# SPRING 2010 GROUND WATER LEVEL REPORT

**DATE:** 4/06/10

**TO:** SOUTH PLATTE NRD BOARD OF DIRECTORS

**FROM:** Chris Kaiser

**RE:** SOUTH PLATTE NRD GROUND WATER LEVEL REPORT

This report summarizes the results of spring 2010 ground water level measurements. Summary sheets showing one and five year ground water level changes by county and physical region are attached. The report also contains maps of the water level differences of one, five, 10, 15, 20, and 30 years. Also included is a map and table of three year rolling averages (fully-appropriated and over-appropriated). Maps were designed using topo to raster (ArcGIS program) and the best available data at the time. The maps do not consider any trends within the data or geology, precipitation, elevation, etc, only the current water level at that given point and anything in between these points, is considered an interpolation. The further the distance between two points, the interpolated surface will average out this bias rather than preserve it. These maps also show areas within our district where there are no monitoring wells present. Data would be more accurate if we could place wells within these designated areas. The SPNRD did receive a grant from the Nebraska Environmental trust to drill 39 monitoring wells. Thirteen wells will be drilled in Kimball County beginning in the fall of 2010 while an additional 26 wells will be drilled in Cheyenne and Deuel Counties beginning in 2011 and 2012, respectively.

The one year ground water levels in Cheyenne County inclined 2.02 feet on average with 17.71 percent of wells measured showing declines. Deuel County showed an average incline of 1.76 feet with 8.7 percent of measured wells showing declines. Kimball County showed 36.36 percent of measured wells declining with an average incline of 0.51 feet.

Five year results show the largest decline in Kimball County with an average decline of 1.84 feet and 75.8 percent of wells showing a decline. Cheyenne County has an average decline of 0.63 feet with 58.3 percent of wells showing a decline. Deuel County has an average incline of 1.53 feet with 21.7 percent of wells showing a decline.

Twenty year results show the largest decline in Cheyenne County, where average water levels show a 8.37 foot drop compared to 1991 levels. Deuel County has an average decline of 0.36 feet while Kimball County averages show a 4.45 foot decline. Overall, twenty year results for the entire district show that 75 percent of wells have declined.

Thirty year results show an incline compared to twenty year results, respectively. Kimball County wells dropped an average of 3.04 feet while Deuel County well averages showed an incline of 1.08 feet. The largest decline is in Cheyenne County where wells had an average of a 4.22 foot decline.

Following is a detailed report of this spring's levels.

# South Platte NRD 1 year report by region

| County | PhysReg | Ave | Max | Min | #Wells | Decline | % Decline |
|---|---|---|---|---|---|---|---|
| **Cheyenne** | | | | | | | |
| | Cheyenne Table | 0.32 | 3.42 | -3.15 | 46 | 15 | 32.6% |
| | Lodgepole Crk | 2.11 | 6.33 | -0.05 | 14 | 1 | 7.1% |
| | Sidney Draw | 3.54 | 7.39 | -0.12 | 12 | 1 | 8.3% |
| | Sidney Area | 4.47 | 7.97 | 0.36 | 24 | 0 | 0.0% |
| **Deuel** | | | | | | | |
| | Deuel Table | 0.96 | 2.78 | -1.92 | 8 | 2 | 25.0% |
| | Lodgepole Crk | 2.12 | 5.45 | 0.36 | 8 | 0 | 0.0% |
| | South Platte | 2.28 | 3.70 | 0.39 | 7 | 0 | 0.0% |
| **Kimball** | | | | | | | |
| | Kimball Table | 0.35 | 3.43 | -2.07 | 12 | 5 | 41.7% |
| | Lodgepole Crk | 0.59 | 6.56 | -2.89 | 21 | 7 | 33.3% |

# South Platte NRD 1 year stats by county

| County | Ave | Max | Min | # Wells | Declines | % Declines |
|---|---|---|---|---|---|---|
| **Cheyenne** | 2.02 | 7.97 | -3.15 | 96 | 17 | 17.71% |
| **Deuel** | 1.76 | 5.45 | -1.92 | 23 | 2 | 8.70% |
| **Kimball** | 0.51 | 6.56 | -2.89 | 33 | 12 | 36.36% |

# South Platte NRD 5 yr stats by region

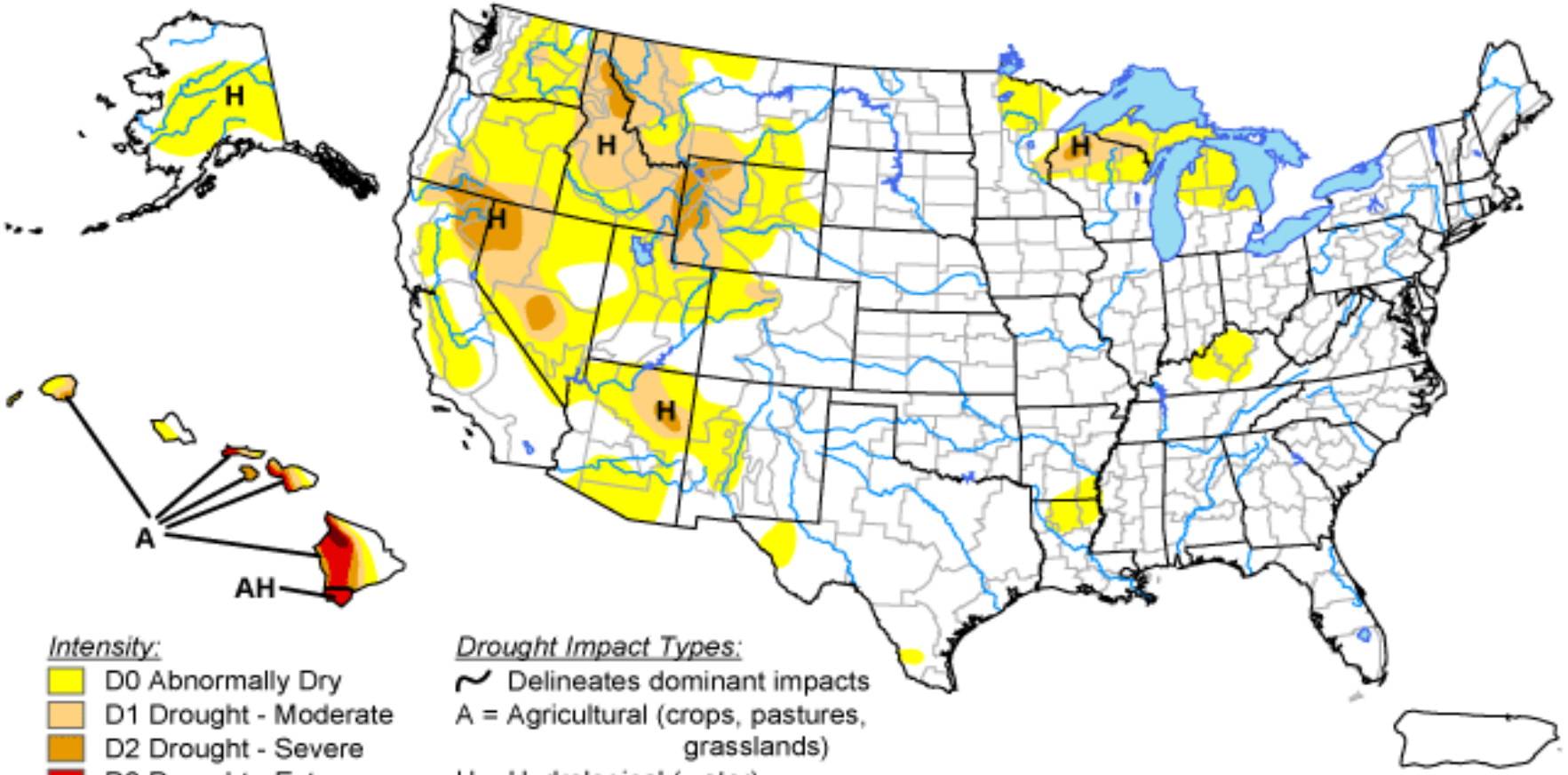
| County | PhysReg | Ave | Max | Min | # Wells | Declines | % Decline |
|---|---|---|---|---|---|---|---|
| **Cheyenne** | | | | | | | |
| | Cheyenne Table | -1.49 | 4.94 | -13.79 | 46 | 35 | 76.1% |
| | Lodgepole Crk | 0.14 | 7.53 | -8.41 | 14 | 7 | 50.0% |
| | Sidney Draw | 0.57 | 4.42 | -2.49 | 12 | 6 | 50.0% |
| | Sidney Area | -0.02 | 3.65 | -2.96 | 24 | 8 | 33.3% |
| **Deuel** | | | | | | | |
| | Deuel Table | -0.24 | 1.28 | -1.76 | 8 | 4 | 50.0% |
| | Lodgepole Crk | 2.58 | 6.19 | -0.20 | 8 | 1 | 12.5% |
| | South Platte | 2.36 | 4.68 | 0.67 | 7 | | 0.0% |
| **Kimball** | | | | | | | |
| | Kimball Table | -1.79 | 1.74 | -7.81 | 12 | 9 | 75.0% |
| | Lodgepole Crk | -1.86 | 2.73 | -5.88 | 21 | 16 | 76.2% |

# South Platte 5 yr Stats by county

| County | Ave | Max | Min | # Wells | Declines | % Declines |
|---|---|---|---|---|---|---|
| **Cheyenne** | -0.63 | 7.53 | -13.79 | 96 | 56 | 58.3% |
| **Deuel** | 1.53 | 6.19 | -1.76 | 23 | 5 | 21.7% |
| **Kimball** | -1.84 | 2.73 | -7.81 | 33 | 25 | 75.8% |

# U.S. Drought Monitor

**March 30, 2010**
Valid 8 a.m. EDT




*Intensity:*
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

*Drought Impact Types:*
- ~ Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

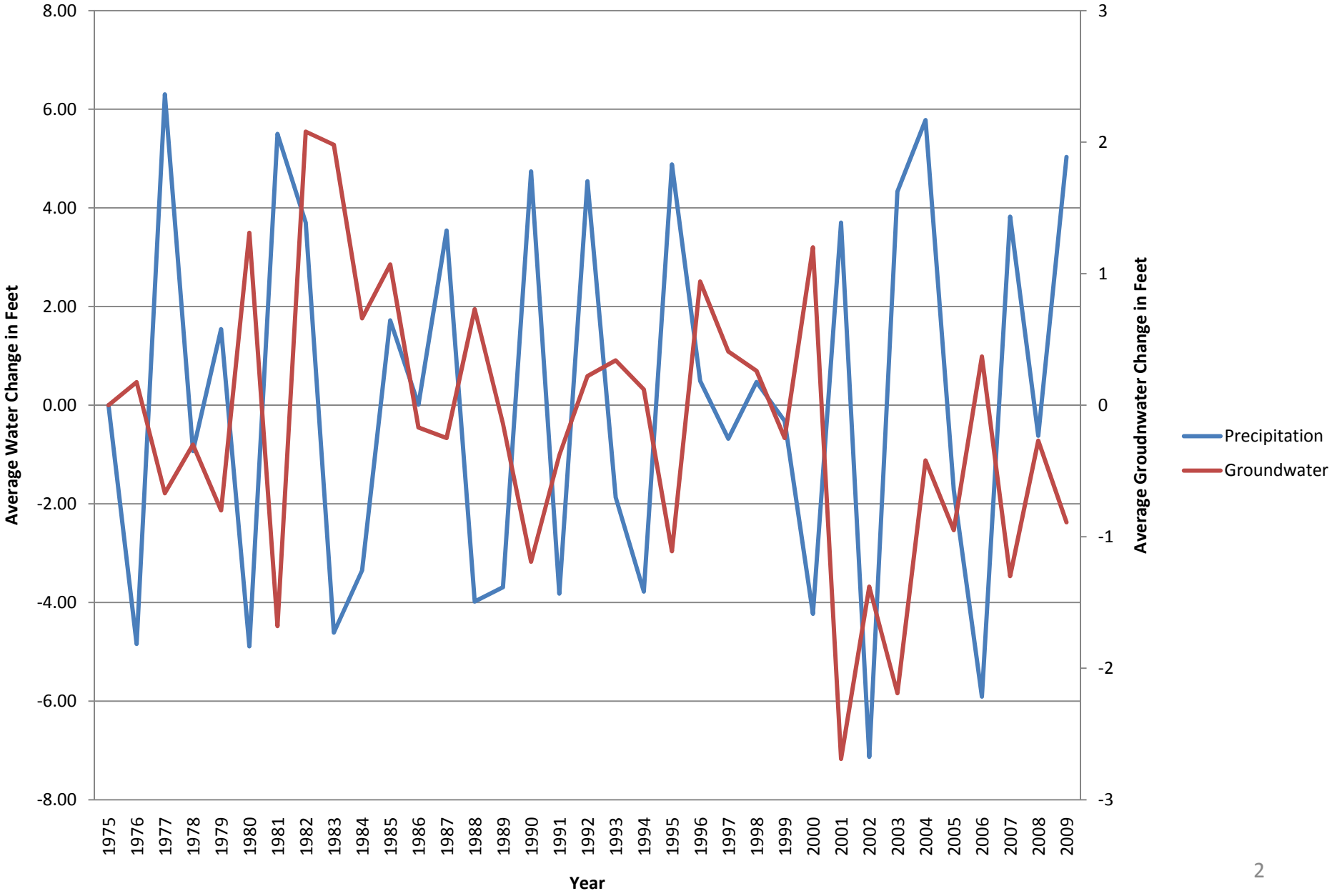
*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

