

Osceola County Rural Water District Water Sustainability and Induced Recharge Study



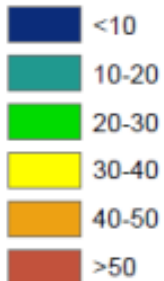
Mike Gannon and Jason Vogelgesang

OCRWD Wellfield Sand and Gravel Thickness

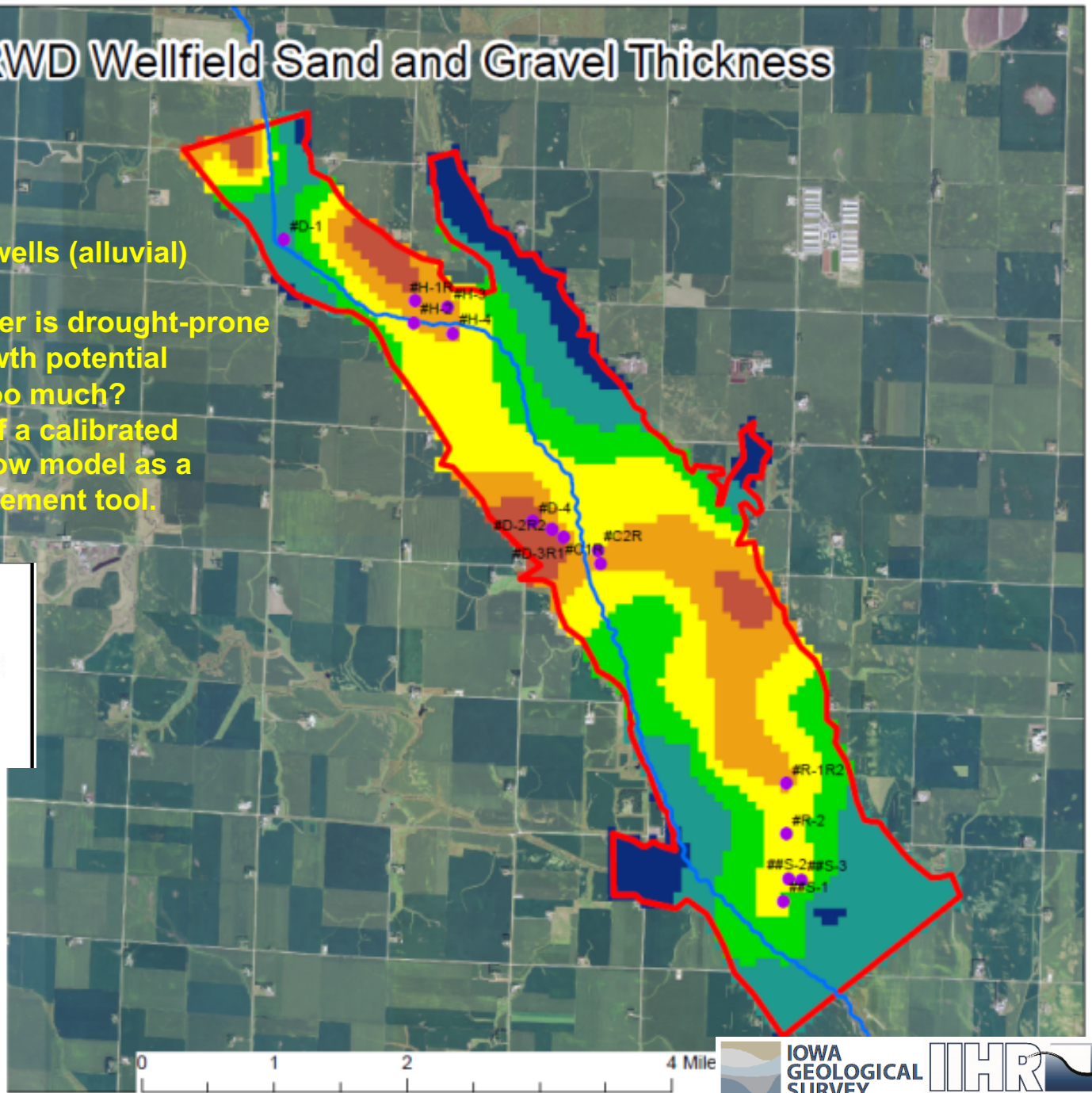
- 15 production wells (alluvial)
- 4.3 mgd
- Ocheyedan River is drought-prone
- Continued growth potential
- How much is too much?
- Development of a calibrated groundwater flow model as a drought management tool.



