

TO: Board of Supervisors

FROM: Scott De Leon, Director
by Tom Smythe, Water Resources Engineer

SUBJECT: Groundwater Conditions
Late January 2014

DATE: February 13, 2014

Due to the current drought conditions, staff measured 83 water wells in the major groundwater basins between January 23 and 27, 2014. These are the wells that are normally measured in April and October of each year to assess groundwater conditions. Based on the current measurements, conditions within each groundwater basin are summarized. These summaries are general statements and due to varying aquifer conditions do not cover all conditions. Individual well owners may experience conditions substantially different than the general condition (some of our wells show markedly different conditions than other nearby wells) and problems are more likely with shallow wells.

Attached are maps of each major groundwater basin showing the wells measured. Each well is labeled as follows:

- Well Number: This is a number assigned by the State, for instance 14N-09W-32M1. The well number identifies the well by Township, Range, Section number and by lot within the section (there are 16 lots).
- S Avg: This is the average spring (April) water level, typically the highest of the year. Most wells were measured since the early or mid-1960's, however, some wells have data going back to the late 1940's and new wells have been added to the network. The long record can document changes in the physical groundwater condition (i.e. downcut stream channels lower the maximum possible groundwater level), changes in irrigation practices (i.e. changes in crop types and irrigation demands), and seasonal impacts (i.e. droughts).
- F Avg: This is the average fall (October) water level, typically the lowest of the year.
- Jan 14: This is the water level measured during the period of January 23 to 27, 2014. If no number is provided, this indicates we were unable to measure the well for some reason (i.e., the pump house was locked).

These maps only tell part of the story of each groundwater basin, as long term groundwater conditions due to changing water use and aquifer conditions can have a substantial effect the average spring and fall levels. Conditions are also different within different areas within a basin. We evaluated numerous hydrographs (plots of groundwater levels over time) within each basin to prepare the following summary. Some example hydrographs are attached.

Big Valley

Big Valley is the largest groundwater basin and the most complicated due to its geology (there are numerous aquifers, some of which have limited connection to adjacent aquifers), recharge characteristics (there are multiple sources of recharge) and differing land use and groundwater use patterns. From the maps, it looked like most of the basin had better than expected groundwater levels, however, after reviewing the hydrographs, we have identified some definite problem areas.

Wight Way: We have measurements on two wells along Wight Way. We do not anticipate problems with these wells, as records indicate lower groundwater levels in the 1960's (10-15 ft difference) than currently, probably due to higher irrigation demand at that time. Newer wells that may not be as deep could experience problems. Hydrograph 13N-09W-28J2 was felt to be most representative of the area.

Kelseyville Bench/Gold Dust Drive: This area is served by a deep aquifer of volcanic ash. Groundwater is showing a several year decline. Recharge of this aquifer is from runoff over the exposed ash layer, which is very limited in extent and in drought conditions gets very little recharge. The decline will continue, but it appears that groundwater levels will be above the levels experienced in the early 1990's. Hydrograph 13N-09W-22F1 was felt to be most representative of the area.

Western Valley Floor: This is the main portion of the valley floor to the west of Kelsey Creek including areas along McGaugh Slough, Adobe Creek and Manning Creek. There has been very little recovery (increase) in groundwater levels since our October 2013 measurement. Many water levels are above the average fall level, as groundwater demands have decreased (probably due to the reduction of pear orchards and increase in vineyards). Fall 2014 water levels will probably be the lowest in the last decade, but in most cases be higher than those experienced during the 1976-77 and 1987-1992 droughts. Hydrographs 13N-09W-10E1, 13N-09W-16E2, 13N-09W-07A3 and 14N-09W-32G2 were felt to be most representative of the area.

Eastern and Northeastern Valley Floor: This is the area east of Kelsey Creek and north of Soda Bay Road east of Lakeside County Park. This area appears to be the most severely impacted area in Big Valley, with almost no recovery evident from Fall 2013. The most recent measurement of one well is at an all time low since 1960. This area could be severely impacted with low groundwater levels this summer. Hydrographs 13N-09W-02C2 and 13N-09W-12M2 were felt to be most representative of the area.

