CARSON WATER SUBCONSERVANCY DISTRICT
REQUEST FOR FUNDING

APPLICANT: David Smith / U.S. Geological Survey
Name
2730 N. Deer Run Road
Address

Carson City	Carson City	Nevada	89701
City	County	State	Zip Code

dwsmith@usgs.gov (Email) 775-887-7616 (Phone)

APPLICANT'S AGENT (if different from Applicant):

_____
Name

_____
Address

_____ _____ _____ _____
City County State Zip Code

_____ _____
Email Telephone #

PROJECT NAME: Water-level and water-quality monitoring in the Newlands Project Area, Churchill County, NV

PROJECT LOCATION/ADDRESS: Lahontan Valley, Churchill County, NV

PROJECT DESCRIPTION:

Lahontan Valley residents depend exclusively on groundwater resources for domestic and municipal drinking-water supply. To inform Churchill County and federal agencies on changing conditions of groundwater resources in Lahontan Valley, the U.S. Geological Survey (USGS) has monitored water levels from the beginning of the Newlands Project in 1903 (Stabler, 1904). To the impacts of water-right transfers and retirements from the 1990-2000s and land-use change to present day conditions (Seiler and Allander, 1993; Lico and Seiler, 1994; Maurer, 2004; Smith and others, 2016). The network currently consists of 67 monitoring wells distributed throughout the Lahontan Valley to capture water-level change of domestic and municipal supply (figure 1). Water-quality data is also collected from domestic wells and the municipal water supply from the basalt aquifer. While this network captures change in the Lahontan Valley aquifer system, analysis indicates the frequency of data collection may be reduced for many sites while still monitoring conditions in the valley. This proposal is to continue monitoring groundwater resources for water levels and water quality in the Lahontan Valley, but with a reduced frequency of collection to improve efficiency and lower cooperator costs.

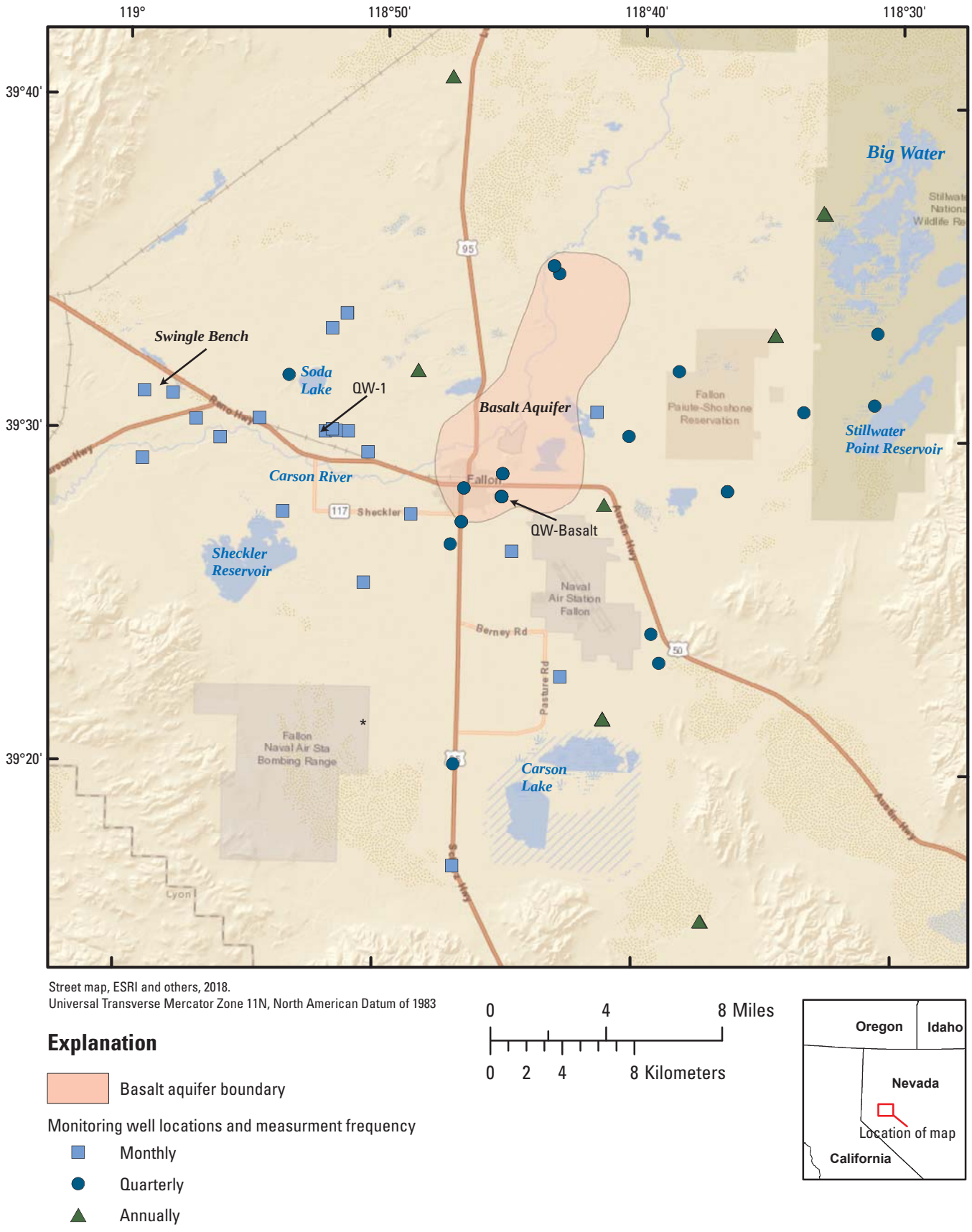

Figure 1. Location and measurement frequency of USGS monitoring wells, Lahontan Valley, NV.

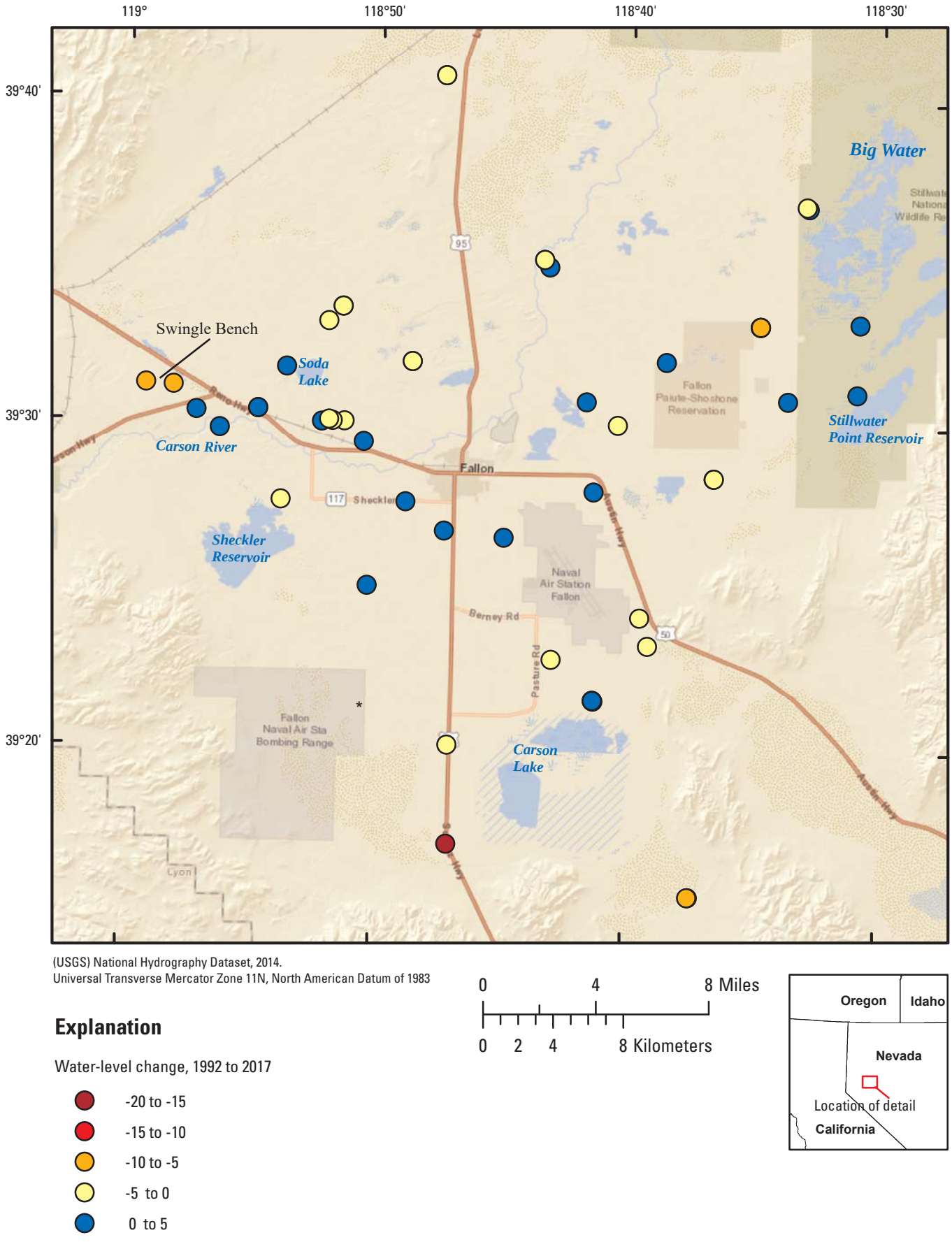

Figure 2. Shallow and intermediate monitoring well locations and water-level change from 1992 to 2017, Lahontan Valley, NV.

Domestic supply in Lahontan Valley consists of wells completed in valley-fill deposits characterized by Glancy (1986) as the shallow aquifer, from 0-50 ft below land surface (bls), and the intermediate aquifer from 50-500 ft bls. The Nevada State Engineer's well log database indicates 1,823 shallow and 2,736 intermediate wells inventoried in the project area. Beneath the intermediate aquifer, greater than 500 ft bls, is the deep aquifer which is generally considered non-potable (Glancy, 1986). The current network consists of 41 wells screened within the shallow aquifer and 12 wells in the intermediate aquifer. The status of water-level change from 1992 to 2017, or a period later than 1992 depending on well completion date, indicates water levels in 29 wells have declined, while water levels in 24 wells have increased slightly (figure 2). Six wells have water levels that have declined more than 5 feet, including two wells near Swingle Bench (figure 3), with the largest decline of 19 ft southwest of Carson Lake (figure 2). Increases are likely related to the prolonged use of canals and flooding from the extensive flood mitigation activities that occurred during Spring and Summer of 2017. The water level in many wells increased, maximum increases of 4 ft, in response to the flood mitigation throughout Lahontan Valley in 2017 (figure 4).