Sand and Gravel Thickness (ft)



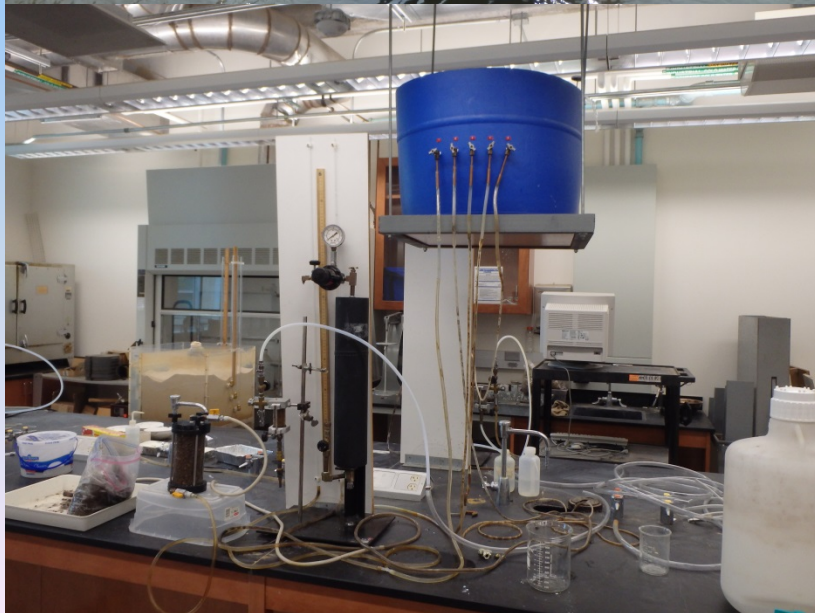
● OCRWD Wells



Collecting Geologic and Hydrologic Data to Adequately Characterize the Aquifer

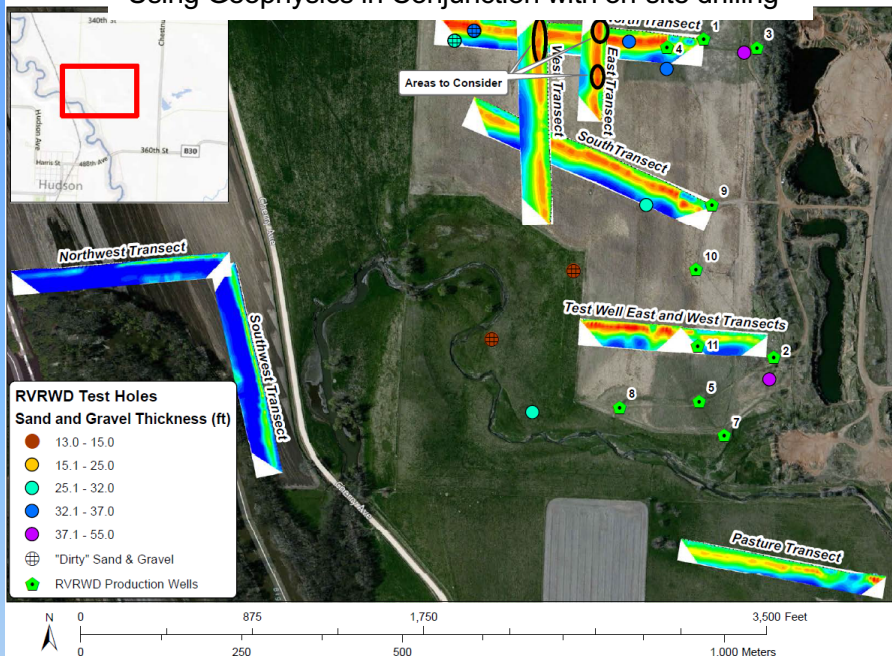


Hydraulic Properties of Stream Sediment is Essential to Understanding The Interaction of Ground Water and Surface Water



