Idaho Department of Water Resources
Open-File Report

Summary of Ground Water Conditions in the Curlew Valley Critical Ground Water Area

2012 Update

By
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Introduction

The Idaho Department of Water Resources maintains a ground water level monitoring network in the Curlew Valley, Idaho. The monitoring network currently consists of 12 wells that are measured on a semi-annual basis (Figure 1). The purpose of the ground water monitoring program is to observe water levels within the Curlew Valley Critical Ground Water Area (CGWA). The CWGA was designated on March 15, 1976. Designation was based on concern that there was insufficient ground water to provide a reasonably safe supply for existing irrigation uses or to fulfill pending applications and permits.

No further studies have been conducted since designation of the CGWA to determine adequacy of supply or impacts on spring flows. However, several reports exist that summarize the ground water conditions in the Curlew Valley (Bendixsen, 1994; IDWR, 1976; Baker, 1974; Chapman and Young, 1972; Bolke and Price, 1969; Nace, 1952; and Thompson and Farris, 1932). A management plan has not been developed for the area, nor has an advisory committee been formed. Currently, data from this monitoring network provides the primary source of information for the management of the ground water resource in this area.

Purpose and Scope

The purpose of this report is to provide an updated summary of the status of the ground water monitoring network and to present water level data collected over the network's history.

Status of the Monitoring Network

Monitoring data exists dating back to 1931 (Table 1). Data for approximately half of the wells in the historic network consists of a relatively short period of record, or contain a few sporadic measurements over a longer period of record. Wells included in the historic network that are no longer being monitored have been dropped from the network due to access restrictions or poor data quality (i.e., unreliable measurements).

Data for the active wells consists of semi-annual measurements from 1999 through 2012, with the exception of two wells. These wells, 16S32E-27DAB1 and 15S32E-09AAA2, have been monitored on a semi-annual basis since 1969. Water level data for the current monitoring network are presented in Appendix A.