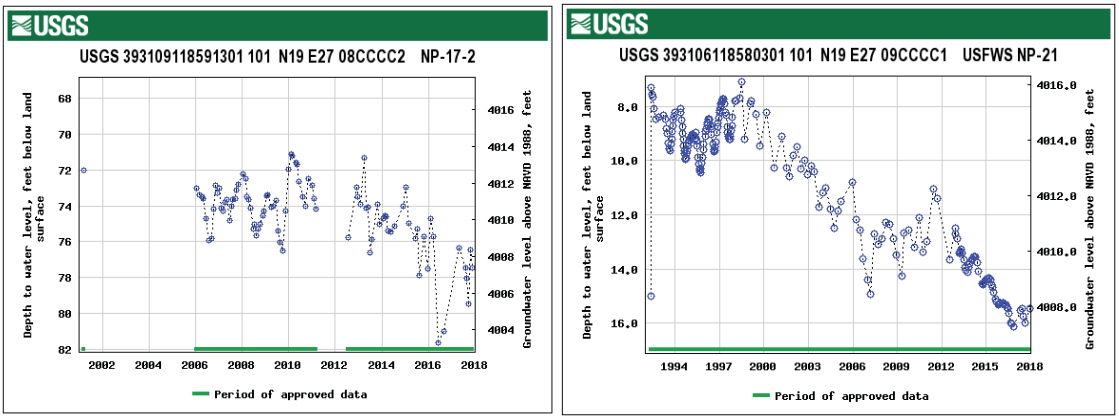

Figure 3. Water-level declines in A) intermediate aquifer domestic well and B) shallow aquifer well in Swingle Bench, Lahontan Valley, NV.

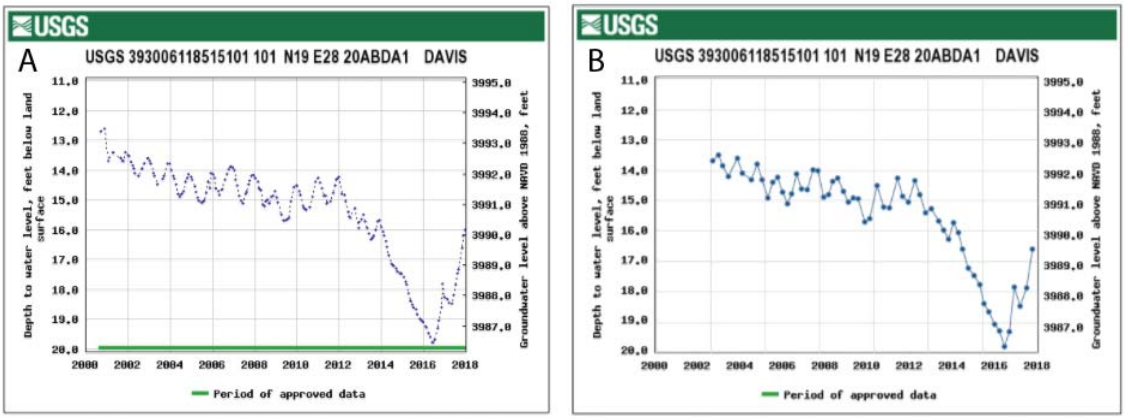

Figure 4. Graphical comparison of water-level measurement frequency of A) monthly, and B) quarterly intervals.

The network includes a synoptic assessment of shallow aquifer water quality at four wells. Recent sample analysis indicates arsenic and nitrate concentrations have increased at well QW-1 (figure 1). Well QW-1 is an intermediate aquifer well located in a one-acre subdivision with septic tank systems. Concentrations of nitrate increased in QW-1 from 9.0 parts per million (ppm) in 2015 to 11.6 ppm in 2017, exceeding the EPA maximum contaminant level (mcl) of 10 ppm (fig. 4). Total arsenic concentrations also increased from 658 parts per billion (ppb) in 2016 to 837 ppb in 2017 (EPA mcl for arsenic is 10 ppb). However, this is based on only two sampling events, continued monitoring will help document water-quality trends in one-acre subdivisions with domestic wells and septic tanks.

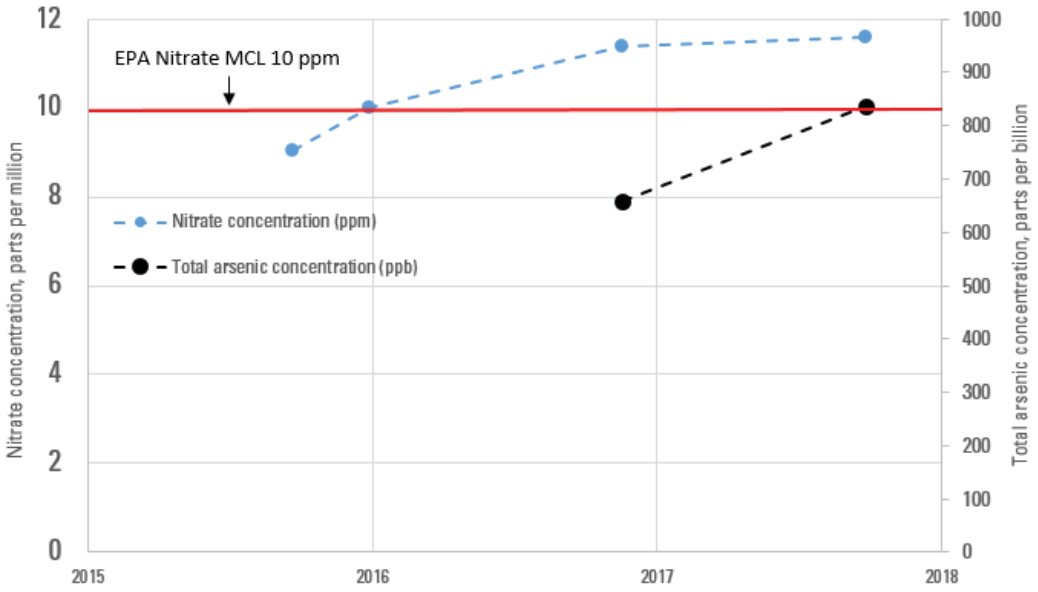

Figure 4. Water-quality changes of total arsenic and nitrate from well QW-1, Lahontan Valley, NV.

Municipal supply for Fallon, the Paiute-Shoshone Tribe, and Naval Air Station Fallon (NAS Fallon) is withdrawn from the fractured basalt aquifer of limited extent located northwest of central Fallon (figure 1). The basalt aquifer outcrops at Rattlesnake Hill as a volcanic cone approximately 1 mile in diameter (fig. 2 in Maurer and Welch, 2001). The basalt aquifer beneath Rattlesnake Hill is mushroom shaped, from 4 miles wide near the surface to 10 miles wide at 400–600 ft bls (Glancy, 1986; Maurer and Welch, 2001). The basalt aquifer is assumed to intersect and exchange groundwater with all three valley-fill aquifers (Glancy, 1986). Quarterly monitoring of the basalt aquifer consists of measuring 14 wells nested at 4 locations in east and central Fallon (figure 1). Annual water-quality samples are collected from the QW-Basalt well (figure 1) and analyzed for major inorganic ions and total arsenic concentration. The frequency of water-level measurements and water-quality sampling of the basalt aquifer will remain annual.

Recent water-level measurements of the basalt aquifer indicate a significant increase from end of 2015 to end of 2017, which has previously not been observed (fig.6). Historical water-level measurements for basalt aquifer indicate a decline of approximately 14.7 feet from September 1969 to September 2010 (figure 6). Data collected from 2010 to 2015 indicate generally stable water levels and water-quality (arsenic and chloride concentrations; figure 5). Basalt aquifer water-levels rose approximately 3.0 ft between December 2015 and December 2017. Concentrations of total arsenic and chloride did not increase during the corresponding increasing water-level period. However, from 2016-17 chloride concentrations have increased from 231 ppm in 2015 to 255 ppm in 2017. The recent increase in water-levels may change as development and associated groundwater withdrawals potentially increase in the future.

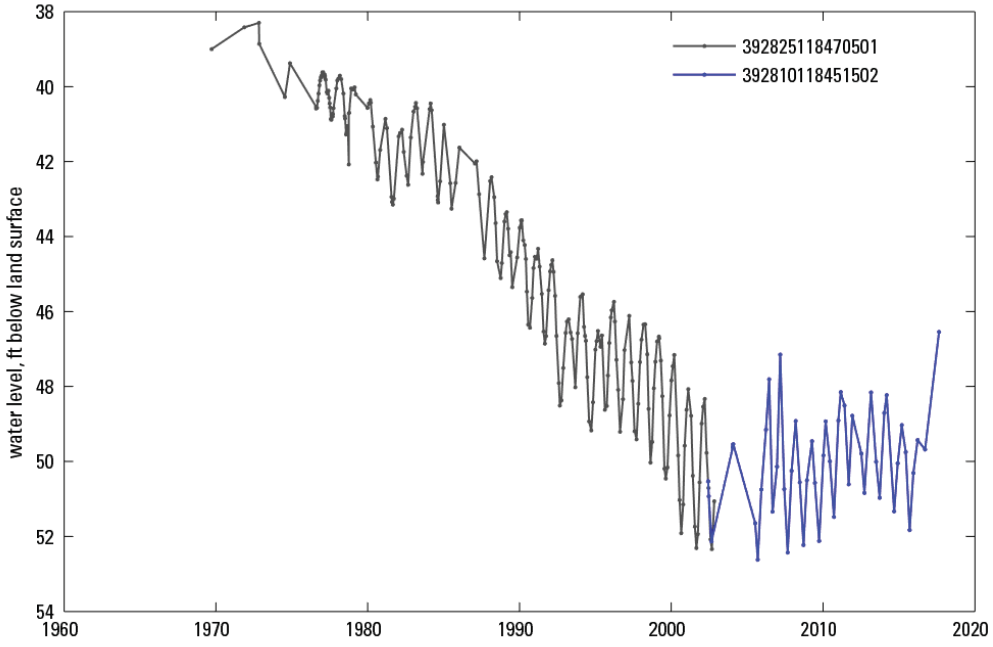

Figure 6. Water-level change of the basalt aquifer, Lahontan Valley, NV.

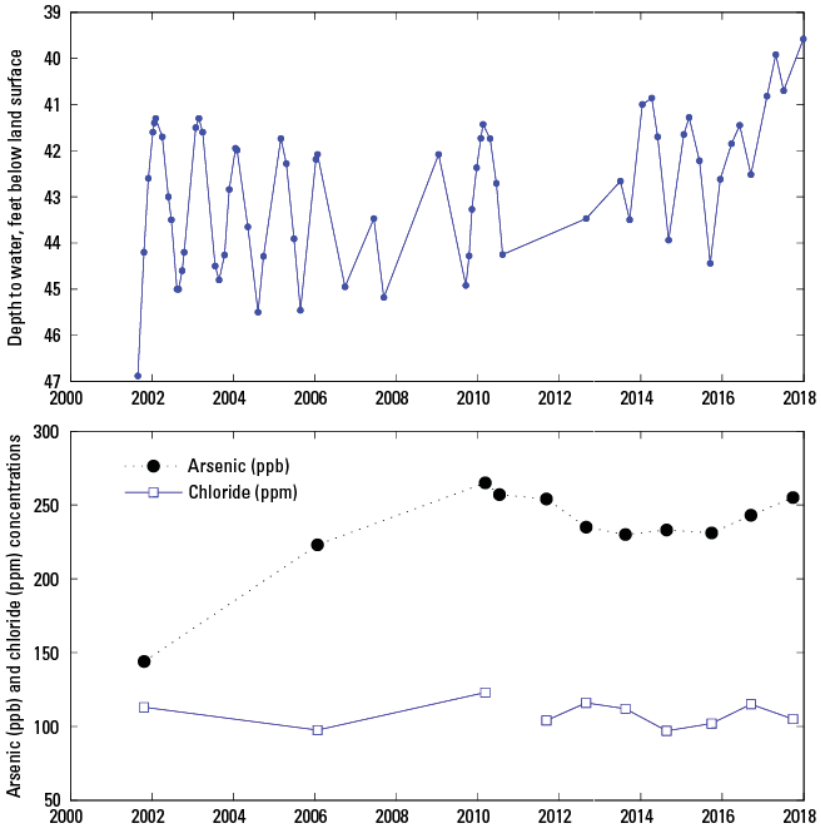

Figure 6. Water-level and water-quality change in the basalt aquifer at site QW-Basalt, Lahontan Valley, NV.