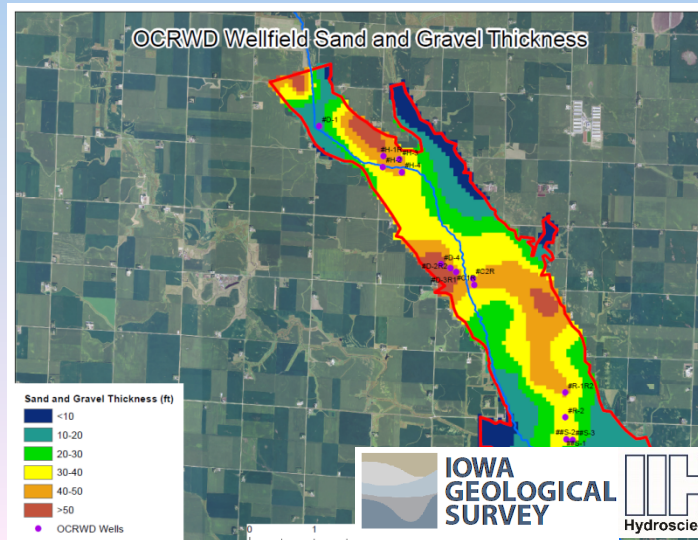
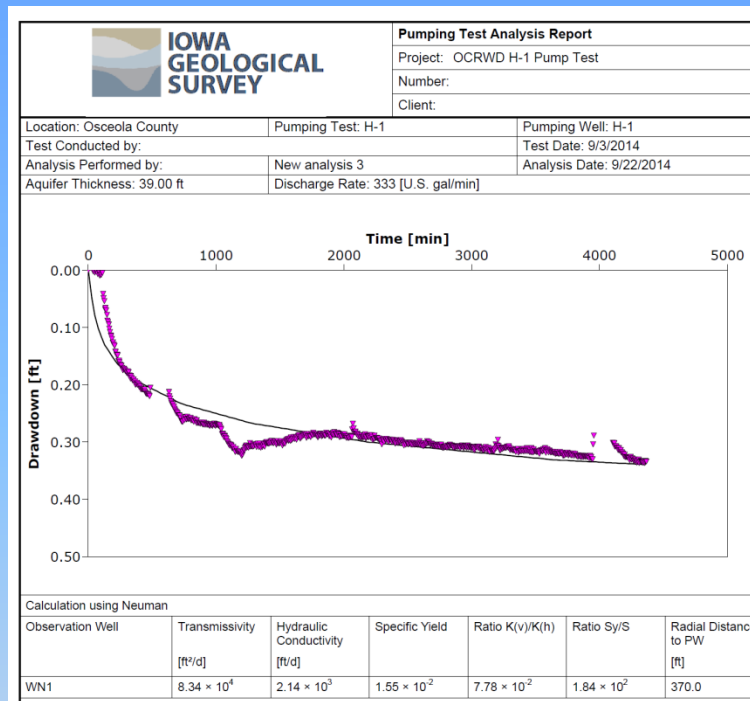
Data Analyses