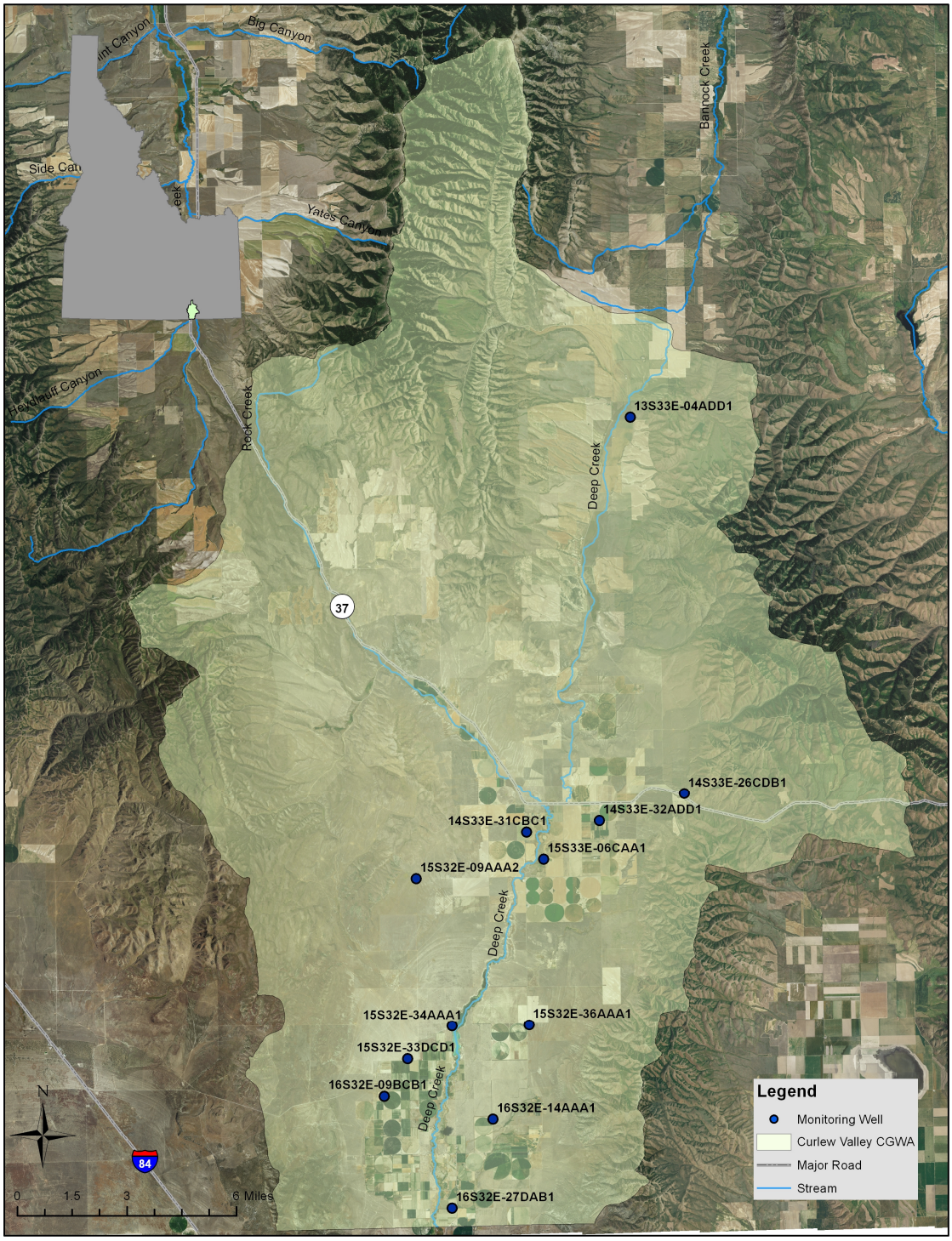

Figure 1. Current (2012) Curlew Valley Ground Water Level Monitoring Network.

Table 1. Summary of Ground Water Monitoring Network for the Curlew Valley CGWA.

Well ID	Period of Water Level Record	Status of the well	Comments
12S33E23DBB1	1987-1988	Inactive	Dropped from network after one year of data collection.
12S33E27CDC1	1987-1988	Inactive	Dropped from network after one year of data collection.
13S33E04ADD1	1947-2012	Active	Well currently being measured as part of the monitoring network.
14S33E16BBB1	1947-2008	Inactive	Dropped from network in 2008 due to access restrictions.
14S33E26CDB1	1947-2012	Active	Semi-annual measurements began on this well in 1999.
14S33E31ABC1	1941-1950	Inactive	Well with 32 measurements collected by the USGS and dropped in 1950.
14S33E31ACC1	1967-2000	Inactive	Well with 5 historical measurements collected by the USGS.
14S33E31CBC1	1970-2012	Active	Semi-annual measurements began on this well in 1999.
14S33E32ADD1	1969-2012	Active	Semi-annual measurements began on this well in 1999.
14S34E31DBD1	1947-1956	Inactive	Well with 20 measurements collected by the USGS.
15S32E09AAA2	1969-2012	Active	Detailed record with 93 measurements collected by the USGS. IDWR began measurements in 2009.
15S32E26AAC1	1931-1970	Inactive	Six measurements collected by the USGS.
15S32E33DCD1	1969-2012	Active	Semi-annual measurements began on this well in 1999.
15S32E34AAA1	1969-2012	Active	Semi-annual measurements began on this well in 1999.
15S32E36AAA1	1959-2012	Active	Semi-annual measurements began on this well in 1999.
15S33E06CAA1	1969-2012	Active	Semi-annual measurements began on this well in 1999.
15S33E21CCC1	1931-2000	Inactive	Six measurements collected by the USGS and IDWR.
15S34E06ABB1	1947-1962	Inactive	Twenty water levels collected by the USGS.
16S32E09BCB1	1969-2012	Active	Semi-annual measurements began on this well in 1999.
16S32E14AAA1	1969-2012	Active	Semi-annual measurements began on this well in 1999.
16S32E27DAB1	1969-2012	Active	Detailed record of 92 measurements collected by the USGS. IDWR began measurements in 2009.
16S33E36AAA1	1955-1998	Inactive	IDWR collected 68 measurements prior to dropping it from the network in 1998.
16S33E36AAA2	1935-1998	Inactive	IDWR collected 88 measurements prior to dropping it from the network in 1998.