TO: Board of Supervisors

FROM: Scott De Leon, Director
by Tom Smythe, Water Resources Engineer

SUBJECT: Groundwater Conditions
Spring 2014

DATE: April 10, 2014

Due to the current drought conditions, staff measured 83 water wells in the major groundwater basins between January 23 and 27, 2014. These are the wells that are normally measured in April and October of each year to assess groundwater conditions. The status of groundwater levels based on these measurements was provided to the Board in February 2014.

We measured these wells again at the end of March and beginning of April. Based on the current measurements, conditions within each groundwater basin are summarized. These summaries are general statements and due to varying aquifer conditions do not cover all conditions. Individual well owners may experience conditions substantially different than the general condition (some of our wells show markedly different conditions than other nearby wells) and problems are more likely with shallow wells.

Attached are maps of each major groundwater basin showing the wells measured. Each well is labeled as follows:

- Well Number: This is a number assigned by the State, for instance 14N-09W-32M1. The well number identifies the well by Township, Range, Section number and by lot within the section (there are 16 lots).
- S Avg: This is the average spring (April) water level, typically the highest of the year. Most wells were measured since the early or mid-1960's, however, some wells have data going back to the late 1940's and new wells have been added to the network. The long record can document changes in the physical groundwater condition (i.e. down cut stream channels lower the maximum possible groundwater level), changes in irrigation practices (i.e. changes in crop types and irrigation demands), and seasonal impacts (i.e. droughts).
- F Avg: This is the average fall (October) water level, typically the lowest of the year.
- Sprg 14: This is the water level measured during the period of March 24 through April 3, 2014. If no number is provided, this indicates we were unable to measure the well for some reason (i.e., the pump house was locked).

These maps only tell part of the story of each groundwater basin, as long term groundwater conditions due to changing water use and aquifer conditions can have a substantial effect the average spring and fall levels. Conditions are also different within different areas within a basin. We evaluated numerous hydrographs (plots of groundwater levels over time) within each basin to prepare the following summary. Well hydrographs are available on the Lake County Water Resources website under Drought Information at:

http://www.co.lake.ca.us/Government/Directory/Water_Resources/Drought_Information.htm).

Big Valley

Big Valley is the largest groundwater basin and the most complicated due to its geology (there

are numerous aquifers, some of which have limited connection to adjacent aquifers), recharge characteristics (there are multiple sources of recharge) and differing land use and groundwater use patterns. From the maps, it looked like most of the basin has decent groundwater levels, considering the severity of the current drought.

Wight Way: We have measurements on three wells along Wight Way. The westernmost well was pumping at the time of measurements, so it does not accurately represent the true conditions of the aquifer. We do not anticipate problems with these wells, as records indicate lower groundwater levels in the 1960's (10-15 ft. difference) than currently, probably due to higher irrigation demand at that time. Newer wells that may not be as deep could experience problems. Hydrograph 13N-09W-28J2 was felt to be most representative of the area.

Kelseyville Bench/Gold Dust Drive: This area is served by a deep aquifer of volcanic ash. Groundwater is showing a several year decline. Recharge of this aquifer is from runoff over the exposed ash layer, which is very limited in extent and in drought conditions gets very little recharge. The decline will continue, but it appears that groundwater levels will be above the levels experienced in the early 1990's. Hydrograph 13N-09W-22M1 was felt to be most representative of the area.

Western Valley Floor: This is the main portion of the valley floor to the west of Kelsey creek including areas along McGaugh Slough, Adobe Creek and Manning Creek. There has been very little recovery (increase) in groundwater levels since our October 2013 measurement. Runoff from Adobe and Manning Creeks was limited in February and March, but did help increase overall groundwater levels, although they still remain 5-10 feet below the spring average. Fall 2014 water levels will probably be the lowest in the last decade, but in most cases be higher than those experienced during the 1976-77 and 1987-1992 droughts. Hydrographs 13N-09W-10E1, 13N-09W-16E2, 13N-09W-07A3 and 14N-09W-32G2 were felt to be most representative of the area.

Eastern and Northeastern Valley Floor: This is the area east of Kelsey Creek and north of Soda Bay Road east of Lakeside County Park. Flows from Kelsey Creek for most of February and March have helped groundwater levels recover. Current levels are 3-5 feet below average for spring. Severe water shortages are no longer anticipated. Hydrographs 13N-09W-02C2 and 13N-09W-12M2 were felt to be most representative of the area.

