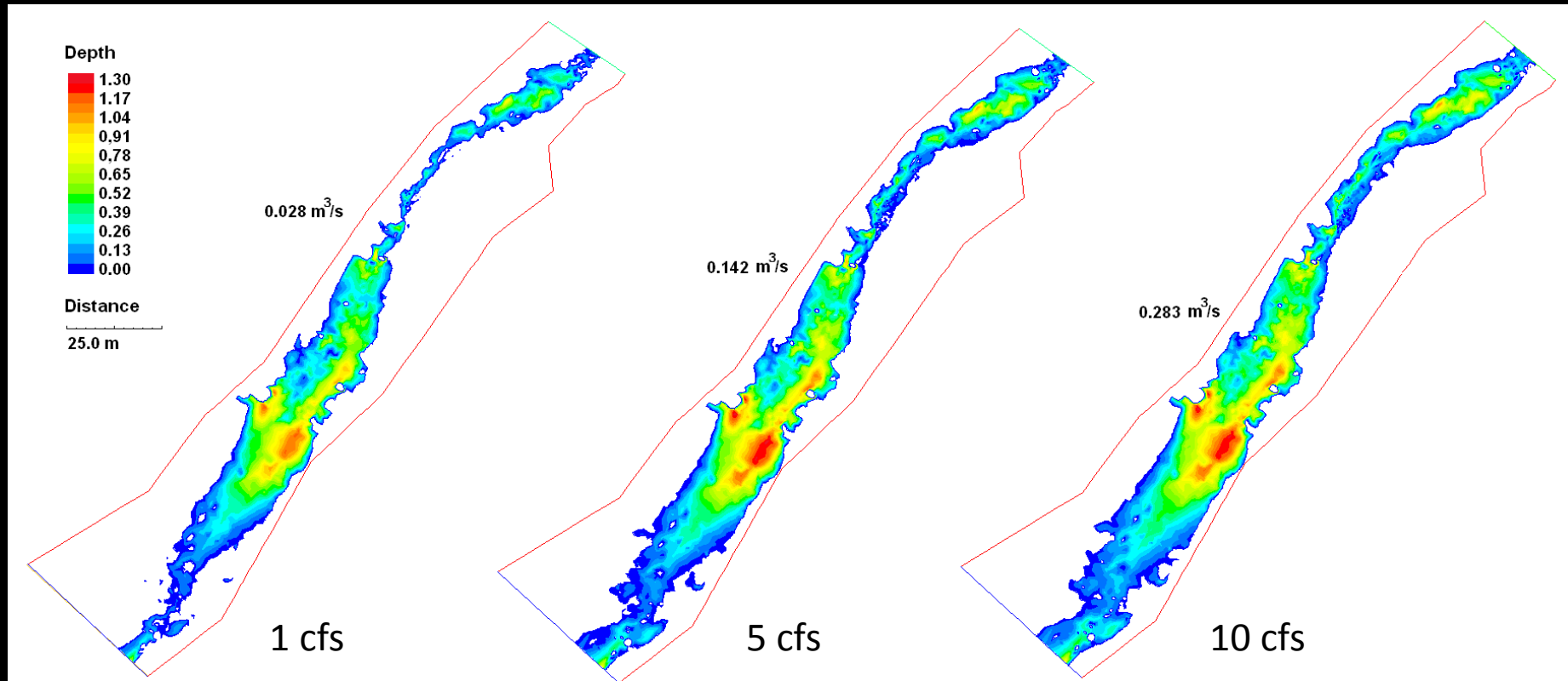


Based on surveyed
topographic data
and flow data





Model Flow Depth and Velocity

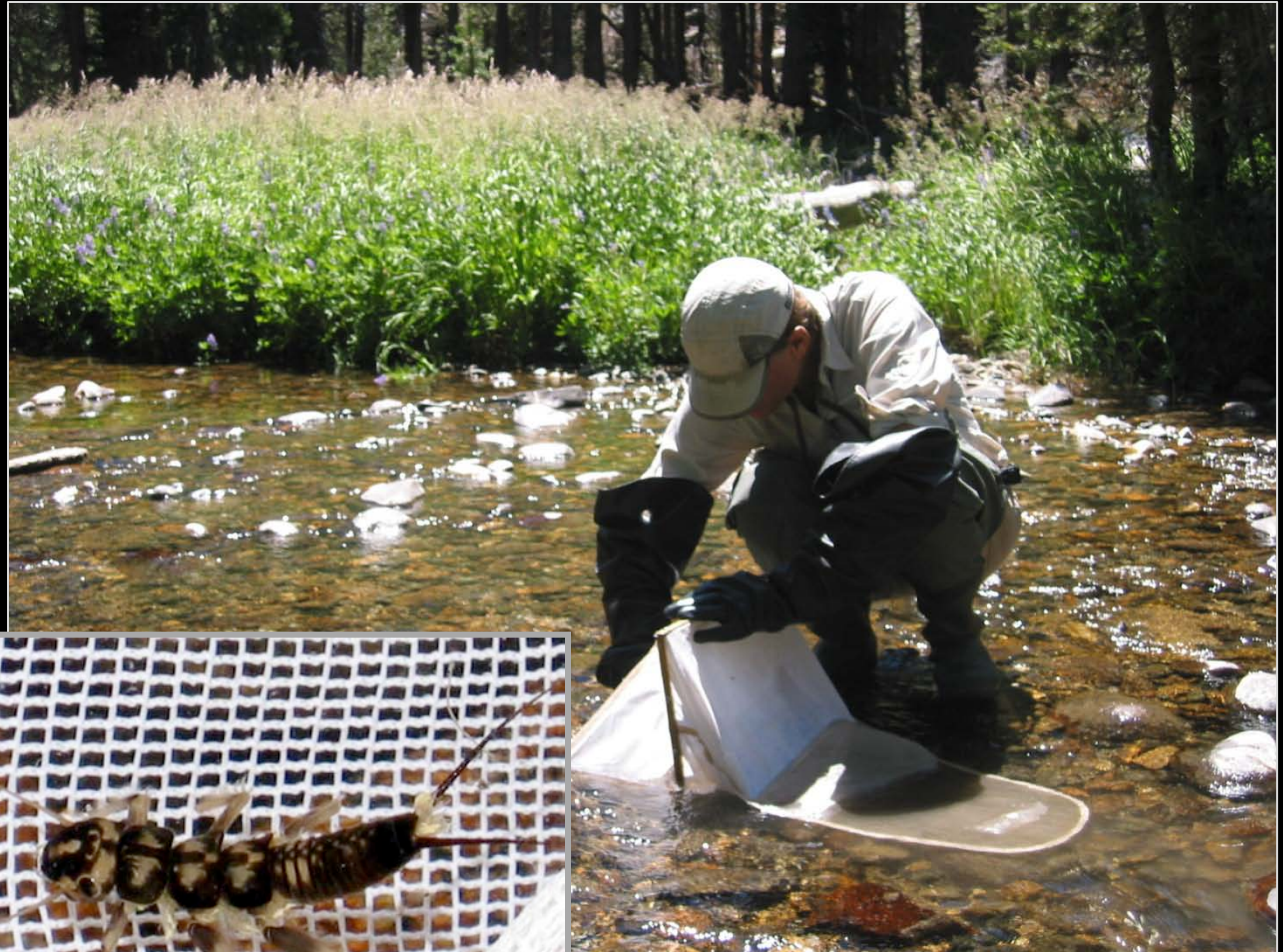


Step 3: Sample benthic macroinvertebrates

Yosemite National Park
U.S. Department of Interior



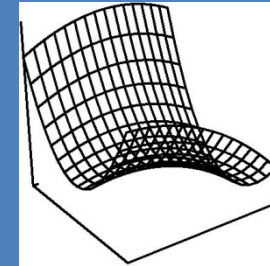
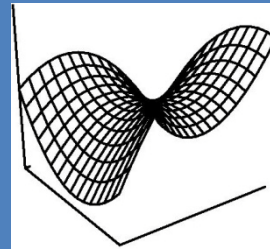
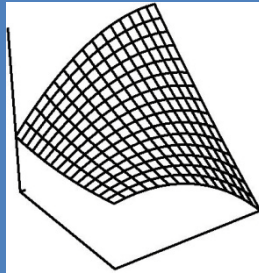
100 locations in the reach (including substrate size, and water depth and velocity)