PROJECT GOALS AND BENEFITS:

The project benefits include:

1. Groundwater monitoring network of 67 wells spatially distributed throughout Lahontan Valley with measurement frequency of 29 quarterly, 20 bi-annually, and 18 annually (figure 7).
2. Evaluate shallow aquifer water-levels and annual water-quality at 3 intermediate basin-fill aquifer wells.
3. The quarterly measurement of the basalt aquifer water-levels and annual sampling of water quality.
4. Improved efficiency by reducing the frequency of water-level measurements.
5. Characterization of the shallow, intermediate, and basalt aquifers for an additional three years.
6. Publish and maintain data online for public use in the USGS NWIS online database (USGS, 2018). Data generally available within a few days of collection.

The funding support will maintain the monitoring of groundwater resources in Lahontan Valley. The monitoring of water levels and water quality will provide data needed to observe effects of pumping demand on the basalt aquifer, future land-use changes, contribute to further understanding of groundwater impacts of water-rights transfers, and aid in water-resources planning and management within Lahontan Valley.

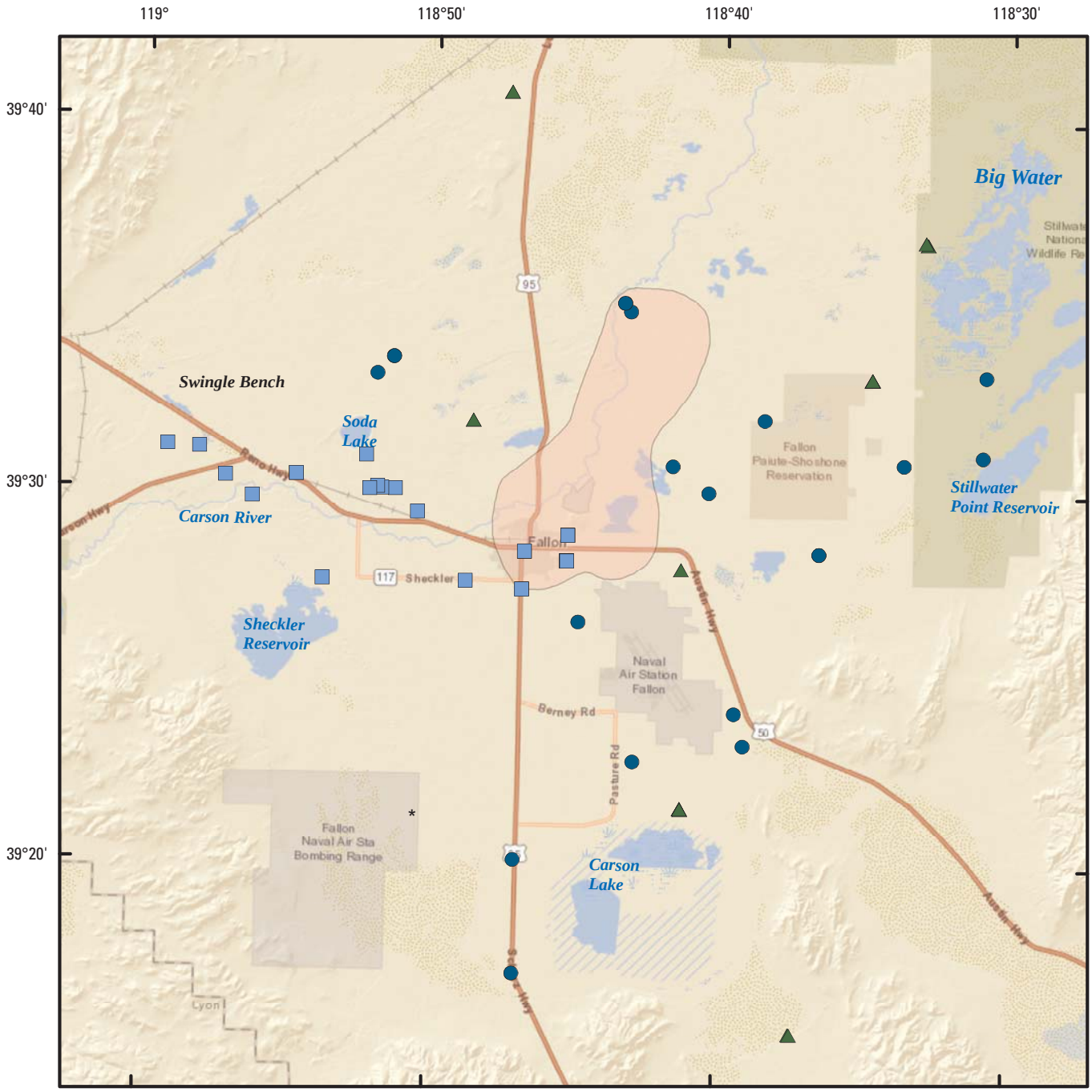

Figure 7. Location and measurement frequency of USGS monitoring wells, Lahontan Valley, NV.

References

Glancy, P.A., 1986. Geohydrology of the basalt and unconsolidated sedimentary aquifers in the Fallon Area, Churchill County, Nevada: U.S. Geological Survey Water-Supply Paper 2263.

Lico, M.S., and Seiler, R.L, 1994. Ground-water quality and geochemistry, Carson Desert, Western Nevada: U.S. Geological Survey Open-File Report 94-31.

Maurer, D.K., Seiler, R.L., Watkins, S.W. 2004. Evaluation of U.S. Geological Survey Monitoring-Well Network and Potential Effects of Changes in Water Use, Newlands Project, Churchill County, Nevada. U.S. Geological Survey Scientific Investigations Report 2004-5246.

Seiler, R.L. Allander, K.K. 1993. Water-Level Changes and Directions of Ground-Water Flow in the Shallow Aquifer, Fallon Area, Churchill County, Nevada. U.S. Geological Survey Water-Resources Investigations Report 93-4118.

Simonds, J. 1996. The Newlands Project. U.S. Bureau of Reclamation Report. Available from http://www.usbr.gov/projects//ImageServer?imgName=Doc_1305124117489.pdf

Welch, A.H., Maurer, D.K., Lico, M.S., McCormack, J.K. 2005. Characterization of Surface-Water Quality in the S-Line Canal and Potential Geochemical Reactions from Storage of Surface Water in the Basalt Aquifer near Fallon, Nevada.

Smith, D.W., Buto, S.G., and Welborn, T.L., 2016, Groundwater-level change and evaluation of simulated water levels for irrigated areas in Lahontan Valley, Churchill County, west-central Nevada, 1992–2012: U.S. Geological Survey Scientific Investigations Report 2016-5045, 23 p., http://dx.doi.org/10.3133/sir20165045.

U.S. Geological Survey. 2018. National Water Information System: Web Interface. Available from http://waterdata.usgs.gov/nwis

TOTAL ESTIMATED PROJECT COST: $99,060
AMOUNT REQUESTED FROM CWSD $5,630 in FY19 and $23,220 over 4 years.

SOURCE OF OTHER FUNDS:

Total cost for the project is $99,060 for four years of monitoring, with $23,220 requested from Carson Water Subconservancy District over the duration of the project. Potential funding will be augmented with an agreement from Churchill County, approved Febuary 1st, 2018, to achieve the stated objectives. Pending the availability of federal matching funds, it is anticipated that funds provided by the CWSD and Churchill County will be matched by the USGS (table 1).

Table 1. Total costs for proposed work.

Cooperator	State Fiscal Year				Cooperator Total
	2019	2020	2021	2022	
CWSD	$ 5,630	$ 5,800	$ 5,860	$ 5,930	$ 23,220
Churchill County	$ 5,630	$ 5,800	$ 5,860	$ 5,930	$ 23,220
NAS Fallon	$ 1,480	$ 1,500	$ 1,560	$ 1,630	$ 6,170
USGS	$ 11,260	$ 11,600	$ 11,720	$ 11,870	$ 46,450
Total	$ 24,000	$ 24,700	$ 25,000	$ 25,360	$ 99,060

ESTIMATED DATE PROJECT TO BEGIN: July 1st, 2018

ESTIMATED TIME TO COMPLETE PROJECT: 4 years, project end date is June 30th, 2022

PERMIT REQUIREMENTS: Approvals for monitoring and sampling of non-USGS groundwater wells will follow USGS protocol.

SIGNED: D. S. Smith

NAME: David Smith

TITLE: Hydrologist - USGS

DATE: 2/1/2018

CARSON WATER SUBCONSERVANCY DISTRICT
REQUEST FOR FUNDING

APPLICANT: Carson City Public Works
Name

3505 Butti Way
Address

Carson City	Carson City	NV	89703
City	County	State	Zip Code

dbruketta@carson.org — Email
(775) 283-7357 — Telephone #

APPLICANT'S AGENT (if different from Applicant):

David Bruketta – Utility Manager
Name

Same as above
Address

City	County	State	Zip Code

Email — Telephone #

PROJECT NAME: Regional Benefits of Seepage from the Brunswick Canyon Reservoir into the Carson River.

PROJECT LOCATION/ADDRESS: The Brunswick Canyon Reservoir is located approximately 5.5 miles east of downtown Carson City. The reservoir lies entirely within Section 18, Township 15 North, Range 21 East, of the Mount Diablo base meridian. The known springs seeping from the reservoir are located within Sections 7, 18 & 19 of Township 15 North, Range 21 East.

PROJECT DESCRIPTION: Briefly describe the project. Provide maps, drawings, photographs or other information. Additional sheets may be attached.

The Brunswick Canyon Reservoir stores reclaimed water produced by the Carson City Water Resource Recovery Facility during the non-irrigation season. Seepage from the reservoir has occurred since the dam and related improvements became operational in 1988. Geotechnical investigation undertaken during the preliminary and final design of the dam indicated that seepage from the reservoir would be minimal, likely consisting of small quantities during the initial filling of the reservoir for a year or two to fill surface voids. Based on these investigations, lining of the

reservoir area was deemed to be unwarranted. The final design of the dam included a clay core in the dam and the injection of grout in the dam abutments to control seepage through and around the dam. Monitoring of test wells installed during the construction of the dam indicates that seepage through the dam and abutments has been minimal. However, seepage from the reservoir has occurred since its initial filling resulting in the development of three areas of springs, two of which discharge directly to the Carson River (fig. 1). The spring discharges are permitted through an NPDES permit.

A significant portion of the reclaimed water pumped to the reservoir is lost due to factors such as evaporation and seepage. Some of the seepage surfaces as springs prior to discharge into the Carson River. This surface water is of high quality and discharges throughout the year. The remainder of the lost seepage presumably enters the deeper Carson River groundwater aquifer and gradually reenters the Carson River downstream from the reservoir. Both the direct spring discharges and the deeper groundwater discharges provide regional benefits for the Carson River and downstream users.