Using Geophysics in Conjunction with on-site drilling

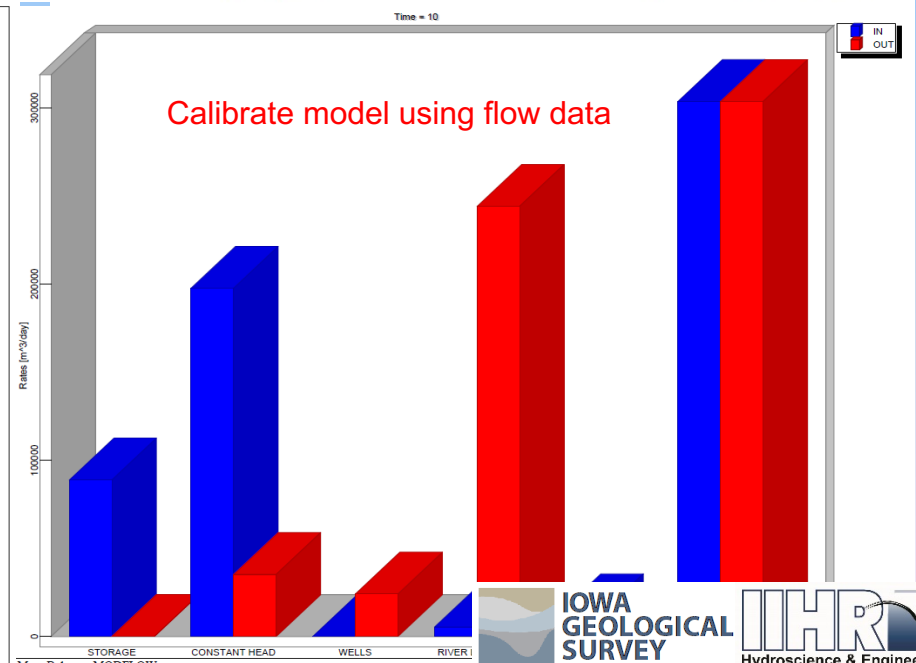
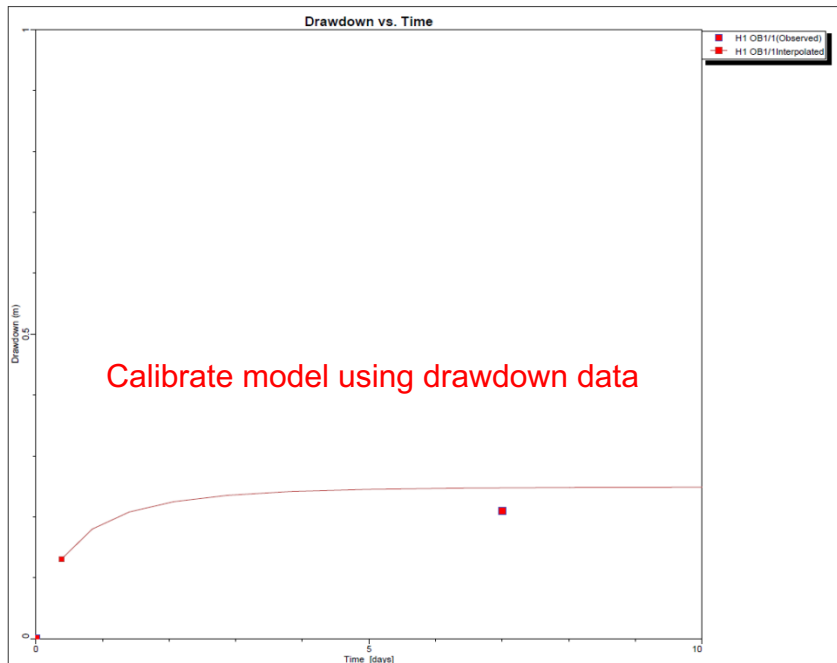
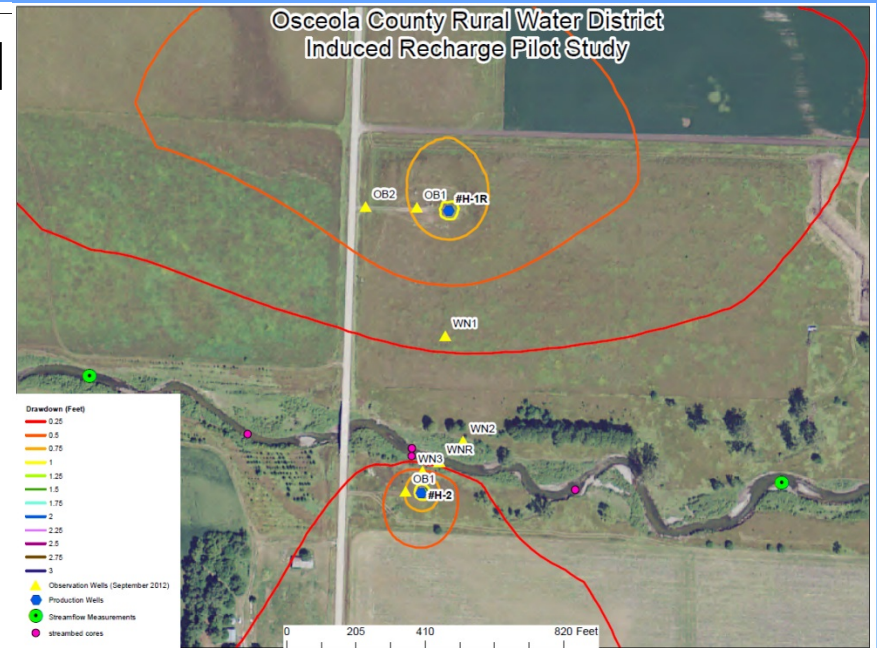
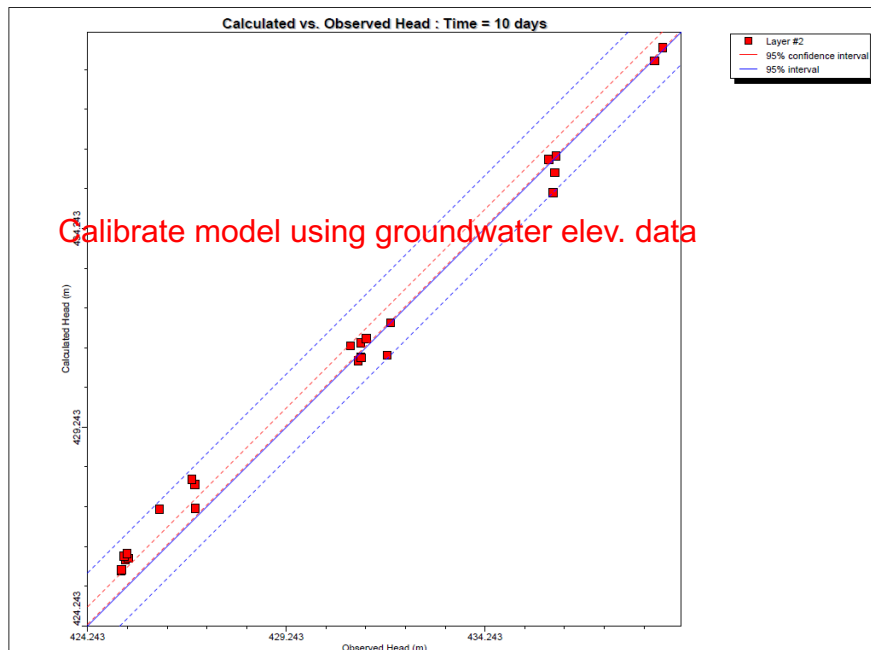