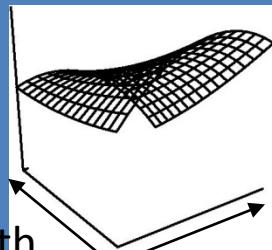
Step 4: Develop habitat metrics



%EPT

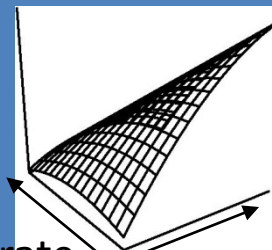


#Plec



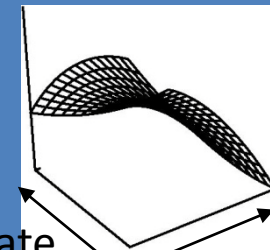
Depth

Velocity



Substrate

Velocity



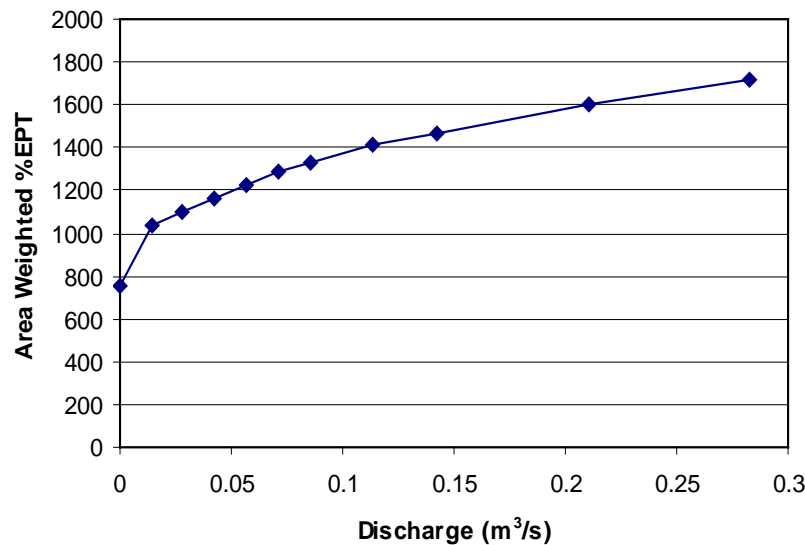
Substrate

Depth

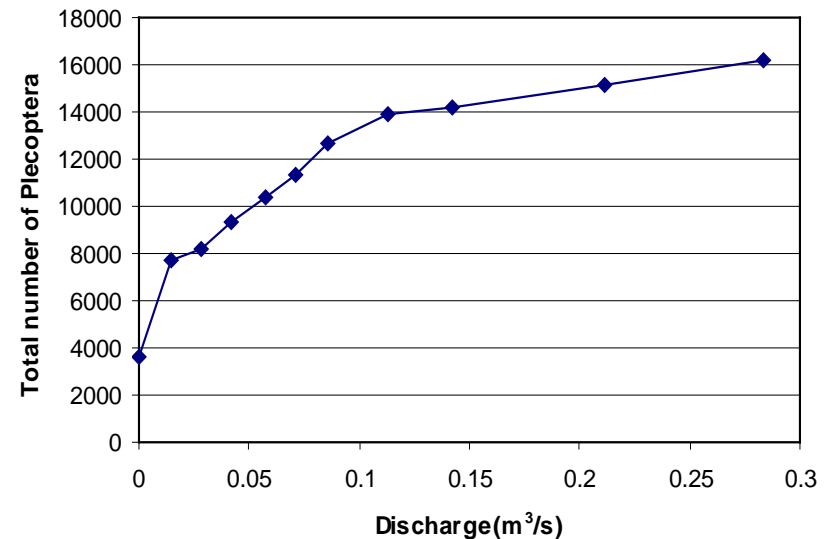
Step 5: Combine habitat metrics with flow model to assess changes in habitat at different flows



Area Weighted %EPT



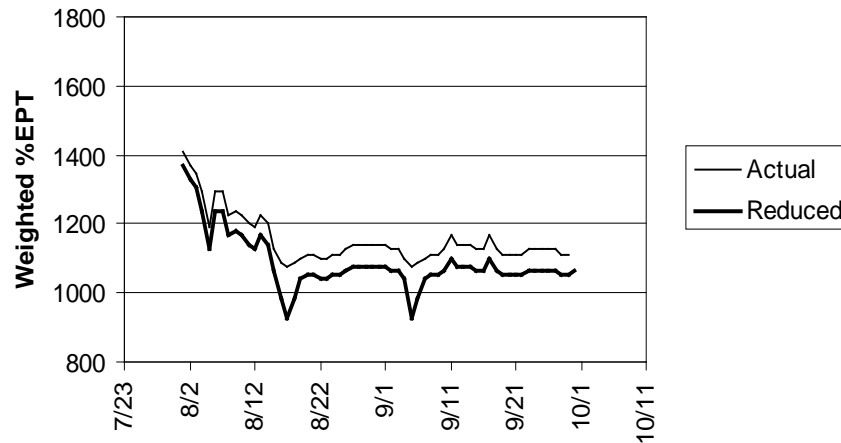
Pn



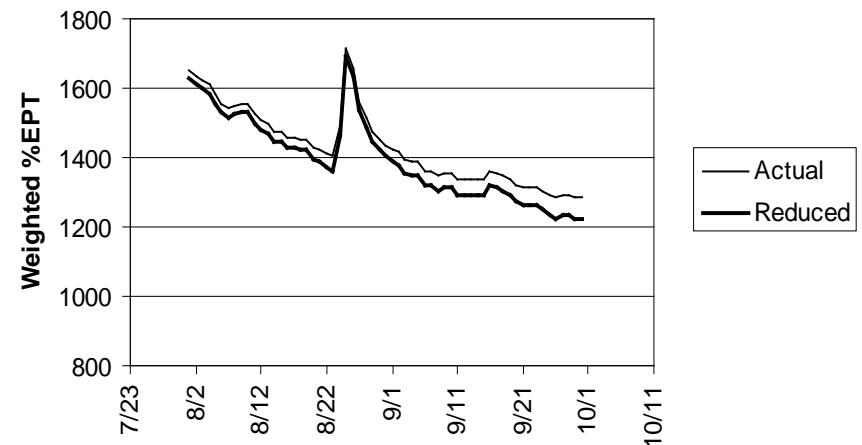
Step 6: Assess impacts due to water withdrawal for public water supply.



Area Weighted %EPT 1960



Area Weighted %EPT 2009





Results

- Loss of habitat below 3 cfs affects plecoptera numbers
- Flows below 0.5 cfs cause step function losses of habitat
- Baseline data for future evaluations



Yosemite Valley Water Supply

Objectives of Study:

1. Characterize hydrogeology of Yosemite Valley
2. Determine effects of pumping on the Merced River and adjacent wetlands