**http://drought.unl.edu/dm**

***Released Thursday, April 1, 2010***

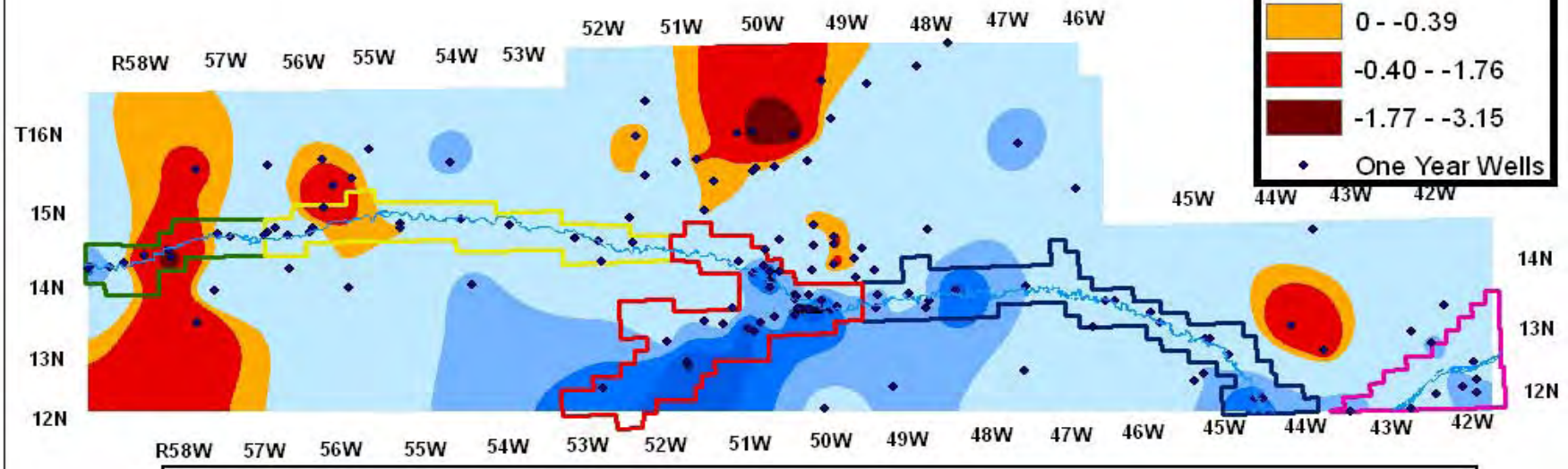
***Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC***

# Spring Groundwater & Annual Precipitation Accumulated Changes 1975-2009



SOUTH PLATTE
NATURAL RESOURCES DISTRICT

# SPNRD 1 Year Water Level Differences




## South Platte NRD 1 Year Stats by County

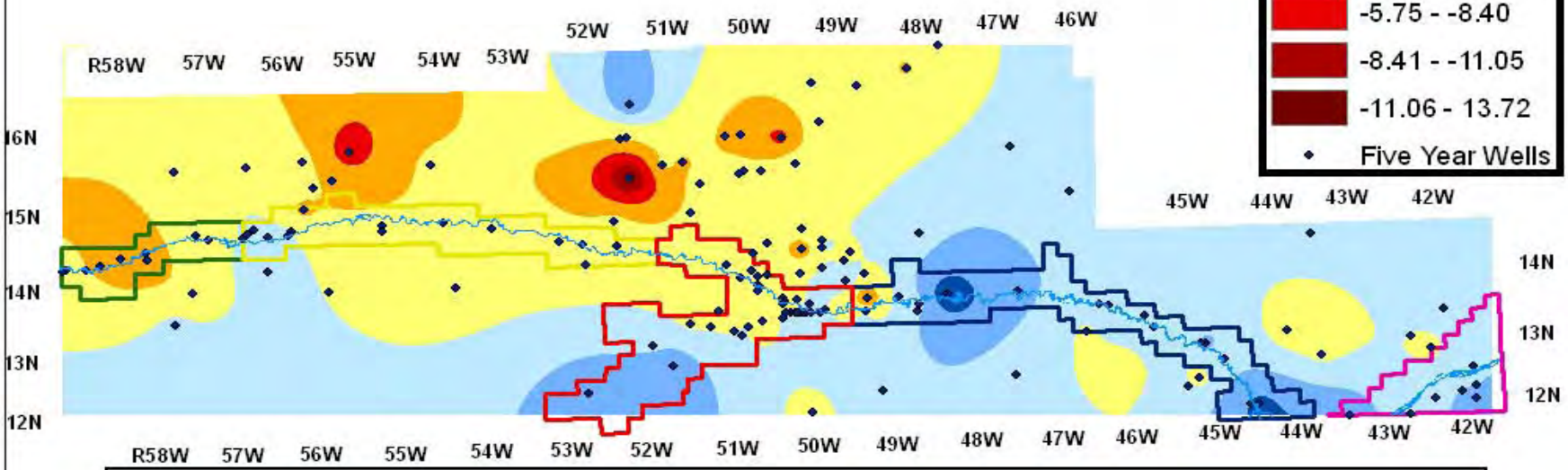
| County | Ave | Max | Min | Count | Decline | % Declines |
|---|---|---|---|---|---|---|
| Kimball | 0.51 | 6.56 | -2.89 | 33 | 12 | 36.36% |
| Cheyenne | 2.02 | 7.97 | -3.15 | 96 | 17 | 17.71% |
| Deuel | 1.76 | 5.45 | -1.92 | 23 | 2 | 8.70% |

0 5 10 20 Miles

Spring 2009 - Spring 2010

SOUTH PLATTE
NATURAL RESOURCES DISTRICT

# SPNRD 5 Year Water Level Differences



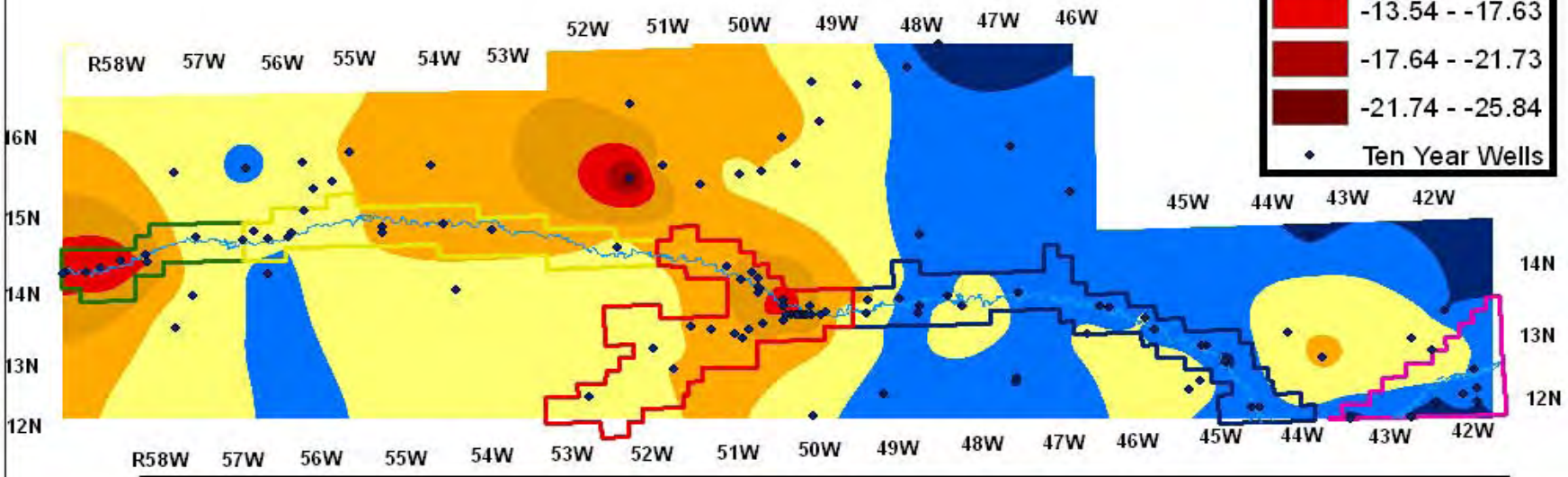

## South Platte NRD 5 Year Stats by County

| County | Ave | Max | Min | Count | Decline | % Declines |
|---|---|---|---|---|---|---|
| Kimball | -3.06 | 2.88 | -9.69 | 32 | 26 | 81.3% |
| Cheyenne | -1.28 | 8.72 | -15.12 | 68 | 48 | 70.6% |
| Deuel | 2.12 | 7.71 | -5.28 | 23 | 5 | 21.7% |

Spring 2006 - Spring 2010

SOUTH PLATTE
NATURAL RESOURCES DISTRICT

# SPNRD 10 Year Water Level Differences



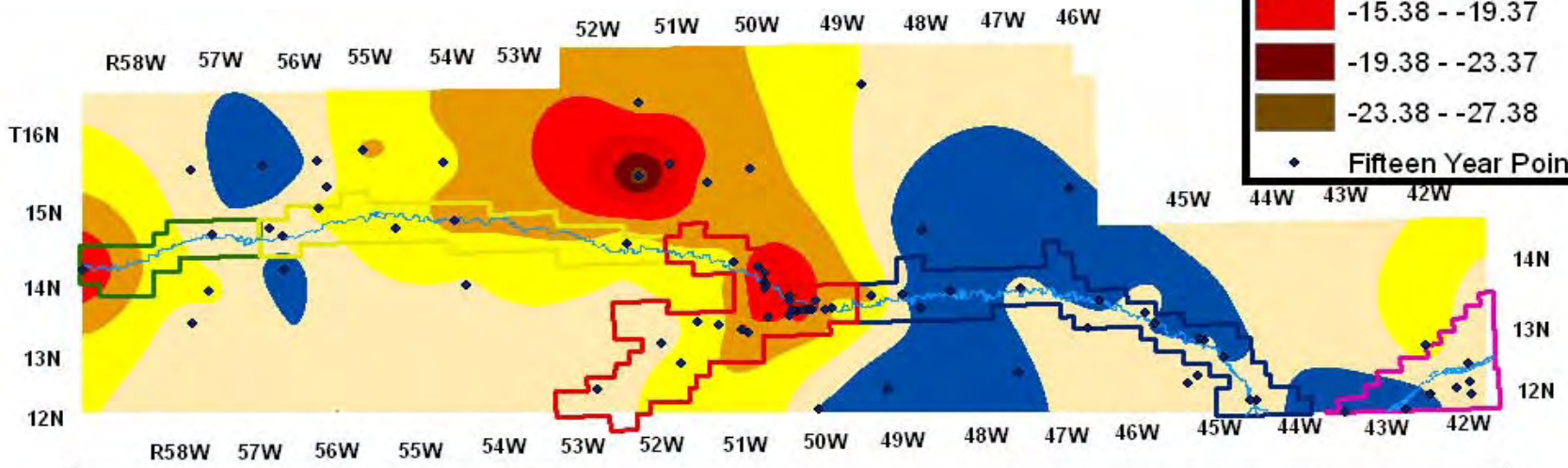

## South Platte NRD 10 Year Stats by County

| County | Ave | Max | Min | Count | Decline | % Declines |
|---|---|---|---|---|---|---|
| Kimball | -6.38 | 1.49 | -18.33 | 30 | 27 | 90.0% |
| Cheyenne | -6.63 | 6.95 | -25.93 | 61 | 46 | 75.4% |
| Deuel | 0.36 | 4.5 | -8 | 23 | 8 | 34.8% |

Spring 2001 - Spring 2010

SOUTH PLATTE
NATURAL RESOURCES DISTRICT

# SPNRD 15 Year Water Level Differences




## South Platte NRD 15 Year Stats by County

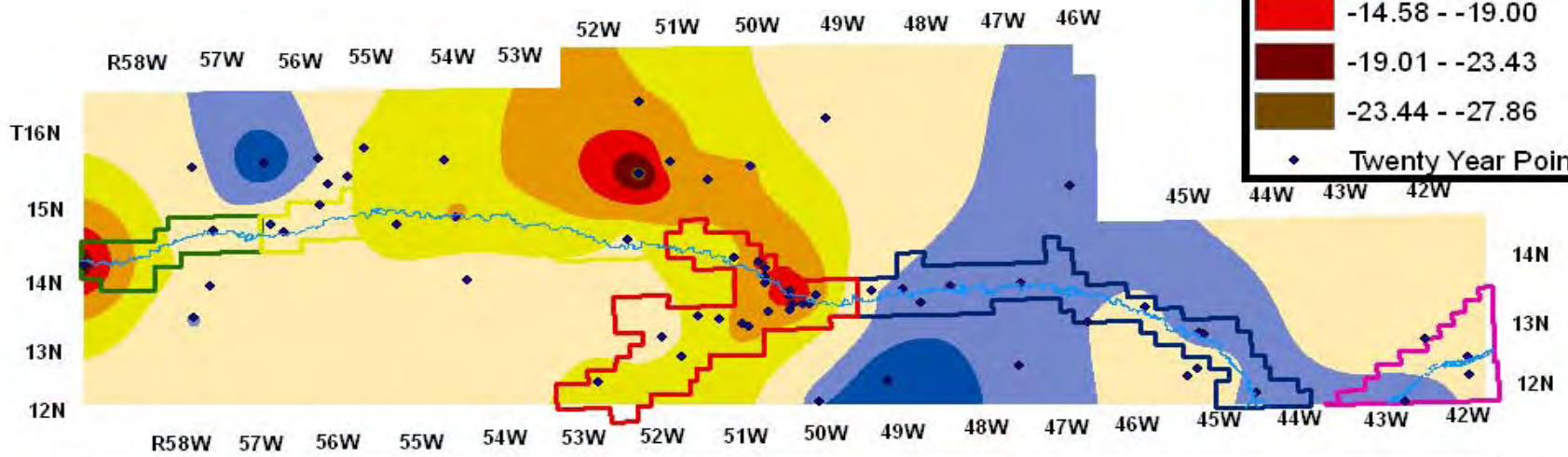
| County | Ave | Max | Min | Count | Decline | % Declines |
|---|---|---|---|---|---|---|
| Kimball | -3.65 | 4.41 | -18.15 | 17 | 14 | 82.4% |
| Cheyenne | -8.55 | 4.62 | -27.4 | 47 | 38 | 80.6% |
| Deuel | -0.57 | 3.92 | -6.12 | 17 | 5 | 29.4% |

