

# Central Nevada Regional Water Authority Groundwater Monitoring Program Annual Report for Fiscal Year 2021-2022

Nyle Pennington

November 03, 2021

## WATER LEVEL MEASUREMENTS:

The single-most objective of the Central Nevada Regional Water Authority Groundwater Monitoring Program is to collect, on an annual basis, water level measurements from 51 wells in 12 groundwater basins, or Hydrologic Area's (HA's). It is important to note that the 51 wells were selected in concert with the USGS and the Nevada Division of Water Resources (NDWR). These wells, which are comprised of thirty-five percent USGS MX wells and sixty-five percent "other" type wells (stock, mining, unused), are called index wells, since it is possible the water level information collected from these wells can be used to 1) determine temporal trends, 2) identify the occurrence and movement of groundwater, and 3) help quantify subsurface flow between basins. The 12 groundwater basins are as follows: Kumiva Valley-HA 079 (3 wells), Granite Springs Valley-HA 078 (3 wells), Big Smoky Valley-HA's 137A and 137B (5 wells), Newark Valley-HA 154 (6 wells), Railroad Valley-HA's 173A and 173B (6 wells), Long Valley-Central Nevada-HA 175 (6 wells), Butte Valley-HA's 178A and 178B (8 wells), Ruby Valley-HA 176 (4 wells), Jakes Valley-HA 174 (2 wells), Clayton Valley-HA 143 (3 wells), Alkali Springs Valley-HA 142 (3 wells) and Clover Valley-HA 177 (2 wells). The Nevada Division of Water Resources does not collect groundwater pumping data from wells in these 12 groundwater basins.

## WATER LEVEL OBSERVATIONS:

Static groundwater level in a well is obtained using either a 500-foot Kevlar Electric Tape, or where appropriate, a weighted 500-foot steel tape. All observations are recorded in feet and tenths of feet.

In 8 of the 12 Program basins, static water levels fluctuated somewhat, generally in response to drought, or where above average precipitation occurred.

The other four groundwater basins, (Railroad Valley, Clayton Valley, Alkali Springs Valley and Jakes Valley) experienced noticeable water level changes, due in large part, to groundwater pumping for mining, and/or drought conditions.

In Railroad Valley (HA 173B), MX-107 declined 4.5 feet from 2009 thru 2019, an eleven year period of record. This well was situated within a few miles, as the crow flies, from a large alfalfa growing operation at Nyala. MX-107 is now (2020), confirmed destroyed. The well is now sanded-in from 200

ft. back to 64 ft., due to damage by cattle during 2019. MX-107 well has been replaced by Stone Corral Well, located 1.1 mile due south from MX-107 on the same road. Data collection at Stone Corral Well began September 30, 2020. In just two years a 0.4 foot decline has been observed in Stone Corral Well, likely due to the same influence from the large alfalfa growing operation just a few miles SE at Nyala.

In Clayton Valley (HA 143), the well called “Silver Peak WO-2”, a truck fill well, shows a steady decline on the order of 4.1 feet from 2007 to 2021, a thirteen year period of record. This likely is due to the fact that the well is adjacent to, and down gradient from, “Silver Peak WO-3 Well”, which is the municipal water source for the Town of Silver Peak, (See Graph # 1).

Also, in Clayton Valley, an unused stock well, located in south Clayton Valley, known as “South Clayton Valley Unused Stock Well”, has remained dry eight years in a row, indicative of drought and de-watering throughout Clayton valley for Lithium mining purposes. It is likely this well has become “sanded-in” over time, as well. Water levels have been collected at this well for 54 years (1967 to 2021), but this well has recovered, periodically, throughout the 54 year period of record. Local residents volunteered, that groundwater pumping has become significant in Clayton Valley over the years, due in large part, to the Lithium mining operation throughout the valley, which utilize distillation pond type recovery processes, which are in turn dependent upon, large scale groundwater pumping. Observed this year (2021), Clayton Valley looked, essentially like one vast open lake, due to the large number of open distillation ponds throughout the valley.