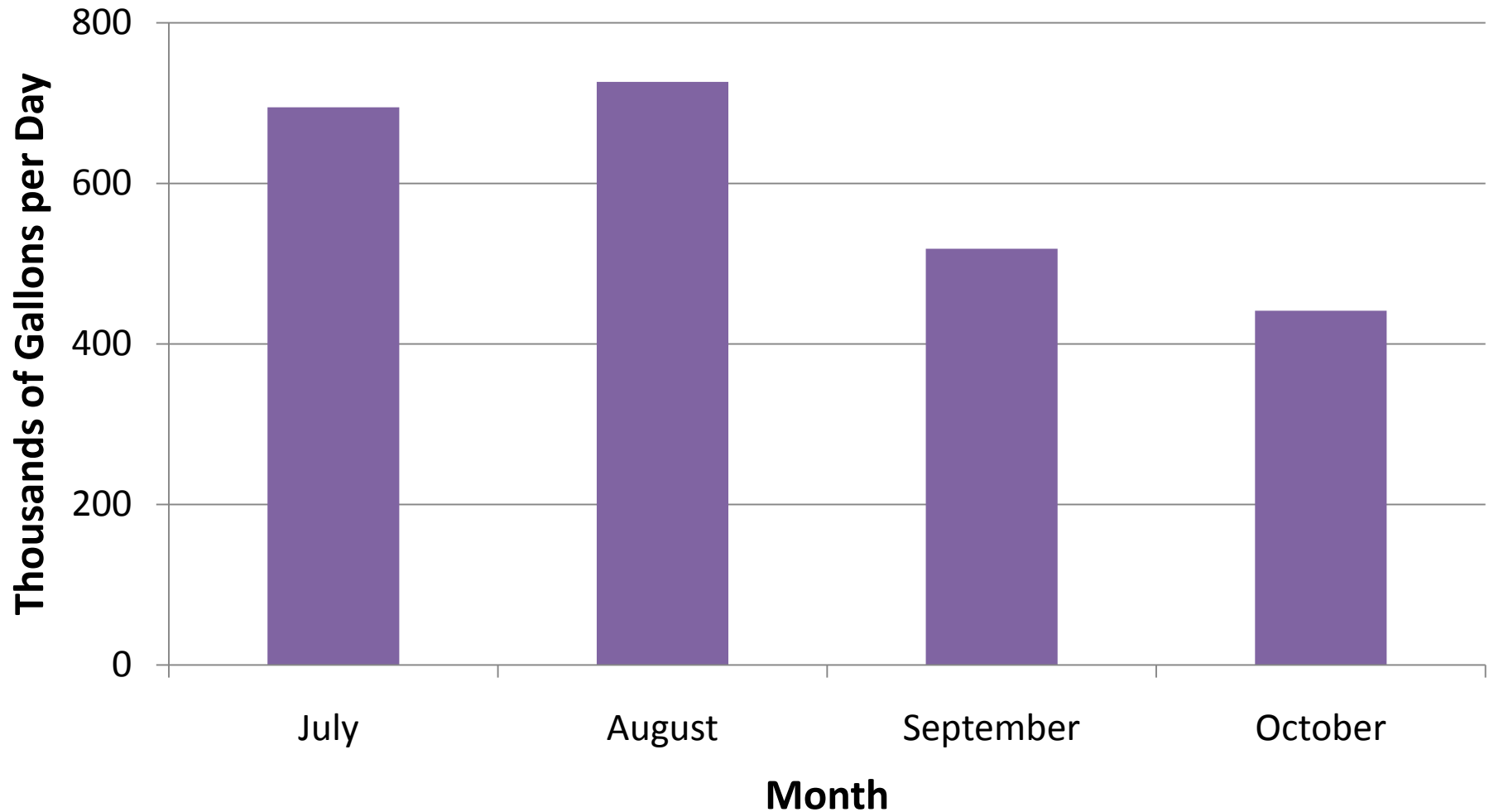
Water usage in Yosemite Valley

- Shifted from surface water supply to groundwater wells in 1983 – diversions of up to 5 cfs
- Current use approaches 1 million gallons / day in August



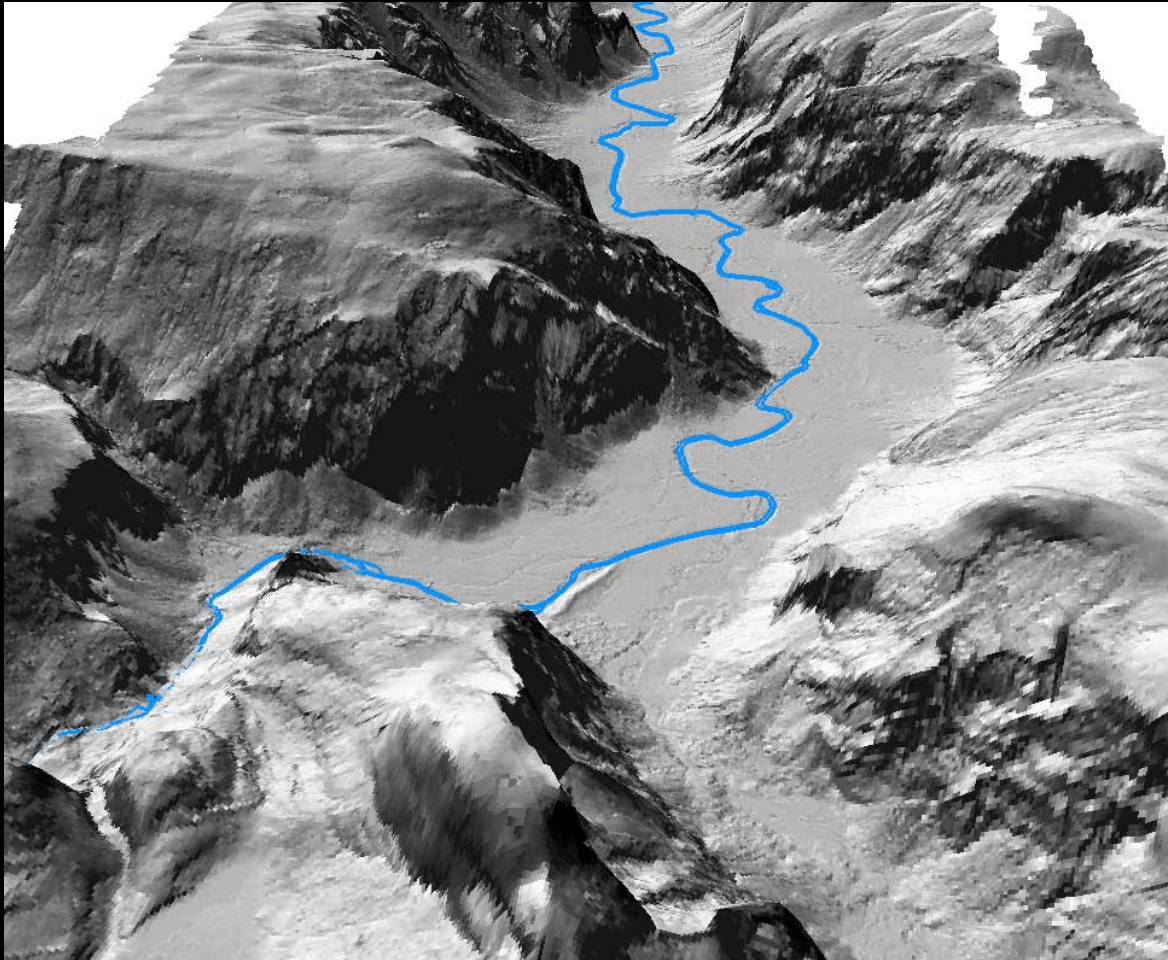
Yosemite Valley Water Use (2010)