Summary of Water Level Data

A review of the data from the wells included in the current monitoring network was conducted to evaluate seasonal water level fluctuations, determine trends, and establish short and long-term changes. Analyses of the data from wells in the historic monitoring network were not conducted. The review of the data indicates 10 of the 12 currently monitored wells display similar patterns in water level changes and seasonal fluctuations.

General Water Level Elevation Analysis

A water table contour map was produced (Figure 2) to determine the general ground water flow direction, and to investigate the potential for multiple aquifers.

The contour map indicates a general north to south flow direction, based on the water level measurements collected in November of 2011. The relatively smooth and evenly spaced water level contours suggest that all of the wells in the monitoring network are completed into the same aquifer system. There are two minor deviations from the overall north to south flow paths that exist near the two most densely populated agricultural areas of the valley. These deviations are consistent with localized impacts from pumping.

Overall Water Level Changes

To evaluate the current conditions of the aquifer, an analysis of water levels was conducted that included determining the differences between the historic water levels and current water levels. Water levels in the spring of 2012 were lower than water levels measured in the spring of 1970 in all but two of the currently monitored wells in the network. The two wells that show an increase in water levels (13S33E-04ADD1 and 14S33E-26CDB1) are the two northern-most wells in the network. These two wells experienced water level increases of 6.3 and 9.9 feet, respectively. The remaining wells in the network experienced water level declines ranging from 1.1 to 26.3 feet. The water level differences between the spring of 1970 to the spring of 2012 are listed in Table 2 and are mapped in Figure 3. Figure 3 indicates that water level declines have been most significant near the agricultural areas.

Recent Water Level Changes

An analysis of the more detailed data collected over the past 10 years was conducted to evaluate any recent changes in water levels. All 12 of the wells in the current network experienced water level declines over the past 10 years. The declines range from 0.4 to 12.4 feet (Figure 4).

