



**MOJAVE DESERT SPRINGS AND WATERHOLES:  
Results of the 2015-16 Mojave Desert Spring Survey  
Inyo, Kern, San Bernardino and Los Angeles Counties, California  
November 11, 2016**

Prepared For:

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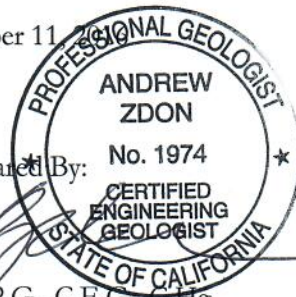
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## EXECUTIVE SUMMARY

This Spring Survey Report (Report) was prepared by Andy Zdon & Associates, Inc. (AZI) on behalf of Transition Habitat Conservancy (THC) and funders the U.S. Bureau of Land Management (BLM) and The Nature Conservancy (TNC) as part of an effort on building a greater understanding of springs in the Mojave Desert. This effort builds on similar efforts previously conducted in the Amargosa River region (Andy Zdon & Associates, 2014a, 2014b).

The Mojave Desert within California, which spans four counties, exists as one of the most important ecological regions in the southwestern United States. Both the groundwater and surface water in the region support isolated, unique and diverse ecosystems, while also supporting human needs through domestic, agricultural, wildlife, stock-watering, mining and other industrial uses. Relatively small variations in groundwater elevation can have considerable effects on the ability for springs to maintain surface flow. While isolated portions of the Mojave Desert have been investigated for site-specific projects, or larger areas studied in more densely populated areas (e.g., Mojave River area), most of the region has seen little in the way of regional hydrogeologic investigations.

Increasing pressures on the region's water resources are well-documented. Population growth in the region (particularly in the West Mojave and the Mojave River Basin), pressures for groundwater export (e.g. the proposed Cadiz Project in southeastern Mojave Desert) and ongoing and proposed renewable energy projects (e.g. in Harper Lake Valley and other proposed projects) all put pressure on an already precarious water supply in this region of sparse precipitation and limited groundwater recharge. The absence of a comprehensive dataset of spring environments across the Mojave can result in project approvals absent any data against which future impacts can be identified. With the future increase in projects such as those described, the identification of baseline hydrologic conditions before substantial impacts start occurring is essential for future water management in the Mojave Desert.

Overall, the principal objectives of this work have been to:

- Provide a comprehensive, focused resource for information on springs throughout the Mojave Desert;
- Provide greater understanding of the hydrologic and biologic conditions at these springs;
- Provides a basis for focusing future biological and hydrologic research at key locations where needed, providing long-term, more cost-effective research solutions;
- Provide a baseline conditions report from which future change can be based; and,
- Provide recommendations for future long-term monitoring and resource management.

This report summarizes the results of this work and makes recommendations for the following activities:

- Continued spring monitoring (hydrological and biological) at selected springs;
- Development of a spring monitoring plan with potential installation of limited monitoring infrastructure to provide better monitoring precision;



- Development of a spring resource management plan that is more comprehensive and regional in nature and provides guidance for incorporating monitoring data into land management decision-making.

## **1.0 INTRODUCTION**

This Report was prepared by Andy Zdon & Associates, Inc. (AZI) on behalf of Transition Habitat Conservancy (THC) and funders: the U.S. Bureau of Land Management (BLM) and The Nature Conservancy (TNC) as part of an effort on building on greater understanding of springs in the Mojave Desert. This effort builds on similar efforts previously conducted in the Amargosa River region (Andy Zdon & Associates, 2014a, 2014b).

The Mojave Desert within California, which spans four counties, exists as one of the most important ecological regions in the southwestern United States. Both the groundwater and surface water in the region support isolated, unique and diverse ecosystems, while also supporting human needs through domestic, agricultural, wildlife, stock-watering, mining and other industrial uses. Relatively small variations in the groundwater elevation can have considerable effects on the ability for springs to maintain surface flow. While isolated portions of the Mojave Desert have been investigated for site-specific projects, or larger areas studied in more densely populated areas (e.g., Mojave River area), most of the region has seen little in the way of regional hydrogeologic investigations. Many of these springs are overlooked in regional hydrologic investigations due to their small size despite their substantial importance to wildlife.

Increasing pressures on the region's water resources are well-documented. Population growth in the region (particularly in the West Mojave and the Mojave River Basin), pressures for groundwater export (e.g. the proposed Cadiz Project in southeastern Mojave Desert) and ongoing and proposed renewable energy projects (e.g. in Harper Lake Valley and other proposed projects) all put pressure on an already precarious water supply in this region of sparse precipitation and limited groundwater recharge. The absence of a comprehensive dataset of spring environments across the Mojave can result in project approvals absent any data against which future impacts could be identified. With the future increase in projects such as those described, the identification of baseline hydrologic conditions before substantial impacts start occurring is essential for future water management in the Mojave Desert.

### **1.1 OBJECTIVES**

Spring monitoring data collection is critical in order to make informed land management decisions and associated recommendations. An objective of this report is to initiate the development of a longer-term periodic monitoring effort to identify potential impacts to springs before irreversible impacts from future groundwater development, and to identify any future changes due to climate change that may occur. Overall, the principal objectives of this work have been to:

- Provide a comprehensive, focused resource for information on springs throughout the Mojave Desert;
- Provide greater understanding of the hydrologic and biologic conditions at these springs:

- Provides a basis for focusing future biological and hydrologic research at key locations where needed, providing long-term, more cost-effective research solutions;
- Provide a basis from which future changes can be identified, and,
- Provide recommendations for future long-term monitoring and resource management.

This project did not include springs in National Park units, military bases and most private lands.

## 1.2 ACKNOWLEDGEMENTS

AZI would like to acknowledge all those who allowed this project to come to fruition. THC went through the time and efforts to apply for funding and manage this intensive project. Jill and Bert Bays provided needed support both in a management role and in the field to get this work done. AZI could not have asked for more desert-knowledgeable field support than that provided by THC's Cody Hanford and Vaughan Williams. Much thanks also go to Vern Biehl and Wendy Marriott for assisting in the field during key times.

Bill Christian of TNC provided critical support and communication that helped to transform this effort from an idea to the product provided herein. Bill Christian and Sophie Parker of TNC also provided field assistance at a critical juncture in the Saline Valley area.

All of this effort would not, and could not, have happened without the support and funding by the BLM. Acknowledgement goes to Russell Scofield for making this project a BLM priority and funded, a hearty thank you. BLM hydrologist Noel Ludwig was also of immense assistance in moving this project forward and additional thanks to Noel for spending the time with AZI in the field for a trial run-through on the work to be conducted. BLM staff in the Barstow, Needles and Ridgecrest Districts were of great help in pointing us in the direction of the critical information on springs that resided in their files. Scans from that information are provided in the spring summaries in Appendix A. In the Needles District, Lara Kobelt was of great assistance and provided a highly organized data library of springs in that district that was remarkable. Thanks to Chris Otahal and Anthony Chavez in the Barstow District of BLM for their assistance in gathering data and information from the diverse springs (ranging from the Amargosa to the San Bernardino Mountains) in their areas. Sam Fitton from the Ridgecrest BLM office was also of assistance in gaining access and insight into the springs in that region.

The staff of the Mojave Desert Land Trust (MDLT) and the Amargosa Conservancy (AC) also provided key field assistance in their areas of the Mojave Desert. Dan Burns of MDLT and Patrick Donnelly, Tanya Henderson, and Len Warren from AC were critical to the success of this project. Also, thanks to Jon Philipp, a much-valued colleague who provided much leg-work on scouting springs in the Amargosa Region in the initial stages of this larger effort. Susan Sorrells of Shoshone, California assisted with those springs in Shoshone, and provided assistance in shutting down the town water system momentarily to allow for a reliable spring flow estimate from the town water system.

Visiting so many springs in a short amount of time resulted in the need for some additional Professional Geologist services. Lee Davisson of M.L. Davisson & Associates assisted with field work in the Turtle Mountains and Old Woman Mountains and reviewed the stable isotope analyses.

Finally, acknowledgements go to all of those BLM personnel over the past 30 years who have visited springs on public lands and provided written records of their observations, whether about current conditions, presence/absence of flow, plants and animals, etc. There are too many to be mentioned here but great thanks. Also a thank you to the private landowners that allowed access or otherwise cross private lands to access various springs on BLM land. Also, particular thanks to Carolyn Chervenak for her on-the-ground knowledge of springs in the Mescal Range/Ivanpah Mountains area and for helping us access springs that would have otherwise been problematic due to private property issues. Carolyn's work caring for the springs in that area provides a real service to the Mojave.

### **1.3 CURRENT SCOPE OF WORK**

Given the importance of all of the issues described above, AZI conducted the following tasks to provide the BLM and all Mojave Desert stakeholders with developing a greater understanding of the region's hydrologic system, and taking the first step in establishing a long-term groundwater monitoring network protective of the resources present. Further, this work provides the BLM and regional stakeholders with a spring resource data set that was collected within a short time frame providing comparable spring condition descriptions across broad regions. AZI conducted the work using a phased approach, providing the greatest flexibility to adjust scope based on new information gathered, and maximizing the ability for this hydrogeologic work to address the goals of the BLM while not wasting precious financial resources on redundant or purely academic activities.

For the purposes of this investigation, AZI identified 436 springs of which 312 were reconnoitered/field inspected during the period from September 2015 through February 2016. Figure 1 shows the project region and distribution of all springs described in this report. Table 1 provides a list of all of the springs, their coordinates and elevations, and general location information. Springs not field inspected were nevertheless reviewed using aerial imagery, and using information from various sources. All 437 springs identified on BLM and land trust lands within the Barstow, Needles and Ridgecrest Districts are described in this report. The 125 springs not field inspected were selected based on access issues, and were deemed to provide the least useful information while requiring the maximum cost and effort to access at this time. Future follow-up monitoring for a selected subset of these unvisited springs is provided in the Recommendations section of this report.

Tasks conducted as part of this effort included the following:

- Extensive data/literature review for hydrogeologic information and other natural and cultural history information associated with the springs in the Mojave Desert;



- Identification/locating springs across the Mojave Desert area on public lands and lands owned by the land trust partners of this project (THC, MDLT, AC, and TNC);
- Field confirmation of locations, updating of geographic coordinates including notation of access and road conditions for future monitoring network decision-making;
- Field reconnaissance of springs for assessment of functioning condition;
- Measurement/estimation of flow and field water quality parameters where surface water was present;
- Collection and analysis of spring water for stable isotopes analysis in each spring for which surface water was present;
- Collection and analysis of spring water for general minerals and metals analysis (for key springs in the Amargosa Basin for which those data had not previously been collected);
- Flora and fauna observations including presence/absence of invasive plant species (or areas to be checked); use by burros and/or wild horses, and specific Common Raven observations for assistance in Desert Tortoise studies being conducted in the Mojave;
- Review of water rights filings for each spring (both BLM and from other entities, public and private) and identification of Public Water Reserves;
- Notation and reporting of wilderness incursions observed, and,
- Preparation of this Report.

### **1.3.1 Report Format**

This monitoring/spring survey report is primarily a data report. The volume of data presented results in a foundation for analysis well beyond the planned scope of this project. Given the volume of information, this report is being provided digitally. Of particular interest to users will be Appendix A, the catalog of springs. Appendix A consists of a series of folders and subfolders that will guide the user to the springs in their particular area of interest. The springs are organized first in terms of BLM District (or land trust/owner); followed by ecological subregion. Each subregion folder then has folders corresponding to each of the springs in that subregion.

Each spring folder in turn, has separate subfolders for items such as field photos, aerial imagery, water rights info, information from BLM files, spring-specific data, and proper functioning condition reports. Also each spring folder will have a spring narrative and copies of the field forms from the current spring survey. If a folder appears missing (e.g. there is no water right folder), it is because there is no information of that type for that spring.

A spreadsheet of the entire list of springs and associated attributes (Master Spring Inventory) is also provided for the user.

## 1.4 LOCATION AND PHYSIOGRAPHIC SETTING

The project area covered the BLM Barstow, Needles and Ridgecrest District (outside of the Ridgecrest District lands within the Kern River watershed). This roughly corresponds to an area bounded on the west by the southern Sierra Nevada, on the east by the Colorado River and in the Amargosa area, the Nevada State Line, on the south by the Transverse Ranges (San Bernardino and San Gabriel Mountains) and eastward along the boundary between San Bernardino and Riverside Counties, and on the north by the BLM Ridgecrest District boundary that extends northward to the Sylvania Mountains at the southern end of Fish Lake Valley north of Death Valley National Park.

Within this area, several ecological subregions have been proposed (e.g., as discussed in Webb, et.al, 2009). To best present the springs efficiently for the purposes of this report, and given that this report provides a land management tool, the springs are presented in terms of BLM District, and then subdivided by ecological subregion. The subregions are:

- Northern Mojave Desert – Owens/Panamint Region
- Northern Mojave Desert – Amargosa Region
- Western Mojave Desert
- Central Mojave Desert
- South-central Mojave Desert
- Eastern Mojave Desert;
- Southeastern Mojave Desert, and,
- The Colorado Desert.

Webb, et.al, (2009) does not break up the Northern Mojave Desert as presented above, but given that the Death Valley National Park was not included within this investigation, and the differing hydrogeologic characteristics and water resources issues associated with the areas east and west of the park, further subdivision of the Northern Mojave Desert was desirable. Figure 2, presents a map of the subregions.

Within this report, depending on the reader's background, what is termed the Mojave Desert may differ than what the reader is used to seeing. Geologically, the Mojave Desert is a region of isolated mountain ranges separated by expanses of desert plains. It forms a wedge-shaped area bounded by the Garlock Fault on the north, the San Andreas Fault (and the north slope of San Bernardino Mountains) on the south, and the Colorado River to the east. North of the Garlock Fault, the region is considered the Basin

and Range geomorphic province. From a biological perspective, with the exception of the Colorado Desert area, the entire project area is within the Mojave Desert.

Unlike many other states, California has defined its groundwater basins based on the extent of the valley fill within the basin and not the extent of the watershed. Therefore, only a fraction of the lands in California are considered to be part of groundwater basins. For the purposes of this report, the groundwater basins described are assumed to include their respective watersheds. This simplifies the discussions concerning potential impacts to springs outside of a specific basin as defined by the State of California with groundwater withdrawals within the alluvial portion of a specific basin. The regional summaries in the following subsections give brief descriptions about each region including details of the various groundwater basins within each region based on DWR (2003). In the following sections, maps are referenced that show the springs in each of the subregions and specific areas within those subregions.

As will be observed, the order of the maps in the figures section corresponds to the order in which springs would be identified on Table 1 and the catalog of springs provided in Appendix A. They are not provided in the order in which they are found in the following text.

#### **1.4.1 Northern Mojave Desert – Owens/Panamint Region**

The Northern Mojave Desert – Owens/Panamint Region covers the northern extent of the BLM Ridgecrest District. Springs included within this survey are found within the Black Springs Valley, Fish Lake Valley, Eureka Valley, Saline Valley, Panamint Valley, Searles Valley, Indian Wells Valley, and Rose Valley groundwater basins. The southernmost end of the Owens Valley also falls within the study area. The distribution of springs within this region are presented on the maps provided as Figures 20 through 27.

The area is within the Basin and Range Geologic Province. This is a region where springs have been utilized for mining (particularly in Searles Valley), livestock and other uses. This region has the greatest elevation, temperature and precipitation extremes of any region in this report. Spring elevations range from approximately 1,000 feet above mean sea level in Saline Valley to over 9,000 feet above mean sea level for springs near the crest of the Inyo Mountains. Most precipitation occurs during the winter months. The regional extent of this area is based on the distribution of iconic Mojave Desert species such as Joshua Tree and creosote bush-white bursage assemblage (Webb, et.al, 2009).

The Fish Lake Valley Groundwater Basin (#6-14) is the northernmost basin covered in this project area. The alluvial portion of the basin covers approximately 75 square miles and is bounded by the Sylvania Mountains on the south, the White Mountains on the west and the Nevada State Line to the north and east. This is an agricultural area and groundwater pumping has been extensive. Ground subsidence appears to have been an issue in some areas of the valley. The only spring in the study within this basin is Kinkade Spring in the Sylvania Mountains.

The alluvial portion of the Black Springs Valley Groundwater Basin (#6-13) covers an area of nearly 50 square miles in the Black Springs Valley – Lower Centennial Flat area of Inyo County. The basin is bounded by the Inyo Mountains to the north, the Talc City Hills to the northeast, and the Coso Range to the south and west. Groundwater from this basin generally drains toward the Owens Valley. Key springs in this area included Black Springs and springs along Centennial Canyon.

The alluvial portion of the Eureka Valley Groundwater Basin (#6-16) covers an area of more than 200 square miles in a remote area of Inyo County largely within Death Valley National Park. Only a few minor springs within this project area (North Piper Mountain, Wheelbarrow and Soldier Pass) lie within this basin.

Saline Valley Groundwater Basin (#6-17) is a large basin and range-style valley lying immediately to the east of the Inyo Mountains with approximately 10,000 feet of elevation relief between the crest of the Inyo Mountains and the valley floor. The alluvial portion of the basin covers approximately 230 square miles, most of which is within the Death Valley National Park. Those springs within the project area are generally to the west of the Saline Valley Road along the flanks of the Inyo Mountains.