0 5 10 20 Miles

Spring 1996 - Spring 2010

South Platte Natural Resources District

# SPNRD 20 Year Water Level Differences




## South Platte NRD 20 Year Stats by County

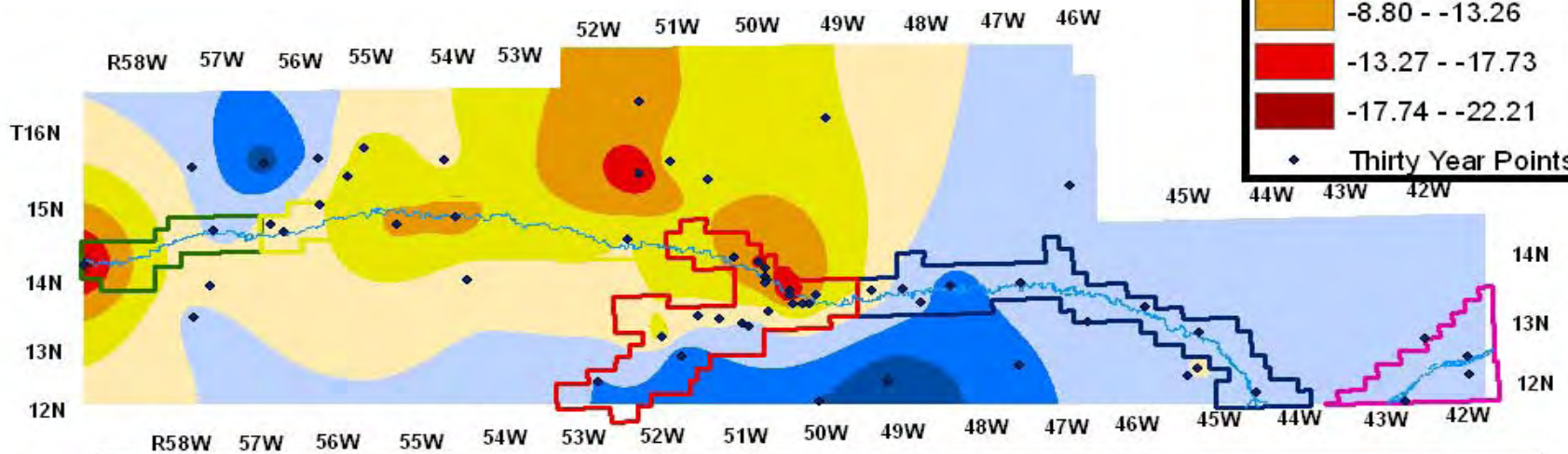
| County | Ave | Max | Min | Count | Decline | % Declines |
|---|---|---|---|---|---|---|
| Kimball | -4.45 | 7.58 | -23.69 | 17 | 14 | 82.4% |
| Cheyenne | -8.37 | 6.69 | -27.99 | 38 | 30 | 79.0% |
| Deuel | -0.36 | 2.85 | -4.59 | 10 | 5 | 50.0% |

0 5 10 20 Miles

Spring 1991 - Spring 2010

SOUTH PLATTE
NATURAL RESOURCES DISTRICT

# SPNRD 30 Year Water Level Differences

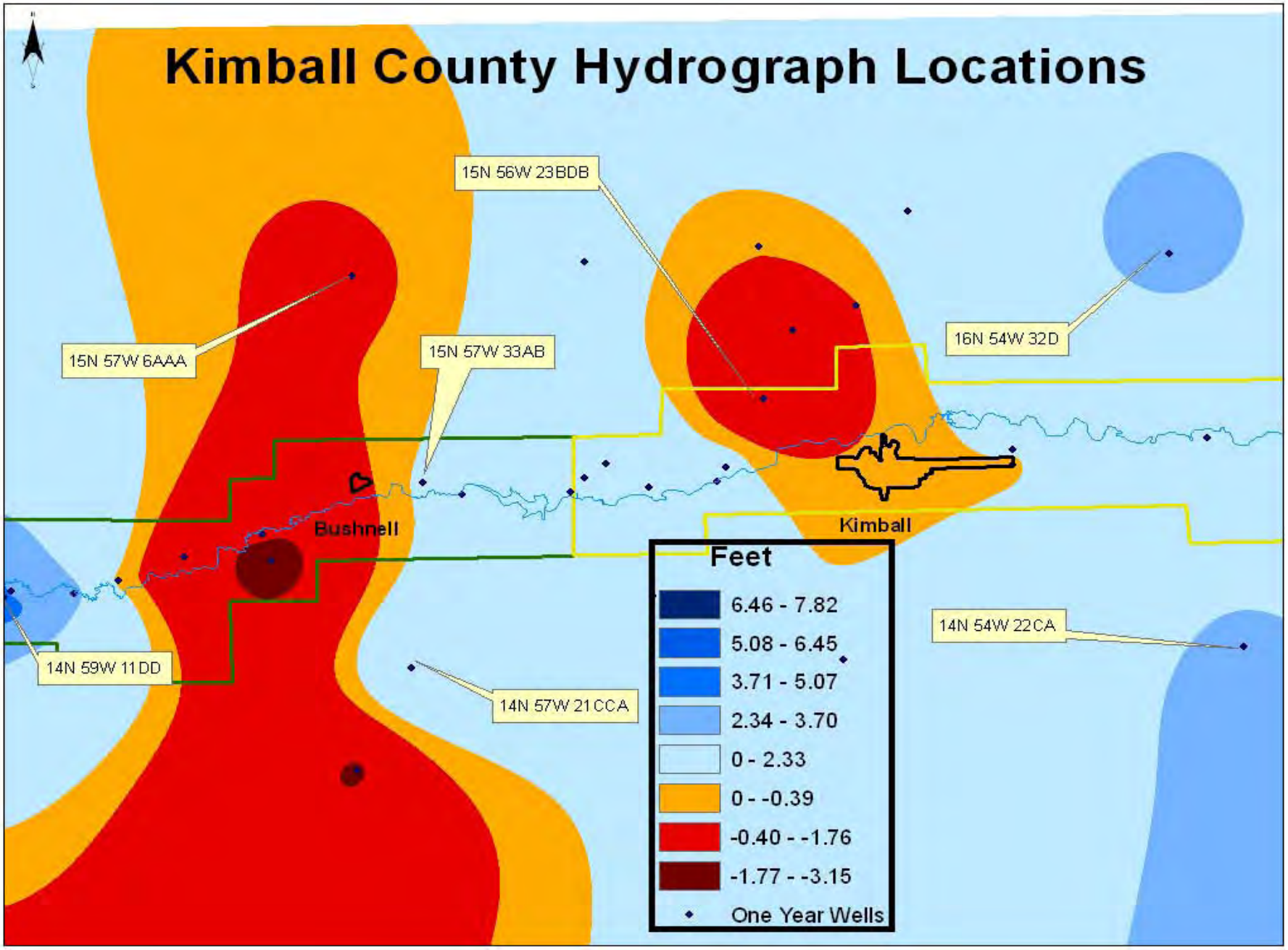



## South Platte NRD 30 Year Stats by County

| County | Ave | Max | Min | Count | Decline | % Declines |
|---|---|---|---|---|---|---|
| Kimball | -3.04 | 13.1 | -21.6 | 16 | 11 | 68.8% |
| Cheyenne | -4.22 | 13.56 | -22.7 | 36 | 24 | 66.6% |
| Deuel | 1.08 | 3.71 | -2.27 | 9 | 2 | 22.2% |

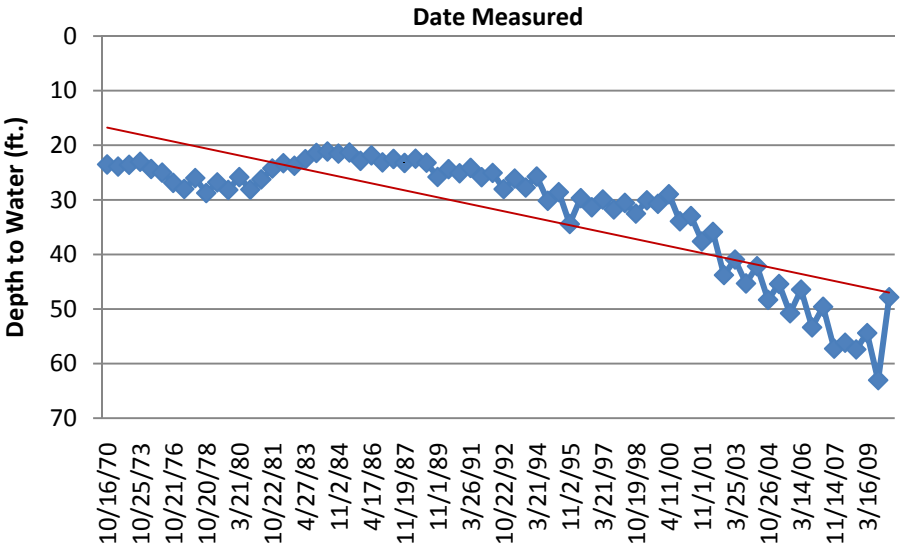
0 5 10 20 Miles

Spring 1981 - Spring 2010


Kimball County Hydrograph Locations
15N 56W 23BDB
15N 57W 6AAA
15N 57W 33AB
16N 54W 32D
Bushnell
Kimball
14N 59W 11DD
14N 57W 21CCA
14N 54W 22CA
Feet
6.46 - 7.82
5.08 - 6.45
3.71 - 5.07
2.34 - 3.70
0 - 2.33
0 - -0.39
-0.40 - -1.76
-1.77 - -3.15
One Year Wells