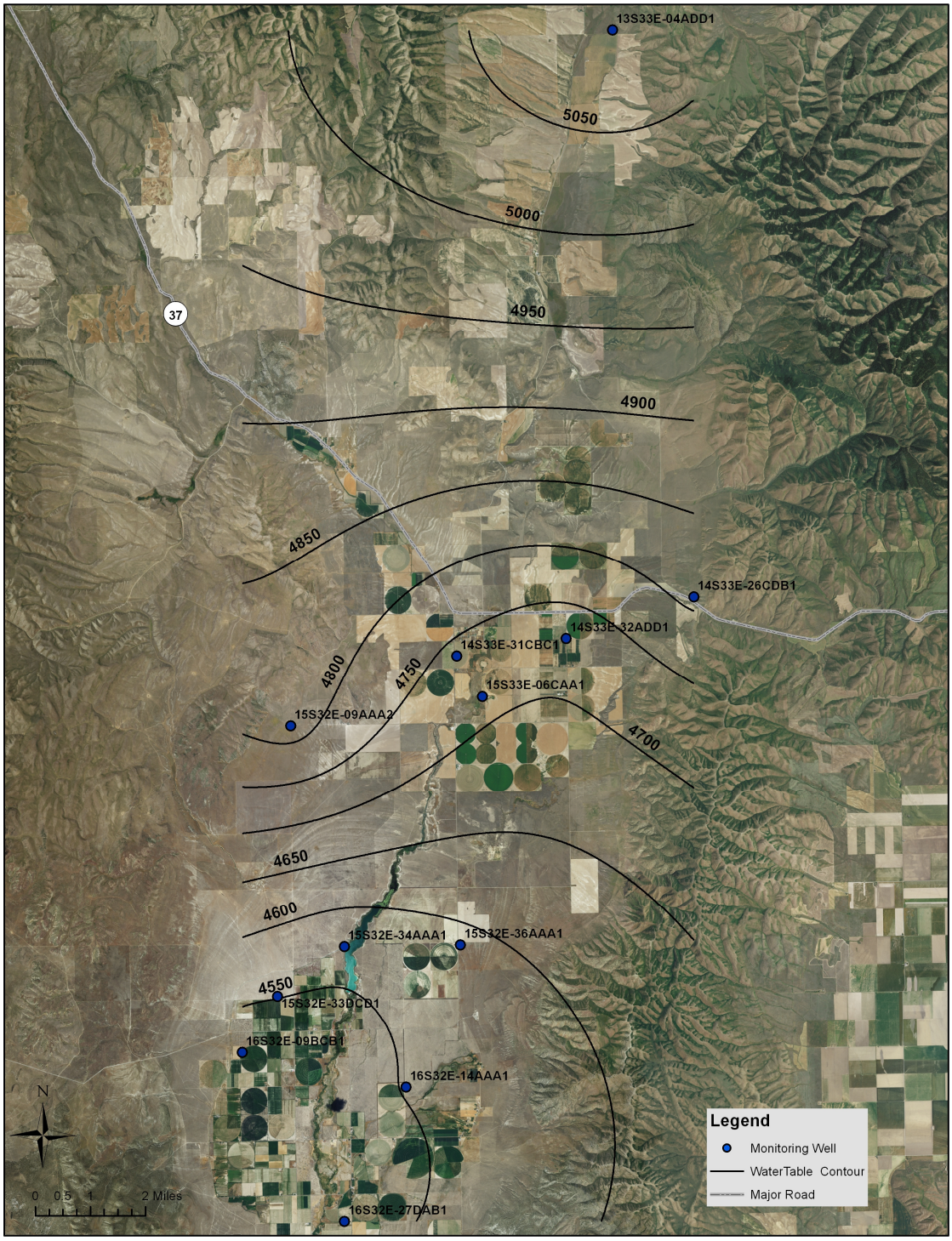

Figure 2. Water table elevation map for November 2011.

Table 2. Summary of water level changes for wells in the current monitoring network.

Well Number	Maximum Seasonal Fluctuation (feet)[1]	Minimum Seasonal Fluctuation (feet)[1]	Average Seasonal Fluctuation (feet)[1]	10-YR Water Level Change (feet)[2]	Long-term Water Level Change (feet)[3]
13S33E-04ADD1	9.7	0.0	1.1	Decline of 1.2	Rise of 6.3
14S33E-26CDB1	17.9	0.1	2.9	Decline of 6.7	Rise of 9.9
14S33E-31CBC1	22.1	0.8	8.1	Decline of 6.4	Decline of 15.6
14S33E-32ADD1	7.3	1.7	3.9	Decline of 12.4	Decline of 16.6
15S32E-09AAA2	5.3	0.0	1.0	Decline of 2.5	Decline of 7.2
15S32E-33DCD1	5.6	1.0	3.8	Decline of 4.8	Decline of 14.4
15S32E-34AAA1	14.5	2.0	8.2	Decline of 4.4	Decline of 7.4
15S32E-36AAA1	35.3	0.0	10.0	Decline of 0.4	Decline of 3.9
15S33E-06CAA1	24.9	1.0	10.9	Decline of 11.6	Decline of 26.3
16S32E-09BCB1	7.4	1.6	4.7	Decline of 5.7	Decline of 20.3
16S32E-14AAA1	15.1	0.2	5.7	Decline of 2.4	Decline of 1.1
16S32E-27DAB1	25.6	0.1	8.8	Decline of 1.3	Decline of 8.1

1. Seasonal fluctuations represent the difference in two consecutive semi-annual measurements (spring elevation minus fall elevation).
2. 10-Year water level changes represent the difference between the 2012 and 2002 spring measurements.
3. The long-term water level change represents the difference between the 2012 and 1970 spring measurements, with exception of 2 wells, 14S33E-32ADD1 and 13S33E-04ADD1, in which long term changes were determined using the difference between the 2011 and 1969 fall measurements.

On average, water levels in the Curlew Valley area have declined 4.9 feet in the past 10 years, resulting in an average decline of 0.49 feet/year. These declines are apparent in all of the monitoring wells in the current network, indicating the water level decline is a regional phenomenon. Considering that the majority of the historic water levels were also higher in the 1970's than now, it appears that the aquifer has yet to reach equilibrium.