Panamint Valley Groundwater Basin (#6-58) is another large valley lying immediately to the west of the Panamint Range and Death Valley National Park and the alluvial portion of the basin covers more than 400 square miles. The project area extends approximately mid-way the west slope of the Panamint Range and nearly all of the east slope of the northern Argus Range. It is separated by Searles Valley by a low divide on the south. Many of the canyons on the west slope of the Panamint Range have continuous streams with well-developed, vigorous riparian areas (for example in Pleasant and Surprise Canyons).

Searles Valley Groundwater Basin (#6-52) is the large valley lying immediately south of the Panamint Valley with the alluvial portion of the basin covering nearly 230 square miles. The basin is bounded by the Argus Range on the west, the Slate Range to the east, a low topographic divide to the north and the Summit Range and Lava Mountains to the south. There are large brine mining operations on the Searles (dry) Lake, and historically, springs along the east slope of the Argus Range have been utilized to support these operations.

Indian Wells Valley Groundwater Basin (#6-54) is the population center of this region, incorporating the city of Ridgecrest, along with the communities of Inyokern and Pearsonville. The Indian Wells Valley Water District alone provides water to more than 30,000 people. The alluvial portion of the basin covers an area of more than 400 square miles and is bounded by the Sierra Nevada on the west, the Coso Range on the north, the Argus Range to the east and the El Paso Mountains on the south. Most of the springs in this basin are located along the east slope of the southern Sierra Nevada, with several springs on the north slope of the El Paso Mountains also present.

Rose Valley Groundwater Basin (#6-56) lies between the Indian Wells Valley (to the south) and the Owens Valley (to the north). Intensive groundwater extraction currently occurs in the valley to support the Coso Geothermal operation in the Coso Range to the east. The basin is bounded by the Sierra Nevada



on the west, the Coso Range on the east, an alluvial divide and the Coso Range on the north, and Volcano Peak (the south end of the Coso Range) on the south. Springs occur in the drainages of the Sierra Nevada and along the alluvial fans, particularly where faults are present. There are also seeps that result from leakage from the Los Angeles Aqueduct (near Little Lake). Although not within the project area due to being on private land, there are springs on the Little Lake Ranch as well.

### **1.4.2 Northern Mojave Desert – Amargosa Region**

The Northern Mojave Desert - Amargosa Region generally corresponds to the Amargosa River Basin that covers an area of 3,124 square miles in east-central California and west-central Nevada. The area is within the Basin and Range Geologic Province. As with the Northern Mojave Desert – Owens/Panamint Region, this region's extent is based on the distribution of Mojave Desert species such as Joshua Tree and creosote bush-white bursage assemblage (Webb, et.al, 2009b). The distribution of springs in this region are presented in Figures 3 through 7 and Figure 14.

The Amargosa River Basin can be subdivided into three basin areas:

- Northern Amargosa Groundwater Basin (Nevada portion of the Basin also referred to as the Amargosa Desert Hydrographic Basin by the Nevada Department of Water Resources);
- Middle Amargosa Valley Groundwater Basin (California); and
- Death Valley Groundwater Basin (California –Nevada).

The Northern Amargosa Valley Groundwater Basin is comprised of the Amargosa River Valley from the river's headwaters northwest of Beatty, Nevada, to the California-Nevada state line. Elevations in this portion of the Amargosa River Basin range from 6,317 feet above mean sea level (ft msl) at Bare Mountain south of Beatty and east of the Amargosa River, to about 2,300 ft msl at the California-Nevada state line near Death Valley Junction, California. The basin is bounded by consolidated rocks of the Yucca Mountain/Pahute Mesa area to the northeast, Bare Mountain on the east, and the Funeral Range to the west. The Northern Amargosa River Basin as defined covers 896 square miles. The springs in the Beatty area included in this report are within this basin.

The Middle Amargosa Valley Groundwater Basin (Groundwater Basin #6-20 as designated by the California Department of Water Resources) is comprised of the Amargosa River Valley along with Chicago Valley and parts of Greenwater Valley within Inyo and San Bernardino Counties, California. The California-Nevada state line is considered the northern boundary of the Middle Amargosa Valley Groundwater Basin. The elevation of the valley floor generally ranges from about 400 ft msl near Salt Creek in the southern portion of the valley to about 2,300 ft msl at the California-Nevada state line near Death Valley Junction. The basin is bounded by consolidated rocks of the Resting Springs and Nopah Ranges on the east, the Dumont Hills on the south, and the Greenwater Range and Ibex, Black, and Funeral Mountains (collectively known as the Amargosa Range) on the west. The surrounding mountains range in elevation up to 7,335 ft msl at Kingston Peak (within San Bernardino County along the southeast

edge of the Basin) and up to 6,725 ft msl at Pyramid Peak, the high point of the Funeral Range to the west. The Middle Amargosa River Basin covers an area of 609 square miles.

Within the watershed of the Amargosa lies the California Valley Groundwater Basin (Groundwater Basin #6-79) bounded by the Nevada State Line on the east, the Nopah and Kingston Ranges on the north and south, respectively and the Middle Amargosa River Basin to the west. The basin covers an area of over 90 square miles. Other groundwater basins in this part of the project area include the Lower Kingston Valley Groundwater Basin (Groundwater Basin #6-21) that drains the Avawatz and Kingston Ranges as well as the Silurian Hills, and Denning Spring Valley Groundwater Basin (Groundwater Basin #6-78) comprised of an area receiving recharge from a portion of the Avawatz Mountains

The Death Valley Groundwater Basin (Groundwater Basin #6-18 as designated by the California Department of Water Resources) is comprised of the Amargosa River Valley from the Salt Creek area to the sink at Badwater in Death Valley, and northward to the northern physical terminus of Death Valley in Nevada (Oriental Wash Area of the Death Valley Basin as designated by the Nevada State Engineer). Elevations in this portion of the Amargosa River Basin range from -282 ft msl at Badwater, to 11,049 ft msl at Telescope Peak, the highpoint of the Panamint Range along the west side of Death Valley. The combined area of the California and Nevada portions of this lower part of the Amargosa River basin is 1,622 square miles.

### **1.4.3 Western Mojave Desert Region**

The Western Mojave Desert covers the southern extent of the BLM Ridgecrest District and springs included within this survey are generally found within the Antelope Valley, Fremont Valley, Cuddeback Valley and southern Indian Wells Valley groundwater basins. Of all the regions described, the Western Mojave has the highest percentage of precipitation that falls in winter. This is also an area of low topographic relief. These springs are located on the maps provided as Figures 8, 28, 31 and 32. Most of the springs in this region occur in three areas:

- The east slope of the southern Sierra Nevada;
- The El Paso Mountains; and,
- The north slope of the San Gabriel Mountains.

This distribution of springs in this area is presented on Figure 6. The Antelope Valley Groundwater Basin (#6-44) is a highly populated basin (population in excess of 300,000) bounded by the San Gabriel Mountains and the San Andreas Fault Zone on the south, the northwest trending Garlock Fault Zone and adjacent Tehachapi Mountains and southern Sierra Nevada to the northwest and low hills and ridges and a groundwater divide to the east. The springs in this report within this basin area are generally along the north slope of San Gabriel Mountains. The groundwater basin is being adjudicated and there is extensive growth in water usage due to population growth and renewable energy development.

The Fremont Valley Groundwater Basin (#6-46) lies between the Antelope Valley and Indian Wells Valley groundwater basins and is bounded by the El Paso Mountains on the north, the Rand Mountains to the south and the Sierra Nevada to the west. Most of the springs investigated in this project were within this basin. This is an area of growing renewable energy project development.

The Cuddeback Valley Groundwater Basin (#6-50) is bounded by the Lava Mountains on the north, the Rand Mountains on the west, Fremont Peak and the Gravel Hills on the south and granitic hills on the east. The alluvial portion of this basin covers approximately 150 square miles.

#### **1.4.4 Central Mojave Desert Region**

The Central Mojave Desert region falls entirely within the Barstow BLM district. This region has the lowest ecological variability in the Mojave Desert and contains the fewest vascular plant species of all the regions (followed by the Western Mojave) (Webb, et.al, 2009). The springs investigated in this region were generally within the watersheds of the Coyote Lake, Harper Valley and Lower Mojave River Valley groundwater basins. The distribution of springs in this region are presented on Figure 8.

The Coyote Lake Valley Groundwater Basin (#6-37) is generally bounded by the Paradise Mountains on the north, the Alvord Mountains on the east, the Calico Mountains on the south and the Lane Mountains on the west. This is a sparsely populated area that bounds the Fort Irwin military base. The alluvial portion of the basin covers approximately 140 square miles.

The Harper Valley Groundwater Basin (#6-47) is within the Mojave River adjudicated area and is an area of former agricultural land use that is transitioning to renewable energy. This valley has been historically over-drafted and groundwater levels in some areas of basin continue to decline (Andy Zdon & Associates, Inc., 2014). The alluvial portion of the basin is quite large covering approximately 640 square miles. The basin is bounded by the Fremont Peak, Black Mountain and the Gravel Hills on the north and east, by the Lockhart Fault and Kramer Hills on the west and by the Waterman Hills and Mount General area on the south. This basin is hydraulically connected to the Mojave River basin with underflow toward Harper Valley.

The Lower Mojave River Valley includes that portion of the Mojave River basin that extends from the Waterman Fault south of Harper Valley to Afton Canyon on the east. This basin includes the towns of Barstow. According to the California Department of Water Resources (2003), *“Hydrographs for wells near the town of Yermo and Newberry Springs show a decline in water level of about 80 to 100 feet over the last fifty years and a decrease of 1 to 2 feet over the last ten years...”* According to the Mojave Water Agency watermaster report for 2015-16 (Mojave Water Agency, 2016) this trend is continuing and the effects of these trends on long-term flow in the Mojave River from Afton Canyon and east is unclear.

### 1.4.5 South-central Mojave Desert Region

The South-central Mojave Desert region falls entirely within the Barstow BLM district. This region has winter-dominated precipitation, but a monsoonal component becomes increasingly important toward the east. Given the proximity to urban areas, this region has the greatest susceptibility to atmospheric pollutants of any of the Mojave Desert regions (Webb, et.al, 2009). There are numerous groundwater basins in this area, with springs investigated in this region were generally within the watersheds of the Mojave River Basins (Upper, Middle and Lower), Lucerne Valley, Johnson Valley, Ames Valley, Pipes Canyon Fault Valley, Morongo Valley, Warren Valley and Twentynine Palms Valley groundwater basins. The distribution of springs in this region are presented on Figures 9 through 13.

The Lower Mojave River Groundwater Basin was described in Section 1.4.4. The Middle Mojave River Valley Groundwater Basin (#6-41) is bounded on the east by the Camp Rock – Harper Valley Fault Zone, on the south by a roughly east-west line extending from Helendale to the Shadow Mountains, on the north by a complex series of bedrock hills and the Helendale Fault, and on the west by a groundwater divide that stretches from the Shadow Mountains to the Kramer Hills. The alluvial portion of the basin covers 330 square miles. The general trend in this basin is declining groundwater levels (DWR, 2003).

The Upper Mojave River Valley Groundwater Basin (#6-42) is generally bounded by the east-west line extending from Helendale to the Shadow Mountains, on the south by the San Bernardino Mountains, on the west by a groundwater divide between the basin and El Mirage Valley, and on the east by the Helendale Fault and bedrock mountains in the Apple Valley area. The alluvial portion of the groundwater basin covers 645 square miles, and this basin is densely populated.

The Lucerne Valley Groundwater Basin (#7-19) has had substantial groundwater level declines historically due to overdraft. The basin is bounded on the south by the San Bernardino Mountains on the south, the Ord Mountains on the north, the Granite Mountains and Helendale Fault on the west and the Camp Rock Fault and Kane Wash area on the east. The alluvial portion of the basin covers approximately 230 square miles.

The Johnson Valley Groundwater Basin (#7-18) is bounded on the south by the San Bernardino Mountains, on the west by surface water drainage divide, on the north by the Fry Mountains and on the east by the Johnson Valley Fault Zone. The alluvial portion of the basin covers approximately 120 square miles. The nearby Pipes Canyon Fault Valley Groundwater Basin (#7-49) is a small groundwater basin (five square miles) bounded by crystalline bedrock units within the San Bernardino Mountains.

The Morongo Valley Groundwater Basin (#7-20) is a fault-bounded valley with the Pinto Mountain Fault and the Morongo Valley Fault being hydraulically important. The basin is bounded by the San Bernardino Mountains on the north and the Little San Bernardino Mountains on the south. Water rises along the Morongo Valley Fault causing wetlands such as those observed at Big Morongo Preserve (see Big Morongo Springs in Appendix A). The alluvial portion of this areally small but important basin covers nearly 12 square miles (significant population center).



The Warren Valley Groundwater Basin (#7-12) which contains the town of Yucca Valley, is bounded by the Pinto Mountain Fault on the south, a bedrock section of the Little San Bernardino Mountains on the north, the Yucca Barrier (a bedrock restriction) on the east and on the west by a bedrock constriction/topographic divide between Warren Valley and Morongo Valley. The alluvial portion of the basin covers approximately 27 square miles. The only spring in this investigation in this basin is Coyote Hole Spring.

The Twentynine Palms Valley Groundwater Basin (#7-10) is bounded by a structural barrier on the north the Pinto Mountain Fault on the south, the Bullion Mountains on the east and the Copper Mountains on the west. The alluvial portion of the basin covers an area of nearly 100 square miles and this basin has a significant population with both the town of Twentynine Palms and the Twentynine Palms Marine Basin present.

#### **1.4.6 Eastern Mojave Desert Region**

The Eastern Mojave Desert region falls entirely within the Needles BLM district. This region is generally a higher elevation region at the confluence of Great Basin, the Mojave Desert and the Sonoran Desert. One of the distinguishing characteristics of this region is the relatively high amount of summer rainfall as compared to elsewhere in the Mojave Desert (Webb, et.al, 2009). Springs in this region generally fall within the Ivanpah Valley, Soda Lake Valley, and Upper Kingston Valley groundwater basins (Figures 14 and 15).

The Ivanpah Valley groundwater basin (#6-30) is generally bounded by the Clark Mountains on the west, the Ivanpah and New York Mountains on the south and the Nevada state line on the east and north although the McCullough Range forms the actual basin physical boundary to the east. The alluvial portion of the basin covers an area of more than 300 square miles.

The Soda Lake Valley groundwater basin (#6-33) is generally bounded by the Marl and Kelso Mountains on the east, the Bristol and Cady Mountains on the south, and the Soda Mountains on the west. An alluvial drainage divide separates the Soda Lake Valley with the Silver Lake area to the north. The alluvial portion of the basin covers approximately 600 square miles.

The Upper Kingston Valley Groundwater Basin (#6-22) is bounded by the Mesquite Mountains and Kingston Range on the north, the Clark and Ivanpah Mountains on the east, Teutonia Peak (Cima Dome) on the south and the Shadow Mountains on the west. The alluvial portion of the basin covers approximately 275 square miles.

#### **1.4.7 Southeastern Mojave Desert Region**

The Southeastern Mojave Desert region is characterized by a mixture of Mojavean and Sonoran floral assemblages (Webb, et.al, 2009). This is geologically diverse region and springs within the region are within the watersheds of the Lanfair Valley (springs on the north slope of the Clipper Mountains such as

Chuckwalla Spring), Fenner Valley, Ward Valley, Cadiz Valley, Bristol Valley, Chemehuevi Valley, and Piute Valley groundwater basins. A considerable extent of the Southeastern Mojave Desert region was incorporated into the newly designated Mojave Trails National Monument. Although springs are scattered throughout this region, the Old Woman Mountains in particular have a substantial number of small springs in granitic terrain (Figures 16 and 17).

Fenner Valley is noteworthy for having one of the largest spring complexes, Bonanza and Lower Bonanza Springs. Fenner Valley Groundwater Basin (#7-2) is bounded by the Marble and Providence Mountains on the west, the Providence and New York Mountains to the north, the Piute and Old Woman Mountains on the east and the Ship and Old Woman Mountains on the south. The Fenner Valley is the location of the proposed Cadiz Groundwater Project which proposes to export to southern California up to 50,000 acre-feet per year of groundwater over a 50-year period.

The Ward Valley Groundwater Basin (#7-3) is bounded by the Old Woman Mountains on the west, the Piute and Sacramento Mountains on the north, the Turtle and Stepladder Mountains on the east and the Iron Mountains and an unnamed fault on the south (DWR, 2003). The alluvial portion of the basin covers approximately 1,500 square miles, making it one of the largest groundwater basins in the Mojave Desert. This was also the proposed site of the Ward Valley disposal site.

The Cadiz Valley Groundwater Basin (#7-7) is downgradient of the flow path of the Fenner Valley groundwater basin and would also fall within the area of influence of pumping effects related to the Cadiz Water Project. The basin is generally bounded by the Calumet Mountains on the west, the Coxcomb Mountains on the south, the Ship Mountains on the north and the Old Woman, Iron and other ranges on the east. The alluvial portion of the basin covers more than 400 square miles.