The purpose of this project is to quantify the amount of reclaimed water that enters the Carson River through spring discharges and deeper groundwater discharges, to identify current and future beneficial uses, and identify in-stream benefits as the springs effluent is at times the primary source of in-stream flow in the Carson River downstream from the Brunswick Canyon Reservoir. Options to be evaluated include exchanges in water rights, inter-basin transfers of potable water and planning level identification of monetary and non-monetary benefits. For example, Carson City and Lyon County currently have an agreement to exchange potable water which could be expanded to be a mechanism for the facilitation of water transfers between basins. The evaluation will include estimating planning level monetary and non-monetary benefits along with costs for the options considered. Non-monetary benefits will be identified for beneficial uses defined in NAC 445A.122 (Standards applicable to beneficial uses). The project plans to use various flow monitoring devices, reservoir level indicators, storage-capacity curves, and water balance principles to quantify the amount of reclaimed water the enters the Carson River through spring discharges and deeper groundwater discharges.

PROJECT GOALS AND BENEFITS: Briefly describe the project goals and benefits to be realized if the project is implemented. Additional sheets may be attached.

This project will quantify the amount of reclaimed water that enters the Carson River through spring discharges and deeper groundwater discharges, identify current and potential future Carson River Basin regional uses of reclaimed water and quantify monetary and non-monetary benefits of these uses. It will evaluate these uses for current conditions and for alternative Carson City population build-out scenarios. The benefits and costs information of these alternatives will be significant input to Carson City and regional water planners as water resource management plans are developed for the Carson River Basin in the future.

TOTAL ESTIMATED PROJECT COST: $ 90,000

AMOUNT REQUESTED FROM CWSD: $ 50,000

SOURCE OF OTHER FUNDS: List all other sources of funds to be used to match funds requested from CWSD. List the provider of the matching funds and the amount requested from each provider.

A $40,000 contribution would be made by the Carson City Sewer Utility Fund, Professional Services account.

ESTIMATED DATE PROJECT TO BEGIN: August 1, 2018

ESTIMATED TIME TO COMPLETE PROJECT: March 1, 2019

PERMIT REQUIREMENTS: If your project requires a permit, license and/or approval from a governmental agency to proceed, please provide the current status of each requirement. If approval has not been requested or is in progress, please provide the estimated date on which approval can be expected.

No permits or approvals required.

OTHER INFORMATION: Provide any other information that may be important to the approval of this application.

None

SIGNED: _____

NAME: Darren Schulz

TITLE: Public Works Director

DATE: February 2, 2018

THE CARSON WATER SUBCONSERVANCY DISTRICT RESERVES THE RIGHT TO DENY ANY AND/OR ALL APPLICATIONS FOR FUNDING.

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Legend:

SPRING

BRUNSWICK CANYON RESERVOIR
SPRING LOCATION MAP

FIGURE

1

CARSON WATER SUBCONSERVANCY DISTRICT
REQUEST FOR FUNDING

APPLICANT: United States Geological Survey
2730 North Deer Run Rd.
Carson City, Nevada 89701

APPLICANT'S AGENT (if different from Applicant):

Angela Paul and Ramon Naranjo
2730 North Deer Run Rd.
Carson City, Nevada 89701
appaul@usgs.gov
775-887-7697

PROJECT NAME: Collection of arsenic and associated geochemical data important to occurrence and mobility of arsenic in groundwater used for public supply in southern Carson Valley, Douglas County, Nevada

PROJECT LOCATION/ADDRESS: Southern Carson Valley, Douglas County, Nevada

PROJECT DESCRIPTION: Arsenic and associated geochemical samples will be collected from a total of nine wells surrounding three selected public supply wells in southern Carson Valley. Selection of sampling area(s) will be made in consultation with water municipalities. Samples will be collected to represent the shallow (≤100 ft penetration depth), moderate (100 to 300 ft penetration depth), and deep (≥300 ft penetration depth) portions of the aquifer. Samples will be analyzed for general chemical characteristics (temperature, dissolved oxygen, pH, specific conductance, and alkalinity) and for arsenic and iron speciation. In addition to arsenic and iron, samples will be analyzed for ammonia, chloride, manganese, nitrate, nitrite, phosphate, sulfate, and dissolved organic carbon, which are important for understanding arsenic mobility.

PROJECT GOALS AND BENEFITS:

Municipal-supply wells in northern Carson Valley have been decommissioned largely due to the presence of arsenic concentrations above the current drinking-water standard of 10 µg/L. To continue to supply the public with water, Douglas County has been relying on water produced from public supply wells in Minden. Due to projected increases in municipal demand, water resource managers are concerned that increasing pumping rates from wells in Minden may change groundwater chemistry and(or) potentially degrade the resource; in particular, there is concern with eventually pulling in arsenic enriched groundwater to these wells. In some wells, pump rate has appeared to influence the concentration of arsenic in groundwater (Brett Reid, 2016, Douglas County Public Utility District, personal communication).

In 2016, the USGS and Carson Water Subconservancy District evaluated the distribution and availability of existing arsenic data in groundwater in southern Carson Valley. The findings of that study indicated that additional arsenic and geochemical data related to arsenic occurrence and mobility are needed to refine characterizing the vulnerability of public supply wells to arsenic contamination. Additional arsenic concentration and associated physical and geochemical data (such as dissolved oxygen, temperature, pH, conductance, phosphate, and water level) are needed by scientists and water resource managers to properly evaluate the risk of arsenic transport to public-supply wells with increasing pumping rates in the southern valley.

During 2017, the Town of Minden Utilities Division has continued monitoring public supply wells as required by the Nevada Division of Environmental Protection (Jeff Cady, January 09, 2018, Town of Minden, Water Operations Manager, personal communication); samples for arsenic are collected monthly from each of nine public supply wells. The proposed study will provide additional information needed to characterize the current status and geochemical conditions in the Carson Valley aquifer in the vicinity of selected public supply wells. The geochemical data are important for eventually evaluating the vulnerability of the supply wells in southern Carson Valley to arsenic. Data obtained as part of this investigation and from the water purveyors during 2017 can be used by water resource management agencies in developing appropriate management strategies in Carson Valley, Nevada.

TOTAL ESTIMATED PROJECT COST: $48,000

AMOUNT REQUESTED FROM CWSD: $30,200

SOURCE OF OTHER FUNDS:

USGS Cooperative Water Program = $16,800

USGS-Nevada Bureau of Mines and Geology collaboration study (ongoing) – arsenic speciation sample bottles, preservative, and analytical costs (including arsenic spike and arsenic blank analyses) = $1,000

ESTIMATED DATE PROJECT TO BEGIN: July 2018

ESTIMATED TIME TO COMPLETE PROJECT: June 2019

PERMIT REQUIREMENTS:

This project will require obtaining permission to sample wells from private and(or) public entities. During the initial phase of the project, project personnel will contact well owners and provide a brief summary of the study, inquire if the well owner would like to participate in the study, and obtain permission to sample their well in the event they would like to participate.

OTHER INFORMATION:

SIGNED:

NAME: Angela Paul

TITLE: USGS Nevada Water Science Center, Hydrologist

DATE: January 09, 2018

DRAFT PROJECT PROPOSAL

Collection of arsenic and associated geochemical data important to occurrence and mobility of arsenic in groundwater used for public supply in southern Carson Valley, Douglas County, Nevada

NV18-03

by

Angela Paul

U.S. Geological Survey
Water Resources Discipline
Nevada Water Science Center

January 09, 2018

INTRODUCTION

Naturally occurring arsenic is one of the most common contaminants in groundwater in the western United States (Thiros and others, 2013). The primary aquifers beneath Carson Valley are comprised largely of quaternary aged basin-fill deposits of weathered granitic and volcanic material (Maurer and others, 2009; Welch, 1994), a factor often associated with relatively high groundwater arsenic concentration (Welch and others, 1988). Conditions favorable to increasing arsenic concentrations in groundwater include, but are not limited to, proximity to arsenic bearing rocks, long groundwater flow paths, the application of phosphate containing fertilizers, and irrigation of arsenic enriched soils (Busbee and others, 2009; Anning and others, 2012). The vulnerability of groundwater resources to arsenic contamination is influenced by the physical properties of the aquifer, pumping rates, well location and screened intervals relative to the groundwater flow system, and geochemical environment (Focazio and others, 2002).

Douglas County has removed water-supply wells in northern Carson Valley from use due to relatively high arsenic concentrations (Carl Ruschmeyer, January 2013, Douglas County Public Works Director, verbal communication). To maintain the supply of water to the public, the town of Minden has increased pumping from existing public supply wells to supplement Douglas County and Carson City water resources (fig. 1). Due to increased pumping and projected increases in municipal demand, water resource managers are concerned that increasing pumping rates from Minden public supply wells may change groundwater chemistry and degrade the resource by potentially drawing in arsenic enriched water (fig. 2). Groundwater chemistry produced by public supply wells located in upgradient groundwater source areas may also be influenced by increased pumping. Groundwater pumping can lower the water table, change hydraulic gradients, deteriorate water quality, and cause changes in yield (Taylor and Alley, 2001; Bartolino and Cunningham, 2003).

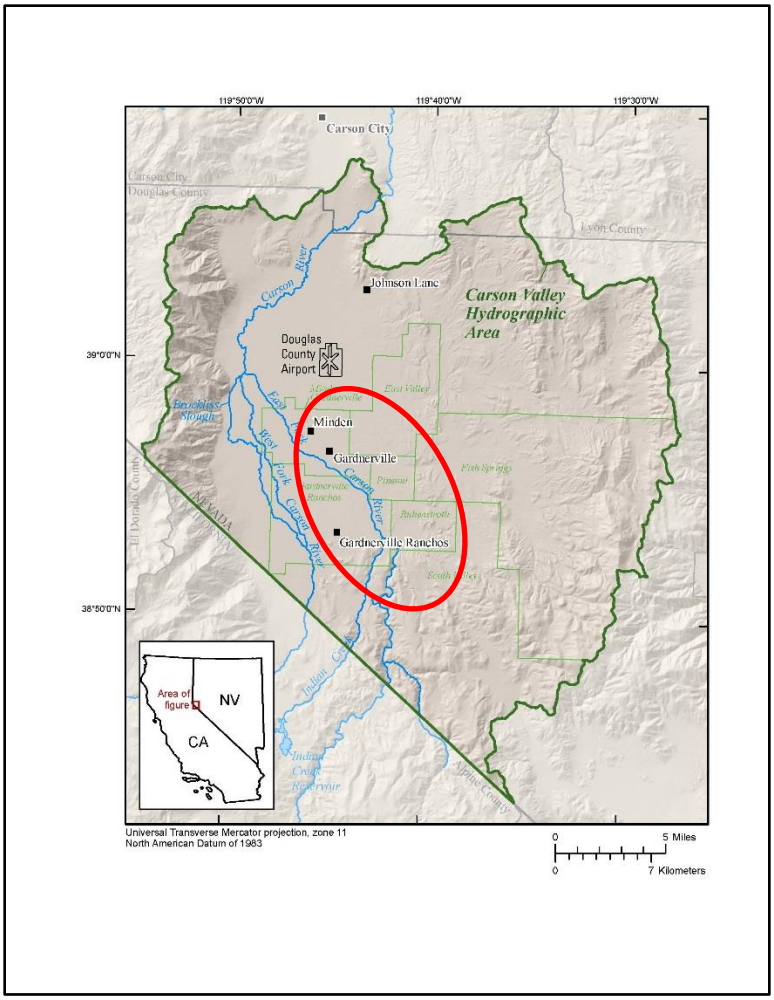
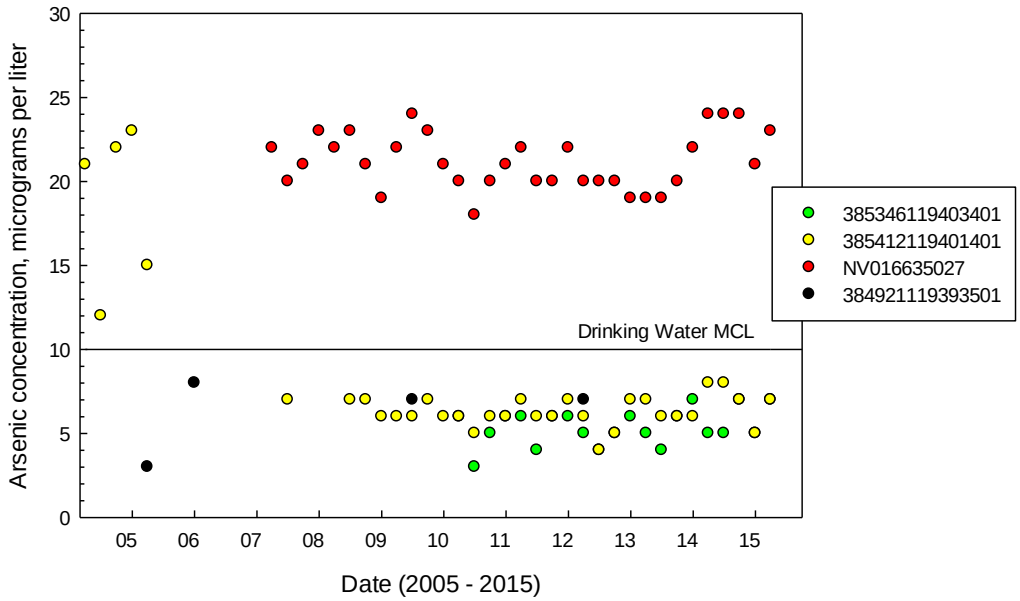