Seasonal Fluctuations

Seasonal responses to aquifer pumping and recharge are apparent in the hydrographs for each well. In general, the hydrographs show similar responses to pumping and recharge events (Figure 4). The maximum, minimum, and average seasonal fluctuations for each well were determined by finding the difference between the semi-annual (fall and spring) measurements (Table 2). The maximum seasonal fluctuation between March of 2009 and October of 2009 was experienced by well 15S32E-36AAA1 (35.3 feet). Three wells (13S33E-04ADD1, 15S32E-09AAA2, and 15S32E-36AAA1) indicate a few anomalous years in which seasonal fluctuations were not measurable, but in general, all of the wells show some degree of seasonal fluctuation, with an average decline between spring and fall of approximately 6 feet.

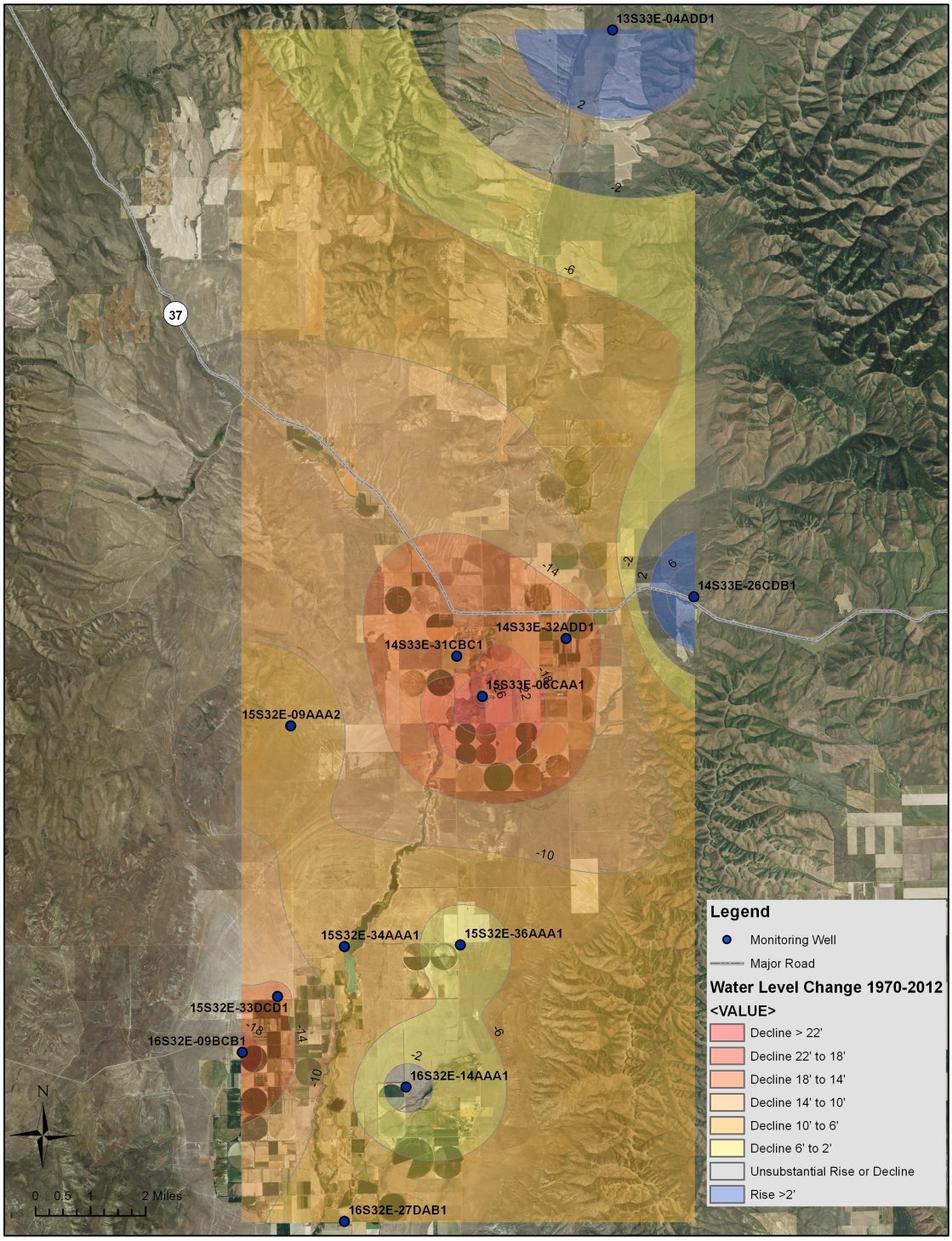

Figure 3. Water level change map for spring 1970 through spring 2012.