The Bristol Valley Groundwater Basin (#7-8) is also downgradient of the flow path of the Fenner Valley groundwater basin and would also fall within the area of influence of pumping effects related to the Cadiz Water Project (similar to Cadiz Valley). The basin is generally bounded by the Bullion Mountains on the west, the Bristol, Granite and other ranges on the north, the Marble, Ship and Calumet Mountains on the east and the Coxcomb Mountains on the south. The alluvial portion of the basin covers nearly 800 square miles.

The Chemehuevi Valley Groundwater Basin (#7-43) is bounded by the Colorado River and Whipple Mountains on the east, the Turtle Mountain on the west and south, and the Sacramento and Chemehuevi Mountains on the north. The alluvial portion of this very large area covers approximately 430 square miles.

#### **1.4.8 Colorado Desert Region**

The project scope was to monitor springs in the Needles, Barstow and Ridgecrest Districts of the BLM. The Needles District extends into the Colorado (Sonoran) Desert, along the Riverside County boundary. Therefore a number of springs in the Whipple and Turtle Mountains were also included in this study

although not truly part of the Mojave Desert proper as defined (Webb, et.al, 2009). The distribution of springs in this region are presented on Figures 16, 18 and 19.

## **1.5 CLIMATE IN RELATION TO SPRINGS**

Deserts are dry places by definition, and precipitation is generally low (and sometime non-existent) over the course of a year and in any given location. Within the Mojave Desert, about 50 to 70% of the annual precipitation falls during November through March (Redmond, 2009). The winter contribution to annual precipitation is generally greater in the western portion of the Mojave Desert than in the eastern portions (where summer monsoonal moisture becomes more important). Generally, all of the precipitation within the Mojave Desert occurs on 20 to 25 days each year. Of those days, precipitation will occur over a fraction of each day, and 99% of the time during the course of a year, there is no precipitation occurring (Redmond, 2009). With that in mind, individual storm events, particularly during summer monsoonal thunderstorms, can provide intense rainfall causing flash floods that may substantially alter the landscape and drainage patterns. In canyon bottoms, springs that occur as a result of canyon bottom bedrock geometry and associated restrictions to flow, can expand and contract with scouring of the channel or increased sediment load, depending on the effect of the flood. Some springs of this type may disappear entirely.

Given the breadth of the study area, and the scope of this report, the user is referred to the Western Climatic Data Center or other climate data resources for current and historical climate data information for their particular areas of interest as they relate to springs within a specific ecoregion.

## **1.6 WATER RIGHTS**

Water rights associated with Mojave Desert springs are summarized in Table 2. The review of water rights revealed most spring features not having water right filings associated with them with the State of California. BLM has numerous claimed and licensed water rights on springs on public lands throughout the region as do other governmental entities such as the California Department of Fish and Wildlife. Numerous private entities have water right filings on public land springs including ranchers, mining operation, private parties for domestic use, and other entities for wildlife enhancement.

The Mojave River Basin is an adjudicated basin and the Antelope Valley is currently being adjudicated. Both of these issues affect groundwater management in those associated basin and potentially the springs in those areas. The complexities of both adjudications would require discussion beyond the scope of this report.

### **1.6.1 Public Water Reserves**

According to DWR (2009),

*“Probably the most common federal reserved water right for BLM is for public water holes and springs. These rights were created by executive orders called Public Water Reserves (PWR). Until 1926, PWRs were created on an ad hoc and sight*

*specific basis. Federal agencies would identify the springs they wanted reserved and these would be incorporated (by executive order) into a chronologically numbered Public Water Reserve. Therefore PWRs with early numbers refer to site specific reservations. In 1926, a cart blanc Public Water Reserve was created through an executive order by President Coolidge entitled "Public Water Reserves No. 107". PWR 107 ended the sight specific system of reserving springs and water holes. The purpose of PWR 107 was to reserve natural springs and water holes yielding amounts in excess of homesteading requirements. This order states that "legal subdivision(s) of public land surveys which is vacant, unappropriated, unreserved public land and contains a spring or water hole, and all land within one quarter of a mile of every spring or water be reserved for public use". There was no intent to reserve the entire yield of each public spring or water hole, rather reserved water was limited to domestic human consumption and stockwatering. All waters from these sources in excess of the minimum amount necessary for these limited public watering purposes is available for appropriation through state water law. To date, many of these Public Water Reserves have not been registered with the state and/or are not adjudicated."*

In the review of the State of California's water rights database system (eWRIMS) and BLM files and maps, AZI was able to identify 33 springs documented as Public Water Reserves. Those springs identified as Public Water Reserves are noted on Table 2.

### **1.6.2 Amargosa Wild & Scenic River & Devil's Hole Decision**

Although located in the Nevada portion of the Amargosa Basin, outside of the study area, the Devil's Hole Decision can affect future pumping in the Nevada portion of the Amargosa Basin, and therefore can have protective aspects associated with spring flow in the California portion of the basin.

In 2008, the Nevada State Engineer issued Order 1197 concerning applications to appropriate additional groundwater from the Devil's Hole area. This order stated that:

*"...with the following exceptions, any applications to appropriate additional underground water and any application to change the point of diversion of an existing ground-water right to a point of diversion closer to Devil's Hole, described as being within a 25 mile radius from Devil's Hole within the Amargosa Desert Hydrographic Basin, will be denied:*

- *Any application within the described area that seeks to change and existing point of diversion closer to Devil's Hole but remains within its existing place of use and is no more than 1/2 mile from its original point of diversion;*
- *Those applications filed which seek to appropriate 2.0 acre-feet per year or less, may be considered and shall be processed subject to Nevada Revised Statutes (NRS) 533 and 534;*
- *For projects that require changes of multiple existing rights, the State Engineer may compare the net impact to Devil's Hole of the proposed changes to the impacts to Devil's Hole of the base rights. If the net impact of the proposed changes is the same or less than its base right impacts, as determined by the State Engineer, such change applications may be considered and shall be processed subject to NRS 533 and 534. In no such case shall new points of diversion be allowed within ten (10) miles of Devil's Hole.*
- *Those applications for environmental permits filed pursuant to NRS 533.437 and 533.4377, inclusive; and,*
- *Those applications filed pursuant to NRS 533.371.*

For point of reference, NRS 533 and 534 are the chapters of Nevada water law that pertain to adjudication of vested water rights/appropriation of public water and underground water and wells, respectively. Environmental permits referenced in NRS 533.437 and 533.4377 are temporary permits for wells used for avoidance of groundwater contamination (e.g. remediation wells).

## **1.7 GROUNDWATER MANAGEMENT**

Groundwater quality issues in the Mojave Desert within California are regulated by the California State Water Resources Control Board – Lahontan and Colorado River Regions. Within Inyo County, California, the county conducts water-related activities such as issuing well permits through the Inyo County Environmental Health Department, and water-quality functions such as monitoring groundwater conditions and quality at the Tecopa and Shoshone landfills through the Inyo County Waste Management Department. Other community planning and environmental review activities are conducted through the Inyo County Planning Department.

Within Kern County, California water well permitting and water quality functions are managed by the County of Kern Public Health Services Department, Environmental Health Division. Other community planning and environmental review activities are conducted through the County of Kern Planning and Natural Resources Department.

Within San Bernardino County, California water well permitting and water quality functions are managed by the County of San Bernardino Division of Environmental Health Services. Other community planning and environmental review activities are conducted through the County of San Bernardino Land Use Services Department.

Within Los Angeles County, California, water well permitting and water quality functions are managed by the County of Los Angeles Public Health Department – Drinking Water Program office. Other community planning and environmental review activities are conducted through the County of Los Angeles Regional Planning Department.

The Mojave Water Agency (MWA) manages the water resources throughout the Mojave River Basin. Management of these waters is conducted to comply with the Mojave Basin Area Judgment, an urban water management plan, MWA's strategic plan, and other documents and policies.

Death Valley National Park oversees water-related issues within the Death Valley National Park inclusive of the Devil's Hole section of the park in Nevada. Currently, Death Valley National Park staff monitor selected springs throughout the park, with an emphasis on Saratoga Spring at the south end of Death Valley adjacent to the Amargosa River. Likewise, the BLM oversees water-related issues on BLM lands. As part of those responsibilities, the BLM is also charged with developing a management plan for the wild and scenic portion of the Amargosa River.

## **1.8 SOURCES OF INFORMATION**

Information gathered by AZI and used in this report were from the archives of, and reports by, the USGS, Nevada Department of Water Resources, California Regional Water Quality Control Board, California Department of Water Resources, Nye County Water District, Death Valley National Park, BLM, and historic information, groundwater level and spring data collected by AZI and within AZI's water resources library.

## **2.0 CURRENT FIELD AND LABORATORY METHODS**

The field activities performed during this project were designed based on expanding the monitoring that was previously conducted as part of the previous reconnaissance and cataloging of all of the known springs and wells in and beyond the Middle Amargosa River Basin, an area encompassing nearly 1,000 square miles (Andy Zdon & Associates, 2014). Additionally, methodologies for describing spring conditions developed for other areas (Sada & Pohlmann, 2002, and Sky Island Alliance, 2012) formed the basis of field descriptions of springs. The field work for this project was conducted from September 2015 through February 2016 with an additional monitoring in the Amargosa region conducted during June 2016 and included herein. Due to the timing of the final release of this Report, the additional data from subsequent monitoring up through September 2016 in the Amargosa region are provided in this report.

### **2.1 SPRING DISCHARGE MONITORING**

The methods used to quantify spring discharge were by via visual estimation, measuring the time it takes for spring flow to fill a bucket or other container of a known volume, use of a flowmeter, or in the case of Shoshone Spring, measuring outfall characteristics from a pipe of known size. In some cases, such as Borax Spring and Tecopa Hot Spring in the Amargosa region or French Madam Spring in the Argus Range, the spring discharged over a lip or out a pipe which enabled direct measurement of spring flow. At other locations, such as at Crystal Spring and Amargosa Canyon Spring #4, spring discharge was temporarily captured and channeled into a pipe or a flume to facilitate direct measurement using the bucket filling technique. A secondary method used to quantify spring discharge was direct measurement using a Marsh-McBirney Flo-Mate solid-state flow meter placed in a flowing channel of water. Measurements from the flow meter are combined with cross-sectional dimensions of the flow channel to yield spring discharge. This measurement technique was used at Christian Spring. All of the spring flow measurements recorded (including visual estimations of flow) are summarized on Table 3. Spring flow measurements (including historic data) are also found in the Catalog of Springs (Appendix A).

There are compromises in the use of spring flow measurement options that can result in under-estimation or over-estimation of free-flowing discharge. Ideally, all of the flow from a spring would be fully captured and channeled into a pipe or flume, allowing for much greater accuracy in measurement of flow. Temporarily channeling the spring using a pipe and other non-permanent materials such as mud and rocks can capture most of the flow, but not all, which can lead to inaccuracies in measurement. Measurement of flow using the solid-state flow meter requires estimates of cross-sectional area and the use of one to two flow measurement points as the meter is often large relative to the width of the channel. Ultimately, all of the spring flow measurements within this report should be seen as an estimate for the range of flows emanating from each spring. Significant alteration to spring discharge locations would be required to achieve the accuracy needed to resolve fine, seasonal changes in spring discharge.

Recommendations for future spring monitoring and potential improvements for monitoring at each spring are provided in the Recommendations section of this report.

## 2.2 FIELD WATER QUALITY ANALYSIS

Field water quality measurements were made with a Hanna HI991300 Multiparameter Meter (for temperature, pH, conductivity and total dissolved solids) and a YSI550A Dissolved Oxygen Meter. Equipment were checked for calibration on a daily basis and calibrated (multipoint) as required per equipment guidelines.

## 2.3 WATER QUALITY SAMPLE COLLECTION AND ANALYSIS

As a continuing step to determine relationships between waters, water samples were collected for the following:

- Stable Isotopes at all springs where surface water was present; and,
- General minerals and metals at selecting spring in the Amargosa region to supplement past monitoring activities.

Stable isotope analysis was conducted by Isotech Analytical in Champaign, Illinois. Samples for oxygen ( $\delta^{18}\text{O}$ ) and deuterium ( $\delta\text{D}$ ) were collected in 60 milliliter glass bottles equipped with a conical shaped inserts inside the caps that form an airtight seal when the bottles are closed. Samples were shipped to Isotech Laboratories in Champaign, Illinois where the  $^{18}\text{O}/^{16}\text{O}$  and  $\text{D}/\text{H}$  ratios were measured as a gas using standardized mass spectrometry methods. Results are reported as a normalization to Standard Mean Ocean Water (SMOW), which is an internationally recognized standard in stable isotope analysis. The normalization converted to standard  $\delta$  (“del”) notation following the convention:

$$\delta = \left( \frac{R}{R_{std}} - 1 \right) 1000$$

Where  $R$  is the isotope ratio of the sample and  $R_{std}$  is the ratio of the standard.

General minerals and metals analysis was conducted by Alpha Analytical Laboratories, Inc., of Sacramento, California, a California-certified analytical laboratory.

The results of the laboratory analyses are presented in Table 3, and laboratory analytical reports are provided in Appendix B.

## 2.4 FLORA AND FAUNA OBSERVATIONS

During site inspections, observations of flora and fauna were noted. These observations were within the confines of those possible based on field personnel present and associated technical backgrounds. As botanical and/or wildlife professionals were not present during monitoring, observations of wildlife in



the field and associated sign (scat and tracks) were able to be made, reliable bird identification was made and vegetation was noted to the extent possible, however rarely to the species level. The level of detail will provide wildlife and vegetation specialists with reconnaissance-level information for planning more detailed studies in the future. More detailed site-specific flora and fauna data are provided in the individual spring summaries where past data exist.

### **3.0 SPRING SURVEY RESULTS**

The importance of developing a baseline conditions report (or “snapshot in time”) is critical to management of these sensitive spring resources. Springs can be particularly susceptible to small changes in hydraulic head in a groundwater system. In the Mojave Desert, where changes can occur very slowly, developing a baseline dataset with continued monitoring is critical. The ability to identify changes in regional groundwater systems is also critical, where stresses to aquifer regimes are significant, and the identification of change at a spring (either hydrologically or biologically) could be too late to affect any meaningful change in water management that would preserve that spring resource. Expanding cones of depression from groundwater pumping can continue to expand for periods of time many times longer than the period that pumping actually took place. Therefore, while continued spring monitoring is critical to the Mojave Desert ecosystem, an expanded network of monitoring including monitoring wells away from spring areas will be needed to be fully protective of these resources.

The following sections summarizes the results of the spring survey and all data, photos, videos and spring summaries are provided in Appendix A.

#### **3.1 LOCATION REFINEMENT**

A key component of this spring survey was to refine the location information for each of the springs in the project area. In many cases, existing spring coordinates were the result of field work extending 50 years or more into the past. At that time, handheld locating devices were not available, and location information may only have been described to the Section level, or sometimes only Township and Range. These locations would then be converted (apparently by choosing the center point of the area described) to precise latitudes and longitude coordinates for input into various analyses, GIS, and on-line resources. This resulted in coordinates for some springs being inaccurate, with some springs noted to be in the wrong watersheds.

Hand-held GPS units were used to obtain refined coordinates at each spring source. GPS measurements were generally within +/- 16 feet. Elevations were developed based on digital elevation maps based on field measured coordinates. For springs not field inspected, coordinates were refined using Google Earth imagery and/or reported coordinates from BLM staff in inspection reports if available.

#### **3.2 SPRING FLOW**

Of the 313 springs visited, surface water was present at 145 springs. Of these, the surface water at the majority of springs was characterized by standing water with no active flow discernible. Of those springs where flow was measurable, spring flows ranged from less than one gallon per minute at many springs, up to 265 gallons per minute at Shoshone Spring in the Amargosa region. The Shoshone Spring flow was measured with the assistance of Susan Sorrells, owner of the town of Shoshone, by temporarily shutting down the town water system and sending all water through a pipe that discharges near the

community pool. Flow from the pipe was then measured using pipe/discharge characteristics. Flow estimates for springs are presented in Table 3.

Where flow was discernible, video documentation of the flow was also gathered (can be found in field photo files in Appendix A) for qualitative comparisons with conditions in the future.

### **3.3 SPRING FIELD WATER QUALITY**

Of the 145 springs where surface water was present, 118 springs had total dissolved solids concentrations (based on conductivity) below 1,000 milligrams per liter (mg/L), and the water characterized as fresh water. The remaining 27 springs had water characterized as brackish (total dissolved solids concentrations between 1,000 mg/L and 10,000 mg/L). None of the springs had water that could be characterized as saline (total dissolved solids concentrations of 10,000 mg/L to 100,000 mg/L).

Spring water temperatures varied from near freezing at French Madam Spring in the Argus Range (measured in December, 2015 when the spring outfall was covered in an ice sheet) to 41.3 degrees centigrade (°C) at Paradise Hot Spring (on private land) in the Central Mojave Region, and 40.1 °C at Tecopa Hot Springs in the Amargosa region.

Measurements of pH generally ranged from 7.0 to 8.5 in springs across the Mojave Desert. However, field pH measurements ranged from 6.21 at Lower Centennial Spring – South (there were other interesting chemical and physical characteristics with this spring as well), to 9.71 at Borax Spring in the Amargosa region.