Figure 1. Location of area of focused study and subareas (outlined in light green) in Carson Valley, Nevada.

A.



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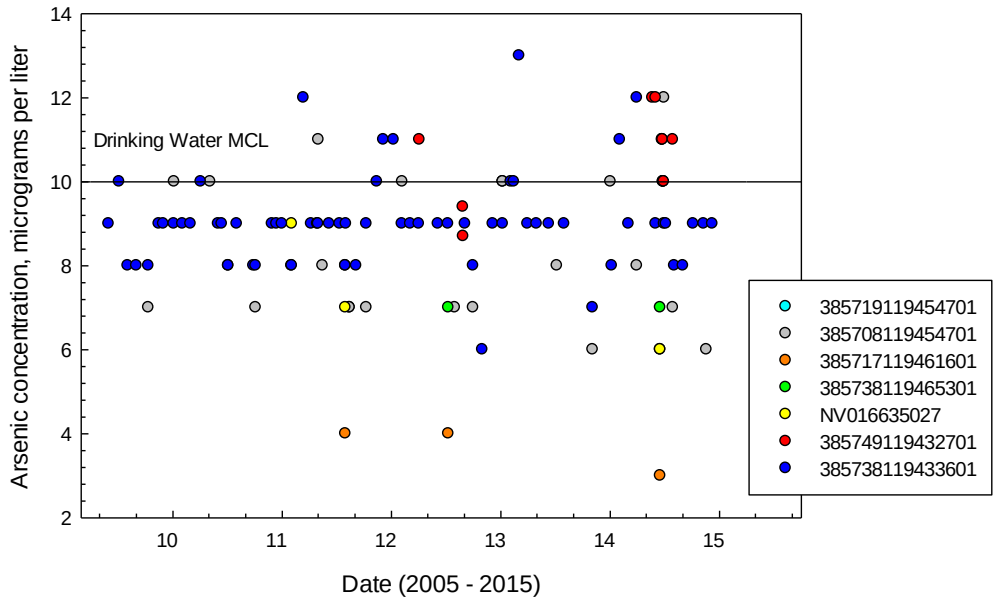

Figure 2. Arsenic concentrations in groundwater samples collected from 2005 to 2015 from select water-supply wells in southern Carson Valley. (A) Arsenic concentration in groundwater samples collected from well 385412119401401 (not used for potable supply) decreased from >10 to < 10 micrograms per liter by maintaining a pump rate equal to or less than 200 gallons per minute (Brett Reid, 2016, Douglas County Public Utility District, personal communication). (B) Generally, arsenic concentrations were below the Maximum Contaminant Level (MCL) for arsenic in water-supply wells.

Essentially, the same mechanisms that control arsenic mobility are important to consider when removing arsenic from drinking water. Traditional arsenic remediation is most effective when arsenic occurs as arsenate, As(V), largely due to the attraction of As(V) to iron oxides (Ohio Environmental Protection Agency, 2010; Paul and others, 2010; Reinsel, 2015). Arsenic mobility and transport through the subsurface is largely controlled by the interaction of groundwater with aquifer sediments. Generally, arsenite (As(III)), the reduced form of inorganic arsenic, exhibits greater mobility in groundwater than the oxidized form, As(V), largely due to the greater attraction of As(V) to aquifer sediments (Smedley and Kinniburgh, 2002). Arsenic speciation (form) is influenced by the relative reduction/oxidation (redox) condition of the aquifer environment. For example, in the vicinity of the Douglas County Airport, where arsenic speciation has been characterized, arsenic in groundwater collected at depths greater than 250 feet below land surface was found to be primarily As(III); however, in the upper 150 feet of the aquifer As(V) predominated (Paul and others, 2010). Geochemical indicators generally used to evaluate redox conditions within an aquifer include but not limited to dissolved oxygen (DO), dissolved organic carbon (DOC), iron, manganese, nitrate/nitrite, and sulfate concentrations (McMahon and Chapelle, 2008; Jurgens and others, 2009). Available data suggest that in the Minden-Gardnerville area, groundwater may largely support As(V). Groundwater in the Gardnerville Ranchos area may also largely support As(V); however, some wells may possibly contain measureable amounts of As(III). The information used to evaluate the possible aquifer redox condition and form of arsenic supported by the aquifer environment in the Minden-Gardnerville and Gardnerville Ranchos areas were based on geochemical parameters that were oftentimes not analyzed in the same sample and many redox conditions were ambiguous (Paul and others, 2017).

This project will provide necessary data for characterizing arsenic and associated geochemical parameters important to its mobility in a spatial context in the vicinity of selected water-supply wells located in Minden, Gardnerville, and Gardnerville Ranchos, southern Carson Valley, Nevada.

PROBLEM

In 2016, the USGS, in collaboration with the Carson Water Subconservancy District, compiled available arsenic and related hydrogeochemical data from the Carson Valley aquifer system for the

purpose of evaluating the sufficiency of available data for characterizing the vulnerability of public supply wells to arsenic contamination under increasing pumping stress. The major findings of this effort were (1) arsenic and associated geochemical data available since 2006 are limited and not spatially extensive (fig. 3), (2) in many cases, geochemical information is unavailable from a common sample (table 1), (3) the depth within the aquifer for which data are available is largely unknown (fig. 4), and (4) aquifer redox conditions were oftentimes ambiguous due to the lack of associated geochemical data (Paul and others, 2017).

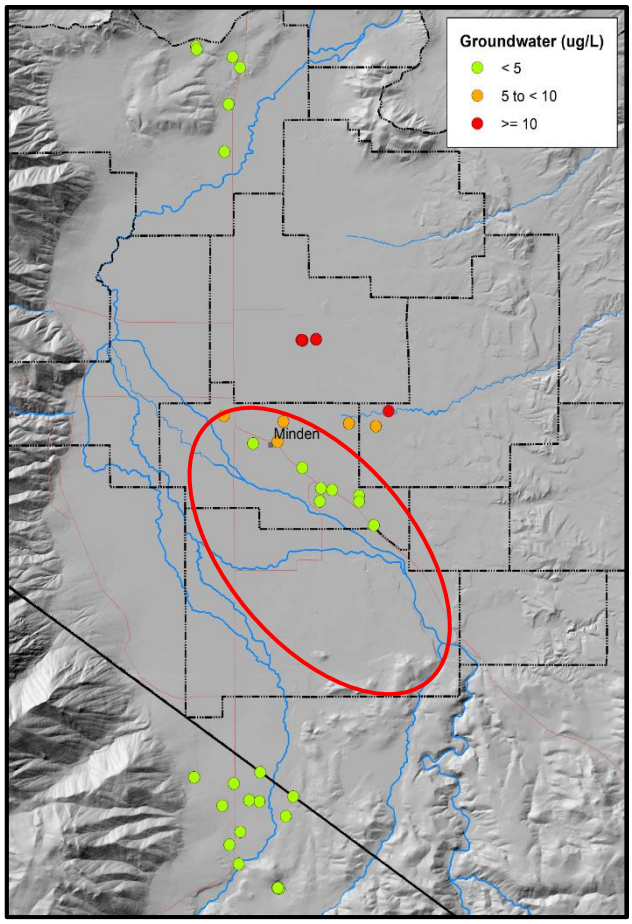

Figure 3. Arsenic concentrations determined in groundwater samples collected from Carson Valley, Nevada, 2006 through 2015. Circled area highlights the general area where increased pumping has been occurring to augment the supply of water to the northern valley areas and Carson City.

Table 1. Counts of existing geochemical data in eastern and southern Carson Valley, Nevada, from 1960 to 2015.

Subarea	Wells (#)	pH	DO	NO_3-N	Fe	Mn	SO4	PO4	WL
Minden-Gardnerville	22	20	9	14	13	12	13	11	4
Gardnerville Ranchos	12	12	8	12	12	12	12	12	9
Ruhenstroth	3	3	1	2	2	2	2	2	1
Pinenut	2	2	2	2	2	2	2	2	2
East Valley	5	5	4	4	4	4	4	4	4
South Valley	5	5	2	2	2	2	2	2	2
Fish Springs	3	3	2	3	3	3	3	3	2

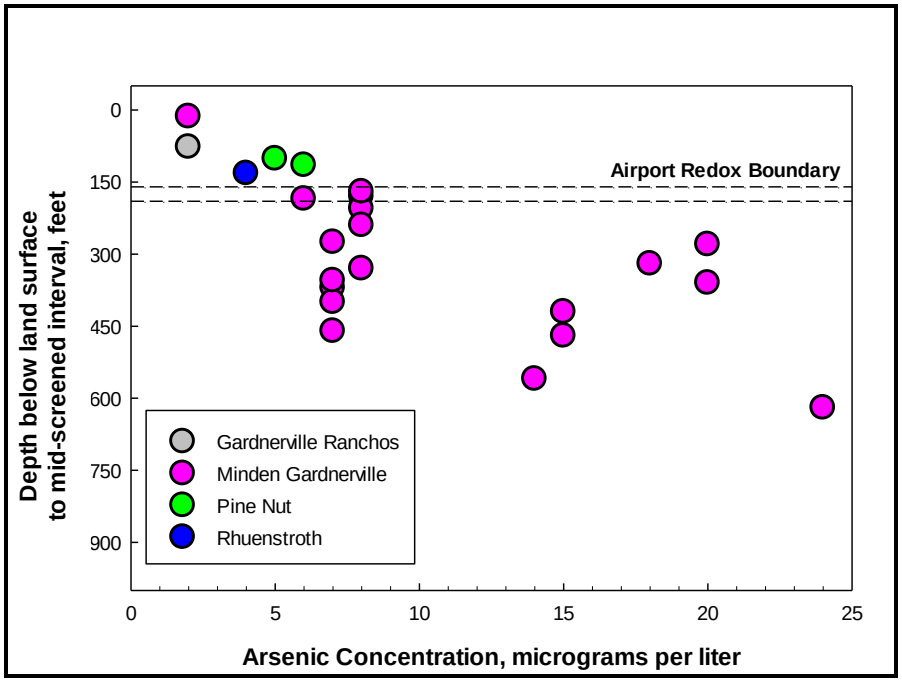

Figure 4. Generally, existing arsenic concentration data suggest that concentrations increase with depth; however, available data are limited. Of the 57 wells evaluated as part of the collaborative effort between the USGS and Carson Water Subconservancy over the period from 1960 to 2015, only 8 distributed among 4 subareas had data that could be associated with an aquifer depth interval.