Yosemite National Park
U.S. Department of Interior



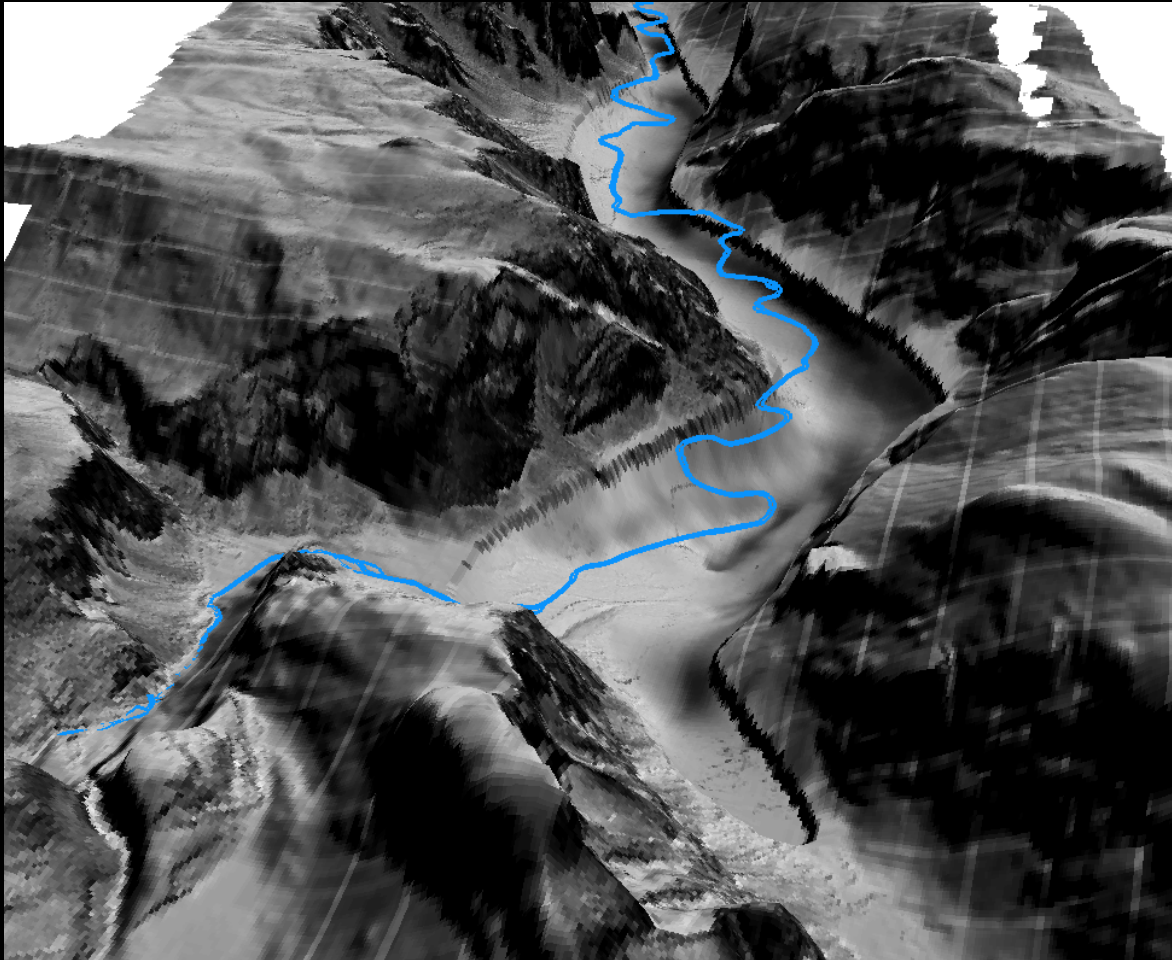


Yosemite Valley Surface Topography



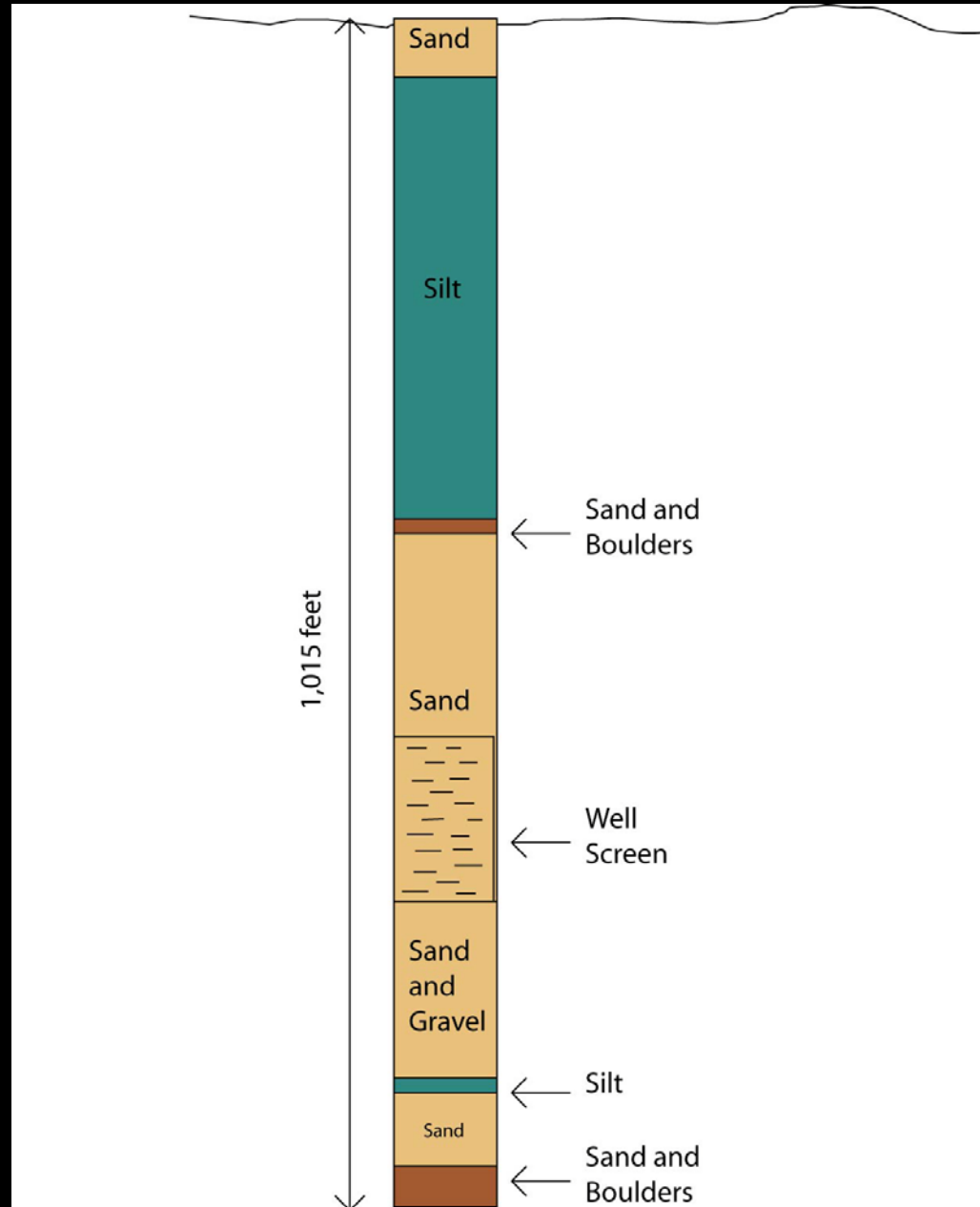