### **3.4 STABLE ISOTOPES**

The  $\delta D$  and  $\delta^{18}O$  results are used to distinguish different water populations that imply different recharge areas or elevations and will reflect regional variation in stable isotope abundance in precipitation at a large geographic scale. These data can be highly useful in sourcing waters and assisting in the evaluation of potential linkages between pumping centers and springs, and/or discerning how climate change may affect springs in different areas. The stable isotope data collected in this spring survey greatly expands the existing dataset for the Mojave Desert, and provides a starting point from which future analyses (for both characterization/developing a greater understanding and for impact analyses for environmental review analyses) can be based.

The  $\delta^{18}O$  and  $\delta D$  abundances in precipitation systematically vary with increasing latitude and elevation. In California this results in lower observed  $\delta^{18}O$  and  $\delta D$  isotope values at higher elevations and further distance inland in general. However in the Mojave Desert where annual precipitation is already low, storm sources yielding precipitation varies between winter maritime and summertime monsoonal. The summer monsoonal rain has higher isotope values than winter season equivalents because of warmer source region temperatures (Figure 33).

Wintertime convergence of dense polar air with subtropical warm moisture of the east Pacific results in precipitation ranging from Oregon-Washington south to southern California (Figure 12). Under these circumstances low amounts of precipitation accumulates in the western and northern Mojave after storms lose most of their moisture crossing the Sierra Nevada or Transverse Ranges. During summertime, warm and moist subtropical air in the Gulf of California converges with cool dense air moving south through the Rockies and Great Basin. This results in accumulated precipitation in the eastern Mojave along with southern Nevada and Arizona.

Overall, these variable precipitation sources yield a systematic difference in  $\delta D$  and  $\delta^{18}O$  abundance in accumulated precipitation in the Mojave Desert. This has been demonstrated in previous work on multi-year annual precipitation collection throughout the Mojave (Friedman et al., 1992). In this work, over seven years of annual precipitation was collected at 32 different sites ranging from approximately -200 to 7,500 feet elevation, as far north as the Owens Valley and south to the US-Mexico border. Systematic variations were shown to exist in  $\delta D$  and  $\delta^{18}O$  for annualized, wintertime, and summertime accumulations, consistent with the regional precipitation sources and elevation effects (Friedman et al., 1992).

Illustrated in Figure 34 is the contoured pattern of  $\delta D$  variations in wintertime precipitation from this previous work. Also mapped are spring locations where stable isotopes were measured and their corresponding  $\delta D$  values. Topographic effects on the  $\delta D$  values are seen in the contoured patterns where low  $\delta D$  values in precipitation occur north of the Transverse Ranges. Also  $\delta D$  values are low in the northern Mojave associated with northern winter storm tracks causing precipitation in areas such as Owens Valley. Furthermore, inspection of the variation of springs'  $\delta D$  values plotted in Figure 13 shows a general correlation with these wintertime isotope precipitation patterns. Exceptions are where spring waters are extensively evaporated and caused enrichment of the isotope abundance, or in localized high elevation areas with lower  $\delta D$  values. Nevertheless, low  $\delta D$  values in both precipitation and spring water is prevalent in the northern Mojave, and high in the southeastern Mojave, suggesting spring water variations at this geographic scale are controlled by geographic position.

Friedman et al. (1992) also produced similar contour plots of summertime precipitation and mean annual precipitation isotope values. In both these cases the general correlation with spring water isotope values is poor. Accordingly, the implication is that spring water sources in the Mojave reflect less of a mean annual precipitation source, but rather wintertime precipitation has the greater influence overall.

The geographic dependence of isotope abundances in Mojave spring water can be further illustrated by dividing the region into four quadrants as shown in Figure 35. Here is defined northwest, northeast, southwest, and southeast quadrants that separate groups of springs as they might be influenced by summer monsoonal versus winter maritime precipitation sources.

Further in Figure 36, each quadrant  $\delta D$  and  $\delta^{18}O$  value is plotted and compared to the Global Meteoric Water Line (GMWL; see Appendix C). It is readily noted that the southern quadrants have higher  $\delta D$

and  $\delta^{18}\text{O}$  values than the northern. Computed average  $\delta\text{D}$  values for each quadrant are shown in the list below and indicate that isotope values increase in spring water from the northwestern Mojave towards the southeast:

<i>Quadrant</i>	<i>Average <math>\delta\text{D}</math></i>
Northwest	-91.6
Northeast	-86.4
Southwest	-77.7
Southeast	-71.6

It can also be observed that most springs samples plot somewhat to the right of the GMWL, suggesting most have experienced some extent of evaporative enrichment of their isotope values. Note that springs with isotope values that plotted well to the right of the GMWL are not included in Figures 36 due to their extensive evaporation.

In summary, stable isotope abundances of spring water can be used to distinguish local or regional source of recharge. In the above illustrations, regional differences in stable isotope abundances of the Mojave spring water will depend on geographic locations. It is predominantly influenced by wintertime precipitation sources, but likely southeastern Mojave has summertime monsoonal source influence. However, for high elevation, low flow springs, isotope values may seasonally vary due to winter versus summer inputs in this area.

### **3.5 SPRING CONDITIONS**

The majority of the springs visited during this spring survey have been previously used and altered by humans. These alterations can include the installation of spring boxes, wildlife drinkers, diversion pipes, small check dams, troughs, adits and excavations. In some cases, these infrastructure have been installed in a manner that does not impact spring yield. Examples of this can be found at Teresa Spring in the Marble Mountains, and Groaner Spring in the Mescal Range. However, in many instances, these “improvements” have impacted spring flow, and in a few cases those impacts are likely permanent without substantial restoration (e.g., at Mesquite Springs along the south slope of the El Paso Mountains).

The presence or absence of the spring being in wilderness has relatively little bearing on the condition of the spring. Most of the springs were used by humans well before wilderness areas were designated. Nevertheless, there was ample indication that regardless of condition, if water was present, the springs were being used by wildlife, indicative of the precious nature of the limited water resource.

#### **3.5.1 Spring Flow Depletion Due to Regional Groundwater Usage**

As described earlier in this report, many springs appear to have been impacted by regional groundwater usage. One of the largest examples of this, is the depletion of a number of springs in the Amargosa

Region. These spring depletions due to regional groundwater usage can occur slowly, over very long periods of time making them particularly difficult to observe and manage.

Outside of the Amargosa River Basin, to the east and north in Nevada, pumpage in the Pahrump Valley and to the north in the Amargosa Desert is of significance to the springs in the Amargosa groundwater system. In Pahrump Valley alone, pumping records available since 1959 (NDWR, 2012b) indicate that beginning with initial groundwater usage of 1,159 AFY in 1959, groundwater pumping in the Pahrump Valley rapidly increased to a maximum pumpage of 47,950 AFY in 1968 (Figure 3-10). During the period of 1964 through 1978, pumping in the Pahrump Valley averaged more than 37,000 AFY. Since that time, groundwater pumping in the Pahrump Valley has gradually decreased to the point that in 2011, total groundwater pumping in the Pahrump Valley was 13,352 AFY, the lowest pumpage since the initial record in 1959.

Groundwater levels in the Pahrump Valley were noted to have declined steadily over the period of record, but of note is that impacts to springs in the Middle Amargosa Basin, particularly in the Shoshone – Tecopa area have not been reported. However, Thompson (1929) referred to a site called Yeoman Spring that had at the time an estimated flow of 90 gpm. Although there is no spring currently called Yeoman Spring, that spring is now referred to as Chappo Spring. The only surface expression of flow at Chappo Spring is a “puddle” surrounded by trees (including non-native palms) and shrubs. Additionally, early reports indicated that Resting Springs had flows of substantially more than 200 gpm (up to 250 gpm). Both of these springs flow at rates lower than those reported in the first half of the 1900’s. While this may be the result of spring modification and additional vegetation uptake, it is possible then, that spring flow in the Middle Amargosa Basin may have been effected by past pumping in the Nevada portion of the basin.

Similarly, groundwater pumping in the Amargosa Desert to the north in Nevada has caused groundwater level declines in that portion of Amargosa Basin, and a groundwater levels in a monitoring well installed on behalf of The Nature Conservancy north of the town of Shoshone and Shoshone Spring have been slowly decreasing indicating that there may be a slow, but currently un-measureable decrease in spring flow at Shoshone Spring that may only be identifiable after several decades.

In the Central Mojave Desert in the Harper Valley area, agricultural pumping for decades caused groundwater level declines that impacted areas of shallow groundwater and seeps, particularly along the south side Harper Valley playa. This can be observed by stressed vegetation including cottonwoods and mesquite along the south and southwest edge of the playa.

### **3.5.2 Spring Flow Depletion Due to Spring Flow Enhancement**

Conditions that were observed in numerous springs in the Mojave Desert, were locations where pipes or other infrastructure were installed into a spring or seep face to enhance flow. These flow enhancements were for a wide variety of uses including livestock, wildlife enhancement and mining operations. In many cases, the effect of these installations was to result in excessive yield in relation to the natural yield of the spring. The enhancements appear to have de-watered the springs leaving them either at poor yield or dry

with stressed or even dead vegetation. As long as such infrastructure is installed, these springs may never recover as the infrastructure allows any water present to immediately drain off rather than be stored naturally.

As an example of this condition, installing pipes in saturated ground to enhance flow is commonly used in geotechnical investigations/remedial activities to drain off groundwater in a landslide area, and to enhance stability (consider the pipes draining water from a hillside along a highway). The very same features that are used to dewater hillsides for ground stability purposes, have been used with the intent of enhancing spring flow, but with the result of simply dewatering the spring systems. Examples of this are at Mesquite Springs along the south slope of the El Paso Mountains, North Piper Mountain Spring in the mountains near the junction of Eureka, Deep Springs and Fish Lake Valleys, and numerous springs in the Old Woman Mountains.

### **3.6 REFINEMENTS TO CONCEPTUALIZATION ON SELECTED SPRINGS**

One of the important aspects of this project was that in each site inspection, a California state-licensed geologist or hydrogeologist was present to observe conditions. Observing so many springs in a relatively short time provided an unprecedented opportunity to compare and contrast site and regional conditions and spring yields and other conditions. This aspect of the project, along with past AZI experiences with springs elsewhere in California and Nevada has led to some refinements to spring conceptualization in certain areas. The following subsections highlight two of these refined areas.

#### **3.6.1 Tecopa Area Springs, Amargosa Region**

During the 1960's, an exploratory borehole was developed for mineral exploration immediately north of the community of Tecopa Hot Springs. Artesian flow of 160-degree Fahrenheit water became uncontrollable, and despite an intensive effort to control the flow, the effort was abandoned, and the newly created "Borehole Spring" was created. The resultant release of pressure in the aquifer system appeared to cause a decrease in flow in Thom Spring south of Tecopa Hot Springs (Thom Spring is along a fault that extends southward from the Borehole Spring area, along the east side of the hills behind Tecopa Hot Springs).

During this spring survey, a series of seeps along that fault line were identified and documented, these being "Yerba Mansa Seep," "East Tecopa Seep," and "One Palm Seep." Another likely connected spring is Vole Spring (south of Thom Spring). Each of these seeps had indications that they were larger in the recent past (as indicated by historic infrastructure and litter piles). All of this helps to confirm the connectivity of springs in the Tecopa Hot Springs area and the Borehole Spring, and that changes to the system may still be occurring as a result of the presence of the Borehole Spring. Of note is that altering or making any attempt to decrease Borehole Spring is problematic as the riparian area that has developed around the Borehole Spring has become one of the last refuges of the critically endangered Amargosa Vole.

### **3.6.2 Bonanza Spring Complex, Clipper Mountains, Southeastern Mojave Desert**

The Bonanza Spring complex (Bonanza Spring and Lower Bonanza Spring) rises on the southwest slope of the Clipper Mountains. This, the largest flowing spring in the southeastern Mojave Desert, has a substantial riparian area with cottonwood and Gooding's Willow trees, and other water-dependent vegetation. It is also in relatively close proximity to the proposed Cadiz Water Project. The environmental review documentation for that project assumes that spring flow at Bonanza Spring is the result of local precipitation in the Clipper Mountains. Based on field inspection of this spring, and other springs in the Clipper Mountains (e.g., Hummingbird Spring and Chuckwalla Spring), this conceptualization of Bonanza Spring does not appear reasonable.

As described above, there is a substantial riparian area covering more than five acres for the spring complex that is anomalous given the limited watershed/catchment for the spring. This is particularly notable in comparison to Hummingbird Spring to the east which has a much larger catchment extending to the crest of the range, and with a more substantial bedrock restriction to flow, but resulting in Hummingbird Spring being much smaller in size (by more than an order of magnitude in flow). It is likely that Bonanza Spring is the result of surfacing underflow from Lanfair Valley, moving through volcanic rocks of the Clipper Mountains, and being forced to the surface along range-front geologic structures. Further indication of the more regional character of the spring is the steady flow of the spring that has been noted back to that reported by Thompson in 1929. That is in contrast to other area springs with more seasonal sources. This would leave Bonanza Spring more susceptible to regional pumping impacts (as hydraulic gradients steepen across these faults) than springs such as Hummingbird. This is indicative that Bonanza Spring flow will be more susceptible to impacts from regional pumping that previously conceptualized.

### **3.7 WILDLIFE OBSERVATIONS**

During the course of the spring survey, upon reaching any particular spring, the presence or absence of surface water could in nearly all cases be identified by the presence of birds and/or other wildlife at the spring prior to actually observing the surface water present. This illustrated the importance of the springs in the Mojave Desert to wildlife, and birds in particularly (both resident and migratory). During September and October, neotropical migratory birds were observed at nearly every spring where surface water was present. These included orioles, tanagers, warblers, flycatchers and vireos. Of note were that non-native species including Brown-headed Cowbirds, Eurasian Collared-Doves, European Starlings and House Sparrows were not observed at any of the springs.

Mammals observed during the course of the survey included Desert Bighorn Sheep in the Whipple Mountains, and sign of Desert Bighorn Sheep in numerous other locations including the Turtle Mountains, Old Woman Mountains, Marble Mountains, Kingston Range, Avawatz Mountains, Argus Range, and elsewhere. An American Badger was observed near Black Springs at the north end of the Coso Range in the Northern Mojave-Owens/Panamint Region. Bobcat was observed at Willow Creek and near Christian Spring (Amargosa). Sign (scat/tracks) of mountain lion were observed in various



locations including in the Old Woman Mountains, at Salt Spring (Amargosa) and elsewhere. Bobcat and coyote scat and tracks were plentiful. Kit fox tracks were observed in the Avawatz Range. Bear tracks and scat was observed at Siebert Spring in the eastern Sierra Nevada in Indian Wells Canyon.

### **3.7.1 Special Status Species Observations**

Numerous special status species were observed during the course of the field work.

Desert Tortoise (state and federal listed as threatened species) were observed on the alluvial fan below the Great Falls Basin spring area in Searles Valley (Inyo County), and south of Blackwater Well and north of McDonald Well in the West Mojave). Additionally a Desert Tortoise shell was observed at Pothole Seep in the Argus Range.

Although not observed by the spring survey team, work with Amargosa Voles (state and federal listed endangered) was being conducted at the time of the spring survey in the Amargosa in the vicinity of Borehole Spring.

During June, 2016, numerous singing Least Bell's Vireos (state and federal listed as endangered) were singing along Willow Creek, and other Least Bell's Vireos were present at Vole Spring and Shoshone Spring. Inyo California Towhee (one bird, state listed endangered) was observed in Great Falls Basin near Twin Springs.

California bird species of special concern that were observed included:

- Burrowing Owl was observed in the Whipple Mountains in the Whipple Wash area;
- Snowy Plover was observed at Grimshaw Lake (fed by Borehole Spring, Dodge City Spring and Tecopa Hot Springs);
- Long-eared Owl family groups and solo birds were observed at numerous springs for example in (but not limited to) the El Paso Mountains (Steel Box and Willow Springs), Amargosa Region (Shoshone Spring, Horse Thief Spring, Twelvemile Spring); and the Newberry Mountains (Sheep Spring);
- Vermillion Flycatcher was observed at Shoshone Spring in the Amargosa Region;
- Loggerhead Shrikes were observed at various locations throughout the Mojave Desert during the spring survey with largest numbers along the north flank of the San Bernardino Mountains, in the Kingston Range area, and in the southeastern Mojave Desert;
- Crissal Thrashers were observed in the Amargosa Region (Shoshone Spring, Willow Creek, Thom Spring, Vole Spring); as well as in the vicinity of springs in Eastern Mojave Region (e.g. near Wheaton Spring, Antimony Spring, and Burro Springs);

- LeConte's Thrashers were observed near Dove Springs in the West Mojave Desert and Bird Spring in the Central Mojave Desert;
- Lucy's Warblers were observed along Willow Creek in the Amargosa Region;
- Yellow Warblers were observed at Butterbrecht Spring (West Mojave); Willow Creek (Amargosa); Frances Spring (Eastern Mojave); Big Morongo Springs (South-central Mojave) and at Jackpot Canyon Spring (Northern Mojave – Owens/Panamint Region); and,
- Yellow-breasted Chat was identified along Willow Creek (Amargosa);

Other notable bird sightings included an American Dipper at Chris Wicht Spring (in Surprise Canyon in the Panamint Range). According to eBIRD, this is the only location for American Dipper east of the Owens Valley in California. A list of bird species identified by Mojave Desert region is provided in Table 5.