Utilizing the location of water-supply and agricultural wells and pumping rates similar to those during the 2005 water year, Yager and others (2012) projected groundwater level declines would be on the order of 5 to 40 feet within the flow path toward water-supply wells operated by the Town of Minden over the next 50 years. Changes in water level could result in changes in zones within the aquifer from which the water-supply wells might intercept source water. Evaluation of the current status of arsenic and related geochemical factors important to the mobility of arsenic can be used to assess the vulnerability of water-supply wells to contamination under various pumping scenarios.

OBJECTIVES AND SCOPE

The primary objective of this study is to increase the spatial understanding of the distribution of arsenic and important geochemical information in areas surrounding select water-supply wells in southern Carson Valley by collecting groundwater samples to complement the existing dataset (2006 – 2015) and continued monitoring by water purveyors as required by Nevada Division of Environmental Protection.

The proposed work is for the collection of water chemistry data from selected wells in southern Carson Valley, Nevada. These data will provide useful information towards understanding the distribution of arsenic in the vicinity of select water-supply wells in the area. Although the data collected will provide information necessary to evaluate water-supply well vulnerability to arsenic enrichment within the southern Carson Valley area, it is outside the scope of this proposed work to actually characterize well vulnerability.

APPROACH

Groundwater samples will be collected from wells in areas surrounding select water-supply wells in southern Carson Valley. Well selection will be coordinated with water purveyor personnel from the Town of Minden, Gardnerville Water Company, and the Gardnerville Ranchos General Improvement District. Ideally, water resource management personnel will collect a similar suite of samples from key water-supply wells in order to expand the dataset. If possible, sampling should be coordinated between the USGS and water resource management districts to ensure appropriate timing of sampling and suite of geochemical analyses.

Agricultural, domestic, and(or) monitoring wells will be selected based on distribution around selected water-supply wells and well-owner permissions. The final well selection will be made based on aquifer penetration depth of the available wells in order to maximize the spatial and sampling-depth representation within the designated buffer area surrounding the selected water-supply wells. Wells not used for water supply will be sampled by USGS personnel following standard USGS sampling protocol (USGS, various dates).

Aquifer penetration depth is defined as the depth of the well minus the static water level (Anning and others, 2012). Well depth will be obtained from available drillers logs. Aquifer penetration depths will be categorized into three basic depth increments, "shallow" (≤ 100 ft into the aquifer), "moderate" (between 100 and 300 ft into the aquifer), and "deep" (≥ 300 ft into the aquifer). These depths were categorized based on the arsenic speciation data obtained near the Douglas County Airport (Paul and others, 2010). A total of nine wells in the southern Carson Valley will be sampled for field parameters, inorganic constituents, and dissolved organic carbon. Ideally, three wells within each 4 square mile (mi^2) buffer area surrounding a selected water-supply well will be sampled. In the event that obtaining permission to sample domestic wells is difficult, the buffer area may need to be extended to ensure that three wells at the various penetration depths are available for sampling. Consideration will be given to well location in relation to the general groundwater flow path in the area (Yager and others, 2012; Maurer and others, 2009; fig. 5).

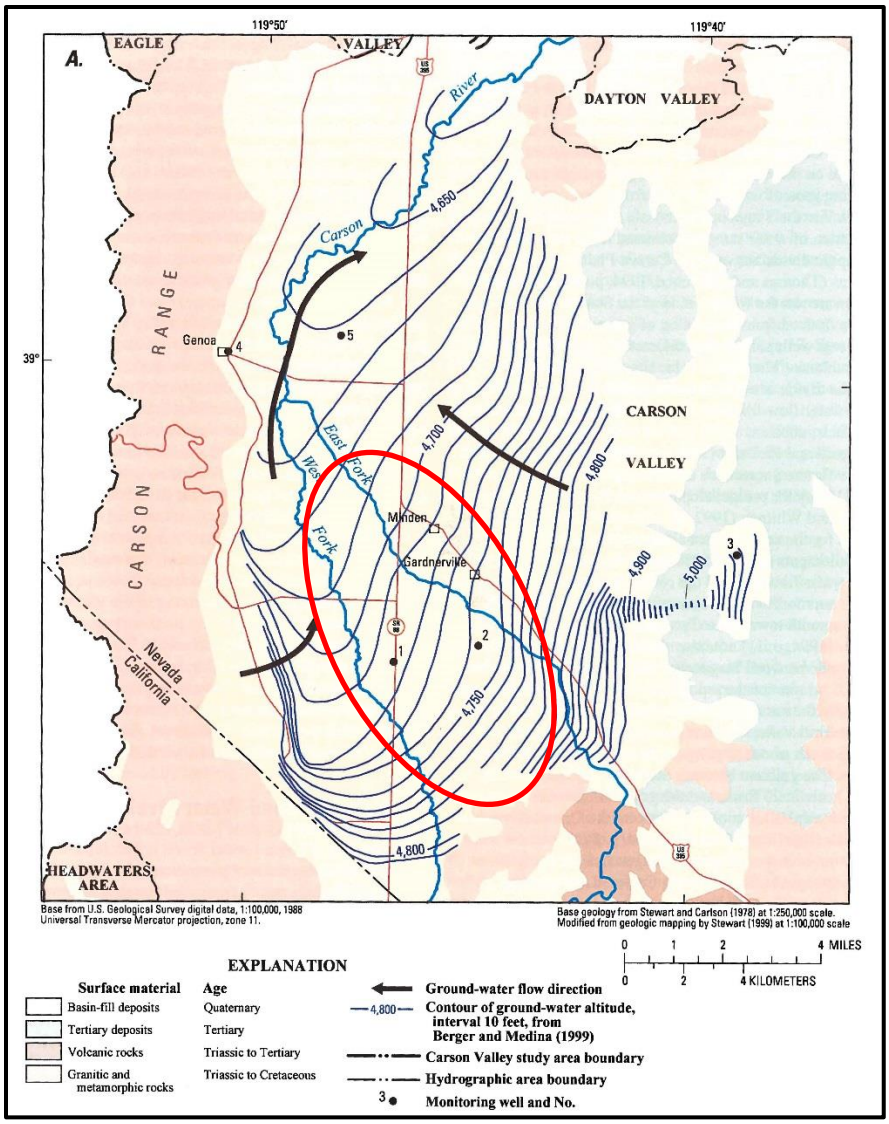

Figure 5. Geology and general directions of groundwater flow in Carson Valley, Nevada (Maurer and others, 2009). Direction of groundwater flow may have changed where water levels have substantially changed over time (Maurer and others, 2009). Circled area indicates general area of proposed study.

Inorganic sample analyses will include arsenic and iron speciation. Other geochemical information that will be collected include temperature, pH, dissolved oxygen, specific conductance, alkalinity, orthophosphate, dissolved phosphorus, ammonia, nitrate, nitrite, manganese, sulfate, chloride, and dissolved organic carbon. Samples will be analyzed by USGS Nevada Water Science Center Staff (alkalinity, DO, pH, specific conductance and temperature),

the USGS National Water Quality Laboratory (ammonia, arsenic speciation, chloride, manganese, nitrate, nitrite, DOC, orthophosphate, dissolved phosphorus, and sulfate) and National Research Laboratory, Boulder, Colorado (iron speciation).

QUALITY ASSURANCE

Inorganic and dissolved organic carbon field blanks will be processed at a randomly selected site to evaluate influences sampling environment and transport may have on analytical results. In the event that a particular analyte is found in measureable quantities in the field blank, the detection(s) will be evaluated in context with the environmental concentration(s) for the analyte(s). For instance, if blank concentrations exceed 10 percent of the median environmental sample concentration for an analyte, environmental concentrations will be reported in context with blank concentration information for the particular analyte found in the blank. All analyte detections found in blank samples will be reported.

Three sequential replicate samples will be collected for inorganic constituents and dissolved organic carbon analyses. One replicate will be collected at a well representing each of the three penetration depth categories. The replicate samples will be collected to provide an understanding of the representativeness and possible variability in geochemical conditions for the wells being sampled as part of this investigation.

Three matrix spike samples will be collected for inorganic constituent analyses. The "matrix" refers to the entire chemical makeup of the groundwater that includes chemical aspects not necessarily included in laboratory analyses. One matrix spike will be collected at a well representing each of the three penetration depth categories. The matrix spikes will be collected to provide an evaluation of any possible matrix effects on the analytical results for the groundwater sampled as part of this investigation.

Water chemistry data will be quality assured by verifying redox sensitive constituent concentrations to dissolved oxygen and other redox sensitive constituents, such as arsenate, arsenite, DO, ferric and ferrous iron, and nitrate, nitrite, and ammonia, for consistency within a given sample. For example, if DO concentrations are relatively high and nitrate dominates the

nitrogen-containing nutrient analyses, one would expect iron (Fe) and arsenic (As) to occur primarily in their oxidized states, Fe(III) and As(V), respectively.

DATA MANAGEMENT PLAN

Generally, the groundwater samples that will be collected as part of this study will be analyzed for a suite of constituents commonly evaluated in many USGS studies. Arsenic and iron speciation analyses are less common; however, parameter codes currently exist for these data and therefore no parameter codes will have to be created as part of this study. Data will be stored in the USGS National Water Information System (NWIS) Database. All data will be made publically available through NWISWeb.

PRODUCTS

Arsenic and related geochemical data will be the primary product for this project. Data will be quality assured, as described above in the Quality Assurance section of the proposal, and stored in the USGS NWIS Database where it is publically available. USGS scientists will present a summary of the data to the cooperator and other interested parties in the form of a USGS reviewed and approved PowerPoint presentation.

TIMELINE

This project consists of four main tasks: (1) inventorying available wells within possible aquifer penetration depth categories from the Nevada State Engineers Office Well Log Database, (2) canvassing for permissions to sample wells within a 4 mi^2 buffer area surrounding each of the selected water-supply wells, (3) collect samples from selected wells in coordination with water purveyor sampling efforts, (4) quality assure collected data, and (5) publish data in the USGS NWIS Database and summarize the data by means of a presentation to the cooperator, other stakeholders, and interested parties.

BUDGET SUMMARY

Total funding required for this 1-year project is $48,000 with the NVWSC contributing $16,800 towards the completion of the work through the Cooperative Water Program. The USGS is currently collaborating with the Nevada Bureau of Mines and Geology (NBMG) evaluating the occurrence of arsenic within the State of Nevada's groundwater resources. Supplies and analyses

associated with arsenic speciation can leveraged with funds available as part of the collaborative effort between the USGS and the NBMG. The ability of the NVWSC to contribute Federal funds is through enabling legislation of the Cooperative Water Program. The annual funding for this project is itemized in Table 2. Labor costs reflect those required for well selection, obtaining permissions to sample wells (canvassing), sample collection, quality assurance and control assessments, identification of spatial and temporal data characteristics, and final presentation of the data summary to the cooperator, stakeholders, and interested parties.