Vertical Permeability of the River Sediment

Sample ID	H-H ₁	Q (mL/minute)	Length (cm)	Area (cm ²)	K (m/sec)	K (ft/day)
Test	81.5	550	15.24	45.58	0.000376066	107
SC	70.5	610	15.24	45.58	0.00048217	137
SS	77.5	575	15.24	45.58	0.000413452	117
SN	71	640	15.24	45.58	0.000502321	142
CC	75.5	600	15.24	45.58	0.000442857	126
CS	60.5	750	15.24	45.58	0.000690821	196
CN	84.5	60	15.24	45.58	3.95689E-05	11
HW	66	650	15.24	45.58	0.000548819	156
HCC	62	750	15.24	45.58	0.000674107	191
HCS	103.5	250	15.24	45.58	0.000134604	38
HE	85.5	475	15.24	45.58	0.00030959	88
HCN	65	690	15.24	45.58	0.000591555	168
DC	72.5	590	15.24	45.58	0.000453496	129
DN	70	590	15.24	45.58	0.000469692	133
DS	65.5	725	15.24	45.58	0.000616817	175
TEST	59.5	750	15.24	45.58	0.000702431	199
					Average K =	129
					Std Dev. =	53



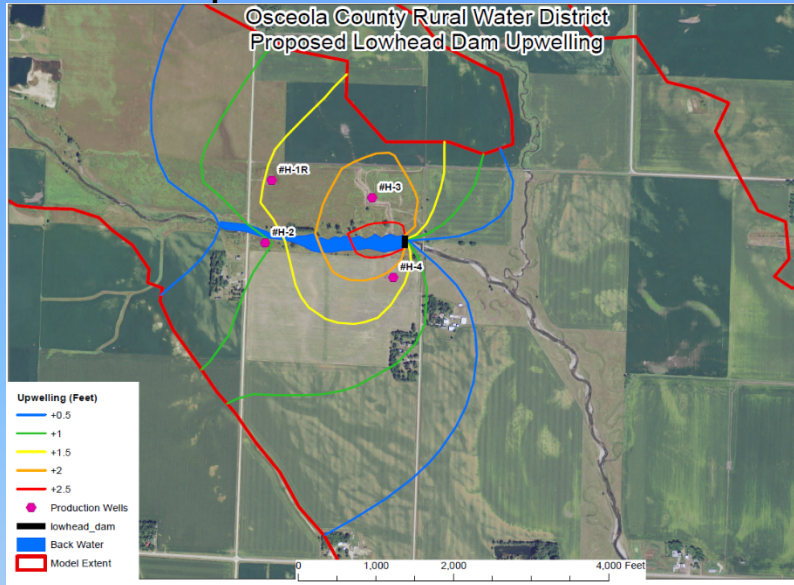
Model Development and Calibration Using Visual MODFLOW