### **3.7.2 Common Raven Monitoring**

Although not part of the original scope for this project, AZI and THC volunteered to gather other data as needed for BLM and other researchers to take advantage of our presence at so many springs over such a large area. One of the tasks conducted included conducting Common Raven monitoring at the springs visited. A report by Tim Shields (2016) regarding the results and with recommendations is provided in Appendix D. What follows is extracted from that report.

As described above, the comprehensive coverage of natural springs in the Mojave Desert of California afforded the opportunity to gather information on the use of these water sources by ravens. The increase in raven numbers in the last half-century and the attendant problems increased raven predation is causing to desert tortoises and other wildlife make such information valuable. The point source nature of these springs and their potentially crucial role in making remote areas of the desert habitable to ravens, indicates that denying ravens access to springs may be a viable management option.

As springs were approached field observers recorded ravens seen in the vicinity, both visually and by listening for vocalizations. Sightings were subdivided by distance into ravens seen at a spring, those within 500m and beyond 500m. Ravens that were heard vocalizing but not seen were recorded as well. Bird behavior was divided into perching and flying. All bird vocalizations, whether associated with a sighting or not, were noted.

A total of 78 ravens were seen at 51 of the 313 spring sites visited during the survey. Two birds were seen perched at Cottonwood Spring, the only ones considered to be "at" a spring. Three of the 78 were perched when observed, the rest were seen flying. Of 48 flying birds 18 vocalized during observation. At least 33 of 78, or 42%, were seen at springs or within 500m. 18 (23%) were seen beyond that distance. 27 (35%) were recorded by vocalization alone. In some cases field observers subdivided vocalizations by distance as well but for this analysis these distinctions will be ignored.

Of 313 springs visited during the study, ravens were seen in the vicinity of 51 or 16% of them. These springs were widely distributed across the total geographic range of the springs visited. Google Earth was used to define a set of remote springs used by ravens. Springs were considered to be “remote” if there were no obvious artificial water sources or permanent human occupation within a radius of ten miles. Using this criterion the following 6 springs qualified as remote: Bluebird, Coffin (Colorado Desert), Horsethief Spring, Tule Well (Northern Mojave – Amargosa), and Rattler Spring, Sunflower Spring (Southeastern Mojave).

Given the relatively brief visits of field workers and the cautious behavior of ravens, that the birds were noted at 16% of all sites indicates that springs are likely commonly used by ravens. At least 42% were seen within 500m of a spring. It is likely that some of the ravens noted only by vocalization were also within this distance. Some spring using birds may have gone uncounted by flying away silently and getting out of sight early in the approach of field workers. Ravens are alert to danger and prone to flee at the approach of humans. The large number of birds seen flying and heard calling in the vicinity of springs probably included some that were at springs when workers approached.

Reliable water sources, such as the springs studied here, may be important resources for ravens, allowing them to more easily occupy wide areas of desert that might otherwise be off limits or difficult to use. Remote springs may be particularly significant sites in allowing ravens to occupy large areas of the desert. Using Google Earth imagery I set an arbitrary distance of 10 miles from any visually obvious body of water, including any human settlement (no matter how small), on the assumption that water would be available at such places. Using this criterion 6 of the 51 springs with raven observations qualified as remote. This subset may be worthy of particular attention in further research.

### **3.8 VEGETATION OBSERVATIONS**

Observations of vegetation present were conducted to the extent and detail that field staff backgrounds allowed. Generally, vegetation was noted in general terms. Commonly encountered spring vegetation in region included willows of varying species, mesquite, cottonwoods, baccharis (sp., commonly referred to as waterweed), catclaw acacia, various species of saltbush, California fan palms (in the Turtle and Whipple Mountains, and planted palms (or sprouted as a result of other planted palms such as date palms) in the Amargosa at various locations and in the Paradise Springs area. Bulrush and phragmites (common reed) were present throughout the area. Cattails were a common component where water was present. Saltgrass and other grass species were also present a majority of the springs visited.

#### **3.8.1 Tamarisk and Arundo**

Tamarisk was noted at many of the springs, in all regions of the Mojave Desert. Particular areas where tamarisk growth appeared to be particularly strong was in the Whipple Wash area of the Whipple Mountains, in washes in the Old Woman Mountains, and areas along the Amargosa River. Arundo (Giant Reed) was noted at Ricky Spring in the Ivanpah Mountains, and at areas such as Sacramento Spring and

Bonanza Spring where past arundo eradication efforts have been conducted. Of note is that past arundo eradication efforts have resulted in the presence of now dried out slash and trash (particularly at Sacramento Spring) that could pose a fire threat and should be removed. In the Argus Range, numerous thickets of reeds (appear to be phragmites) were present but should be checked for the presence of arundo as well (for example at Nadeau Spring).

## 4.0 RECOMMENDATIONS FOR MOJAVE DESERT SPRINGS – FUTURE WORK

Given the regional and local pressures on water resources throughout the Mojave Desert, it is clear that an effective monitoring program for spring and waterholes is required. Although there are land status protections in many spring areas (e.g. designated wilderness), impacts to these springs may occur from stresses to aquifer systems many miles away, and those impacts may occur slowly over decades. In order to understand these spring systems and to be able to identify future attributable impacts in a defensible manner, a monitoring program for the entire region will be needed. Based on the current work, and past investigations by others, the hydrology of the Mojave Desert is noted by on-going change. Although the work in this report can be considered a baseline from which to identify future change, it is key to recognize that this effort represents a “snapshot in time” of conditions that are actively changing at the current time.

The Mojave Desert, which for this project spans two states and five counties (inclusive of Nevada springs included in this report) exists as one of the most important ecosystems in the southwestern United States. Both the groundwater and surface water in the region support a unique and diverse ecosystem, while also supporting human needs through domestic, agricultural, wildlife, stock-watering, mining and other industrial uses. Based on the results of the current and past hydrologic work in the region, the following sections highlight future work that should be incorporated into a spring monitoring plan for the Mojave Desert.

### 4.1 MONITORING

Monitoring forms the basis for any water management activities in that it is impossible to manage any resource without a basis for what that resource comprises (Groundwater Resources Association of California, 2005). The recommendations provided below contain provisions for both automated monitoring techniques and regular field monitoring. In desert areas where river channel or spring conditions can radically change as the result of one summer thunderstorm, having regular field observations taking place is key to not only monitor the resource, but to assure that automated data collection devices are working correctly (and to perform maintenance) and that physical conditions on the ground have not changed to the extent that automated data collection is compromised (e.g. river changing course and stream gage station no longer accurately measuring flow).

Given the extent of the Mojave Desert, AZI is proposing 35 key springs (Table 5) that should be incorporated into the proposed hydrologic monitoring program. Other springs may be included in the future for biological importance. These springs will provide information as to seasonal and annual changes in spring flow and conditions, identification of potential impacts from regional and local groundwater usage, and an ability to evaluate the effect of climate change on these important resources.

- **Spring Discharge** - Flow discharge and groundwater elevation measurements (where wells are incorporated into the monitoring) should be conducted and collected on a regular basis (at least annually) from the existing suite of springs and wells listed in Table 5. Basic field water quality

data should be collected at all discharge, and groundwater elevation monitoring points. For a starting point, the methodology used in this project should continue until such that:

- **A Survey of Sites for Dedicated Monitoring Infrastructure and Work Plan Development can be conducted** and developed, respectively to evaluate means for collecting as precise flow and/or groundwater elevation/head data as can be efficiently conducted. The greater the flow and/or head data precision, the easier it will be to identify data trends such as decreasing flow or changes in water quality. This task may also include the planning for the installation of precipitation gages at specific selected springs.
- **Visual Monitoring** – All future monitoring events should include photographic and video (where applicable) documentation from specific locations to identify noticeable changes in the spring environments. This will assist in identification of tamarisk or other non-native vegetation encroachment that could affect spring flows. Additionally, periodic cross-checking with aerial imagery should be conducted to identify changes to areas not specific to monitoring sites.
- **Groundwater Usage and Precipitation** – Monitoring existing and proposed groundwater usage throughout the basin both in Nevada and California will be a key monitoring component protective of the WSR along with maintaining available precipitation data should be conducted.
- **Visit Selected Springs that were not field inspected** – Visiting remaining un-inspected springs, particularly in the Chemehuevi, Dead and Old Woman Mountains would be useful for future spring planning.

#### 4.2 ADDITIONAL INVESTIGATION

Additional geologic/hydrogeologic interpretation should be conducted focusing the on the key springs listed for future monitoring. Additionally, the spring information in Appendix A should be used to develop a work plan for conducting focused flora and fauna surveys. The information provided in Appendix A can be used to identify key springs for investigation (e.g. for the presence of spring snails) making these investigation more feasible.

#### 4.3 DEVELOPMENT OF A SPRING RESOURCES MANAGEMENT PLAN

Consideration should be given to the development of a spring resource management plan. This plan would develop water resource management protocols (inclusive of a regional groundwater monitoring network) that would not only tie in the results of spring monitoring (hydrological and biological) with land management decision-making, but would also identify monitoring locations (e.g. monitoring wells) well away from spring habitats that could be used to identify groundwater impacts before springs are affected. Observations of spring flow changes or biological changes at springs given the hydrology of the Mojave Desert, may be too late to affect meaningful safeguards or management actions to protect these sensitive spring resources.

## **5.0 CONDITIONS AND LIMITATIONS**

This report has been prepared according to generally accepted standards of hydrogeologic practice in California at the time this report was prepared. Findings, conclusions, and recommendations contained in this report represent our professional opinion and are based, in part, on information developed by other individuals, corporations, and government agencies. The opinions presented herein are based on currently available information and developed according to the accepted standards of hydrogeologic practice in California. Other than this, no warranty is implied or intended.

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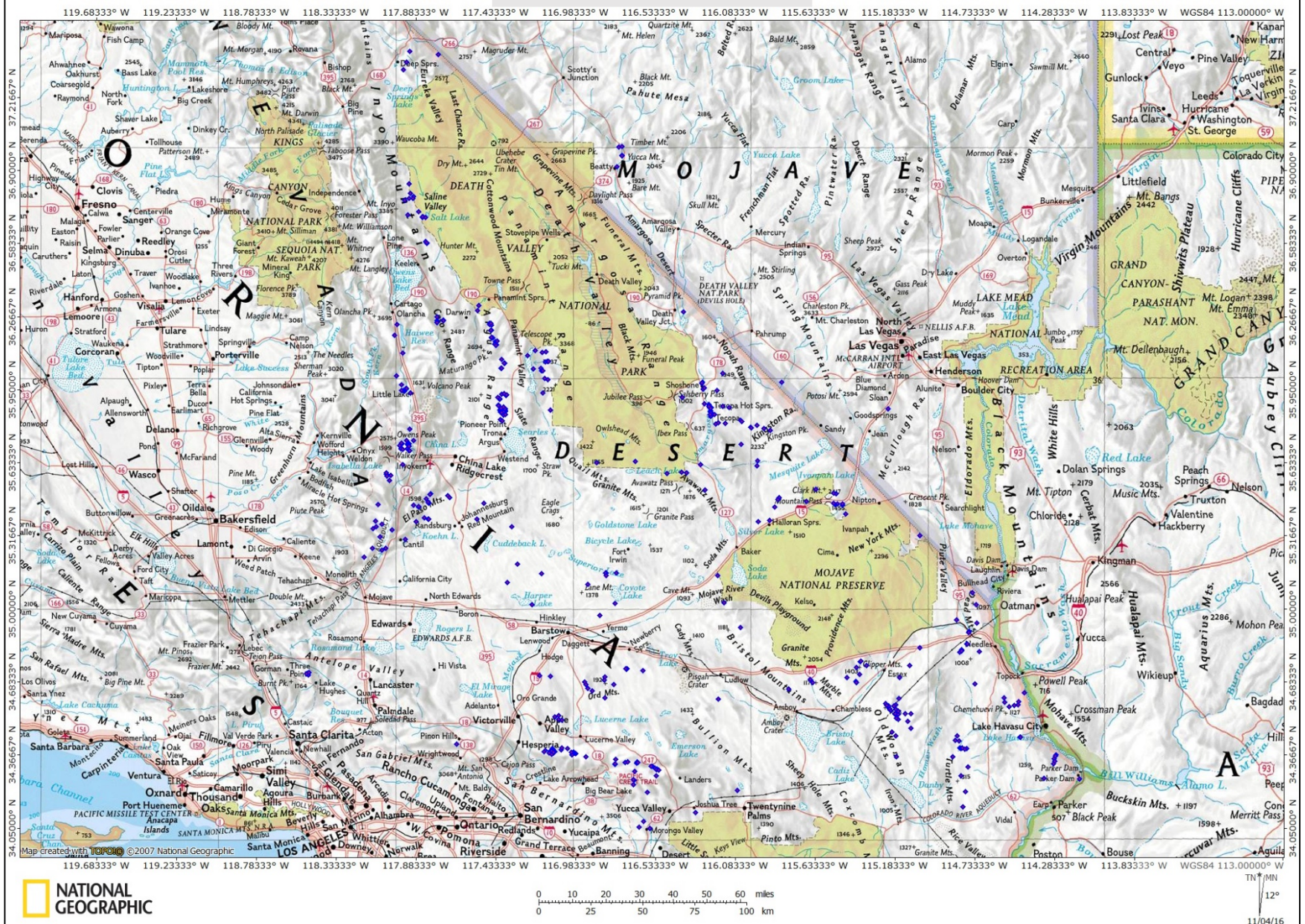
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## FIGURES

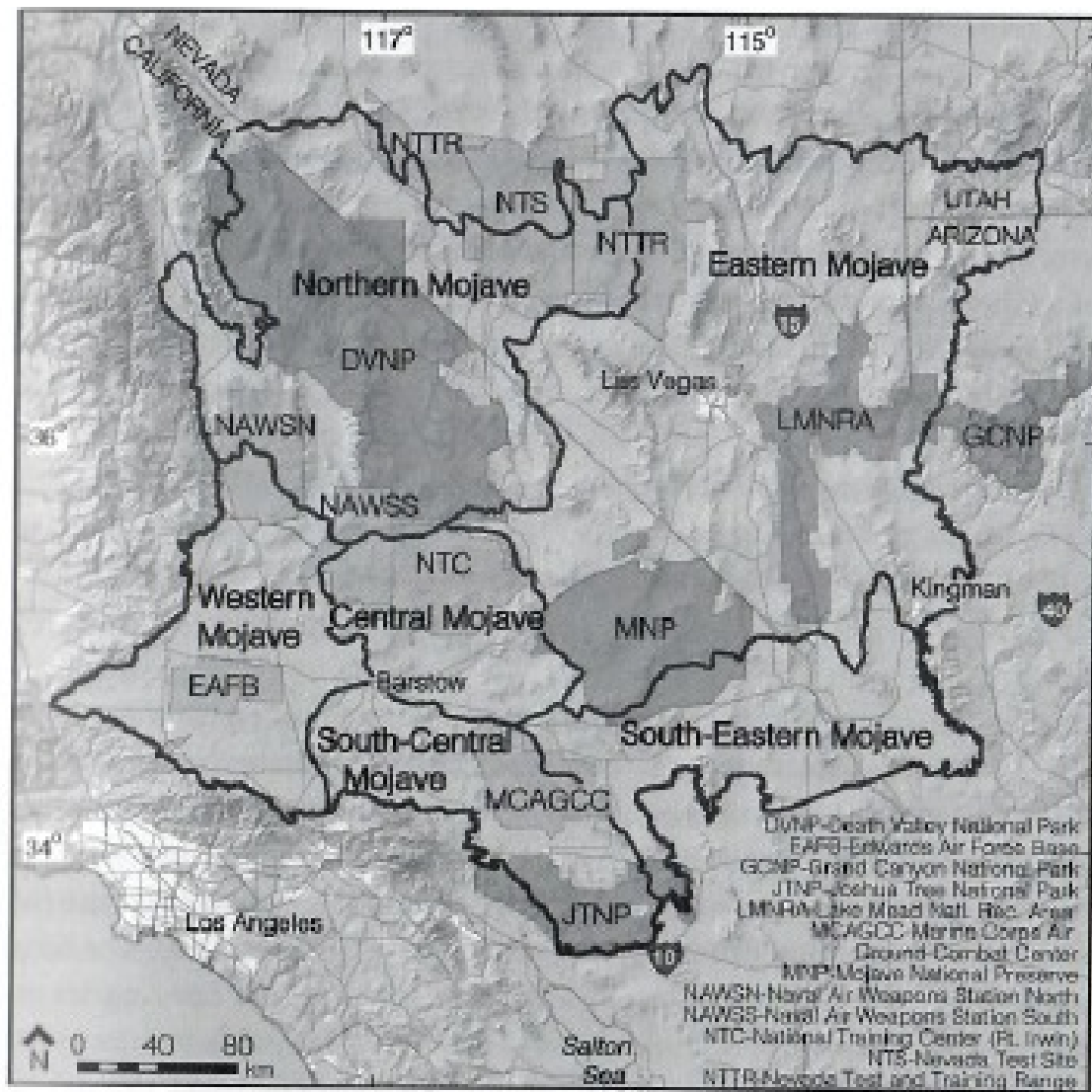


Figure 1  
Distribution of Spring  
Survey Springs (All Areas)