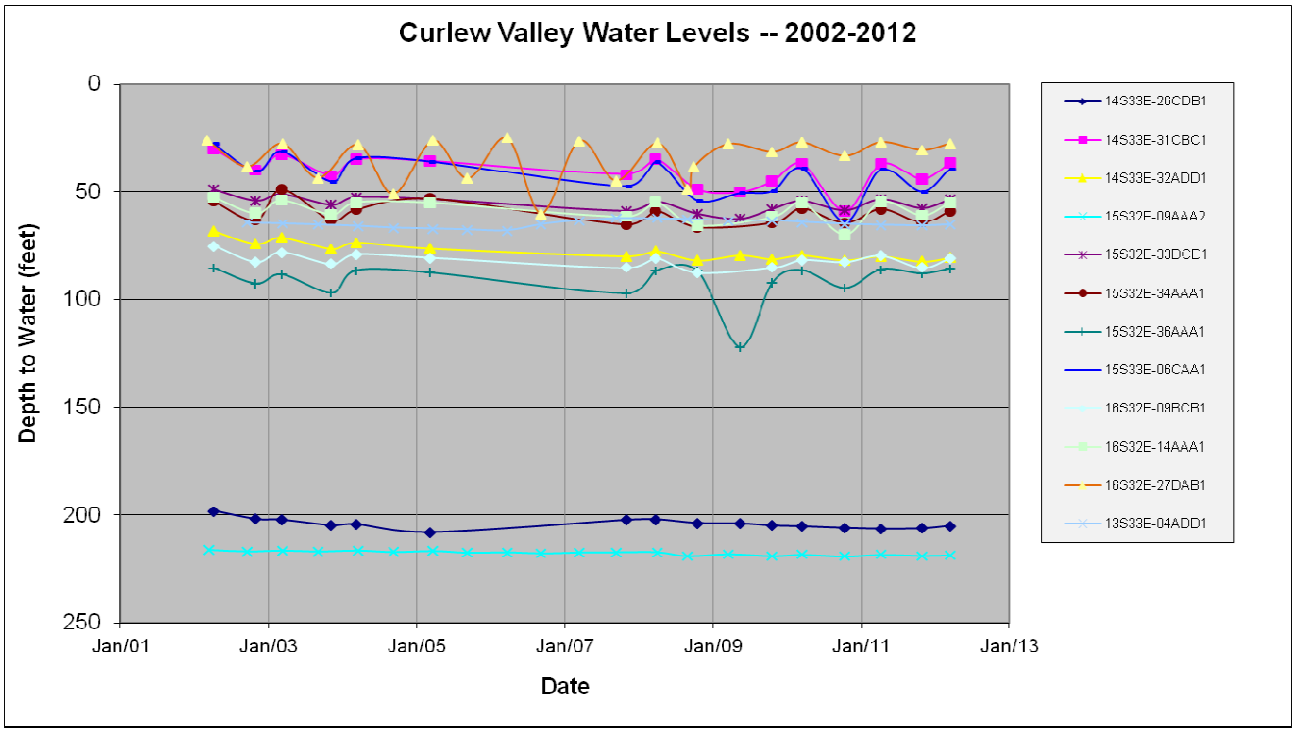

Figure 4. Water levels for previous 10 years.

Conclusions and Recommendations

Over the past 10 years, water levels have declined at an average rate of 0.49 feet per year, more than double the long-term (1970-2012) average decline of 0.22 feet/year. The most significant declines have occurred near irrigated lands in the central and south-western portions of the valley.

Currently, only one well exists in the northern half of the Curlew Valley CGWA boundary. It is recommended that at least one more well be incorporated into the northern portion of the monitoring network. In addition, installing data loggers in a few of the monitoring wells would provide more detailed information with respect to the seasonal responses of the aquifer.