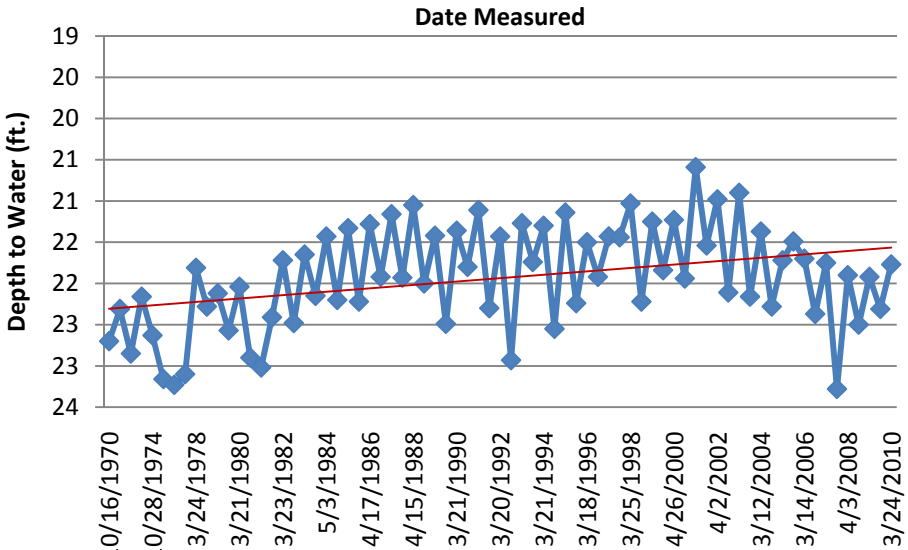
## 14N 59W 11DD

### NE/WY Stateline 1 East of Pine Bluffs



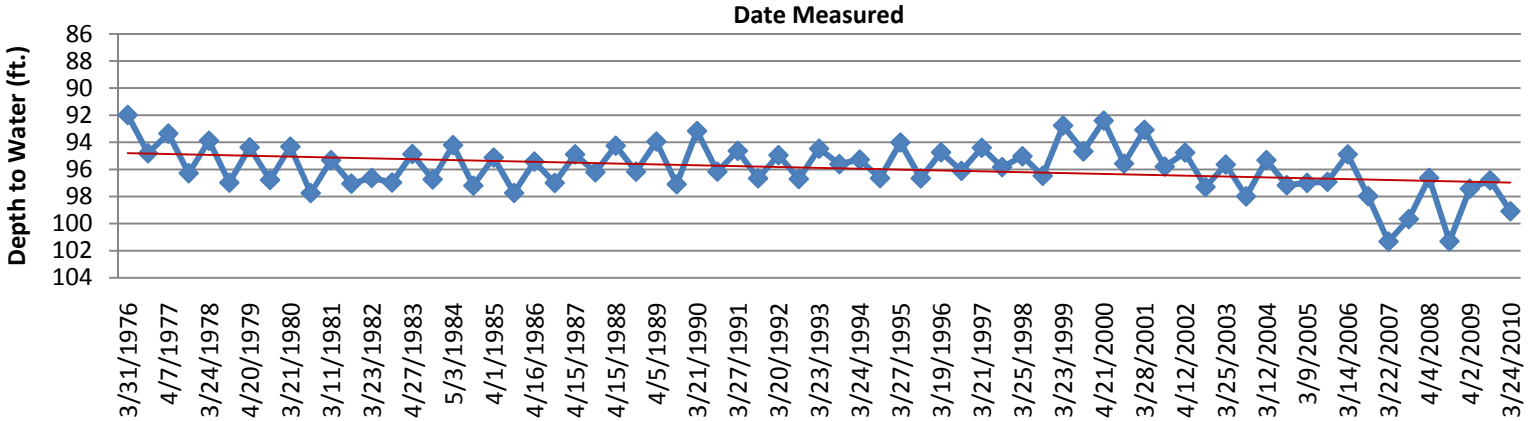

## 15N 57W 33AB

### 1 East of Bushnell

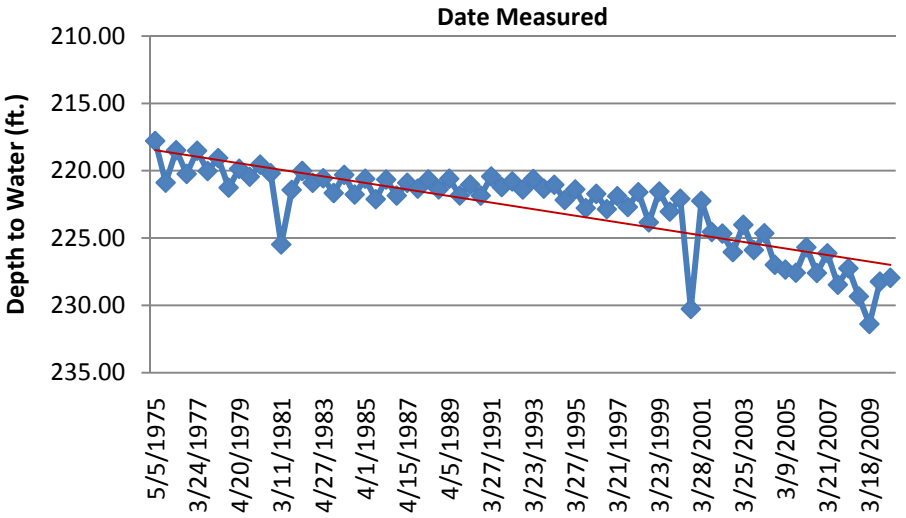



## 15N 56W 23BDB

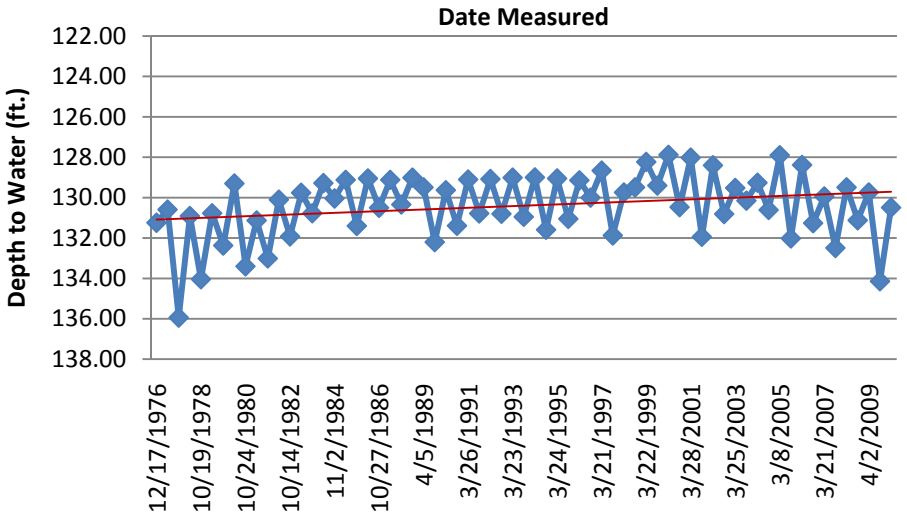
### 3 West 2 North of Kimball



## 16N 54W32D
### 5 North 2 West of Dix

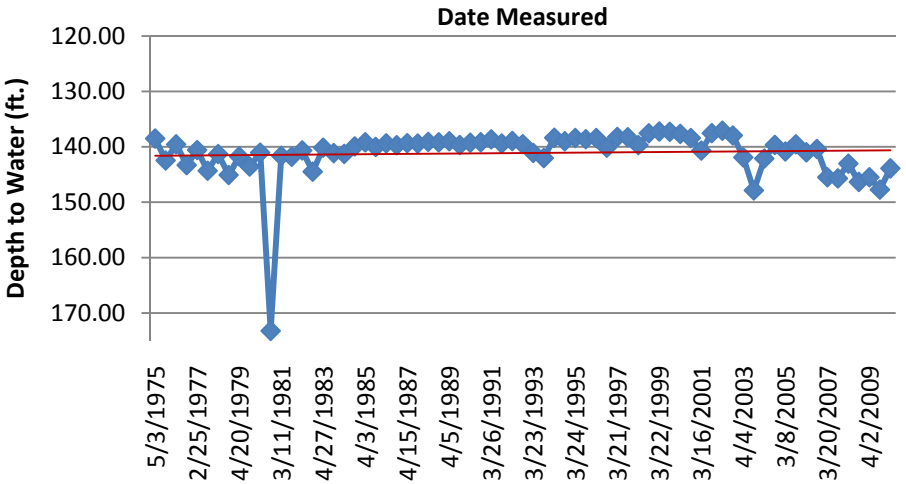



## 15N 57W 6AAA
### 5 North of Bushnell

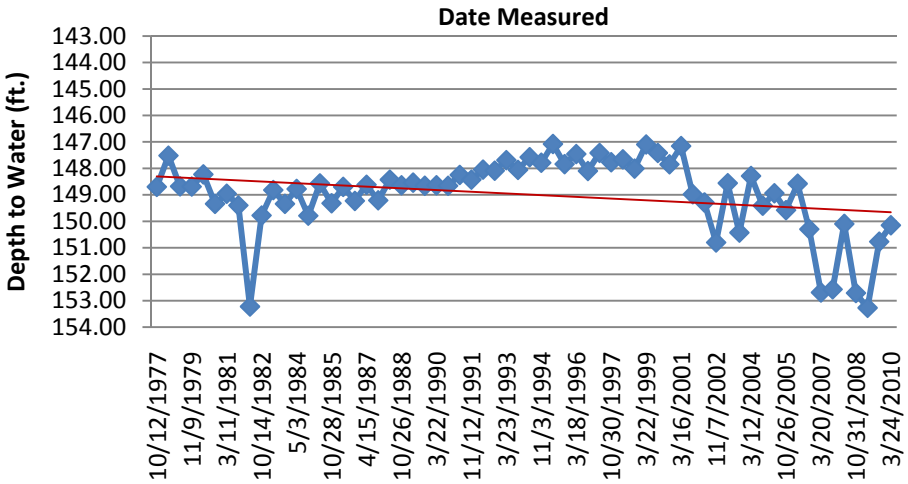


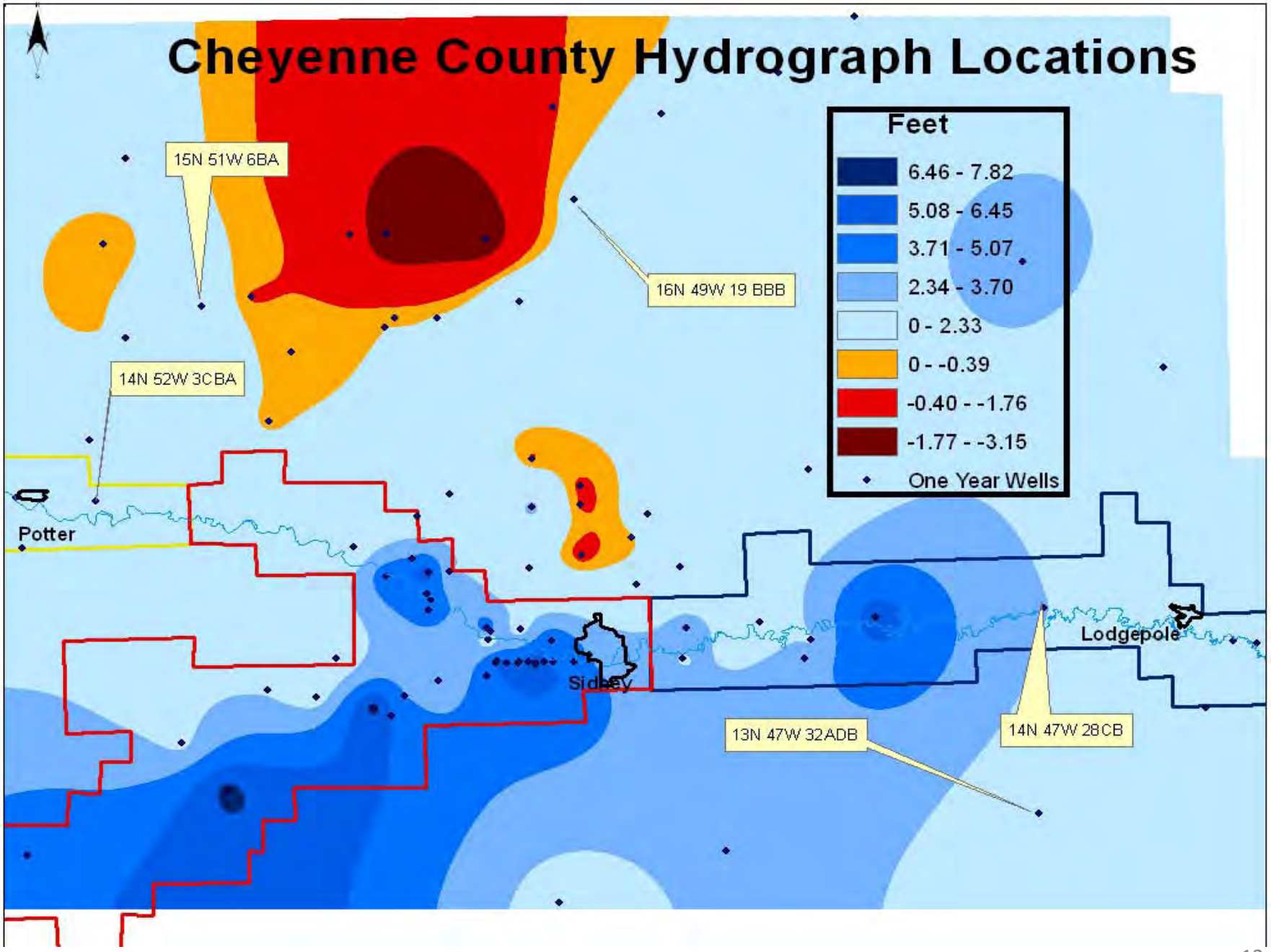



## 14N 57W 21CCA
### 5 South 1 East of Bushnell



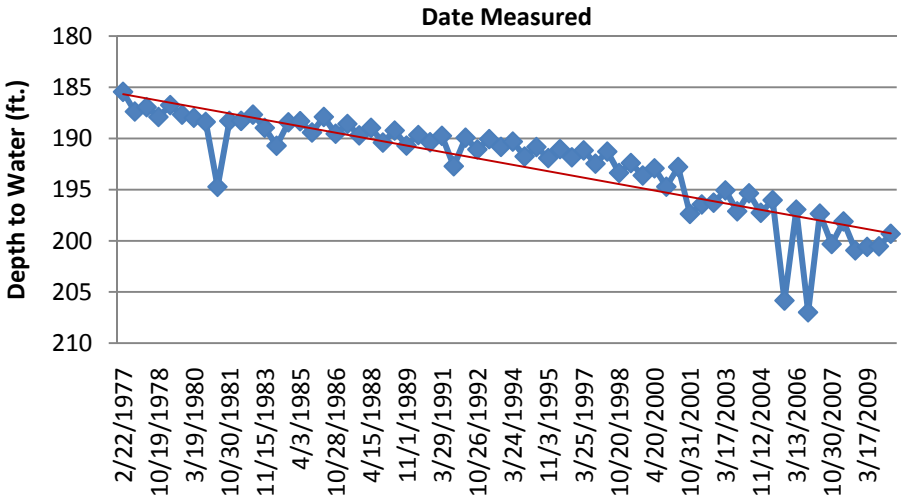

## 14N 54W 22CA
### 4 South 1 West of Dix




Cheyenne County Hydrograph Locations
Feet
6.46 - 7.82
5.08 - 6.45
3.71 - 5.07
2.34 - 3.70
0 - 2.33
0 - -0.39
-0.40 - -1.76
-1.77 - -3.15
One Year Wells
15N 51W 6BA
16N 49W 19 BBB
14N 52W 3CBA
Potter
Sidney
Lodgepole
13N 47W 32ADB
14N 47W 28CB