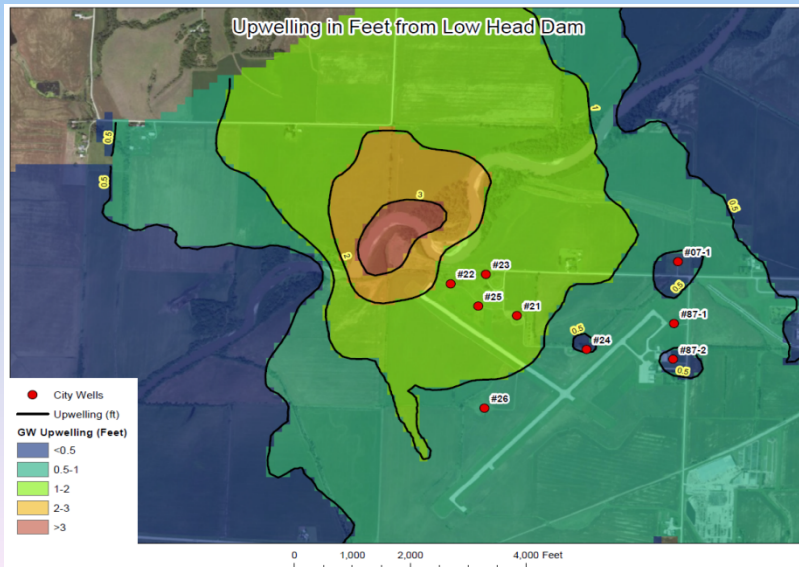
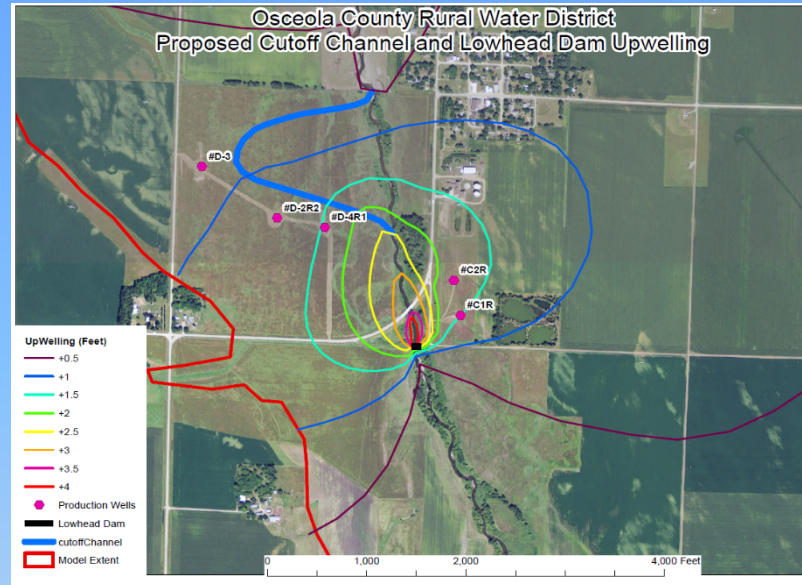
Following Model Calibration