References

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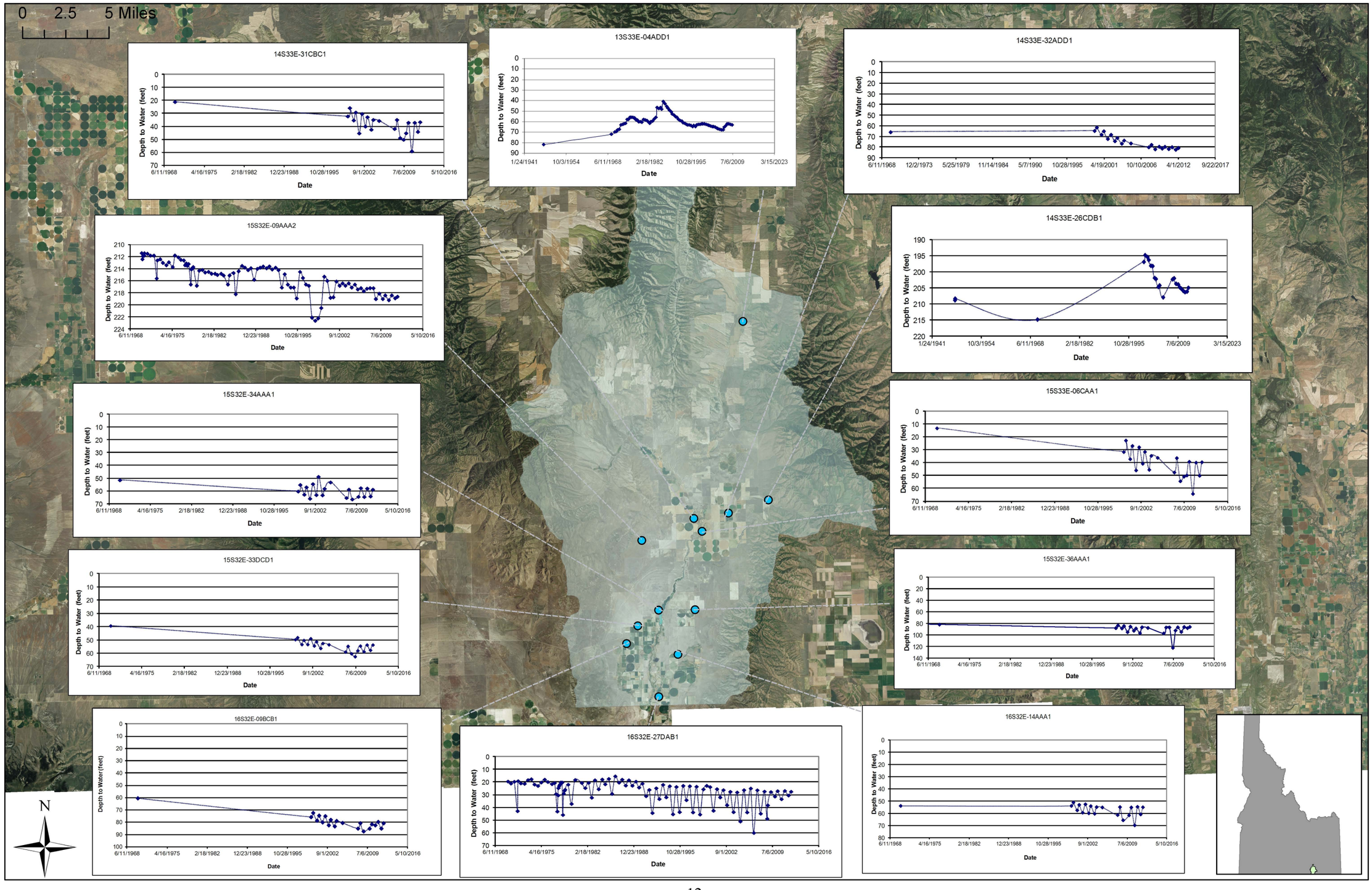
APPENDIX A

HYDROGRAPHS


0 2.5 5 Miles
14S33E-31CBC1
Depth to Water (feet)
Date
13S33E-04ADD1
14S33E-32ADD1
15S32E-09AAA2
14S33E-26CDB1
15S32E-34AAA1
15S33E-06CAA1
15S32E-33DCD1
15S32E-36AAA1
16S32E-09BCB1
16S32E-27DAB1
16S32E-14AAA1
N