Also, this year (2021), the well known as “Clayton Valley Northeast Stock Well”, is again dry. Static water level in this well was typically near 171 feet. I sounded this well to be near 200 feet in depth. The well is dry and reported as such. Observed, is a new and expanded, Lithium mining complex constructed approximately one mile north, and down gradient from, “Clayton Valley Northeast Stock Well”. This year (2021), the new mining complex has constructed two very sizeable distillation type recovery ponds, adjacent north from the complex and all ponds are full. The stock well is dry due to down gradient de-watering activity for Lithium recovery.

In adjacent Alkali Springs Valley (HA 142), a significant decline in water level has been observed at the “Goldfield Mine Well” from 2007 to 2021. The decline, from 2007 to 2021 in static water level, is now 36.42 feet; due to water withdrawals for mining activities, which tap the same aquifer as the Goldfield mine well, (See Graph # 2). Note: during the 2020 visit, due to the re-alignment of Hwy 95 for mining purposes, the entire right of way going into Goldfield is now fenced off, and there is no access into the Goldfield Mine Well from Hwy 95. A new route into the well was found this year-2021, from Main Street, Goldfield Nevada. The well, however, remains on the property of Gemfield Gold Corporation, designated by them as De-water # 3. Gemfield Gold plans to de-water this well at the rate of 71 GPM, or 0.16 CFS, or 0.32 AF/Day, which will further influence the decline in the Goldfield Mine Well.

In Jakes Valley (HA 174), the well known as “Jake’s Valley Large Diameter Stock Well”, this year (2021), shows a recovery of + 4.0 feet, (See Graph # 3).

#### HYDROLOGIC OUTLOOK:

Again this year, I have included a single U.S. Drought Monitor Map of the State of Nevada for the period ending October 26, 2021, at the conclusion of field work. Note the huge swath designated “Exceptional Drought”, and essentially the remainder designated “Severe or Extreme Drought”. The U.S. Drought Monitor Map is updated weekly on Thursdays.

#### POST FIELD WORK:

Following field work, Authority groundwater level measurements are forwarded electronically to NDWR for inclusion into their homepage (water.nv.gov) accessible database, located under “Mapping and Data”, then “Water Use and Availability”, then “Water Level Data”. Once in “Water Level Data”, simply VIEW the HA of your concern. All 2021 groundwater level measurements from the 51 wells monitored by the Authority, are usually entered into NDWR’s water level data base by the end of November. Authority water levels were forwarded to the U.S. Geological Survey as well.

Nevada Division of Water Resources does not show the 51 wells as being CNRWA sites if an Authority index well was given a Site ID number by the USGS, or if the well was given a Site Name by NDWR. The USGS Site ID number is a fifteen digit number based on the Latitude/longitude of any given well. The Site Name is based upon the HA number, the Township/Range, section ¼ ¼. The NDWR data base lists each well by Site Name first, the Site ID second (if one exists), and then if applicable, by common name. This methodology mitigates any confusion as to which well is being identified. Water level measurements made by CNRWA field personnel are recorded and credited in the NDWR database as “CNRWA” acquired water-level measurements. All water level measurements, from each of the twelve valleys, are appropriately grouped within their proper hydrologic area (HA). Most, but not all, of the Authority’s index wells have past (historical) water level measurements associated with them, although intermittent, which is extremely important from a historical perspective, as rise or decline in groundwater levels can only be viewed over periods of years. All 51 index wells are now permanently part of the continuous CNRWA monitoring program.

#### CNRWA WELL MEASUREMENT DATA REPORT (2014):

To facilitate dissemination of Authority index well water level information, a report entitled “Central Nevada Regional Water Authority Well Measurement Report, dated September 2014”, was constructed in 2014 using “WORD” format (an electronic WORD file), which is updated annually with the most current water level measurements. This report lists each index well and associated water level data from the earliest date the information was collected until 2021. The subject report: Central Nevada Regional Water Authority Well Measurement Data Report is attached.

#### ADDED WORK TASK(S) FOR FY 2019-2020:

For FY 2020-2021: There were no additional work tasks to address, other than routine data collection/field work, the reporting thereof, and construction of annual report.