# 15N 51W 6BA

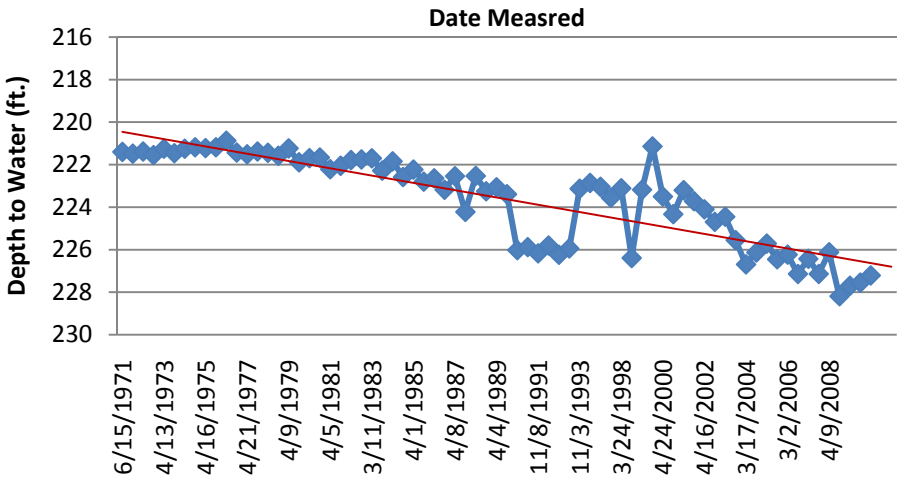
## 6 North 5 East of Potter




# 16N 49W 19BBB

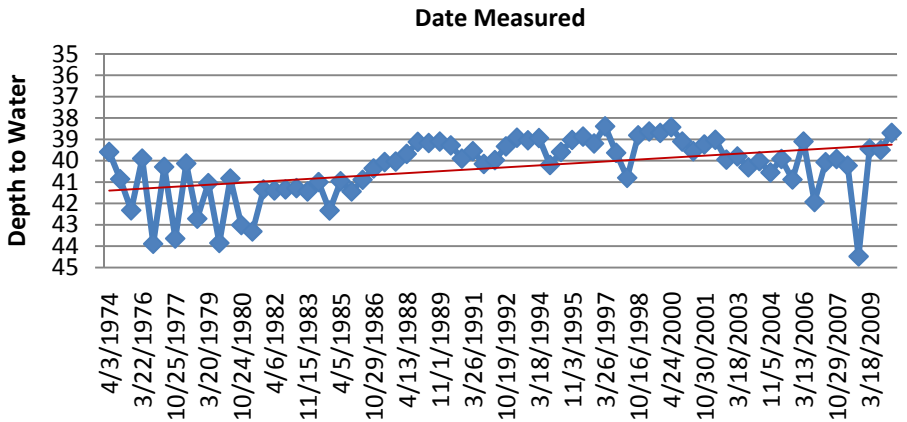
## Gurley Recorder

## 2 North 1 West of Gurley




# 15N 46W 18CCC

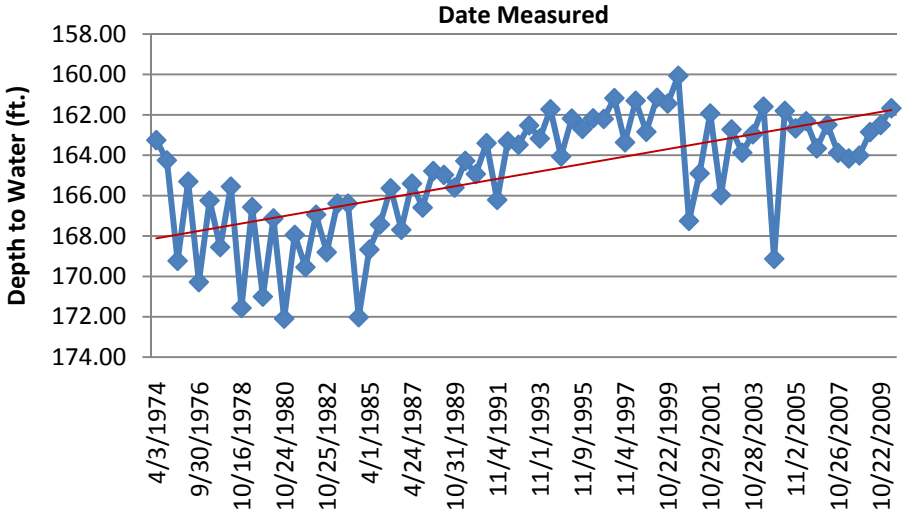
## 8 Miles North of Lodgepole





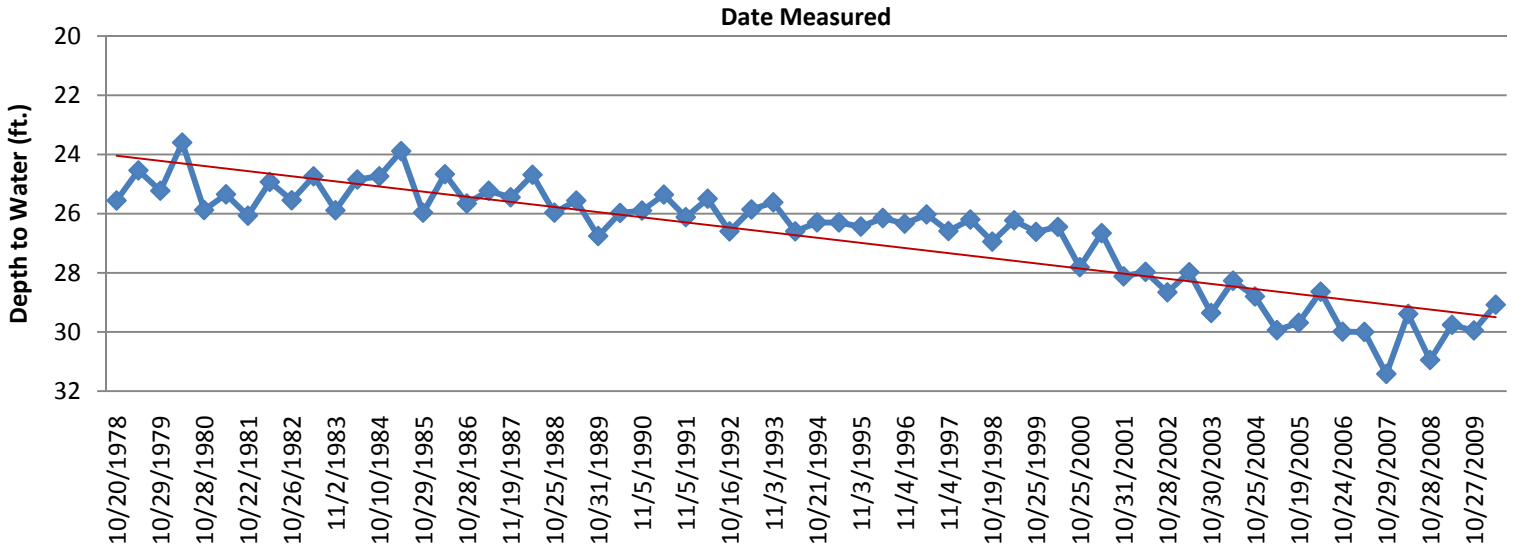

# 13N 47W 32ADB

## 6 South 4 West of Lodgepole



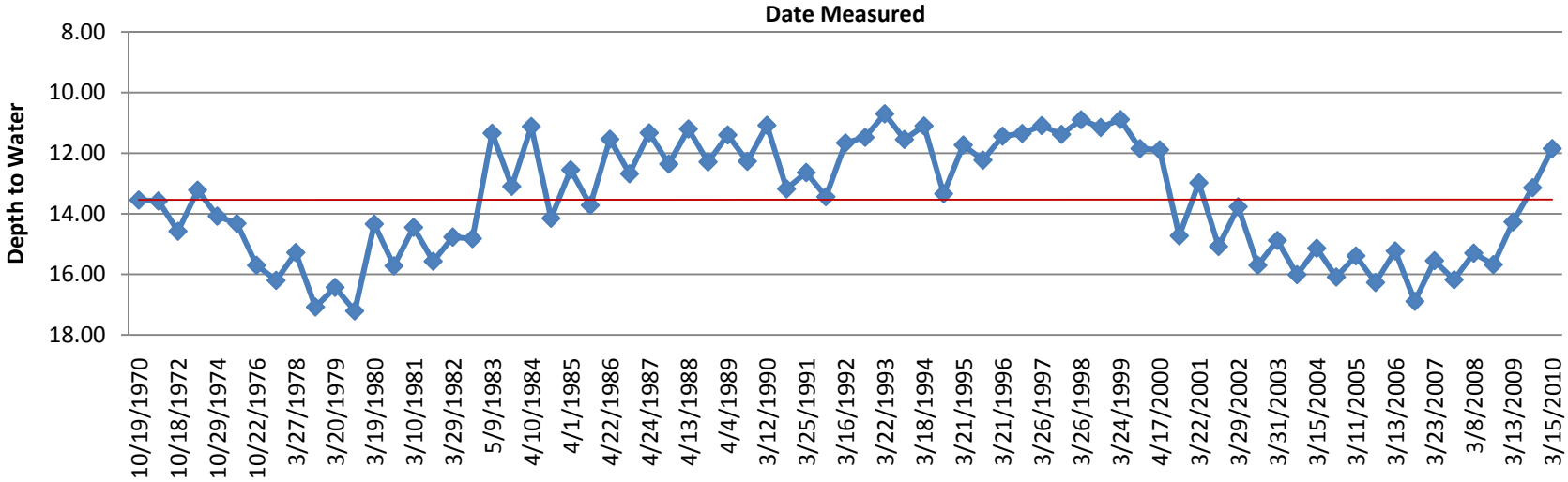
# 14N 52W 3CBA

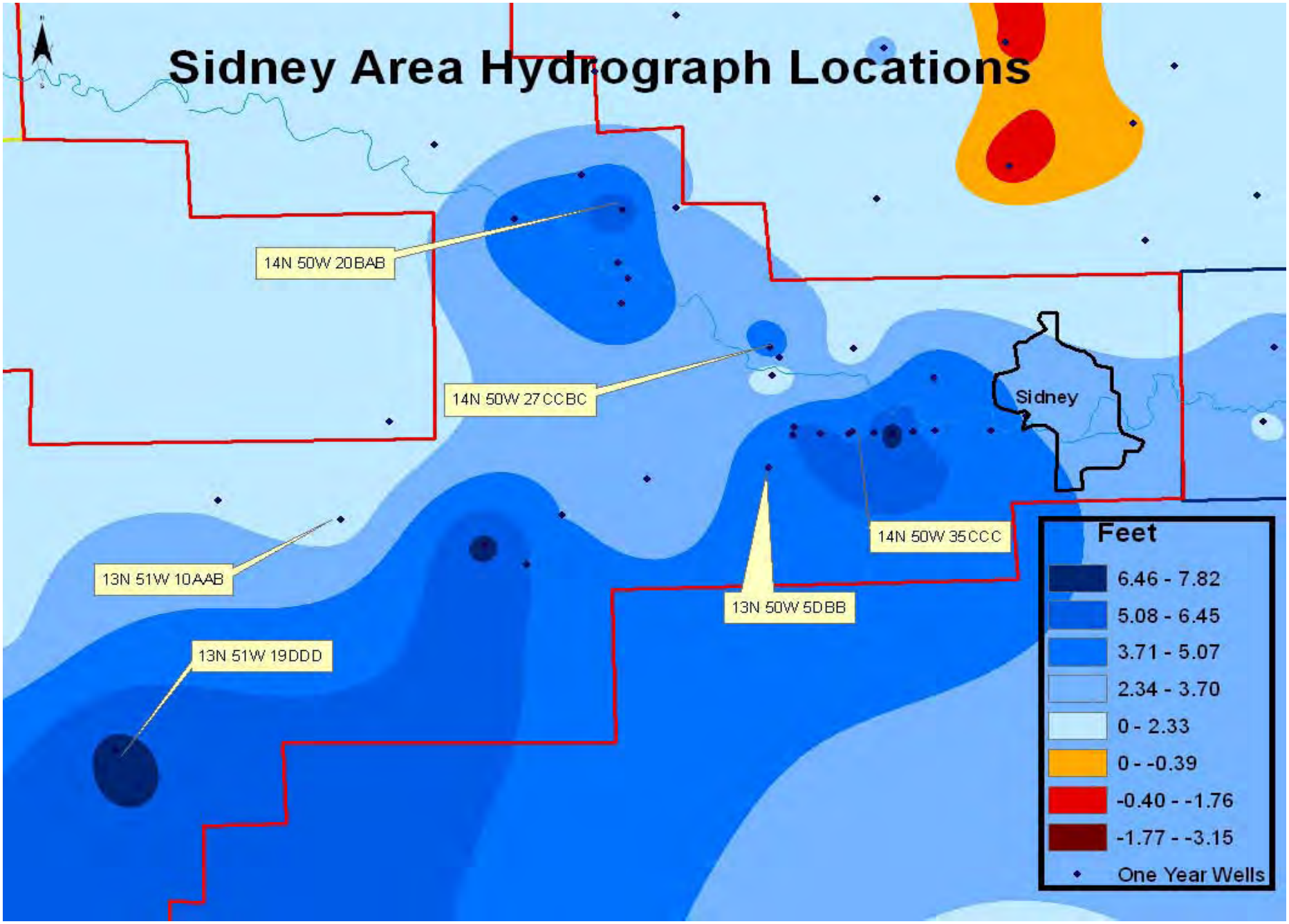
## 2 East of Potter




# 14N 47W 28CB

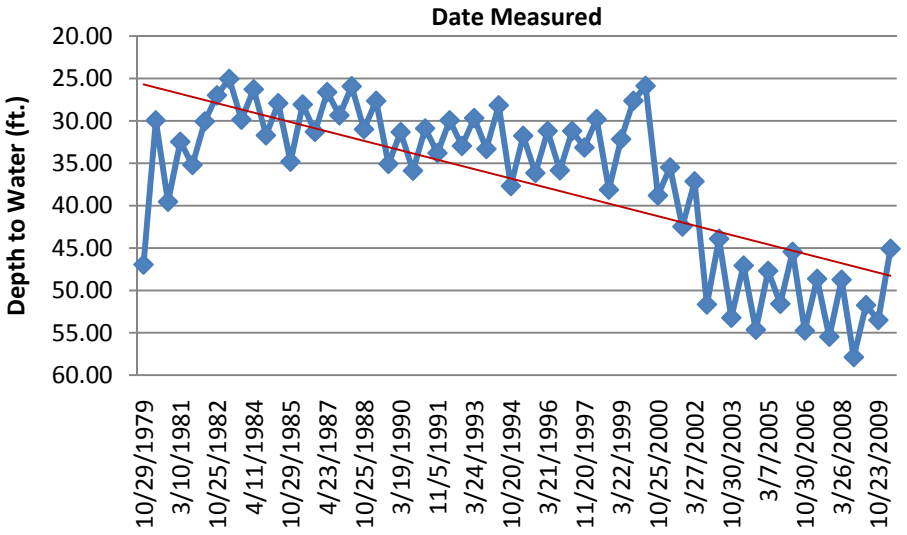
## 4 West of Lodgepole




Sidney Area Hydrograph Locations
14N 50W 20BAB
14N 50W 27CCBC
14N 50W 35CCC
13N 50W 5DBB
13N 51W 10AAB
13N 51W 19DDD
Sidney
Feet
6.46 - 7.82
5.08 - 6.45
3.71 - 5.07
2.34 - 3.70
0 - 2.33
0 - -0.39
-0.40 - -1.76
-1.77 - -3.15
One Year Wells

