

Empire Gulch WL vs Wet-Dry-Regression 55-608612-3

----- Forwarded message -----

From: Frank Postillion <Frank.Postillion@pima.gov>

Date: Wed, Jul 2, 2014 at 3:39 PM

Subject: Regression Analysis of Depth to Water vs wetted creek. Well about 1 mile NW of Empire/Cienega Cree Confluence

To: "blomeli@blm.gov" <blomeli@blm.gov>

Ben,

I ran this (attached) to see if there was any similarity with the areas we are looking at in the lower Cienega. However, the only WL data (ADWR-GWSI I could find was winter and I could only look at that versus the wetted Cienega and Empire Gulch in June. This may be indicative of the general watershed condition for that winter to summer period and typically the response in streamflow is propagated based on the winter-spring condition. The Upper Empire Gulch area showed more substantial predicted groundwater level declines from the proposed Rosemont Pit (Myers and Tetra Tech 2.5 feet at 150 years; Myers/Montgomery 0.3ft at 150 years, increasing to over 3.3 feet at 1000years) than the Davidson/Lower Cienega. Using this by analogy may help to convince USFWS either 1) that the reduction in flow could be substantial or 2) the necessity to collect more data, or 3) render a jeopardy opinion because of the uncertainties.

Anyway, it is in the Las Cienegas and shows the need for additional WL data collection and seasonal wet-dry runs to help assess the relationship between groundwater level and wetted stream length in the area.

Regards,

Frank Postillion CGWP
Chief Hydrologist
Watershed Management Section Manager
Water Resources Division
Pima County Regional Flood Control District
97 E. Congress Ste. 232
Tucson, Arizona 85701
(520) 724-4653; 724-4626 fax; 325-1713 cell
Frank.Postillion@rfcd.pima.gov

| Wtr Level | Date | Stm Length | Date | Well 55-608612 Empire Gulch D 19-17-9ABB |
|-----------|-----------|------------|-----------|--|
| 54.1 | 1/10/2006 | 31680 | 6/1/2006 | |
| 53.2 | 1/16/2007 | 31680 | 6/1/2007 | |
| 53.6 | 1/8/2008 | 29040 | 6/1/2008 | |
| 53.8 | 1/11/2010 | 37488 | 6/12/2010 | |
| 52.8 | 1/13/2011 | 37488 | 6/11/2011 | |
| 54.9 | 1/10/2012 | 25344 | 6/14/2012 | |
| 54.1 | 1/10/2013 | 24816 | 6/22/2013 | |

SUMMARY OUTPUT

| <i>Regression Statistics</i> | |
|------------------------------|-----------|
| Multiple R | 0.682091 |
| R Square | 0.4652482 |
| Adjusted R | 0.3582978 |
| Standard E | 4125.6158 |
| Observatio | 7 |

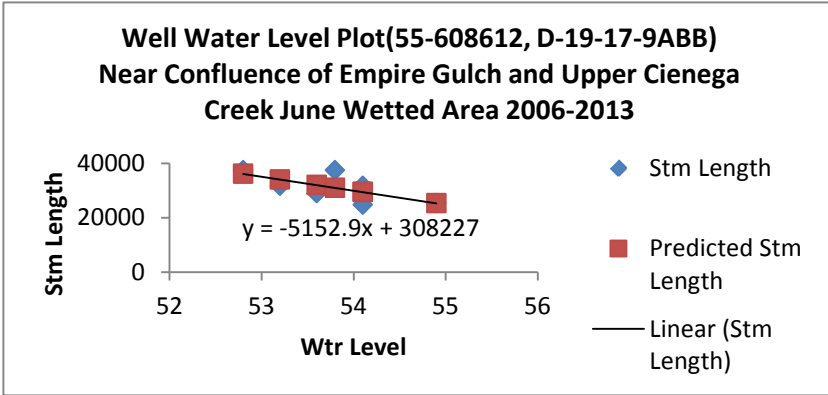
ANOVA

| | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>ignificance F</i> |
|------------|-----------|-----------|-----------|----------|----------------------|
| Regression | 1 | 74042309 | 74042309 | 4.350132 | 0.091398 |
| Residual | 5 | 85103529 | 17020706 | | |
| Total | 6 | 1.59E+08 | | | |

| | <i>Coefficients</i> | <i>andard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i> | <i>Upper 95%</i> | <i>ower 95.0%</i> | <i>pper 95.0%</i> |
|-----------|---------------------|---------------------|---------------|----------------|------------------|------------------|-------------------|-------------------|
| Intercept | 308227.3 | 132890.7 | 2.3194038 | 0.068104 | -33379.2 | 649833.8 | -33379.2 | 649833.8 |
| Wtr Level | -5152.869 | 2470.574 | -2.085697 | 0.091398 | -11503.7 | 1197.944 | -11503.7 | 1197.944 |

RESIDUAL OUTPUT

| <i>Observation</i> | <i>icted Stm Le.</i> | <i>Residuals</i> |
|--------------------|----------------------|------------------|
| 1 | 29457.098 | 2222.902 |
| 2 | 34094.68 | -2414.68 |
| 3 | 32033.533 | -2993.53 |
| 4 | 31002.959 | 6485.041 |
| 5 | 36155.828 | 1332.172 |
| 6 | 25334.803 | 9.196721 |
| 7 | 29457.098 | -4641.1 |



| Lower 95.0% | Upper 95.0% |
|-------------|-------------|
| -81522.4 | 730001.2 |
| -13008.6 | 2093.06 |