#### MONITORING EFFORTS IN OTHER BASINS-ONGOING:

**SNAKE VALLEY BASIN (HA 195):** Snake Valley Basin, located within Utah and Nevada, has a sophisticated groundwater monitoring program. The Utah U.S. Geological Survey is committed to a 50-year groundwater monitoring program, specifically in response to the proposed Southern Nevada Water Authority (SNWA) Groundwater Development Program in eastern Nevada (now defunct). In addition, the SNWA monitors 5 wells quarterly on the Nevada side of the basin in Hamlin Valley (HA 196). These quarterly observations, made by SNWA, are recorded in the NDWR water level data base. Also, U.S. Geological Survey (Carson City) drilled two, deep wells (one into Ely limestone, the other into alluvium) near the southern toe of the Snake Range near Big Springs Creek in 2009 and 2010. One well is Big Springs NW well (alluvium); depth 460 feet. From November 2009 to February 2014, there have been 23 static groundwater level measurements made at this well, in addition to 4 water quality samples. Over this period, static water levels fluctuate between 226.7 feet to 228.2 feet. This well was measured each 6-months by USGS and water levels entered into NDWR data base. Now Big Spring NW Well, (since 09-16-2014), is continuously monitored by transducer-recorder. The second well is Big Spring SW Well (Ely limestone), Hamlin Valley; depth 700 feet. From September 2010 to February 2014 there have been 19 static groundwater level measurements made in addition to 4 water quality samples. Over this period, static water levels fluctuate between 352.5 feet to 357.5 feet. Also, a full aquifer stress pump test was performed on this well. This well is continuously monitored (since 09-08-2014) by transducer-recorder, and water levels for both wells, are entered into NDWR's data base. It should also be noted that the Nevada portion of Snake Valley (south from Highway 50) and Hamlin Valley, were intensively canvassed in 2009; meaning: every well that could be found was inventoried and static water levels procured.

**SPRING VALLEY BASIN (HA 184):** SNWA monitors a large number of wells in Spring Valley and provides the data to NDWR for inclusion into the NDWR database. USGS operates a well network in Spring Valley as well, but north from Highway 50 to Big Hardpan. USGS, in 2010, intensively canvassed Spring Valley south from Highway 50 to the Limestone Hills for the GPS location of wells, and procured water level measurements on all inventoried wells. The NDWR data base contains 58 records for Spring Valley Basin.

**STEPTOE VALLEY BASIN (HA 179):** NDWR operates a monitoring network throughout Steptoe Valley and water level data are extensive. NDWR data base contains 104 records for Steptoe Valley. This network is monitored annually in the spring.

**WHITE RIVER VALLEY BASIN (HA 207):** NDWR expanded its water level monitoring network in White River Valley beginning in 2012. Measurements were first made during spring of 2013. These are annual measurements and there are 31 listed records for this basin in the NDWR water level data base. In addition to NDWR monitoring, SNWA also monitors a number of wells within the basin.

**UPPER REESE RIVER VALLEY BASIN (HA 056):** NDWR monitors, on an annual basis, 35 wells within this basin. This basin portion lies south from U.S. Highway 50, trending towards the headwaters of the Upper Reese River. NDWR collects no pumping inventory within this basin.

**GENERAL OBSERVATIONS:**

Groundwater monitoring for fiscal year 2021-2022, shows groundwater fluctuation in eight of the twelve valleys. The other four valleys, (Clayton Valley, Alkali Springs Valley, Railroad Valley and Jakes Valley), had wells with a noticeable decline/increase in water levels. Not surprisingly, Jakes Valley Large Diameter Stock Well, shows a + 4.0 foot recovery from 2020. Clayton Valley is significant, as “Clayton Valley Northeast Stock Well” is dry, due to ongoing, large scale de-watering practices associated with Lithium mining.

Noticed this year (2021), a no name, usually perennial flowing, high altitude spring, on the east side of Newark Valley (HA 154), was again seen flowing, though not robustly, indicative of above average snowpack. Also, in Southern Newark valley (south from Highway 50), the well known as Eighteen Mile Stock Well, was substituted into the Authority’s network for the adjacent stock well that became dry in 2017. In extreme southern Newark valley, adjacent east, approximately one mile from Paris Stock Well, a large oil & gas drilling platform was seen in full operation. Paris Well was being pumped for oil & gas exploration.