Evaluation of Various Methods to Increase Groundwater Storage

Proposed Low Head Dam



Proposed Cutoff Channel and Low Head Dam



Ocheyedan River Upstream of Wellfield



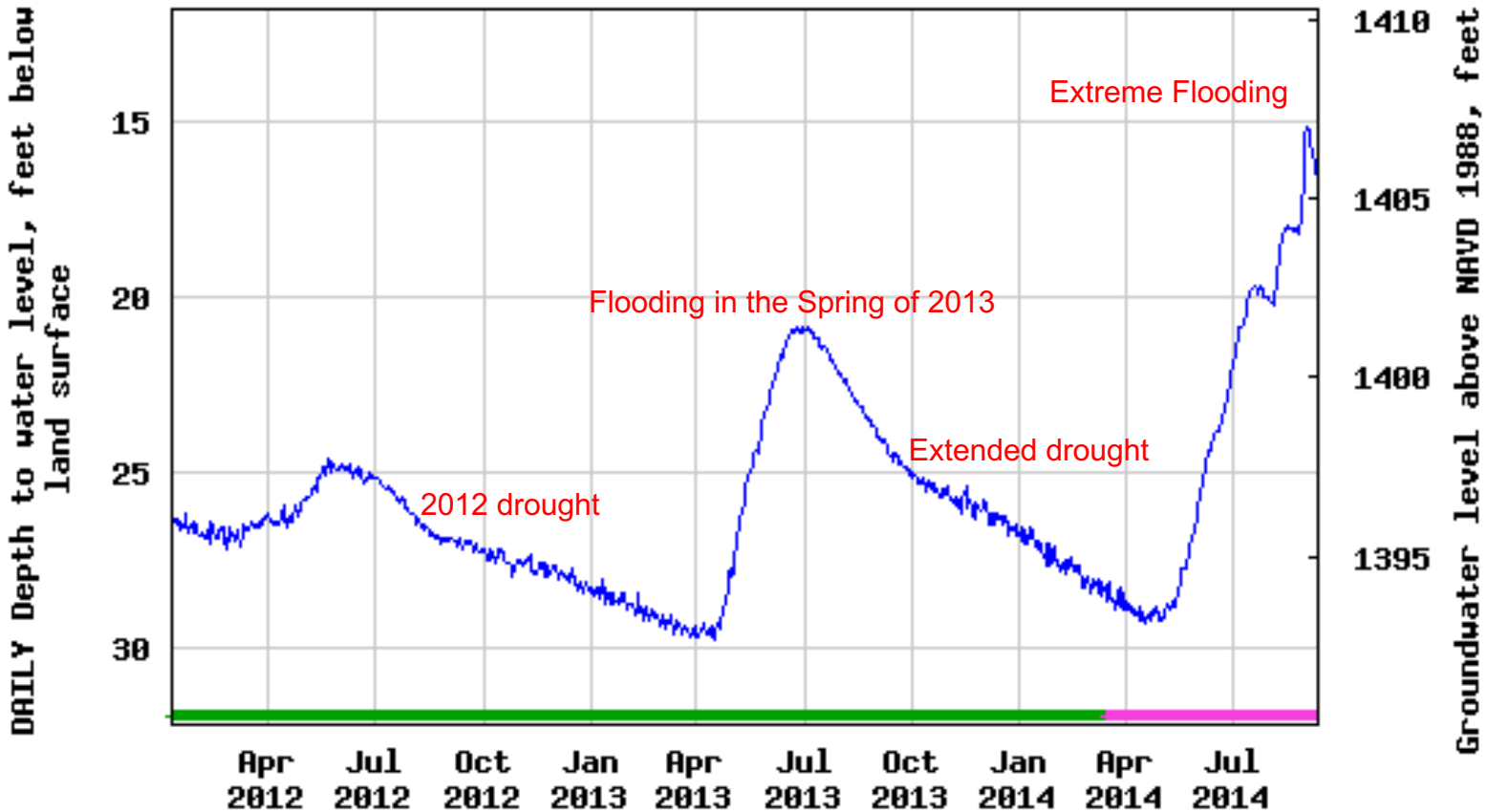
Ocheyedan River Downstream of Wellfield



Extremes in Precipitation Create Fluctuations in Shallow Groundwater



USGS 420212095235701 083N39W04BBB 2008IACRN-6

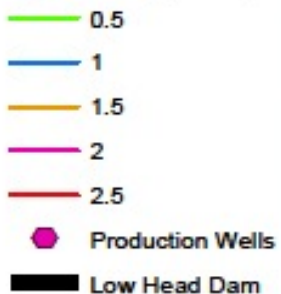


— Daily mean depth to water level — Period of provisional data
— Period of approved data