TO: Board of Supervisors

FROM: Scott De Leon, Director
by Tom Smythe, Water Resources Engineer

SUBJECT: Groundwater Conditions
Fall 2014

DATE: November 24, 2014

Due to the current drought conditions, staff measured 83 water wells in the major groundwater basins between January 23 and 27, 2014. These are the wells that are normally measured in April and October of each year to assess groundwater conditions. The status of groundwater levels based on these measurements was provided to the Board in February 2014.

We measured these wells again between March 24 and April 3, 2014. Based on the spring measurements, conditions within each groundwater basin were summarized in our memorandum of April 10, 2014. While not a miracle, sufficient rains have fallen since early February to recharge most of the major groundwater basins sufficiently to provide adequate water supplies for 2014, however, some shortages may still occur, particularly with shallower wells.

We measured these wells again between September 30 and October 7, 2014. Based on the spring measurements, conditions within each groundwater basin are summarized. These summaries are general statements and due to varying aquifer conditions do not cover all conditions. Individual well owners may experience conditions substantially different than the general condition (some of our wells show markedly different conditions than other nearby wells) and problems are more likely with shallow wells.

Attached are maps of each major groundwater basin showing the wells measured. Each well is labeled as follows:

- Well Number: This is a number assigned by the State, for instance 14N-09W-32M1. The well number identifies the well by Township, Range, Section number and by lot within the section (there are 16 lots).
- S Avg: This is the average spring (April) water level, typically the highest of the year. Most wells were measured since the early or mid-1960's, however, some wells have data going back to the late 1940's and new wells have been added to the network. The long record can document changes in the physical groundwater condition (i.e. down cut stream channels lower the maximum possible groundwater level), changes in irrigation practices (i.e. changes in crop types and irrigation demands), and seasonal impacts (i.e. droughts).
- F Avg: This is the average fall (October) water level, typically the lowest of the year.
- F2014: This is the water level measured during the period of September 30 through October 7, 2014. If no number is provided, this indicates we were unable to measure the well for some reason (i.e., the pump house was locked).

These maps only tell part of the story of each groundwater basin, as long term groundwater conditions due to changing water use and aquifer conditions can have a substantial effect the average spring and fall levels. Conditions are also different within different areas within a basin. We evaluated numerous hydrographs (plots of groundwater levels over time) within each basin

to prepare the following summary. Well hydrographs are available on the Lake County Water Resources website under Drought Information at:

(http://www.co.lake.ca.us/Government/Directory/Water_Resources/Drought_Information.htm).

Big Valley

Big Valley is the largest groundwater basin and the most complicated due to its geology (there are numerous aquifers, some of which have limited connection to adjacent aquifers), recharge characteristics (there are multiple sources of recharge) and differing land use and groundwater use patterns. From the maps, it looked like most of the basin has decent groundwater levels, considering the severity of the current drought.

Wight Way: We have measurements on three wells along Wight Way. The westernmost well was at record low levels. The two wells near the center of Wight Way were within the normal range, primarily due to limited groundwater pumping in the area. Hydrograph 13N-09W-28J2 was felt to be most representative of the area.

Kelseyville Bench/Gold Dust Drive: This area is served by a deep aquifer of volcanic ash. Groundwater is showing a several year decline. Recharge of this aquifer is from runoff over the exposed ash layer, which is very limited in extent and in drought conditions gets very little recharge. Groundwater levels are near the record lows recorded in the 1987-1992 drought. Hydrograph 13N-09W-22M1 was felt to be most representative of the area.

Western Valley Floor: This is the main portion of the valley floor to the west of Kelsey Creek including areas along McGaugh Slough, Adobe Creek and Manning Creek. Most of the wells were within 3 feet of the average fall level, being generally above the average south of Highway 29 and below the average north of Highway 29. Given the dry conditions, water levels are significantly higher than we anticipated in the spring. Hydrographs 13N-09W-16E2, 13N-09W-07A3 and 14N-09W-32G2 were felt to be most representative of the area.

Eastern and Northeastern Valley Floor: This is the area east of Kelsey Creek and north of Soda Bay Road east of Lakeside County Park. Current levels are 3-5 feet below average for fall, with the exception of one well near the Gaddy Lane – Clark Drive intersection. Hydrographs 13N-09W-02C2 and 13N-09W-12M2 were felt to be most representative of the area.