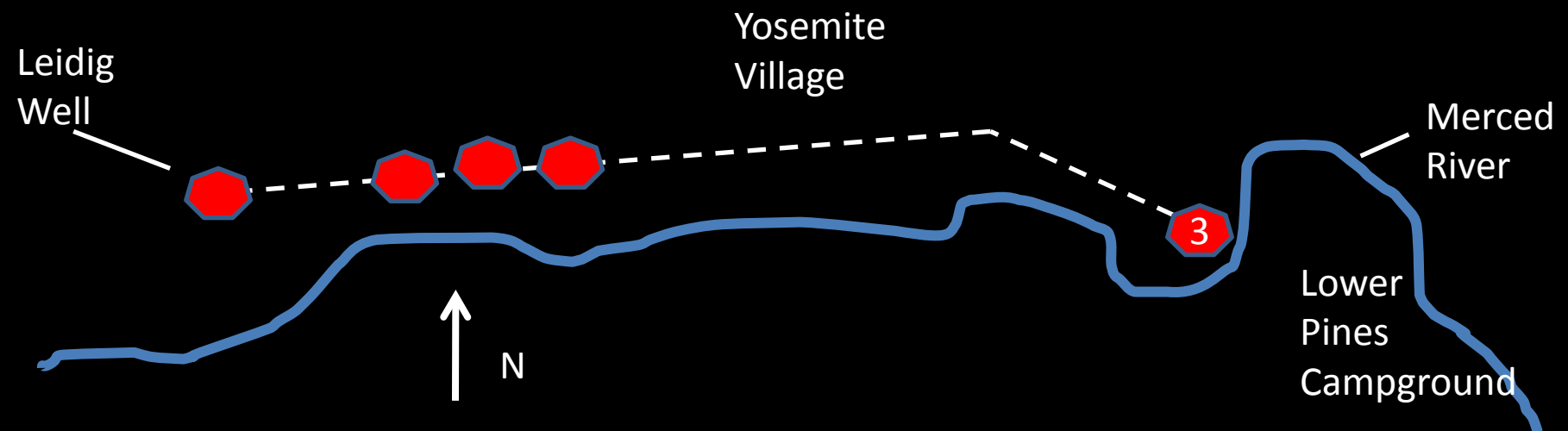
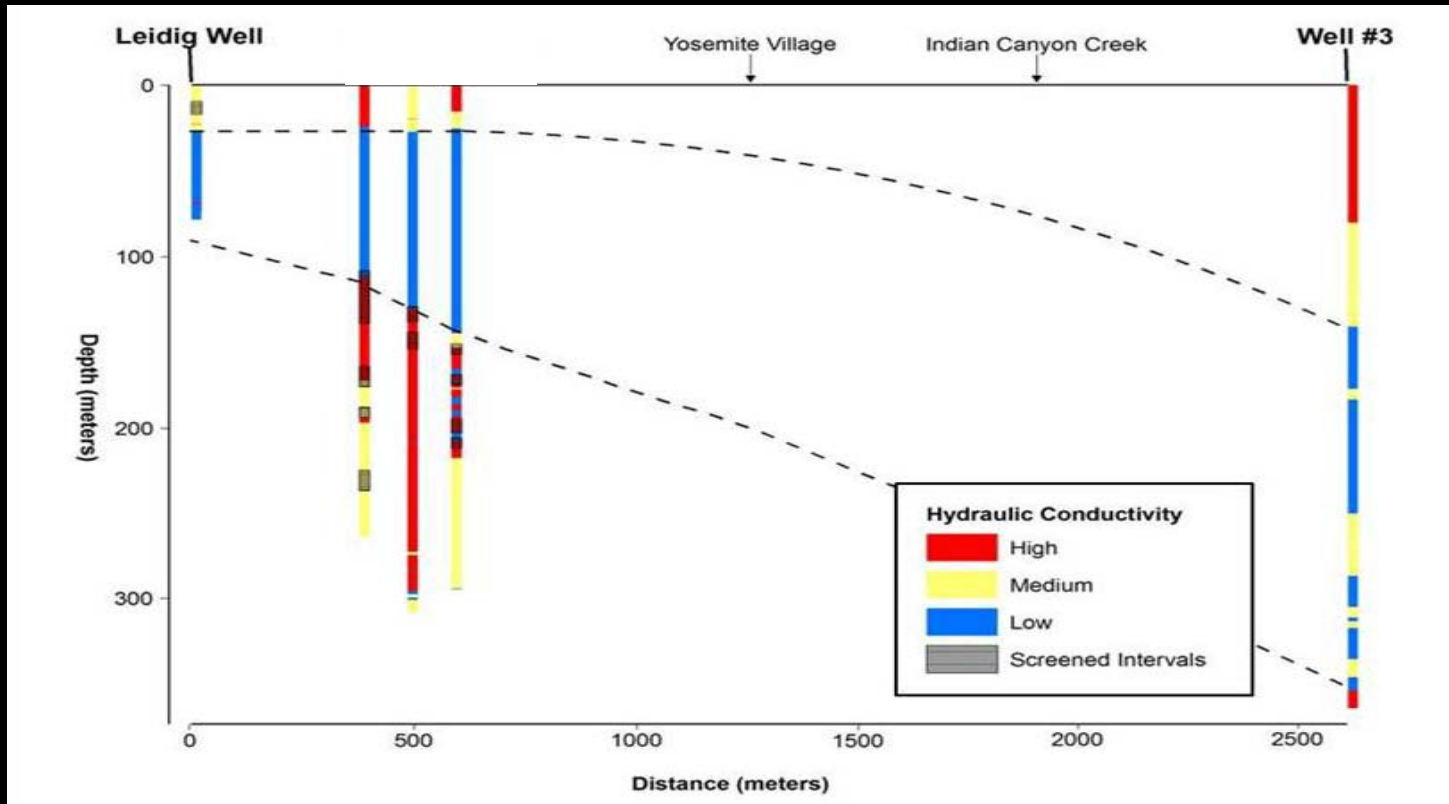
Yosemite Valley Bedrock Topography





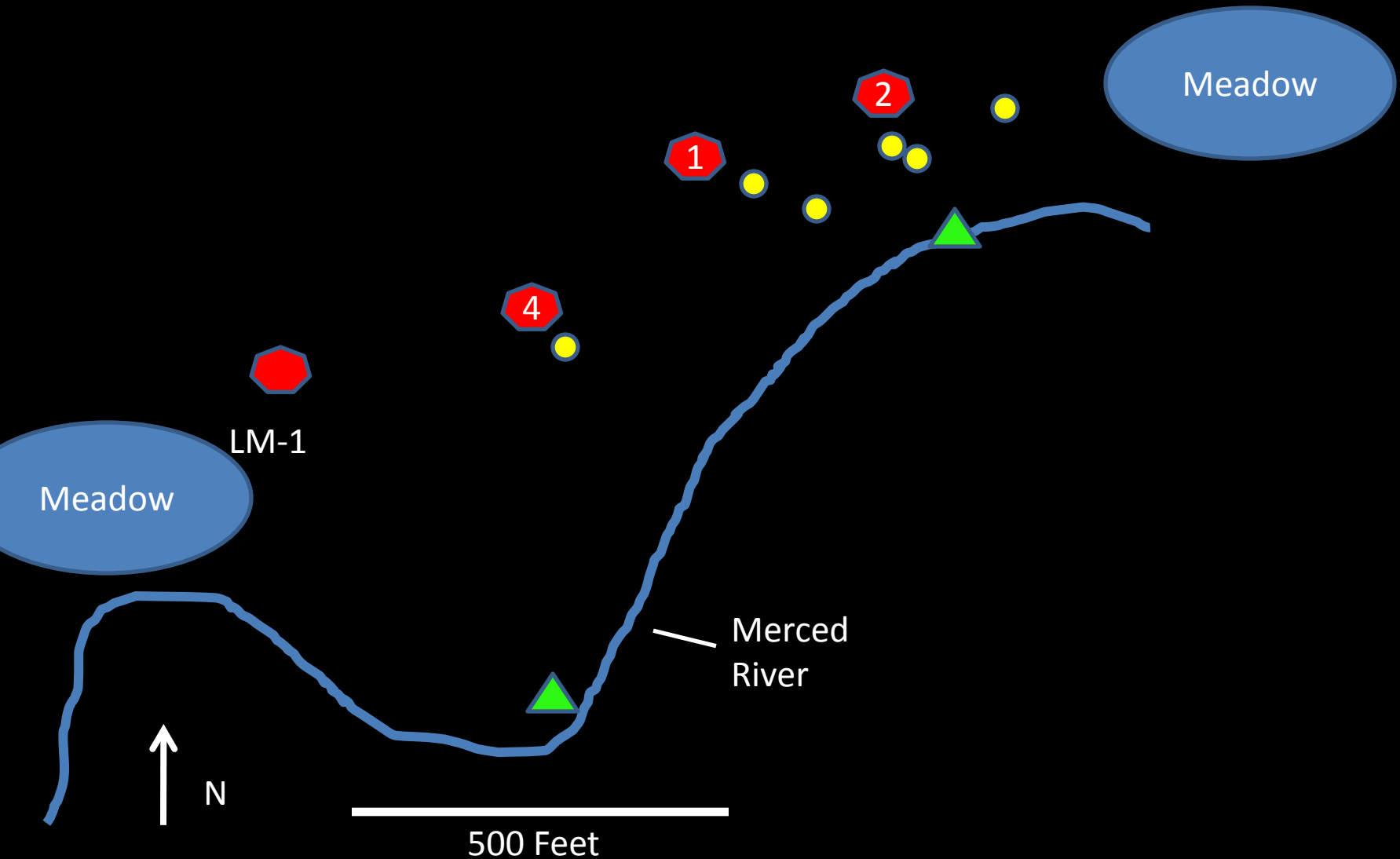
Typical well stratigraphy and screen depth