Two Authority index wells were found with damaged well heads in 2019. MX-139 in southern Butte Valley (HA 178B), was found with the 4-foot galvanized steel riser pipe broken off at land surface, likely due to cow/horse rubbing on the riser pipe. I capped at LS and covered with rocks in 2019. During the 2020 field run, I was able to successfully make full repair to this well-head by digging out the base and installing a 2-inch coupler and new riser pipe. This year (2021), I again found the riser pipe removed and thrown some 20 feet from the well head. The static WL’s are now inconsistent, and I highly suspect human intervention at MX-139. I repaired the riser pipe, and performed a one gallon water test upon departure. This well needs to be closely monitored next year, and if need be, substituted with an adjacent MX well three miles north. MX-107 in northern Railroad Valley (HA 173B) suffered the same type of damage by cattle in 2019. MX-107 is confirmed destroyed. The well is sanded-in from 200 ft. back to 64 ft. In lieu of MX-107, I moved monitoring operations one mile directly south (same road), to Stone Corral Stock Well, an unused stock well. There is a 7.6 foot head difference, sloping from MX-107 to Stone Corral Well. This head difference indicates ground water flow from north to south, since GW flow is from higher head to lower head. Stone Corral Well is a 6-inch steel casing enclosed by steel grates, and so should be free from damage.

In Alkali Springs Valley (HA 142), Gemfield Gold Corporation did drill two large capacity production wells adjacent south from Goldfield # 1 well, for mining and milling purposes.

Fiscal year 2021-2022 field work was accomplished in four (4) separate trips, by dividing adjoining valleys into groups or segments for efficiency. These four separate trips (A, B, C & D), require 10 field days and generate a mileage figure of nearly 3,200 miles.

**NOTEWORTHY:**

1. NDWR Order #1300: No new groundwater appropriations within designated HA 137A, Tonopah Flat. Perennial Yield=6,000 A/F per year. F.E. Rush and C.V. Schroer, Water Resources of Big Smoky Valley, Lander, Nye and Esmeralda Counties, Nevada, Water Resources Bulletin No. 41, (Department of Conservation and Natural Resources, Division of Water Resources and U.S. Department of the Interior, Geological Survey), 1971. Current committed appropriations=23,195.9 A/F per year. Order #1300 dated December 11, 2018; Jason King. CNRWA monitors three (3) wells within HA 137A, Tonopah Flat. Alum Stock Well, Rogers Stock Well and MW-118 (RMG Corp.).
2. June 9, 2017. AB 52 now law. Dissolved Mineral Resource (Lithium) Exploration Regulatory Authority now at the Division of Minerals. Carson City.
3. AB 159 (Swank and Brooks), did not pass the 2017 Legislature. "Ban on Fracking in Nevada".
4. November 4, 2020. New Lithium exploration in Railroad Valley, HA 173 A & B. Large 13,000 acre ranch purchased, but not mentioned, which is where the Lithium extraction will occur. Operation will also include a large solar array.  
Source: Doug Cole, CEO of "American Batteries Metal Technology", Fernley Nevada. Mr. Cole was a guest on "Nevada Newsmakers", KKOH Radio. Host Sam Shad.
5. October 25 and 26, 2021: Atmospheric River precipitation event. Most areas of western Nevada record multiple inches of rain. Blue Wing Mountain remote weather station (Kumiva Valley), records 1.5 inches of precipitation in a three day period. Wells in Kumiva and Granite were monitored October 31, 2021. The majority show a decline in static WL's. Analysis: Most if not all drainages in Kumiva and Granite Valleys are armored. Little to no infiltration. Most episodic, precipitation event runoff goes to Blue Wing alkali flat and Granite alkali flat, which then is lost to evaporation.

**ATTACHMENTS (5):**

**HYDROGRAPHS:** Attached are three hydrographs based on CNRWA monitoring data that show areas where water level declines and or recoveries are known to be occurring.

**(GRAPH #1):** Clayton Valley Silver Peak WO-2 Truck Fill Well. Measurements show gradual decline, due to its proximity from an adjacent, and up-gradient, municipal withdrawal well.

**(GRAPH #2):** Goldfield Mine Well. Measurements show substantial influence of mining activity which tap the same aquifer as the Goldfield Mine Well.

**(GRAPH #3):** Jakes Valley Large Diameter Stock Well. Measurements show a + 4.0 foot recovery.

**DROUGHT MONITOR COMPARISON MAP:** Hydrologic outlook glance after field work.

**WELL MEASUREMENT DATA REPORT (2014):** Central Nevada Regional Water Authority Well Measurement Data Report.