TO: Board of Supervisors

FROM: Scott De Leon, Director
by Tom Smythe, Water Resources Engineer

SUBJECT: Groundwater Conditions
Spring 2015

DATE: March 30, 2015

Due to the current drought conditions, staff measured 83 water wells in the major groundwater basins between January 23 and 27, 2014. These are the wells that are normally measured in April and October of each year to assess groundwater conditions. The status of groundwater levels based on these measurements was provided to the Board in February 2014.

We measured these wells again between March 24 and April 3, 2014. Based on the spring measurements, conditions within each groundwater basin were summarized in our memorandum of April 10, 2014. While not a miracle, sufficient rains have fallen since early February to recharge most of the major groundwater basins sufficiently to provide adequate water supplies for 2014, however, some shortages may still occur, particularly with shallower wells.

We measured these wells again between September 30 and October 7, 2014. Groundwater levels in Lake County were below normal, however, the deviation from average conditions were not excessive. Compared to other areas of California, especially those areas south of the Delta, Lake County's groundwater impacts in the major aquifers from the drought appear to be limited.

During the period March 18 through March 23, 2015 we measured 81 wells. Based on the Spring 2015 measurements, conditions within each groundwater basin are summarized. These summaries are general statements and due to varying aquifer conditions do not cover all conditions. Individual well owners may experience conditions substantially different than the general condition (some of our wells show markedly different conditions than other nearby wells) and problems are more likely with shallow wells. This does not include other smaller aquifers and water bearing formations, such as the Clear Lake Volcanics, within Lake County. Approximately 70% of the groundwater use in the County is extracted from the measured groundwater basins.

Attached are maps of each major groundwater basin showing the wells measured. Each well is labeled as follows:

- Well Number: This is a number assigned by the State, for instance 14N-09W-32M1. The well number identifies the well by Township, Range, Section number and by lot within the section (there are 16 lots).
- S Avg: This is the average spring (April) water level, typically the highest of the year. Most wells were measured since the early or mid-1960's, however, some wells have data going back to the late 1940's and new wells have been added to the network. The long record can document changes in the physical groundwater condition (i.e. down cut stream channels lower the maximum possible groundwater level), changes in irrigation practices (i.e. changes in crop types and irrigation demands), and seasonal impacts (i.e. droughts).
- F Avg: This is the average fall (October) water level, typically the lowest of the year.

- S2015: This is the water level measured during the period of March 18 through 23. If no number is provided, this indicates we were unable to measure the well for some reason (i.e., the pump house was locked).

These maps only tell part of the story of each groundwater basin, as long term groundwater conditions due to changing water use and aquifer conditions can have a substantial effect the average spring and fall levels. Conditions are also different within different areas within a basin. We evaluated numerous hydrographs (plots of groundwater levels over time) within each basin to prepare the following summary.

Well hydrographs are available on the Lake County Water Resources website under Drought Information at:

[http://www.co.lake.ca.us/Government/Directory/Water Resources/Drought Information.htm](http://www.co.lake.ca.us/Government/Directory/Water_Resources/Drought_Information.htm).

Big Valley

Big Valley is the largest groundwater basin and the most complicated due to its geology (there are numerous aquifers, some of which have limited connection to adjacent aquifers), recharge characteristics (there are multiple sources of recharge) and differing land use and groundwater use patterns. From the maps, it looked like most of the basin has decent groundwater levels, considering the severity of the current drought.

Wight Way: We have measurements on three wells along Wight Way. The westernmost well was lower than normal, however, it had recovered nearly 30 feet from our Fall 2014 measurement. The two wells near the center of Wight Way were within the normal range, primarily due to limited groundwater pumping in the area. Hydrograph 13N-09W-28J2 was felt to be most representative of the area.

Kelseyville Bench/Gold Dust Drive: This area is served by a deep aquifer of volcanic ash. Groundwater is showing a several year decline. Recharge of this aquifer is from runoff over the exposed ash layer, which is very limited in extent and in drought conditions gets very little recharge. Groundwater levels are near normal spring levels, however, the two wells measured near Renfro Drive were below average fall levels, indicating a problem with recharge in this area of the aquifer (the furthest from the presumed recharge areas). This area will probably require several normal runoff years to fully recover from the drought. Hydrograph 13N-09W-22M1 was felt to be most representative of the area.