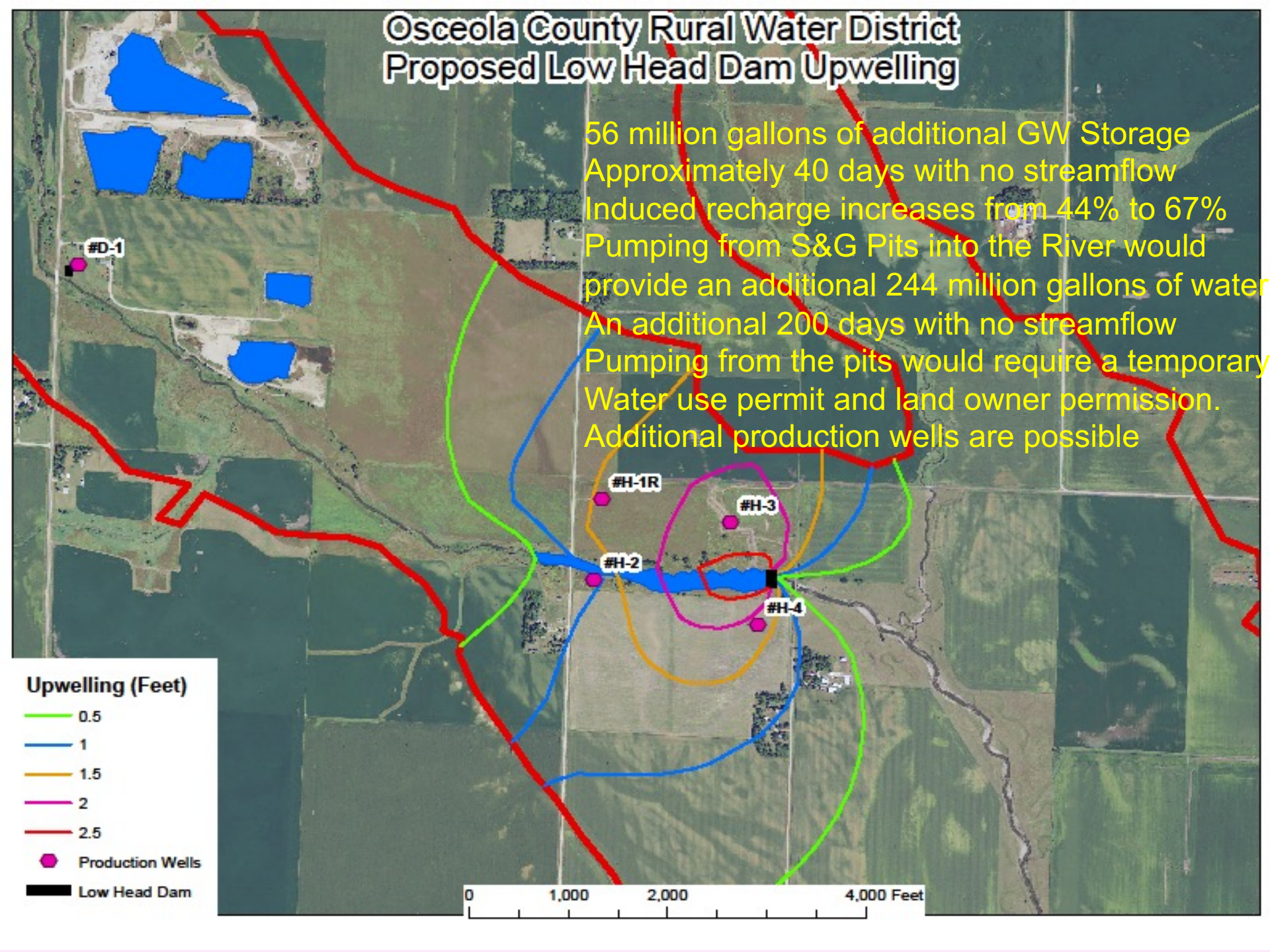
Osceola County Rural Water District Proposed Low Head Dam Upwelling

56 million gallons of additional GW Storage
Approximately 40 days with no streamflow
Induced recharge increases from 44% to 67%
Pumping from S&G Pits into the River would provide an additional 244 million gallons of water
An additional 200 days with no streamflow
Pumping from the pits would require a temporary
Water use permit and land owner permission.
Additional production wells are possible

Upwelling (Feet)



0 1,000 2,000 4,000 Feet





Questions or Comments

Contact Information

Mike Gannon 319-335-1581 or 319-541-1598

Mike-Gannon@uiowa.edu