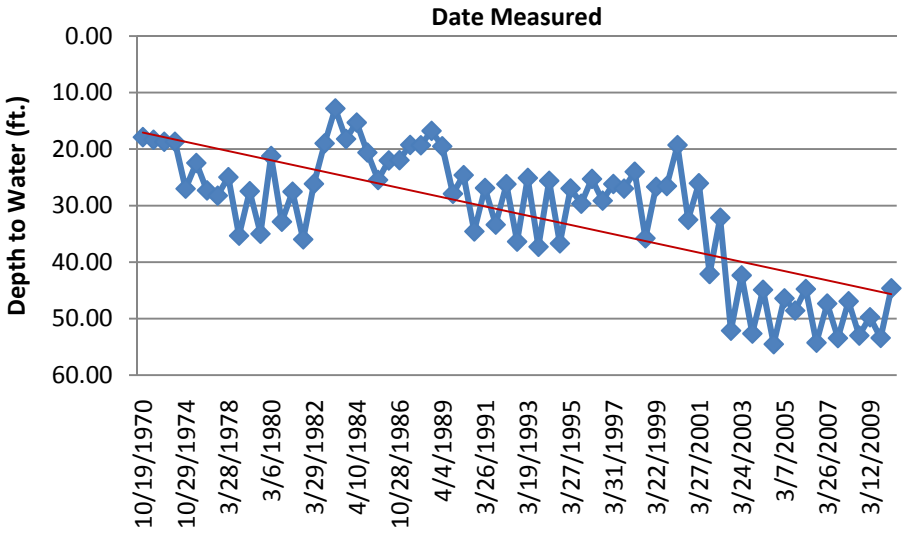
## 14N 50W 20BAB

### 5 West 2 North of Sidney



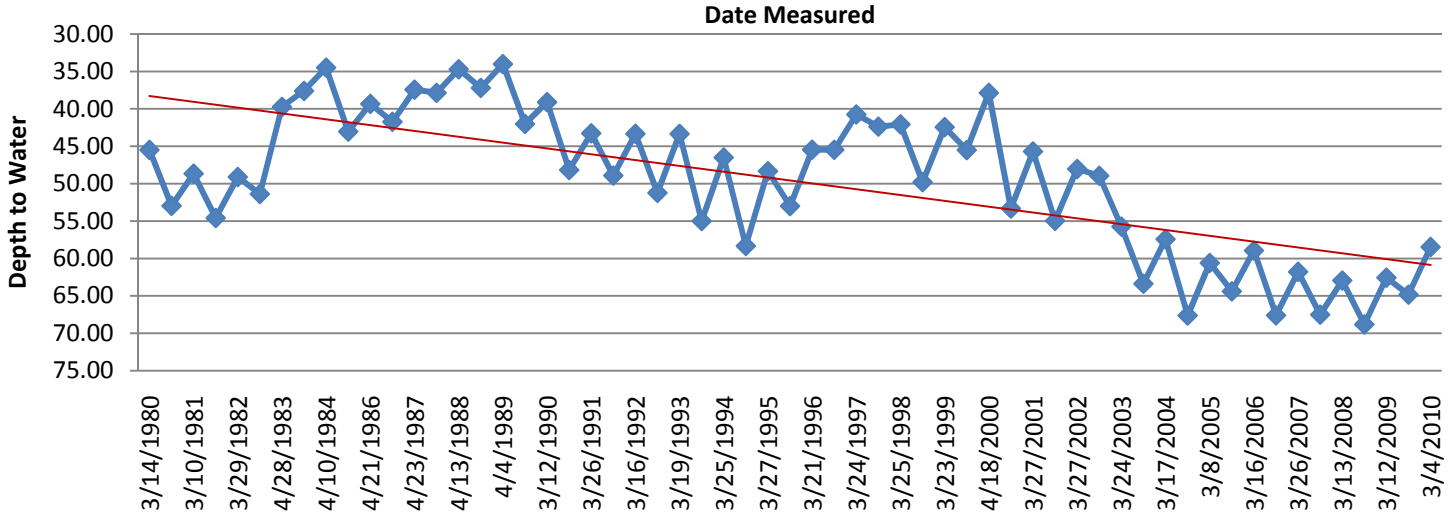

## 14N 50W 27CCBC

### 3 West of Sidney



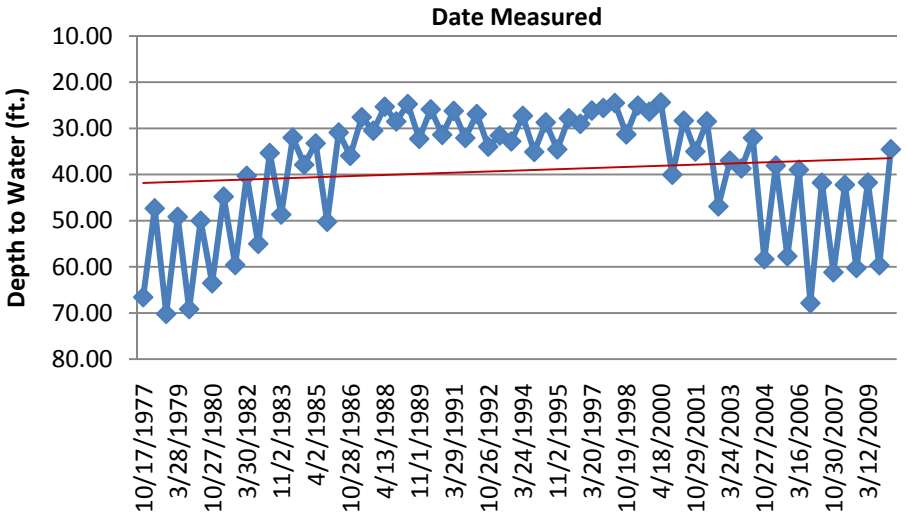

## 14N 50W 35CC

### 1.5 West of Sidney



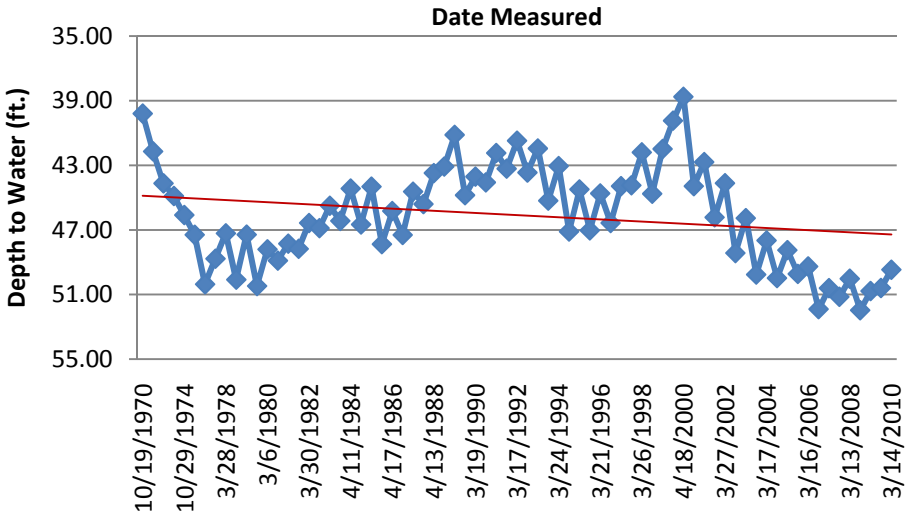
## 13N 51W 19DDD

### 4 South 11West of Sidney



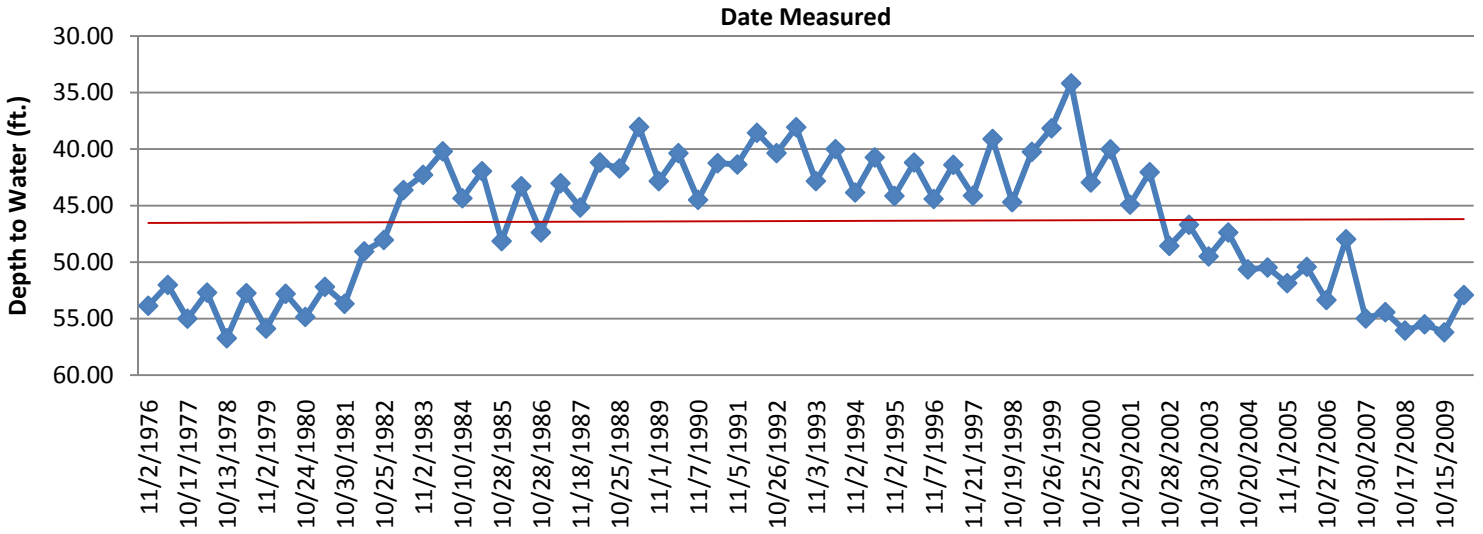

## 13N 51W 10AAB

### 1 South 8 West of Sidney

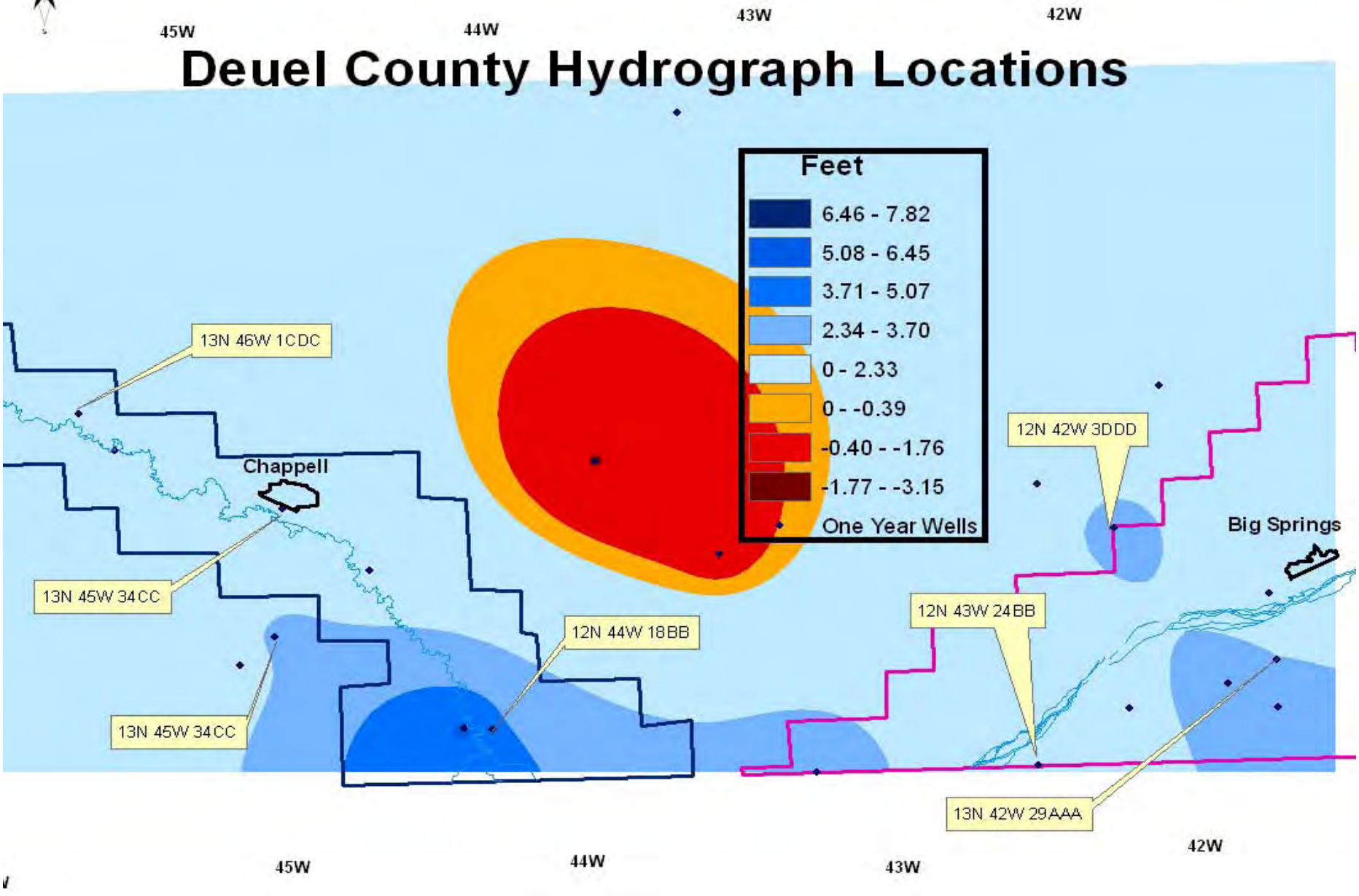



## 13N 50W 5DBB

### 4.5 West of Sidney

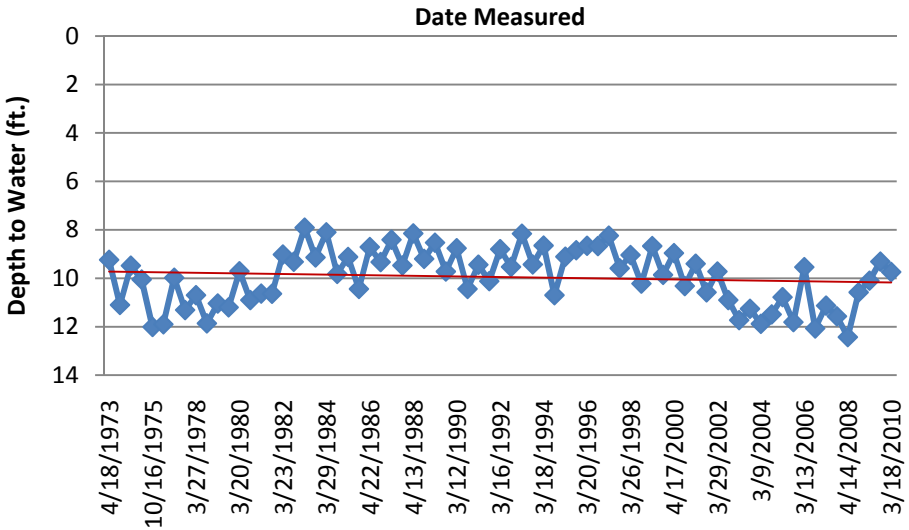


# Deuel County Hydrograph Locations



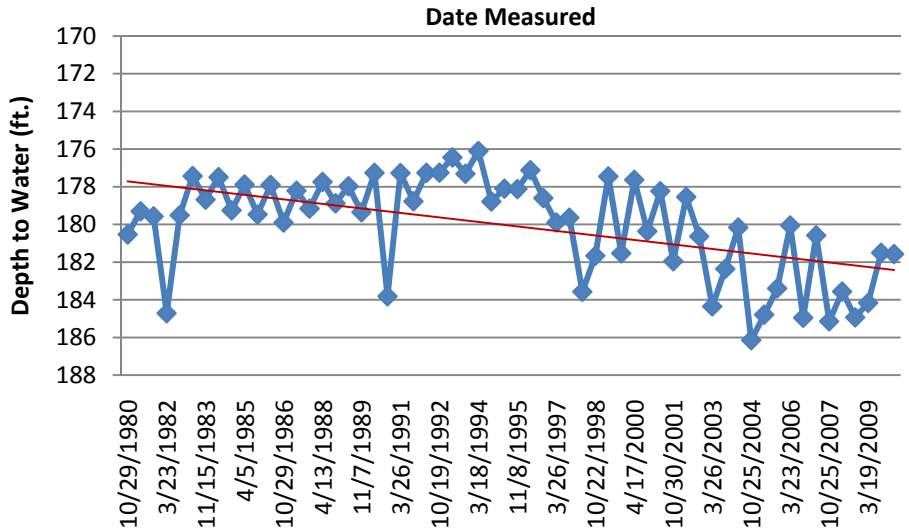
## 13N 46W 1CDC

### 2 North 4 West of Chappell




## 13N 45W 34CC

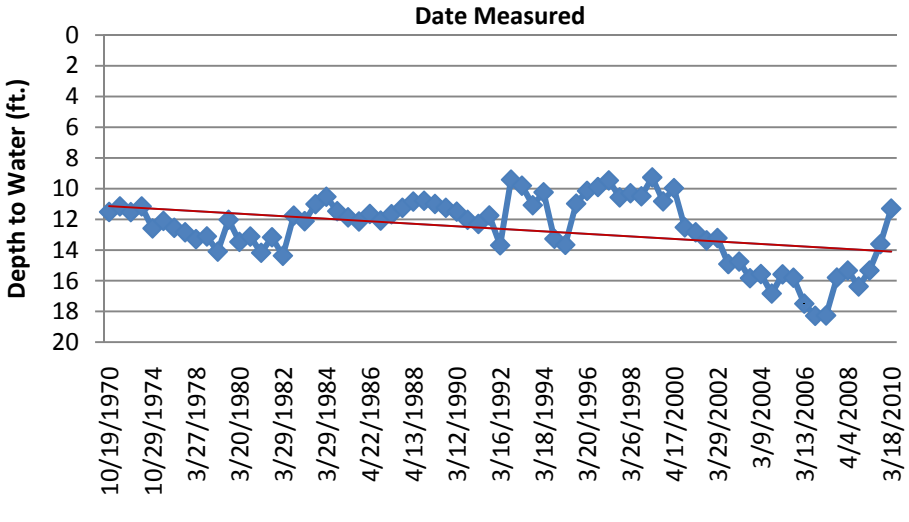