Date: November 4, 2016  
Project: THC Springs  
Image Source: USGS





Adapted from: Webb, Heaton, et.al., 2009



Figure 2: Ecological Subregions



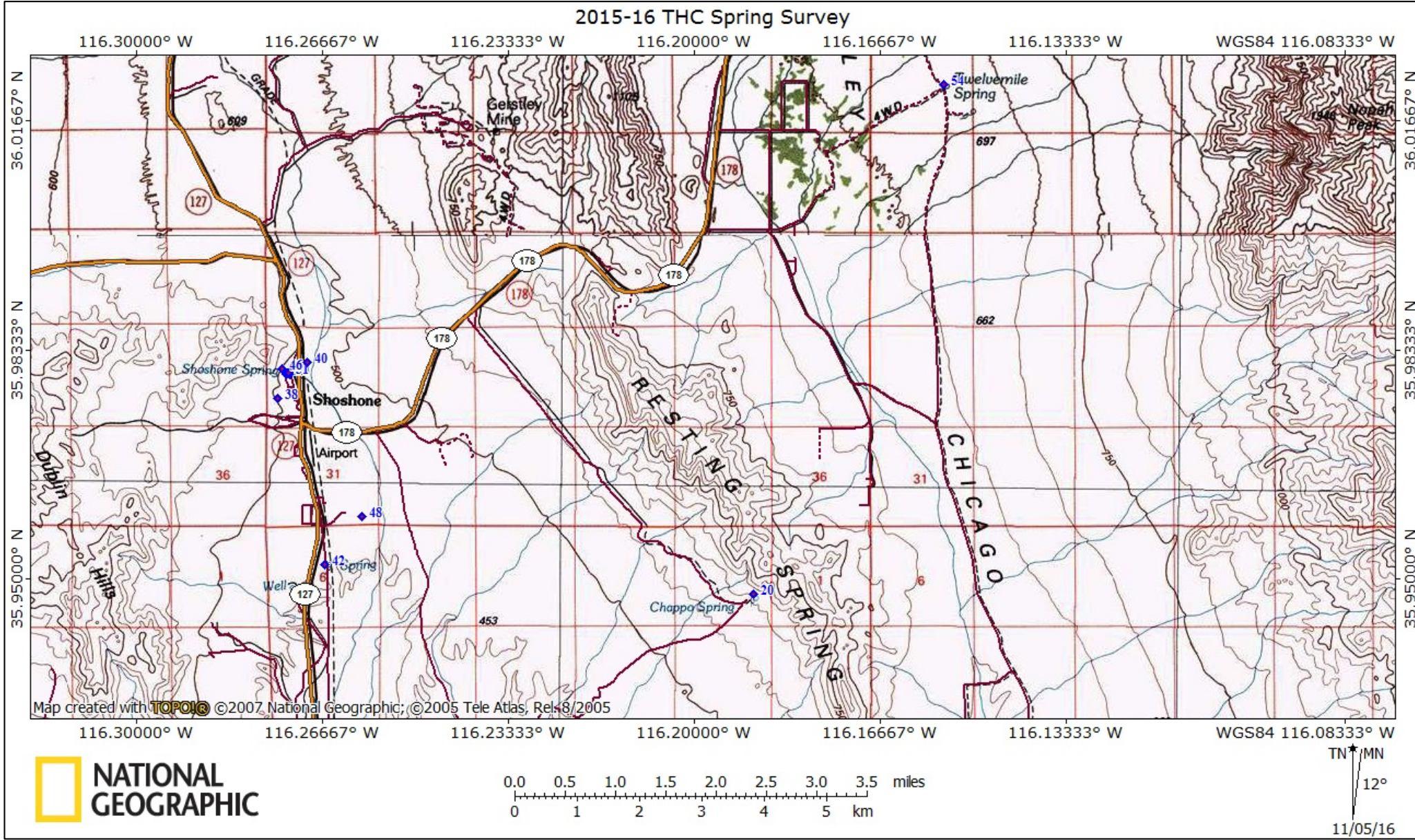


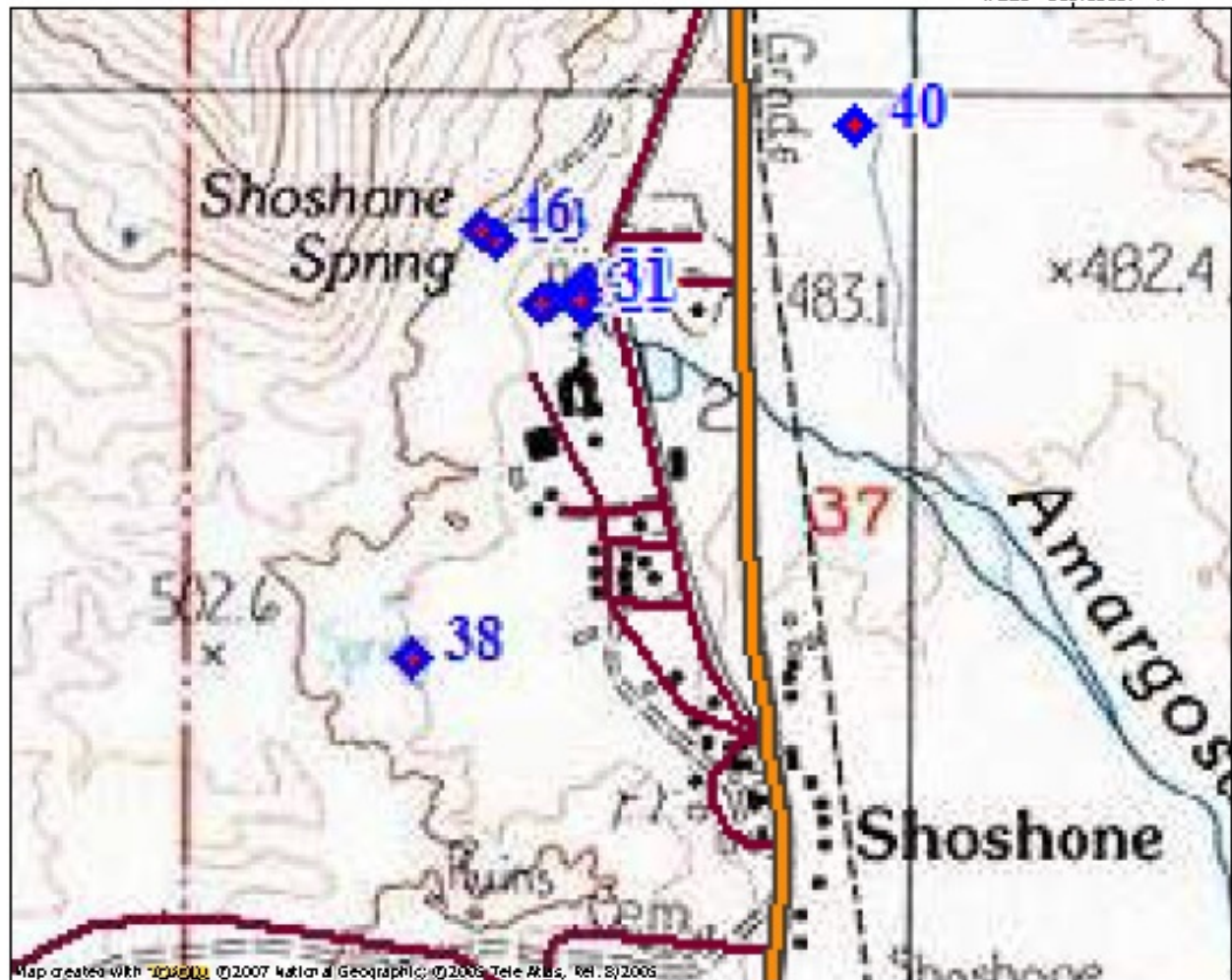
Figure 3  
BLM Barstow  
District  
(Amargosa),  
Shoshone Area  
Springs

Date: November 6, 2016  
Project: THC Springs



2015-16 THC Spring Survey

WGS84 116.25967° W



NATIONAL  
GEOGRAPHIC

0.00 0.05 0.10 0.15 0.20 miles  
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 km

WGS84 116.25967° W

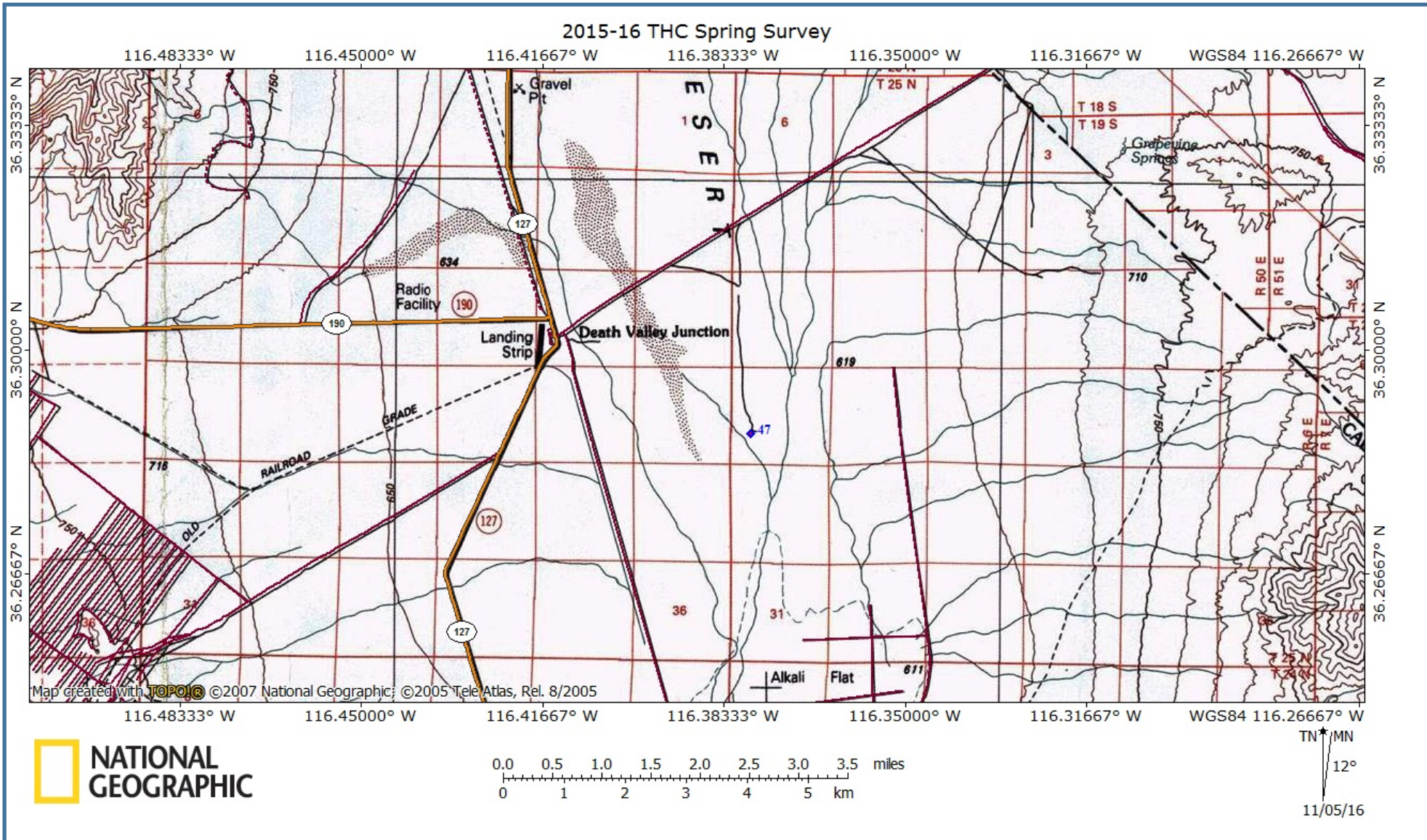
TH 14° 12"  
11/09/16

Figure 4: BLM Barstow District  
(Amargosa), Shoshone Spring  
Complex

ANDY ZDON &  
ASSOCIATES, INC.