Table 1. Schedule of tasks for the collection of groundwater samples for the determination of arsenic concentrations and related geochemical parameters near select water-supply wells in southern Carson Valley, Douglas County, Nevada, 2018-2019.

No.	Task	FY 2018				FY2019			
		1	2	3	4	1	2	3	4
1	Inventory of available wells from Nevada State Engineers Database				x	x			
2	Canvass for permissions to sample wells within designated buffer areas				x	x			
3	Collect samples from selected wells					x	x		
4	Provide presentation						x	x	

Table 2. Budget itemized by cost categories (gross funds) for the collection and analyses of groundwater samples from areas surrounding water-supply wells in southern Carson Valley, Douglas County, Nevada, 2018-2019.

Cost Category	FY18	FY19
Project Management	800	1,800
Well Inventory	2,500	1,200
Well Canvassing	--	6,200
Sample Collection	--	15,000
Laboratory	--	12,400
GIS Support	--	3,050
Database	--	2,550
Presentation	--	2,500
Total	**$3,300**	**$44,700**
USGS Funding	$1,155	$15,645
USGS collaborative project	--	$1,000
Carson Water Subconservancy District	$2,145	$28,055

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CARSON WATER SUBCONSERVANCY DISTRICT
REQUEST FOR FUNDING

APPLICANT: Sierra Nevada Journeys
Name
190 East Liberty Street
Address

Reno	Washoe	NV	89501
City	County	State	Zip Code

Carol@SierraNevadaJourneys.org 916-591-9988
Email Telephone #

APPLICANT'S AGENT (if different from Applicant):

_____
Name
_____
Address

_____	_____	_____	_____
City	County	State	Zip Code

_____ _____
Email Telephone #

PROJECT NAME: Providing Family Watershed Nights for Carson River Watershed Communities

PROJECT LOCATION/ADDRESS: Five (5) schools in Carson City, Minden, and/or Douglas counties

PROJECT DESCRIPTION: Briefly describe the project. Provide maps, drawings, photographs or other information. Additional sheets may be attached.

Funding from the Carson Water Subconservancy District (CWSD) will serve over 500 children and their parents in communities within the Carson River Watershed with five community-building and educational events called Family Watershed Nights (FWN). FWNs invite K-6 students, their parents, and siblings to attend a fun, family-friendly evening which provides watershed education at the family level and reinforces STEM concepts learned in the classroom. Through hands-on activities, participants will gain a sense of ownership and stewardship for the health of their community watershed.

See attached for further information.

PROJECT GOALS AND BENEFITS: Briefly describe the project goals and benefits to be realized if the project is implemented. Additional sheets may be attached.

Through programs led by SNJ's credentialed science teachers and with the assistance of our volunteer program, we will be successful in meeting the following goals:

1. Provide five watershed family events for five schools within the Carson River Watershed including Carson City, Minden, and/or Douglas counties;
2. Assess, evaluate, and refine watershed stations that are provided to all participants.
3. Engage 500 individuals (students, parents, and siblings) in hands-on watershed-themed activities; and,
4. 100% of participants will gain hands-on experience with:
    a. Various watershed models;
    b. Defining current issues impacting the Carson River Watershed; and,
    c. Identifying solutions and ideas for helping to protect local watersheds.

See attached for project benefits.

TOTAL ESTIMATED PROJECT COST: $5,095
AMOUNT REQUESTED FROM CWSD: $3,800

SOURCE OF OTHER FUNDS: List all other sources of funds to be used to match funds requested from CWSD. List the provider of the matching funds and the amount requested from each provider.

Air Quality Management Division via the Washoe County School District: $1,295

ESTIMATED DATE PROJECT TO BEGIN: August 2018

ESTIMATED TIME TO COMPLETE PROJECT: June 2019
(If completion date is greater than a year, please indicate how much funding is needed in each fiscal year.)

PERMIT REQUIREMENTS: If your project requires a permit, license and/or approval from a governmental agency to proceed, please provide the current status of each requirement. If approval has not been requested or is in progress, please provide the estimated date on which approval can be expected. Additional sheets may be attached.

N/A

OTHER INFORMATION: Provide any other information that may be important to the approval of this application.

If funded, the CWSD will be highlighted as a sponsor of the five Family Watershed Nights. The sponsorship attribution will read: "Family Watershed Night sponsored by the Carson Water Subconservancy District." SNJ will also distribute the Carson River Watershed Map to all participating students and families. SNJ and participating schools promote the event utilizing flyers and social media channels; the CWSD will be recognized by thousands of school and community members. If interested, CWSD volunteers are needed and welcome to assist at the various activity stations during the evening. CWSD will be thanked publically from the podium and if an official representative is present, can join SNJ staff at the podium in welcoming students and their families to the event. If desired, CWSD can once again have a designated table and offer their own activity during the event.

SIGNED: 

NAME: Carol Maytum

TITLE: Grants Manager

DATE: February 1, 2018

THE CARSON WATER SUBCONSERVANCY DISTRICT RESERVES THE RIGHT TO DENY ANY AND/OR ALL APPLICATIONS FOR FUNDING.

Providing Family Watershed Nights for Carson River Watershed Communities

A Proposal to the Carson Water Subconservancy District

Project Description (continued)

Through funding from the Carson Water Subconservancy District (CWSD), Sierra Nevada Journeys (SNJ) will deliver five Family Watershed Nights (FWN) to schools located in Carson City, Minden, and/or Douglas counties. FWNs target K-8 students and their families, offering an exciting 1.5 hour event that fosters engagement, curiosity, innovation, and teamwork, all centered on the STEM fields and watershed education. Students and their parents and siblings attend this family event at no charge and enjoy various activity stations that include mini-challenges and family-based team projects.

Most recently, CWSD funded the delivery of four FWNs featuring watershed-focused mini-challenges where participants also receive the Carson River Watershed Map. Area teachers, students and families have expressed gratitude for the CWSD's support of this program and SNJ hopes this partnership will continue. With funding from CWSD, SNJ will work to serve an increased number of schools as well as assess, evaluate, and refine current watershed-focused stations.

SNJ will measure the success of these Family Watershed Nights by the number of attendees, engagement of the participants, and feedback from the educators at the school sites. Students are evaluated by the worksheets they complete with their family during the event often for extra credit by their teacher.

SNJ Family Nights are an established program offering. We have successfully conducted several hundred Family Nights in northern Nevada over the last eight years with participation ranging between 50-250 attendees at each event. Our program consistently receives high marks from parents, students, teachers, and principals for being fun, professional, and informative.

Project Benefits (continued)

In our own pre-assessments, we have found that only 17% of students could 1) list one way to protect their own watershed and 2) describe why it would be helpful. This illustrates that children are not learning about local issues facing their watersheds. A recent national study from The Nature Conservancy might reveal why. The report notes that students who have had a personal experience in nature are increasingly uncommon: "The vast majority of today's children use a computer, watch TV, or play video games on a daily basis, but only about 10 percent say they are spending time outdoors every day." And yet, students who have experienced nature are:

- Significantly more likely to express concern about water pollution, air pollution, global warming, and the condition of the environment;
- More than twice as likely to "strongly agree" that protecting the environment is "cool";
- More than twice as likely to consider themselves a "strong environmentalist,"; and
- Substantially more likely to express interest in studying the environment in college, working in a job related to nature, or joining an environmental club at their school. [1]

Through SNJ's interactive and engaging programs we focus on teaching through nature and encourage local youth and their families to have meaningful experiences outdoors, thereby increasing their likelihood to value nature, engage with it, and feel empowered to care for it. Moreover, FWNs successfully teach children and their families about specific local issues facing the Carson River Watershed and actions they can take to prevent further degradation of this river ecosystem.

We know that parent engagement is critical to student success, particularly in low-income homes. Children from diverse cultural backgrounds tend to do better when parents and professionals collaborate to bridge the gap between the culture at home and the learning institution. Schools and teachers need support in reaching out to the families of their students. This is where Sierra Nevada Journeys can help bridge the gap. Family Watershed Nights address a crucial concern and provide knowledge and awareness of water issues at the family level.

Our initiative helps engage students and their families by encouraging them to adopt environmental stewardship practices aimed at reducing point-source water pollution. Through fun and hands-on activities, students and their families learn more about their local watershed and become better stewards of the Carson River. Beyond the environmental impact, SNJ's Watershed Family Nights also:

- Involve parents in their child's education, regardless of their own education level, ethnicity, and socio-economic status;
- Use hands-on science as the vehicle for exploration, which provides a language-neutral context;
- Provide a meaningful family activity that is linked to learning, building on parent's instinctual desire to help their child's academic success;
- Help forge a sense of trust between the school and the families, encouraging families to become involved in their child's school; and,
- Provide a means for the local community to engage in helping support low-income children and their success in learning.

In addition to our qualified staff with a combined teaching experience of over 25 years, we also have a volunteer model in place in which we can seamlessly integrate volunteers into our Family Watershed

[1] The Nature Conservancy, Connecting America's Youth to Nature, 2012 Retrieved from: http://www.nature.org/newsfeatures/kids-in-nature/youth-and-nature-poll-results.pdf

Night. A rich experience for the volunteers, assisting at an SNJ Family Night provides another interaction point between the community and the school.

Accomplishments through 2017 CWSD Funding

Thanks to funding from CWSD, SNJ has completed four Family Watershed Nights. Information below includes income level at each school using statistics from the National School Lunch Program (NSLP), a federally funded program that provides free/reduced cost meals to low-income families.

The completed FWNs took place:

- September 14, 2017 at Gardnerville Elementary (37% of students are eligible for NSLP)
- October 25, 2017 at JC Fremont Elementary (60% of students are eligible for NSLP),
- November 16, 2017 at Bordewich Bray Elementary (55% NSLP eligible), and
- December 5, 2017 at Scarselli Elementary (36% NSLP eligible).

During the Family Watershed Night, students, their parents, and siblings participated in an interactive 1.5 hour event that included mini challenges (solved at family's own pace/interest level) and then a family-based competitive challenge. Attendees explored various watershed models and defined and discussed solutions for issues impacting the Carson River Watershed. 575 total participants were impacted during the 4 Family Watershed Nights! This included students, their parents, and any siblings that came along.

SNJ Family Watershed Nights

SNJ Family Night Components	Price/Night	# of Nights	Amount	SNJ Match	CWSD
Site and Personnel Coordination	$180	5	$900	$0	$900
Program Delivery	$450	5	$2,250	$0	$2,250
Management Time	$120	5	$600	$600	$0
Transportation	$39	5	$195	$195	$0
Supplies	$100	5	$500	$500	$0
Subtotal:			**$4,445**	**$1,295**	**$3,150**

Watershed Components	Amount	SNJ Match	CWSD

CARSON WATER SUBCONSERVANCY DISTRICT
REQUEST FOR FUNDING

APPLICANT: American Rivers
120 Union St
Nevada City, Nevada County, California, 95959
jfair@americanrivers.org (530) 478-0206 x206

APPLICANT'S AGENT (if different from Applicant):
Not Applicable

PROJECT NAME: Beaver Education in the Carson River Watershed

PROJECT LOCATION/ADDRESS: Hope Valley and Faith Valley Meadow
Blue Lakes Rd, Alpine County, California

PROJECT DESCRIPTION: Briefly describe the project. Provide maps, drawings, photographs or other information. Additional sheets may be attached.

The proposed project will organize a set of educational workshops addressing the role of beaver in meadow and floodplain ecosystems. The goal will be to educate agencies, stakeholders and local community members about the ecological benefits of beaver, to dispel misperceptions and provide options for management that are compatible with restoration goals.