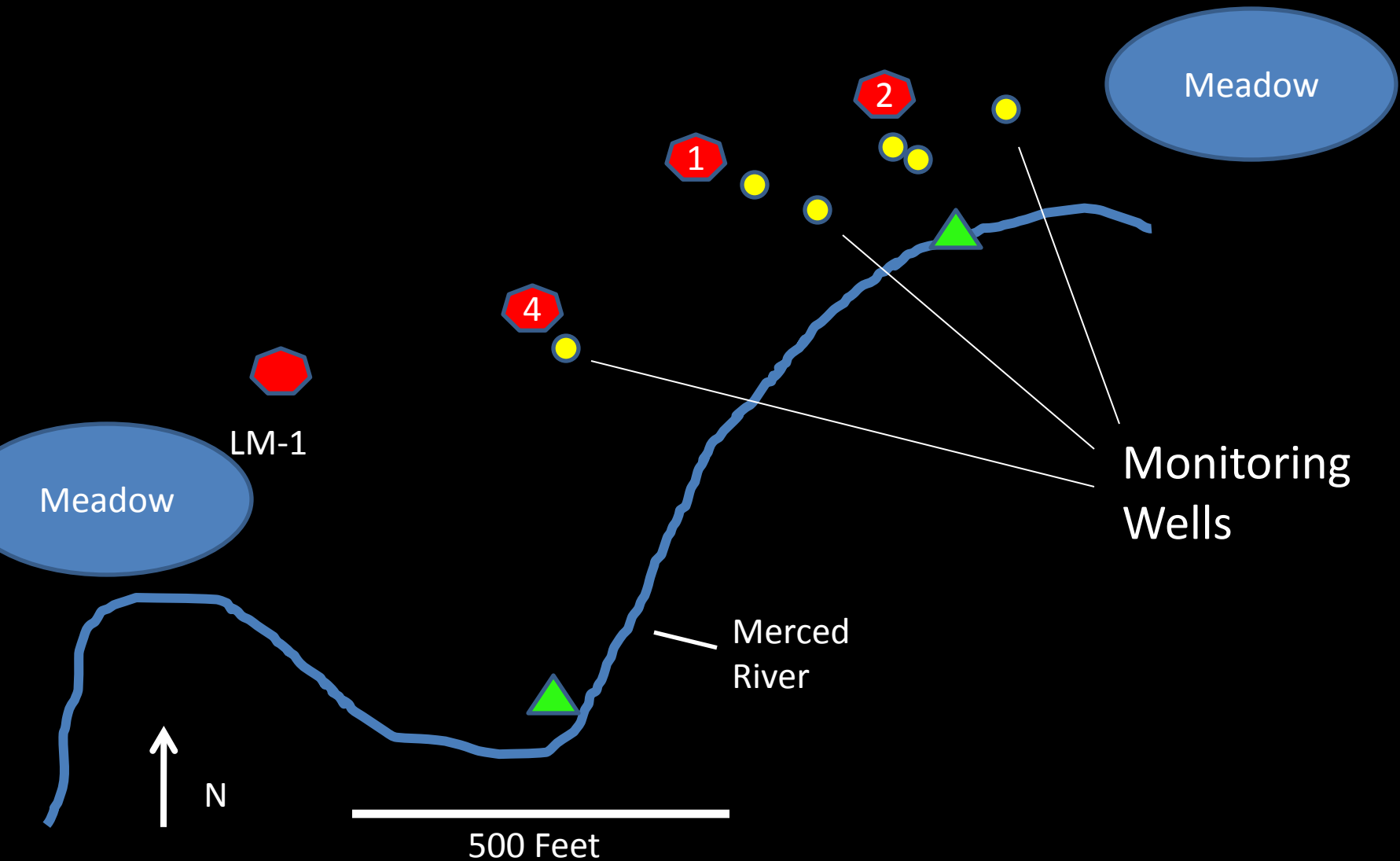


Monitoring Strategy



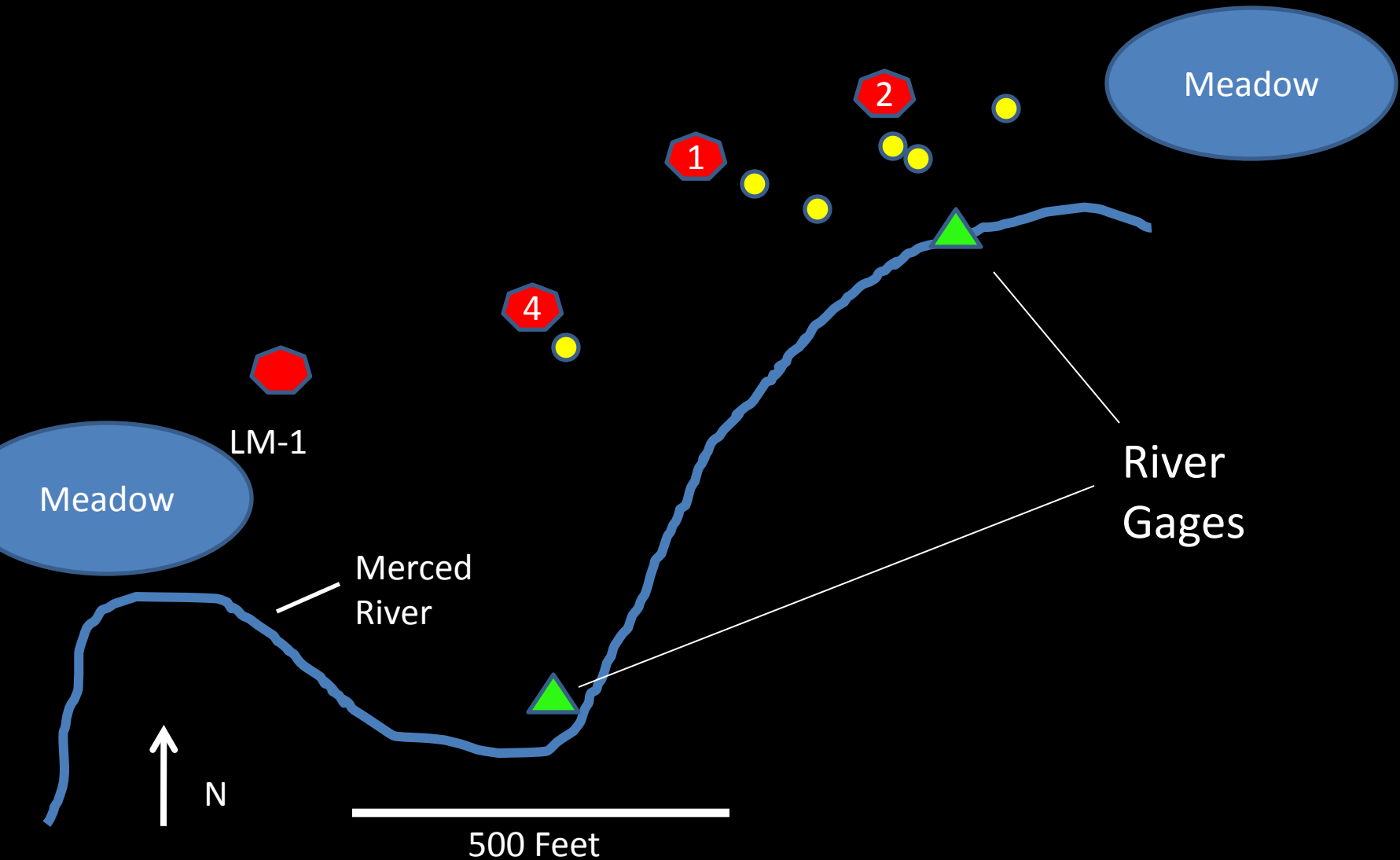


Monitoring Strategy

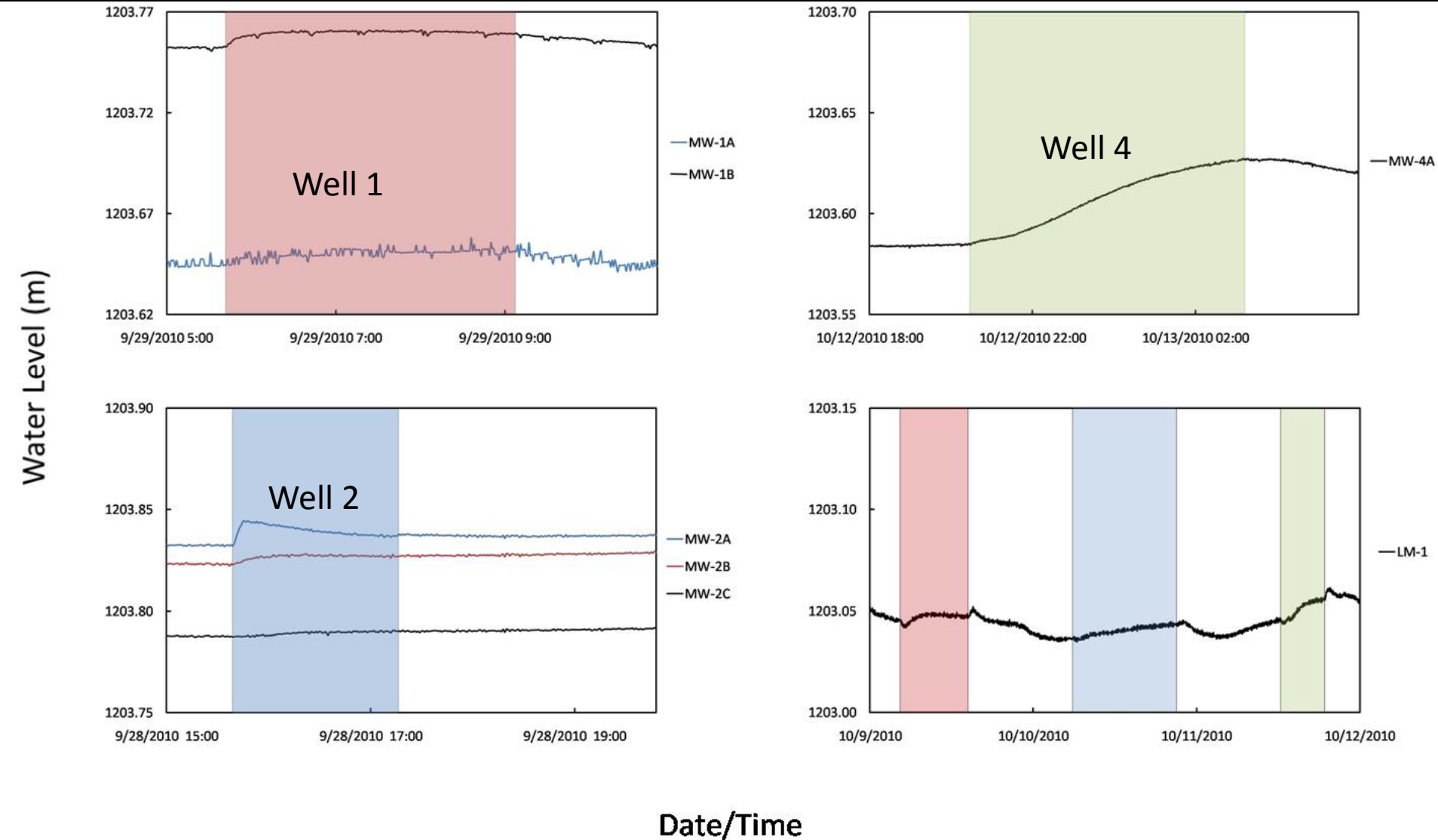




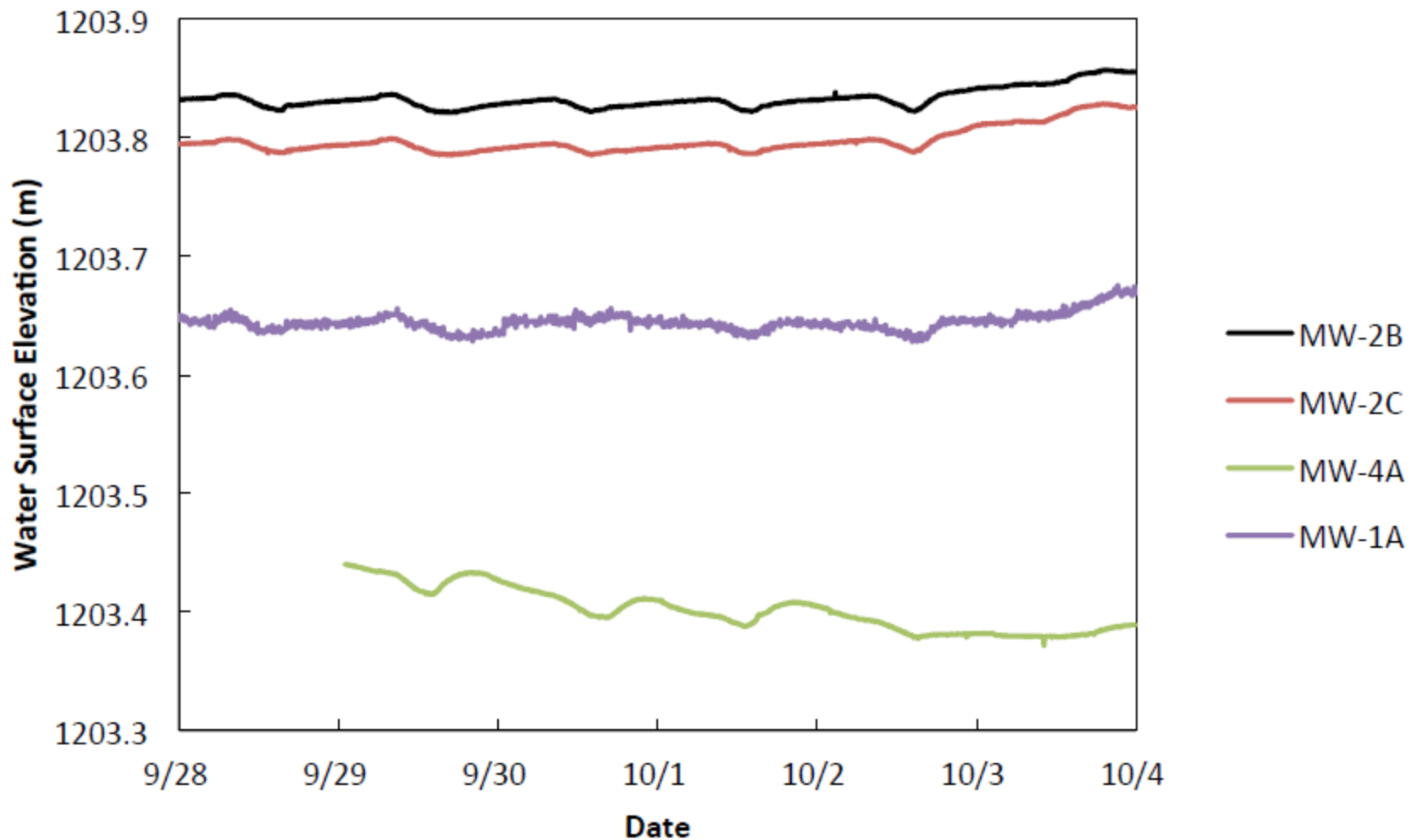
Monitoring Strategy