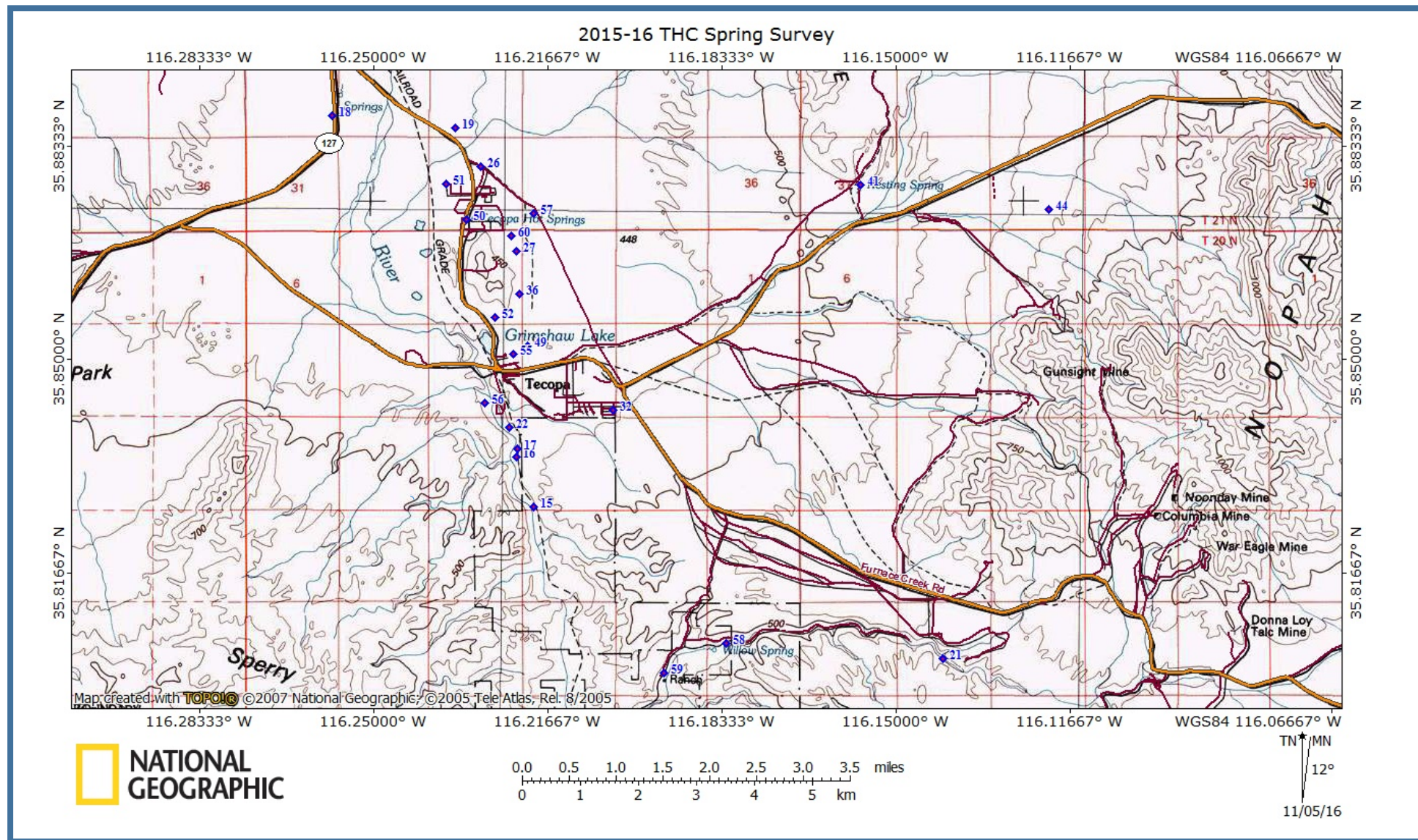




**Figure 5**  
**Barstow District**  
**(Amargosa) – Hog**  
**Farm Well**

Date: November 6 2016  
 Project: THC Springs





**Figure 6**  
**BLM Barstow**  
**District**  
**(Amargosa)**  
**Tecopa Area**  
**Springs**

Date: November 6, 2016  
 Project: THC Springs



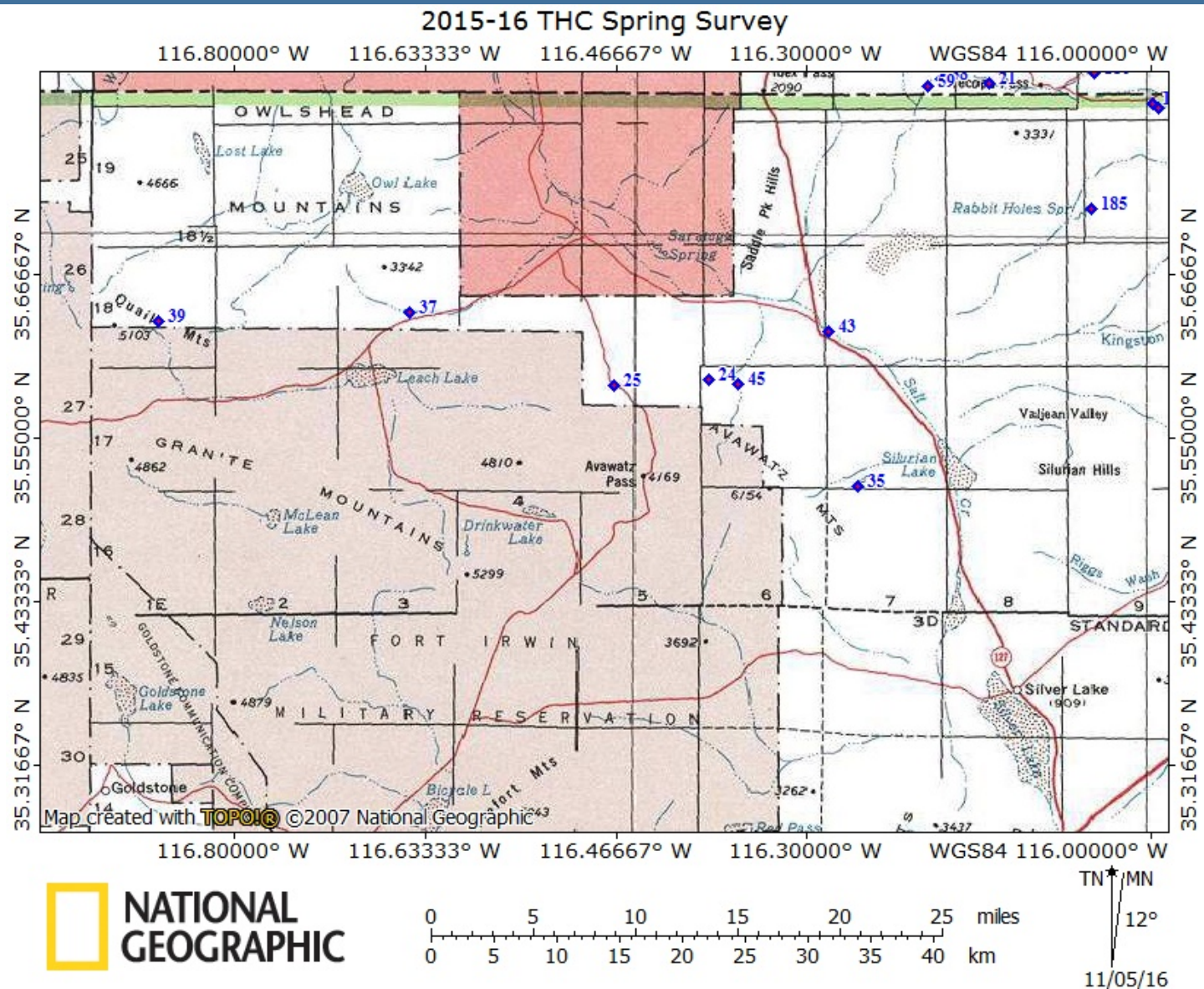
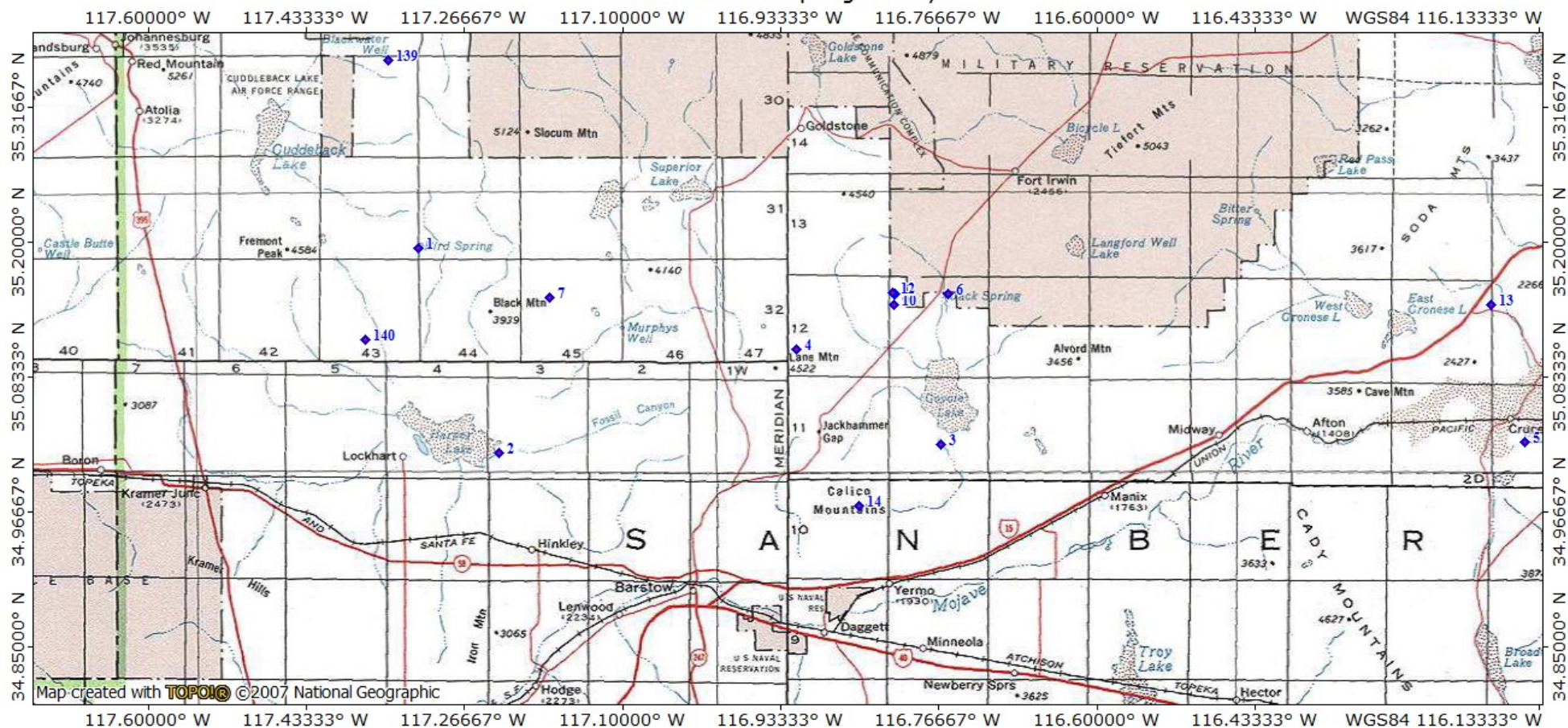


Figure 7  
BLM Barstow  
District  
(Amargosa)  
Avawatz Area  
Springs

Date: Nov 6, 2016  
Project: THC Springs



# 2015-16 THC Spring Survey



0 5 10 15 20 25 miles  
0 5 10 15 20 25 30 35 40 km

TN MN  
12°  
11/06/16

Figure 8  
BLM Barstow  
District, West and  
Central Mojave  
Area Springs

Date: Nov 9, 2016  
Project: THC Springs



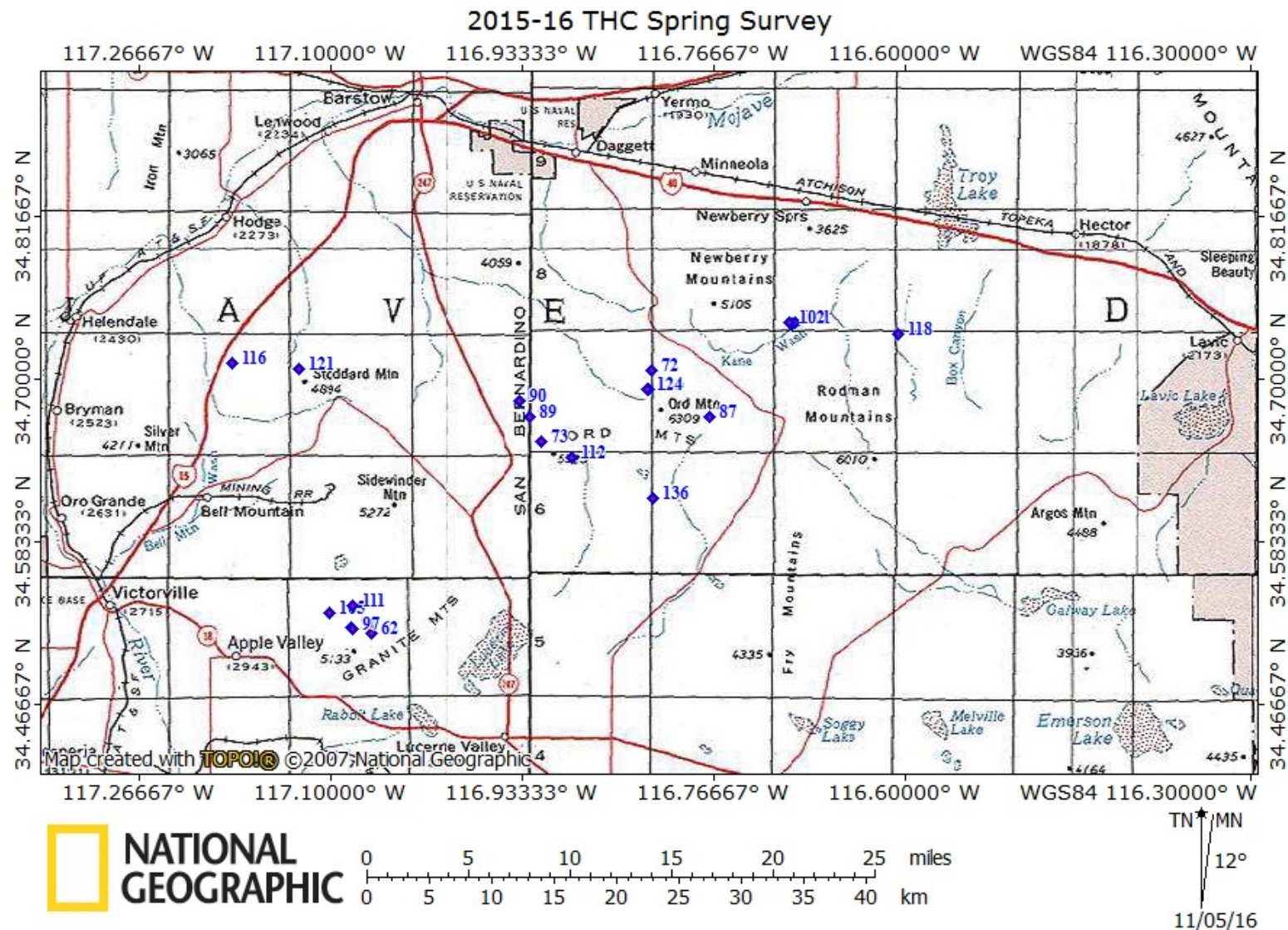


Figure 9  
BLM Barstow  
District (South-  
Central Mojave),  
Ord-Rodman  
Area Springs

Date: Nov 9, 2016  
Project: THC Springs



# 2015-16 THC Spring Survey

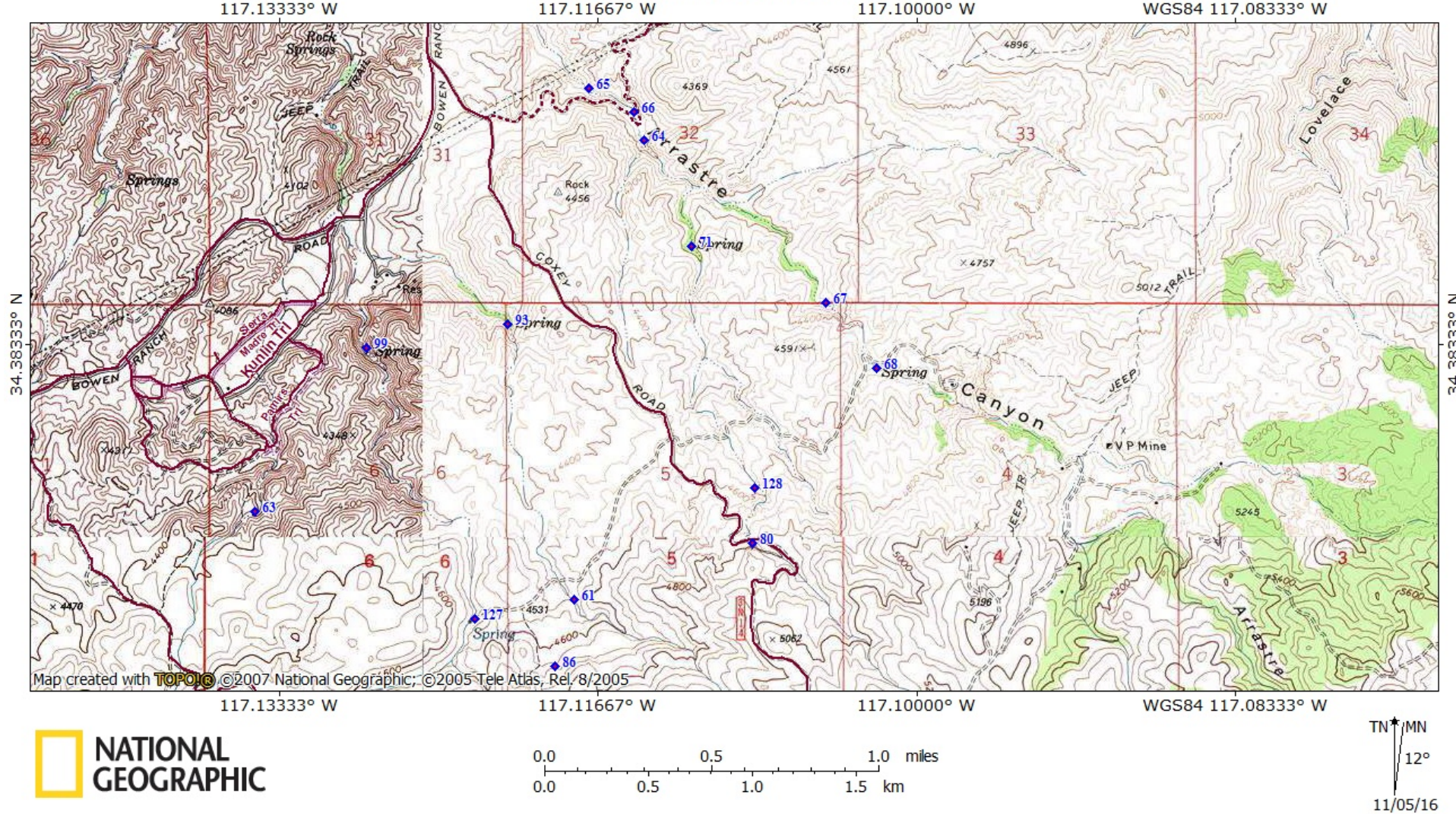
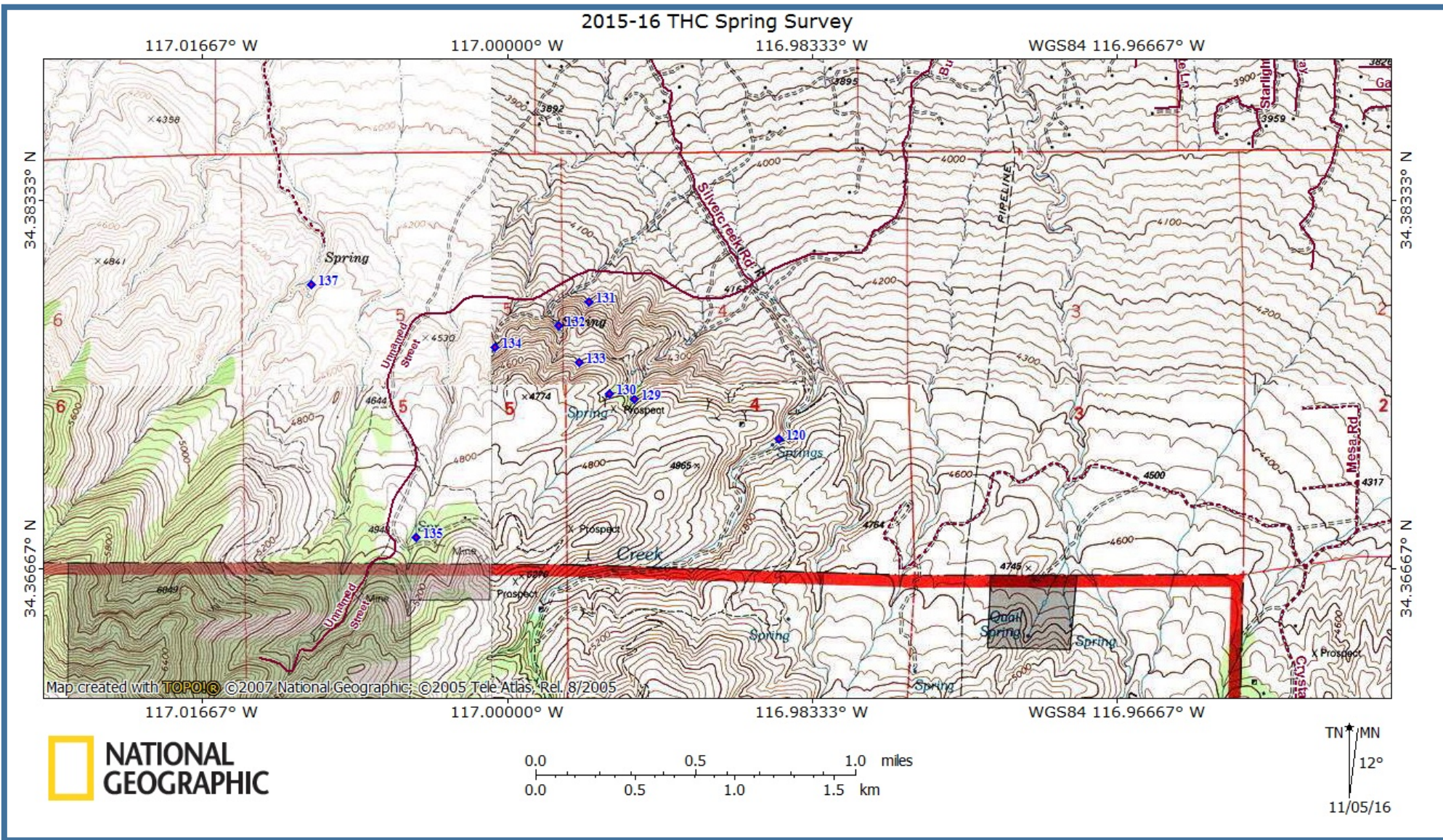