Western Valley Floor: This is the main portion of the valley floor to the west of Kelsey Creek including areas along McGaugh Slough, Adobe Creek and Manning Creek. Most of the wells were within 2 feet of the average spring level. One well on Smith Lane is substantially below average for unknown reasons, however, it may be tied to the wells off of Renfro Drive discussed above. Hydrographs 13N-09W-16E2, 13N-09W-07A3 and 14N-09W-32G2 were felt to be most representative of the area.

Eastern and Northeastern Valley Floor: This is the area east of Kelsey Creek and north of Soda Bay Road east of Lakeside County Park. Current levels are generally less than 3 feet below average for Spring, with the greatest departure from average west of Kelsey Creek. Hydrographs 13N-09W-02C2 and 13N-09W-12M2 were felt to be most representative of the area.

TO: Board of Supervisors

FROM: Will Evans, Deputy Director – Water Resources
by Tom Smythe, Water Resources Engineer

SUBJECT: Groundwater Conditions
Fall 2015

DATE: February 23, 2016

Staff has been measuring groundwater levels in the major groundwater basins in the county since the early 1960's. Due to statewide drought conditions, for the last two years, we have provided periodic updates on our groundwater levels. These updates are also posted on our website at http://www.co.lake.ca.us/Government/Directory/Water_Resources/Drought_Information.htm.

Staff measured 80 water wells in the major groundwater basins between September 30 and October 2, 2015. Following is a summary of groundwater levels. Fall groundwater levels in Lake County were near normal, with some areas above average and some below average fall levels. Compared to other areas of California, especially those areas south of the Delta, Lake County's groundwater impacts in the major aquifers from the drought appear to be limited.

These summaries are general statements and due to varying aquifer conditions do not cover all conditions. Individual well owners may experience conditions substantially different than the general condition (some of our wells show markedly different conditions than other nearby wells) and problems are more likely with shallow wells. This does not include other smaller aquifers and water bearing formations, such as the Clear Lake Volcanics, within Lake County. Approximately 70% of the groundwater use in the County is extracted from the measured groundwater basins.

Attached are maps of each major groundwater basin showing the wells measured. Each well is labeled as follows:

- Well Number: This is a number assigned by the State, for instance 14N-09W-32M1. The well number identifies the well by Township, Range, Section number and by lot within the section (there are 16 lots).
- S Avg: This is the average spring (April) water level, typically the highest of the year. Most wells were measured since the early or mid-1960's, however, some wells have data going back to the late 1940's and new wells have been added to the network. The long record can document changes in the physical groundwater condition (i.e. down cut stream channels lower the maximum possible groundwater level), changes in irrigation practices (i.e. changes in crop types and irrigation demands), and seasonal impacts (i.e. droughts).
- F Avg: This is the average fall (October) water level, typically the lowest of the year.
- Fall 2015: This is the water level measured during the period of September 30 and

October 2, 2015. If no number is provided, this indicates we were unable to measure the well for some reason (i.e., the pump house was locked).

These maps only tell part of the story of each groundwater basin, as long term groundwater conditions due to changing water use and aquifer conditions can have a substantial effect the average spring and fall levels. Conditions are also different within different areas within a basin. We evaluated numerous hydrographs (plots of groundwater levels over time) within each basin to prepare the following summary. Well hydrographs are available on the Lake County Water Resources website under Drought Information at:

(http://www.co.lake.ca.us/Government/Directory/Water_Resources/Drought_Information.htm).

Big Valley

Big Valley is the largest groundwater basin and the most complicated due to its geology (there are numerous aquifers, some of which have limited connection to adjacent aquifers), recharge characteristics (there are multiple sources of recharge) and differing land use and groundwater use patterns. From the maps, it looked like most of the basin has decent groundwater levels, considering the severity of the current drought.

Wight Way: We have measurements on three wells along Wight Way. Each of the three wells measured showed different results. Staff believes conditions are within the normal range and there do not appear to be significant groundwater problems in the area.

Kelseyville Bench/Gold Dust Drive: This area is served by a deep aquifer of volcanic ash. Groundwater is showing a several year decline. Recharge of this aquifer is from runoff over the exposed ash layer, which is very limited in extent and in drought conditions gets very little recharge. Groundwater levels are near normal levels, however, with several wells measured significantly below average fall levels. This area will probably require several normal runoff years to fully recover from the drought.