Public and agency perception of beavers has been mixed over the last several decades. Early to mid-twentieth century literature asserting that beavers were not native to much of the Sierra led to their management as a non-native and nuisance species. However, a growing body of research indicates that beaver are not only native (James and Lanman, 2012) to most of the Sierra, but an integral part of floodplain ecosystems more generally. Restoration practitioners have begun to recognize the value of harnessing beaver activity in meadow and floodplain restoration efforts because beavers augment natural geomorphic processes. Beaver dams decrease peak flows, expand habitat complexity, reconnect channels to their floodplains, and increase groundwater recharge. In addition, researchers are developing better methods to manage and work with beaver to minimize conflict with human activities and maximum ecosystem benefit.

In a local context, the project assessment of the upper reach of Hope Valley Meadow conducted by Waterways Consulting in 2012 as part of the Hope Valley Meadow Restoration Project indicated that beaver dams are helping to improve the condition of Hope Valley meadow by increasing the extent of stable, vegetated streambanks. For the Hope Valley project, we were encouraged by beaver pond creation adjacent to restoration activities, only to be disappointed when the beaver dams were, apparently intentionally ripped out. Our vision for our next project in Faith Valley Meadow hinges specifically on healthy beaver habitat, existing beaver populations, and potentially beaver dam analogues to restore the meadow. Education to prevent the unnecessary active removal of beaver dams will be important for this effort.

The proposed project will host three-four educational workshops geared toward a variety of audiences. American Rivers will partner with the Humboldt-Toiyabe National Forest and Alpine Watershed Group for this effort. We would specifically like to target the downstream agricultural community and water users to dispel misconceptions about the negative effects of beaver and provide options for management that are compatible with both land use and ecological goals. We would also like to target local agency staff and restoration practitioners to provide information about new literature demonstrating the benefits of working with beaver or using techniques like beaver dam analogs for meadow and floodplain restoration. We anticipate hosting at least one field trip to Hope Valley or Faith Valley meadow. Presenters would include beaver restoration experts from Utah State University and NOAA's Northwest Fisheries Science Center,

as well as beaver dam analog implementers, such as the Scott River Watershed Council and the Nature Conservancy. See the links below for examples of similar workshops held previously:

- http://etalweb.joewheaton.org.s3-us-west-2.amazonaws.com/ICRRR/Beaver/2014/2_ManagementConservationRestorationPlannning.pdf

- https://www.fws.gov/oregonfwo/articles.cfm?id=149489624

Attachment: Map of beaver dams in Hope Valley, October 2017.

PROJECT GOALS AND BENEFITS: Briefly describe the project goals and benefits to be realized if the project is implemented. Additional sheets may be attached.

Project goals include:

- Improve the knowledge of downstream agricultural community members and water users about the ecological benefits beaver provide and beaver management options.
- Improve the knowledge of agency staff and restoration practitioners about the benefits of working with beaver and using techniques like beaver dam analogs for meadow and floodplain restoration.

Project benefits include:

- Improved management of beaver in the Carson watershed to minimized negative effects on meadow and floodplain ecosystems.
- Greater support for working with beaver and utilizing beaver dam analogs in meadow restoration projects like the Faith Valley Meadow Restoration Project.
- Regional experts engaged to collaborate on local Carson River projects.
- Best science incorporated into meadow restoration and floodplain management projects in the Carson River watershed.

TOTAL ESTIMATED PROJECT COST: $13,500
AMOUNT REQUESTED FROM CWSD: $10,000

SOURCE OF OTHER FUNDS: List all other sources of funds to be used to match funds requested from CWSD. List the provider of the matching funds and the amount requested from each provider.

California Department of Water Resources (Tahoe Sierra IRWM): $3,500

ESTIMATED DATE PROJECT TO BEGIN: July 1, 2018

ESTIMATED TIME TO COMPLETE PROJECT: 15 months.
(If completion date is greater than a year, please indicate how much funding is needed in each fiscal year.)

This timeframe would allow two field seasons for field trips, but is not essential if this poses a problem for the Carson Water Subconservancy District.

FY1 (July 1, 2018 – July 1, 2019): $8,000
FY 2 (July 1, 2019 – September 30, 2020): $2,000

PERMIT REQUIREMENTS: If your project requires a permit, license and/or approval from a governmental agency to proceed, please provide the current status of each requirement. If approval has not been requested or is in progress, please provide the estimated date on which approval can be expected. Additional sheets may be attached.

No permits are required

OTHER INFORMATION: Provide any other information that may be important to the approval of this application.

American Rivers has been working in the Carson watershed since 2011 and has strong working relationships with local partners, the Alpine Watershed Group and the Humboldt-Toiyabe National Forest.

SIGNED: Julie Fair

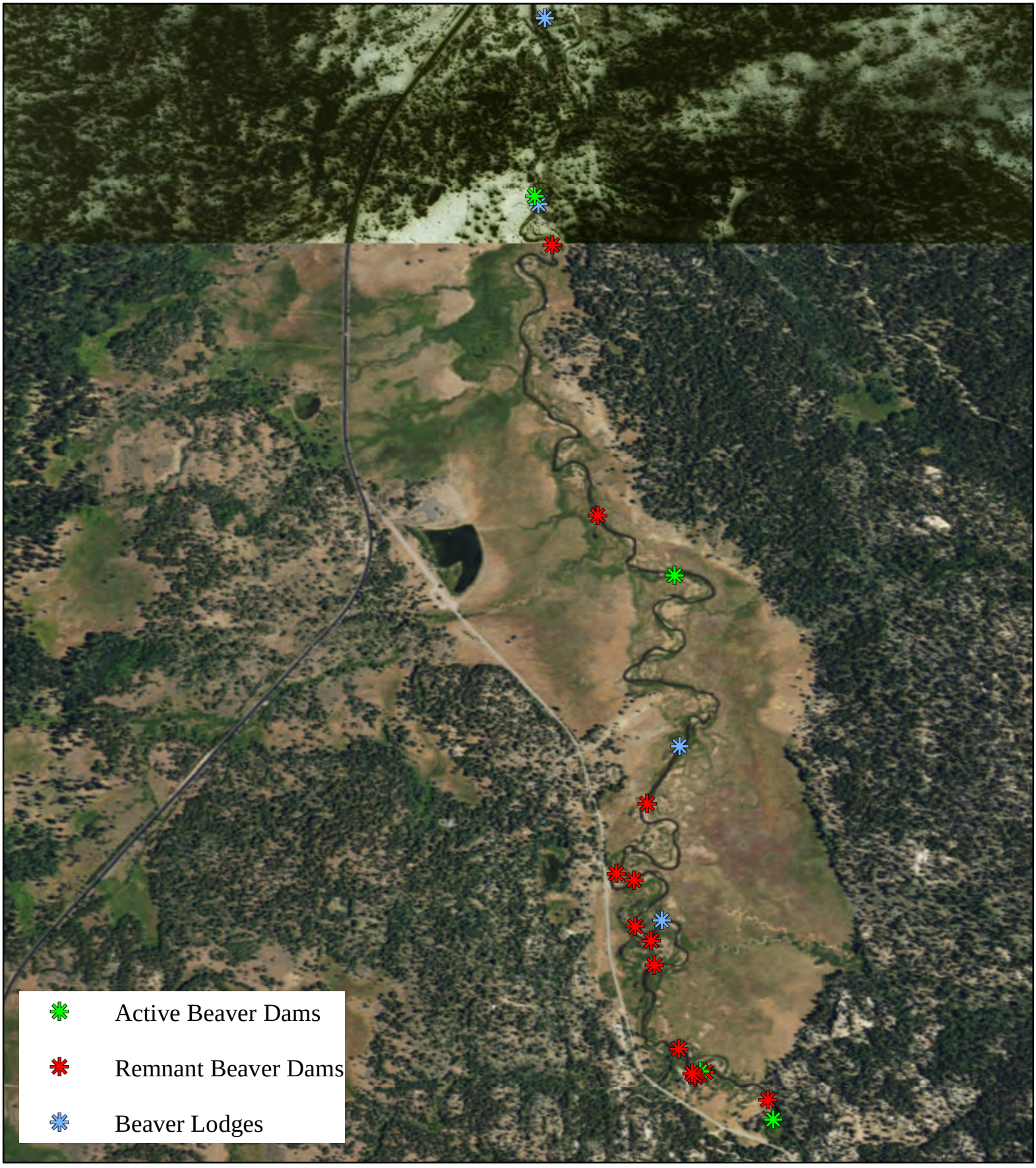
NAME: Julie Fair

TITLE: Associate Director, California Conservation

DATE: 2/1/18

THE CARSON WATER SUBCONSERVANCY DISTRICT RESERVES THE RIGHT TO DENY ANY AND/OR ALL APPLICATIONS FOR FUNDING.

Upper Hope Valley Beaver Structures
October 2017



CARSON WATER SUBCONSERVANCY DISTRICT

777 E. William St., #110A
Carson City, NV 89701
775/887-7450, fax 775/887-7457

CARSON WATER SUBCONSERVANCY DISTRICT
REQUEST FOR FUNDING

APPLICANT: __CWSD_____
Name

_____
Address

_____ _____ _____ _____
City County State Zip Code

_____ _____
Email Telephone #

APPLICANT'S AGENT (if different from Applicant):

_____
Name

_____
Address

_____ _____ _____ _____
City County State Zip Code

_____ _____
Email Telephone #

PROJECT NAME: ___Upstream Storage Evaluation_____

PROJECT DESCRIPTION: Briefly describe the project. Provide maps, drawings, photographs or other information. Additional sheets may be attached.

As part of CWSD 2017 Strategic Planning Session, the CWSD Board identified the need to evaluate potential water storage sites upstream of Lahontan Reservoir as one of the top priorities. The proposed project would be to hire an engineering firm to help develop a rating matrix for evaluating potential surface and groundwater storage sites in the Carson River Watershed and then evaluate potential storage sites throughout the watershed utilizing the matrix.

PROJECT GOALS AND BENEFITS: Briefly describe the project goals and benefits to be realized if the project is implemented. Additional sheets may be attached.

This study will help identify where in the Carson River Watershed potential storage site might be located and how much water could be stored. The matrix rating will include environmental constraints, costs, storage capacity, what water would be stored, and who would benefit from the water storage.

TOTAL ESTIMATED PROJECT COST: _____$50,000_____
AMOUNT REQUESTED FROM CWSD: _____$50,000_____

SOURCE OF OTHER FUNDS: List all other sources of funds to be used to match funds requested from CWSD. List the provider of the matching funds and the amount requested from each provider.

None.

ESTIMATED DATE PROJECT TO BEGIN: _____July 1, 2018_____

ESTIMATED TIME TO COMPLETE PROJECT: ___June 30, 2019_____
(If completion date is greater than a year, please indicate how much funding is needed in each fiscal year.)

PERMIT REQUIREMENTS: If your project requires a permit, license and/or approval from a governmental agency to proceed, please provide the current status of each requirement. If approval has not been requested or is in progress, please provide the estimated date on which approval can be expected. Additional sheets may be attached.

None.

January Treasurer's Report

OTHER INFORMATION: Provide any other information that may be important to the approval of this application.

N/A

SIGNED: _____

NAME: _____

TITLE: _____

DATE: _____

THE CARSON WATER SUBCONSERVANCY DISTRICT RESERVES THE RIGHT TO DENY ANY AND/OR ALL APPLICATIONS FOR FUNDING.