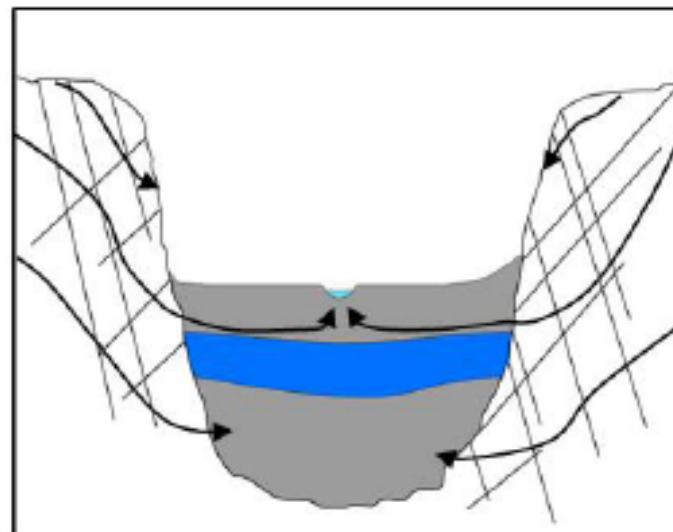
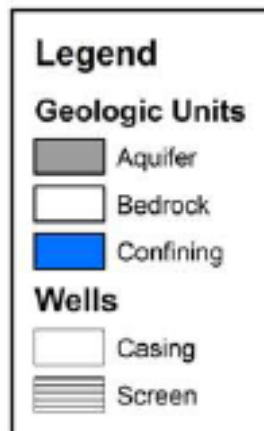
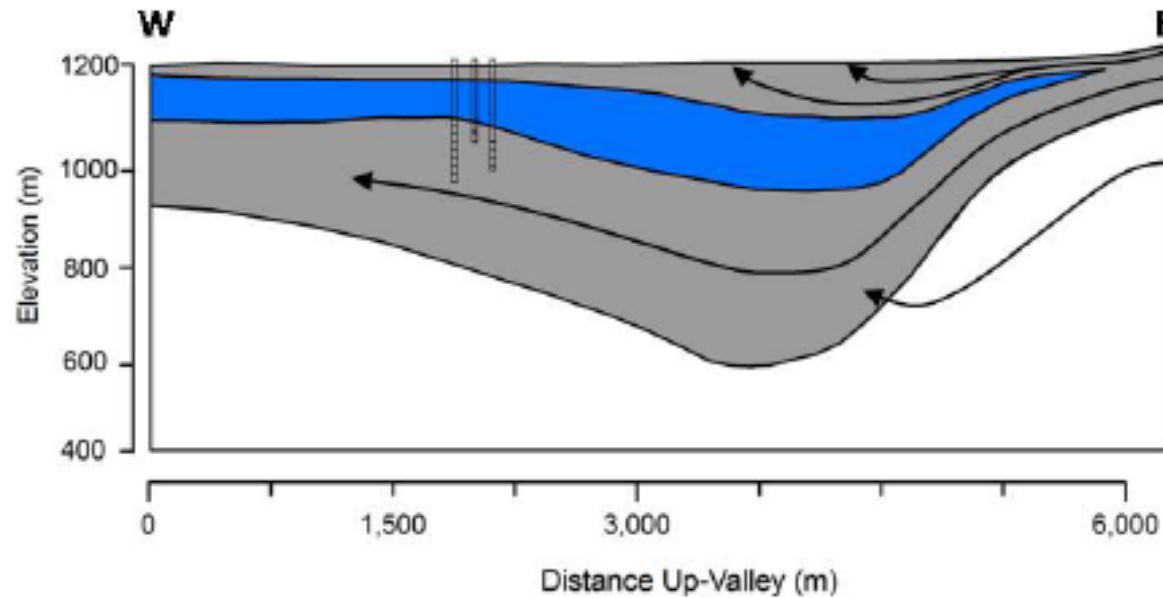
Monitoring Results



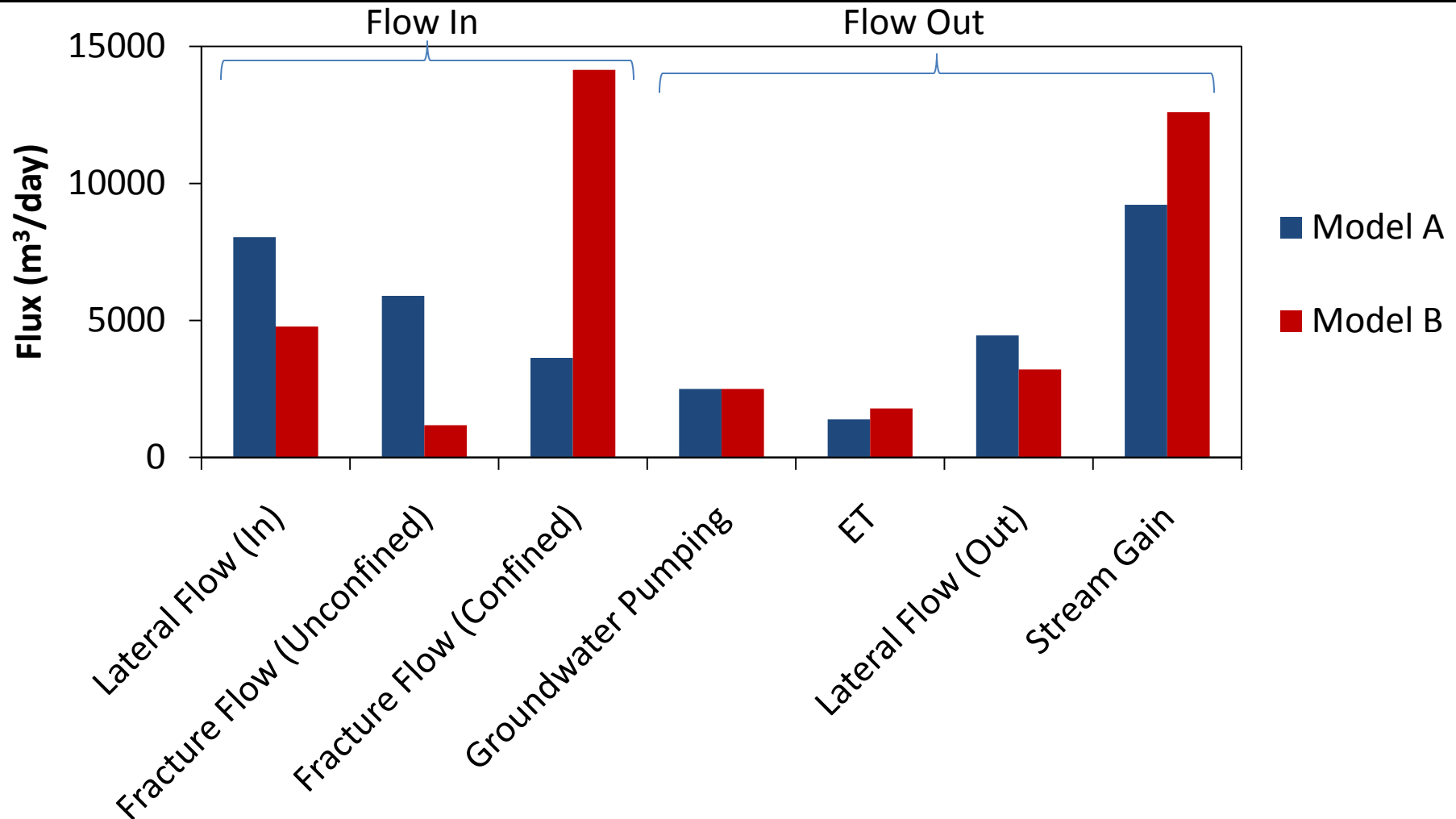
Monitoring Results



Conceptual Model



Conceptual Model





Conclusions

- Groundwater pumping appears to minimally affect water levels in meadows and river flow
- Conceptual model shows pumping is likely substantial portion of groundwater budget
- Investigation provides baseline for future research and monitoring