Western Valley Floor: This is the main portion of the valley floor to the west of McGaugh Slough, including areas along Adobe Creek and Manning Creek. Most of the wells were above the average fall level. Wells near Soda Bay Road tended to be slightly below average levels.

Eastern and Northeastern Valley Floor: This is the area east of McGaugh Slough. Current levels are generally less than 2 feet below average for Fall, with the greatest departure from average near Kelseyville.

TO: Board of Supervisors

FROM: Will Evans, Deputy Director – Water Resources
by Tom Smythe, Water Resources Engineer

SUBJECT: Groundwater Conditions
Spring 2016

DATE: April 20, 2016

Staff has been measuring groundwater levels in the major groundwater basins in the county since the early 1960's. Due to statewide drought conditions, for the last three years, we have provided periodic updates on our groundwater levels. These updates are also posted on our website at http://www.co.lake.ca.us/Government/Directory/Water_Resources/Department_Programs/Groundwater_Data.htm.

Staff measured 80 water wells in the major groundwater basins between April 11 and April 13, 2016. Following is a summary of groundwater levels. Spring groundwater levels in Lake County were near normal, with some areas above average and some below average spring levels. Compared to other areas of California, especially those areas south of the Delta, Lake County's groundwater impacts in the major aquifers from the drought appear to be limited.

These summaries are general statements and due to varying aquifer conditions do not cover all conditions. Individual well owners may experience conditions substantially different than the general condition (some of our wells show markedly different conditions than other nearby wells) and problems are more likely with shallow wells. This does not include other smaller aquifers and water bearing formations, such as the Clear Lake Volcanics, within Lake County. Approximately 70% of the groundwater use in the County is extracted from the measured groundwater basins.

Attached are maps of each major groundwater basin showing the wells measured. Each well is labeled as follows:

- Well Number: This is a number assigned by the State, for instance 14N-09W-32M1. The well number identifies the well by Township, Range, Section number and by lot within the section (there are 16 lots).
- S Avg: This is the average spring (April) water level, typically the highest of the year. Most wells were measured since the early or mid-1960's, however, some wells have data going back to the late 1940's and new wells have been added to the network. The long record can document changes in the physical groundwater condition (i.e. down cut stream channels lower the maximum possible groundwater level), changes in irrigation practices (i.e. changes in crop types and irrigation demands), and seasonal impacts (i.e. droughts).
- F Avg: This is the average fall (October) water level, typically the lowest of the year.
- Spring 2016: This is the water level measured during the period of April 11 and April 13, 2016. If no number is provided, this indicates we were unable to measure the well for some reason (i.e., the pump house was locked).

These maps only tell part of the story of each groundwater basin, as long term groundwater conditions due to changing water use and aquifer conditions can have a substantial effect the average spring and fall levels. Conditions are also different within different areas within a basin. We evaluated numerous hydrographs (plots of groundwater levels over time) within each basin to prepare the following summary. Well hydrographs are available on the Lake County Water Resources website under Department Programs – Groundwater Data.

Big Valley

Big Valley is the largest groundwater basin and the most complicated due to its geology (there are numerous major aquifers, some of which have limited connection to adjacent aquifers), recharge characteristics (there are multiple sources of recharge) and differing land use and groundwater use patterns. From the maps, it looked like most of the basin has good groundwater levels.

Wight Way: We have measurements on three wells along Wight Way. Each of the three wells measured had groundwater levels substantially above the spring average.

Kelseyville Bench/Gold Dust Drive: This area is served by a deep aquifer of volcanic ash. Groundwater is showing a several year decline. Recharge of this aquifer is from runoff over the exposed ash layer, which is very limited in extent and has limited recharge. Groundwater levels have begun to recover, however, with all wells remain below average spring levels. This area will probably require several normal runoff years to fully recover from the drought.

Western Valley Floor: This is the main portion of the valley floor to the west of McGaugh Slough, including areas along Adobe Creek and Manning Creek. Most of the wells were above the average spring level.

Eastern and Northeastern Valley Floor: This is the area east of McGaugh Slough. Most of the wells were above the average spring level.