### 3 South of Chappell





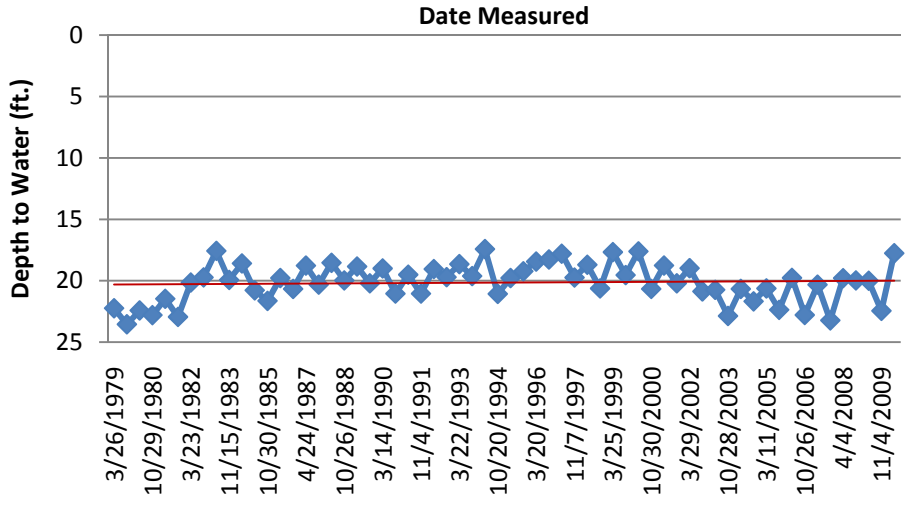

## 12N 44W 18BB

### 1 North of CO/NE State Line



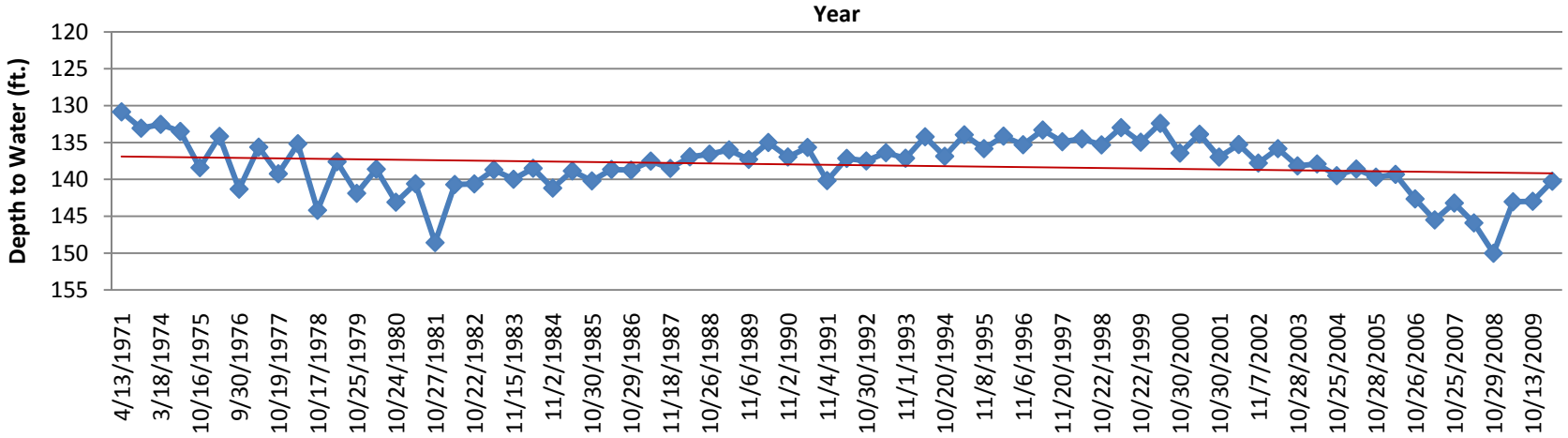

## 13N 45W 22BAB

### in Chappell by viaduct



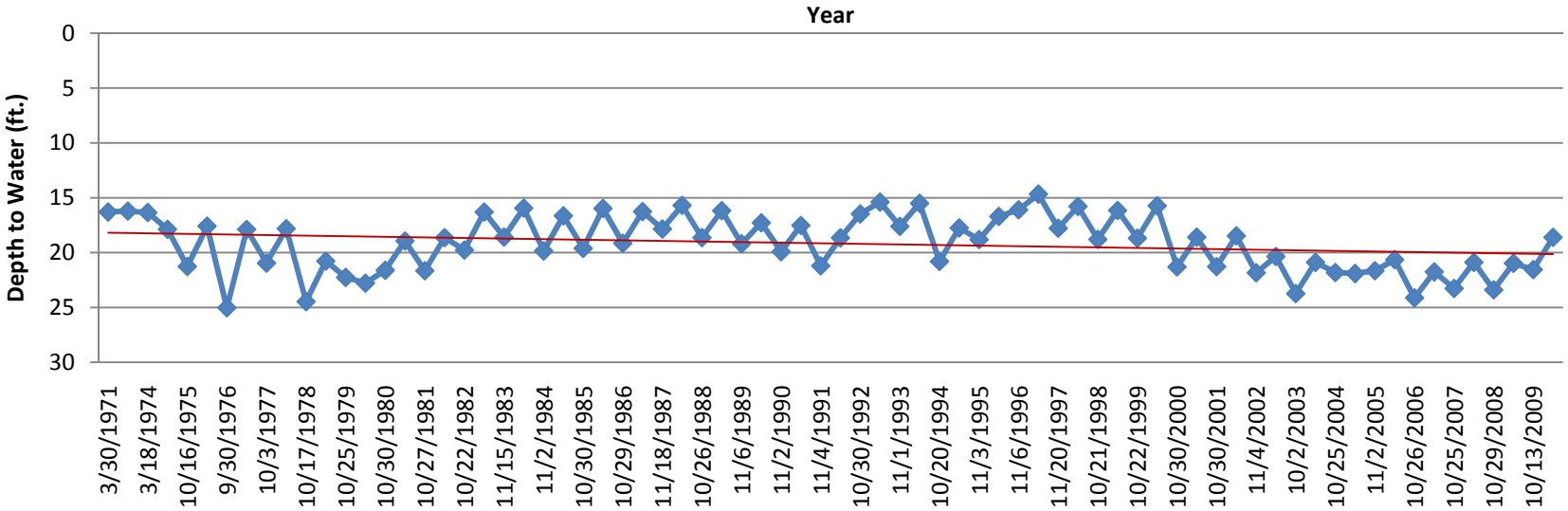
# 13N 42W 29AAA

## 4 West 1 North of Big Springs




# 12N 42W 3DDD

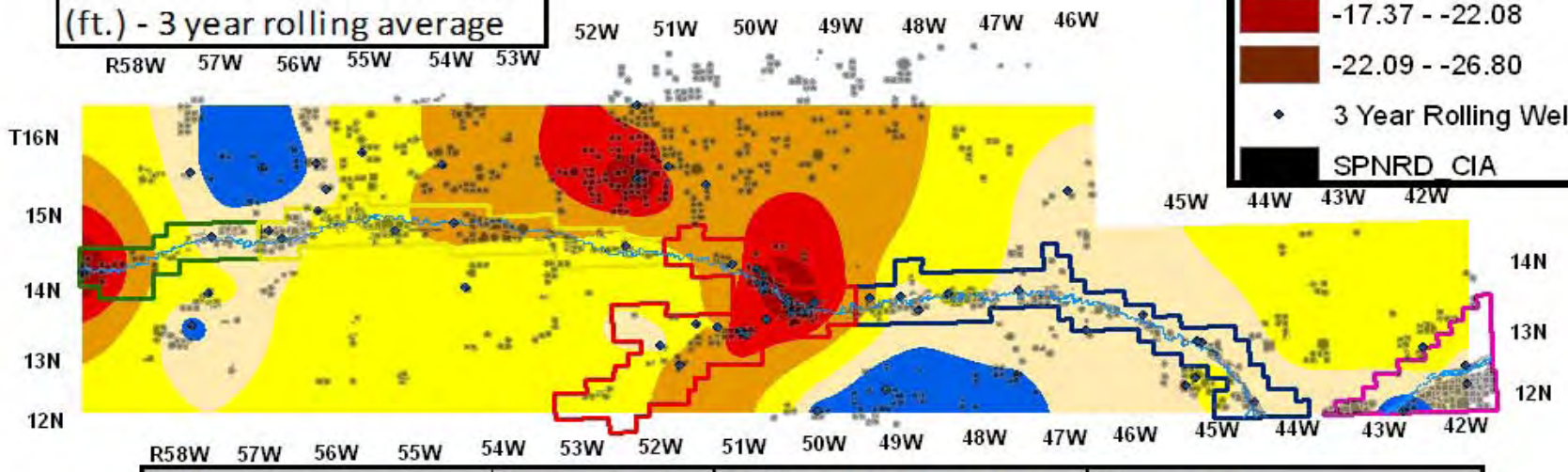
## 2 South 1 West of Big Springs



SOUTH PLATTE
NATURAL RESOURCES DISTRICT

# SPNRD 3 Year Rolling Averages

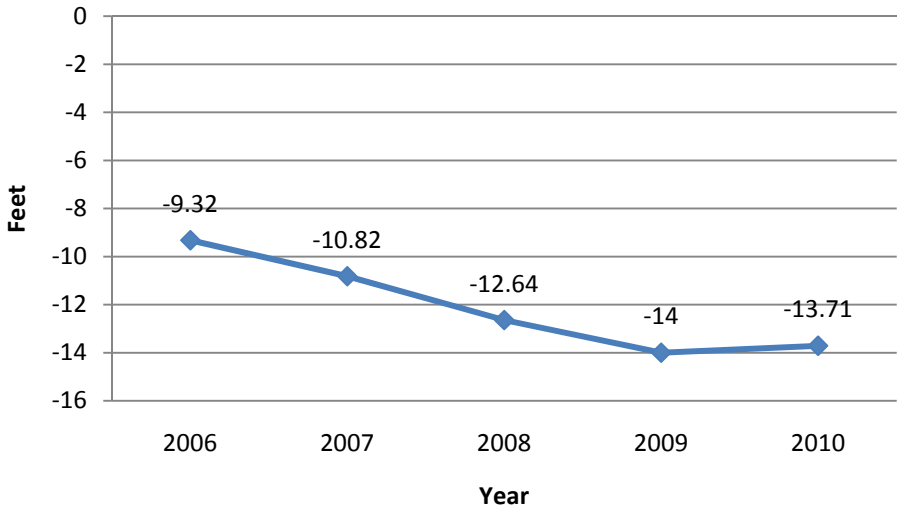
Average difference between 1988-1997 groundwater level averages and 2008-2010 groundwater level averages (ft.) - 3 year rolling average



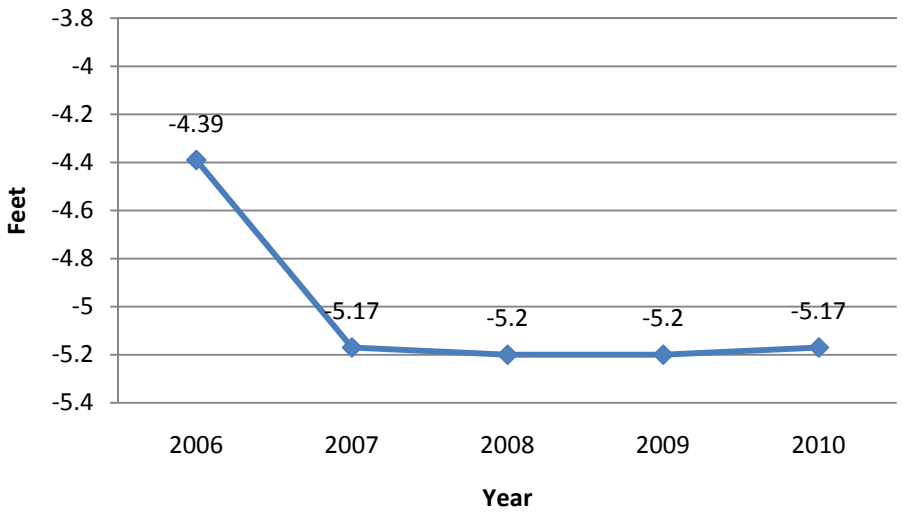

| Subarea | # of Wells | 3 Year Rolling Ave | Allocation |
|---|---|---|---|
| Pine Bluffs to Oliver | 2 | -13.71 | 14"/year, 42" over 3 years |
| Oliver to Buffalo Bend | 6 | -5.17 | 16"/year, 48" over 3 years |
| Buffalo Bend to Sidney | 19 | -15.88 | 14"/year, 42" over 3 years |
| Sidney to CO | 9 | -2.72 | 16"/year, 48" over 3 years |
| SPV | 4 | -2.42 | 20"/year, 80" over 4 years |
| Fully Appropriated | 20 | -3.82 | 20"/year, 80" over 4 years |

# Comparison of 3 Year Rolling Averages

## Pine Bluffs to Oliver Reservoir

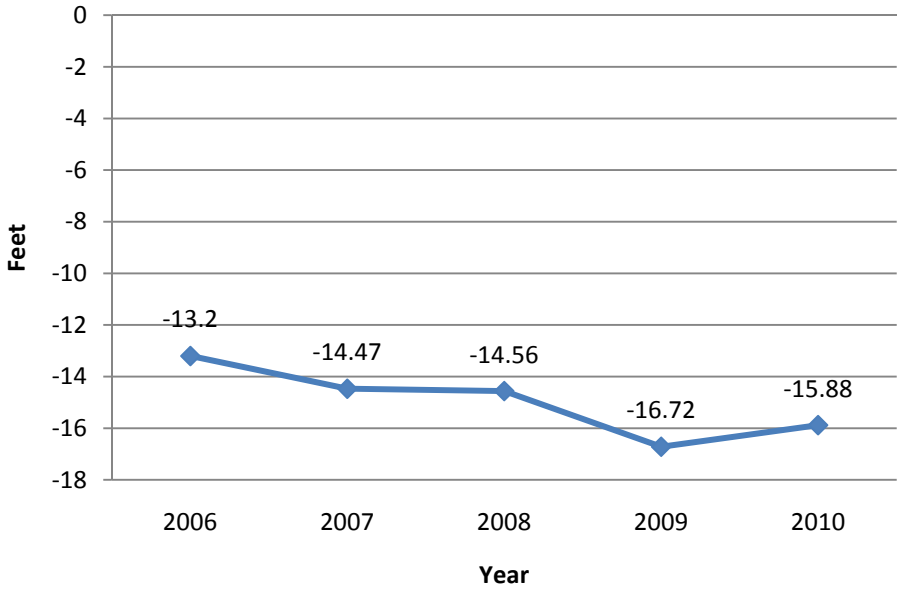



## Oliver Reservoir to Buffalo Bend

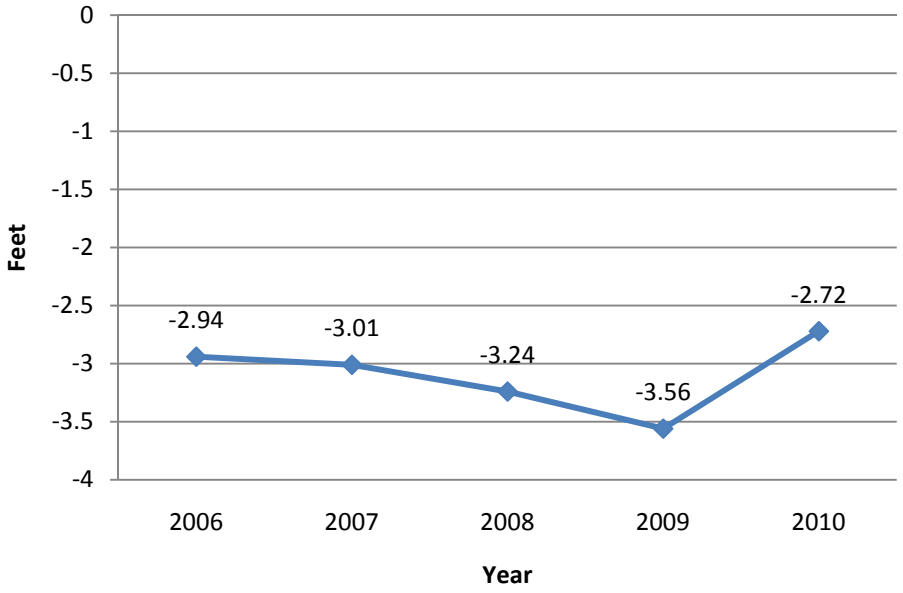




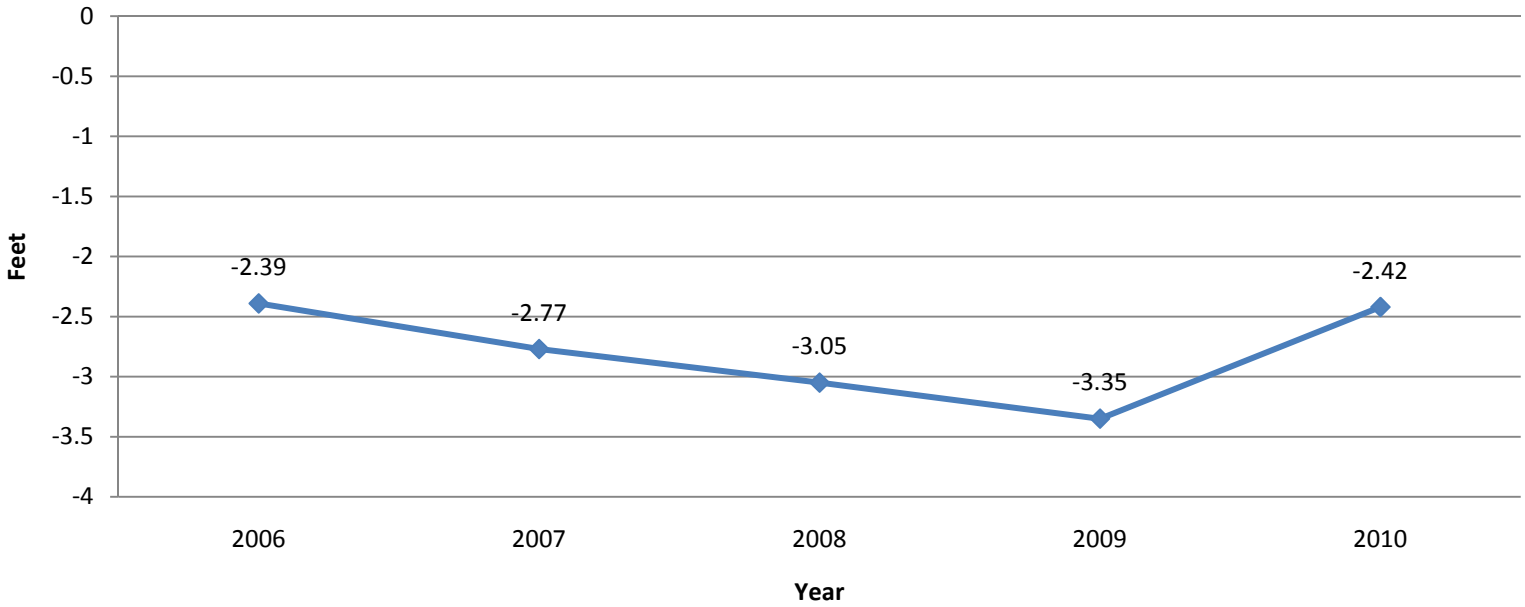

## Buffalo Bend to Sidney




## Sidney to Colorado



## South Platte Valley




## Fully Appropriated