Figure 10  
BLM Barstow  
District (South-  
Central Area),  
Juniper Flats  
Area Springs

Date: Nov 9, 2016  
Project: THC Springs





**Figure 11**  
BLM Barstow  
District (South-  
Central Areas),  
White Knob Area  
Springs

Date: Nov 9, 2016  
Project: THC Springs



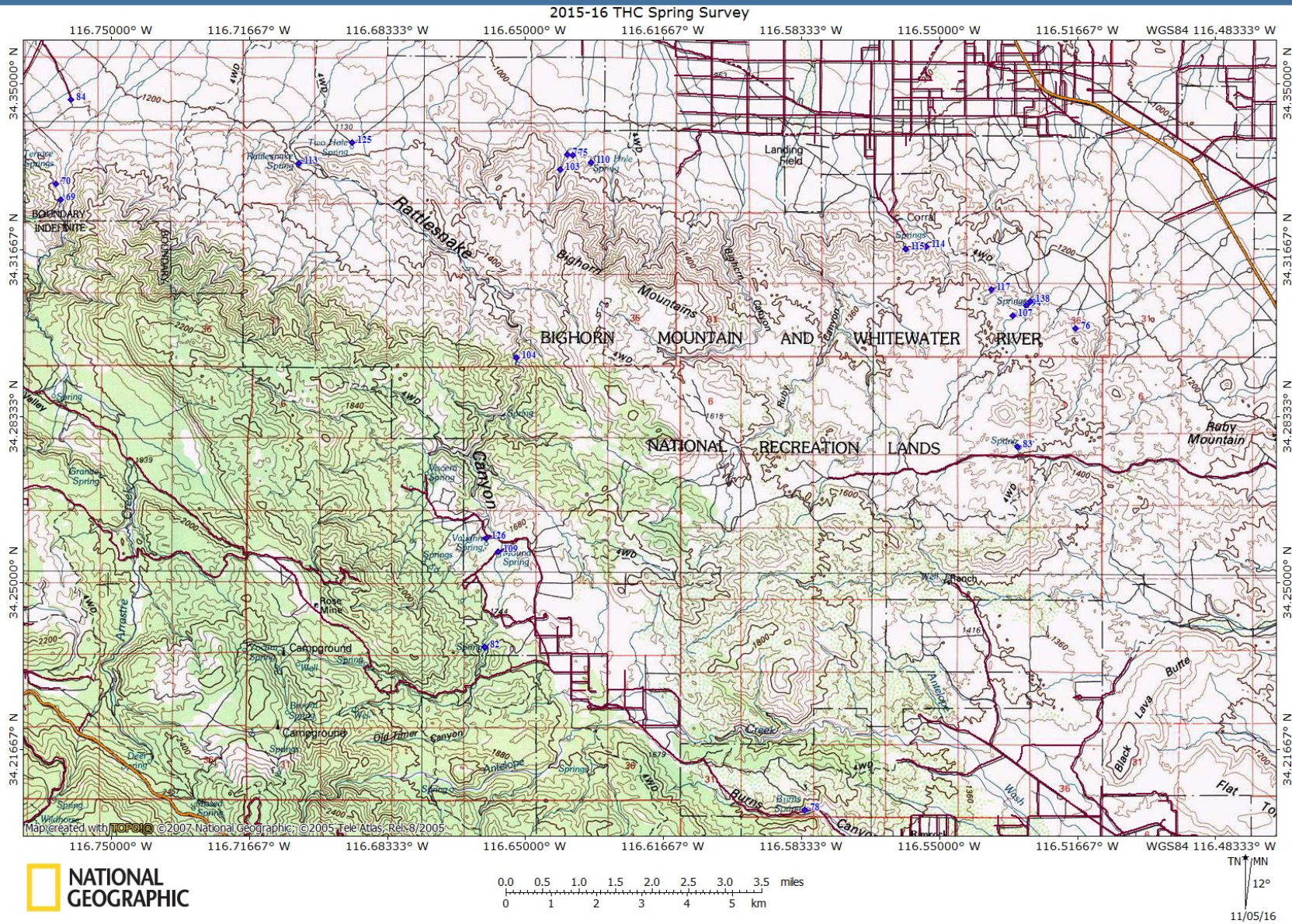


Figure 12  
BLM Barstow  
District (South-  
Central Area),  
Bighorn  
Mountains  
Area Springs

Date: Nov 9, 2016  
Project: THC Springs



## 2015-16 THC Spring Survey

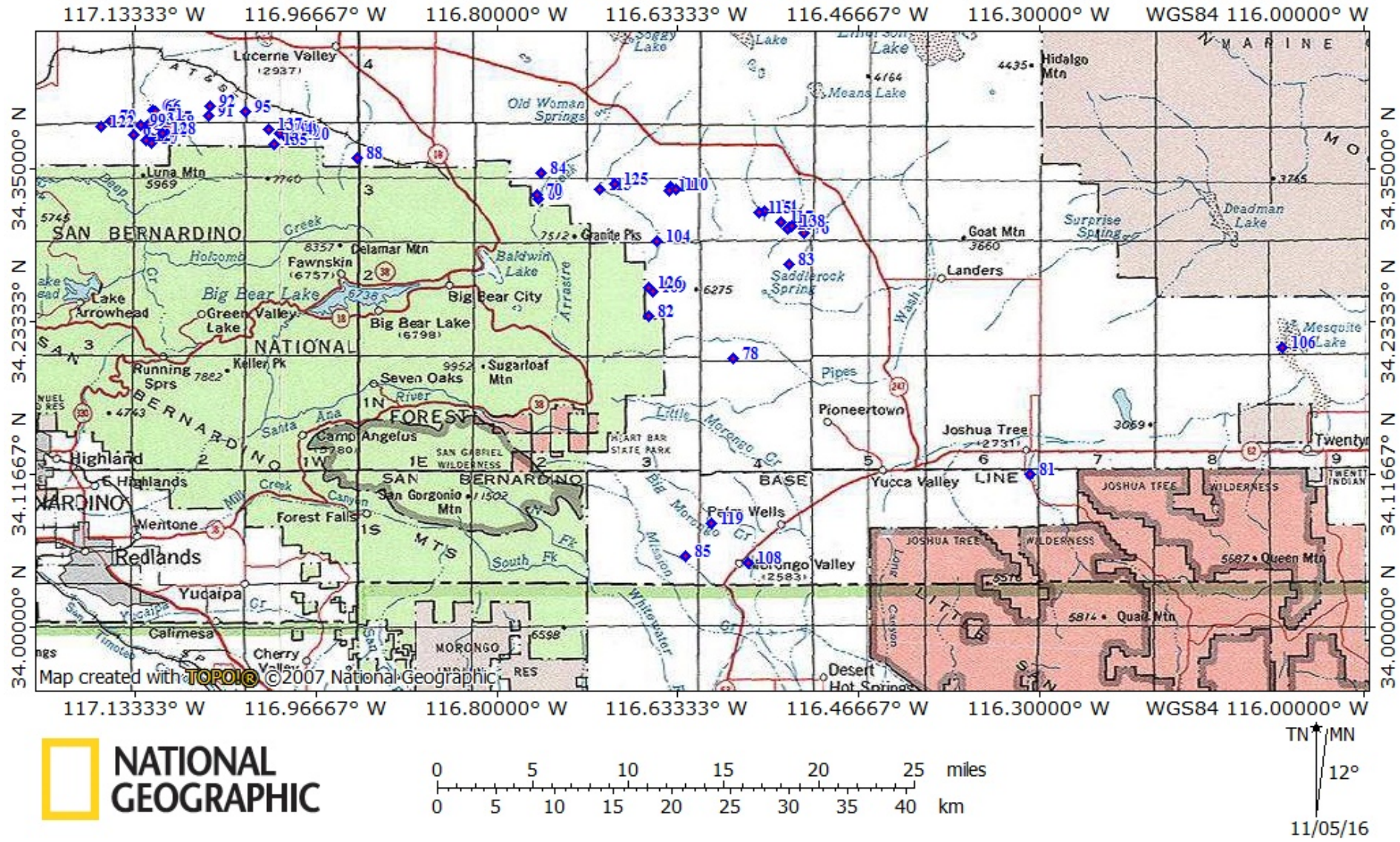


Figure 13  
BLM Barstow  
District (South-  
Central Area),  
Southernmost  
Springs

Date: Nov 9, 2016  
Project: THC Springs



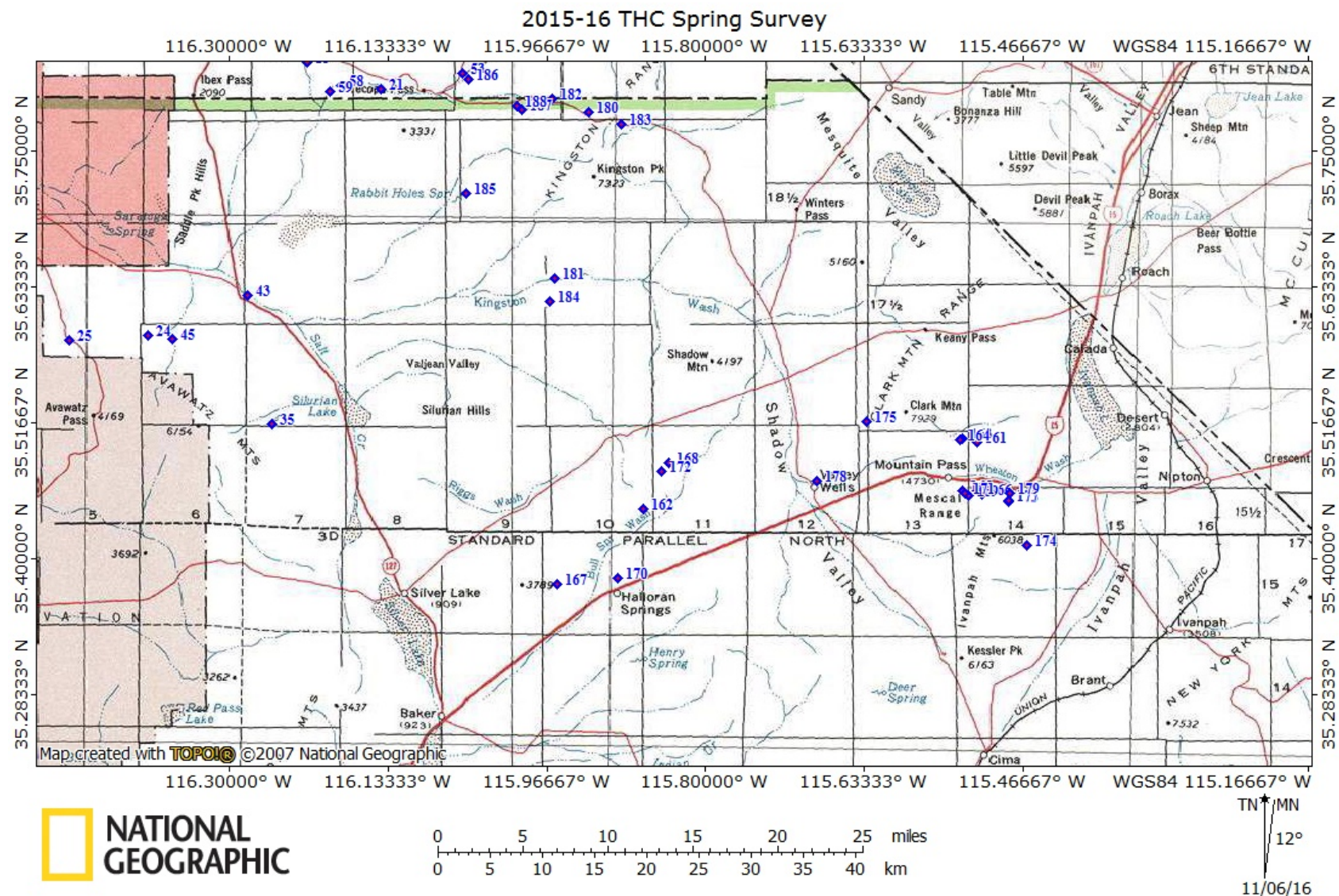


Figure 14  
BLM Needles  
District,  
Amargosa and  
East Mojave  
Area Springs



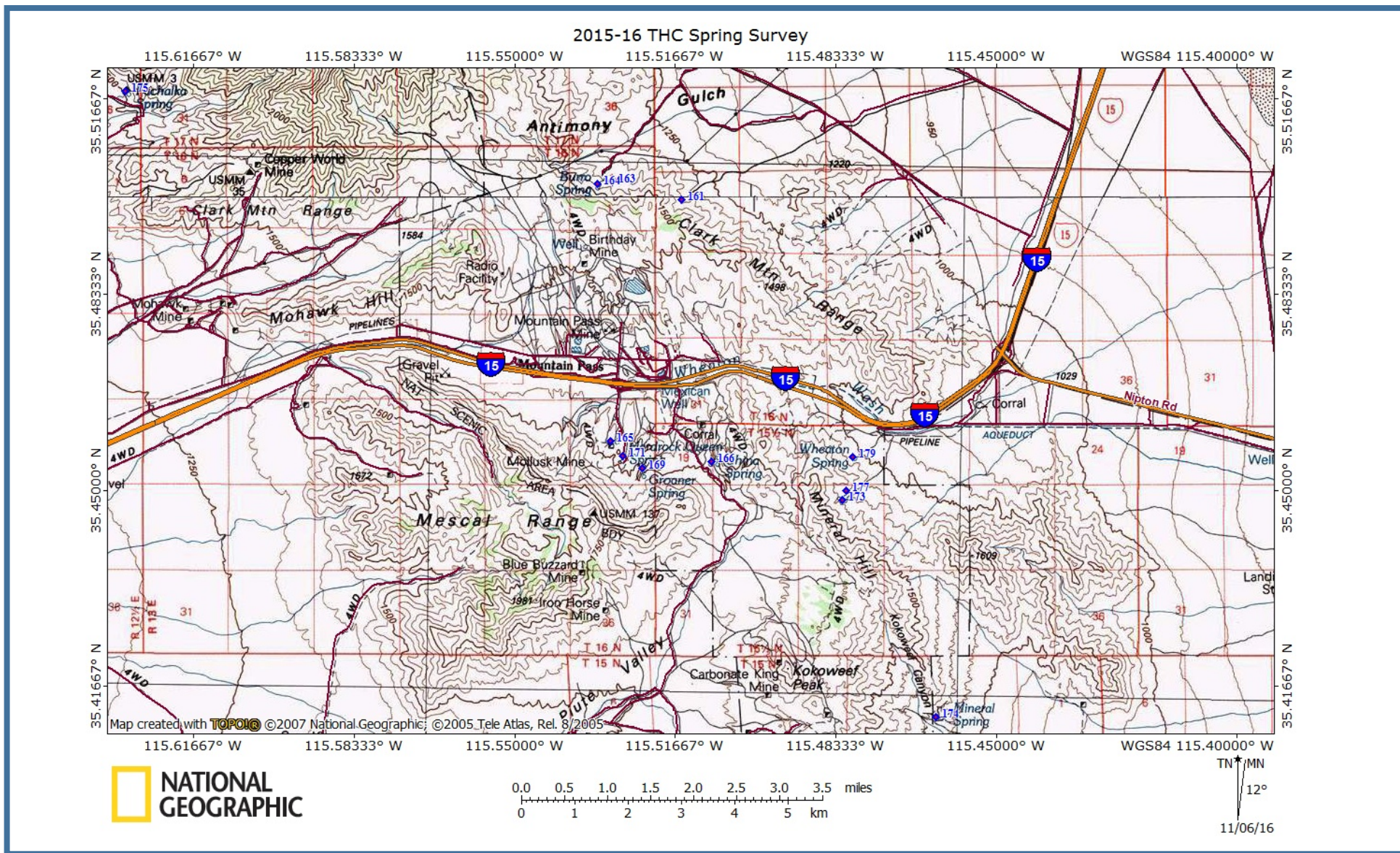


Figure 15  
BLM Needles  
District (East  
Mojave), Clark-  
Ivanpah Area  
Springs

Date: Nov 9, 2016  
Project: THC Springs



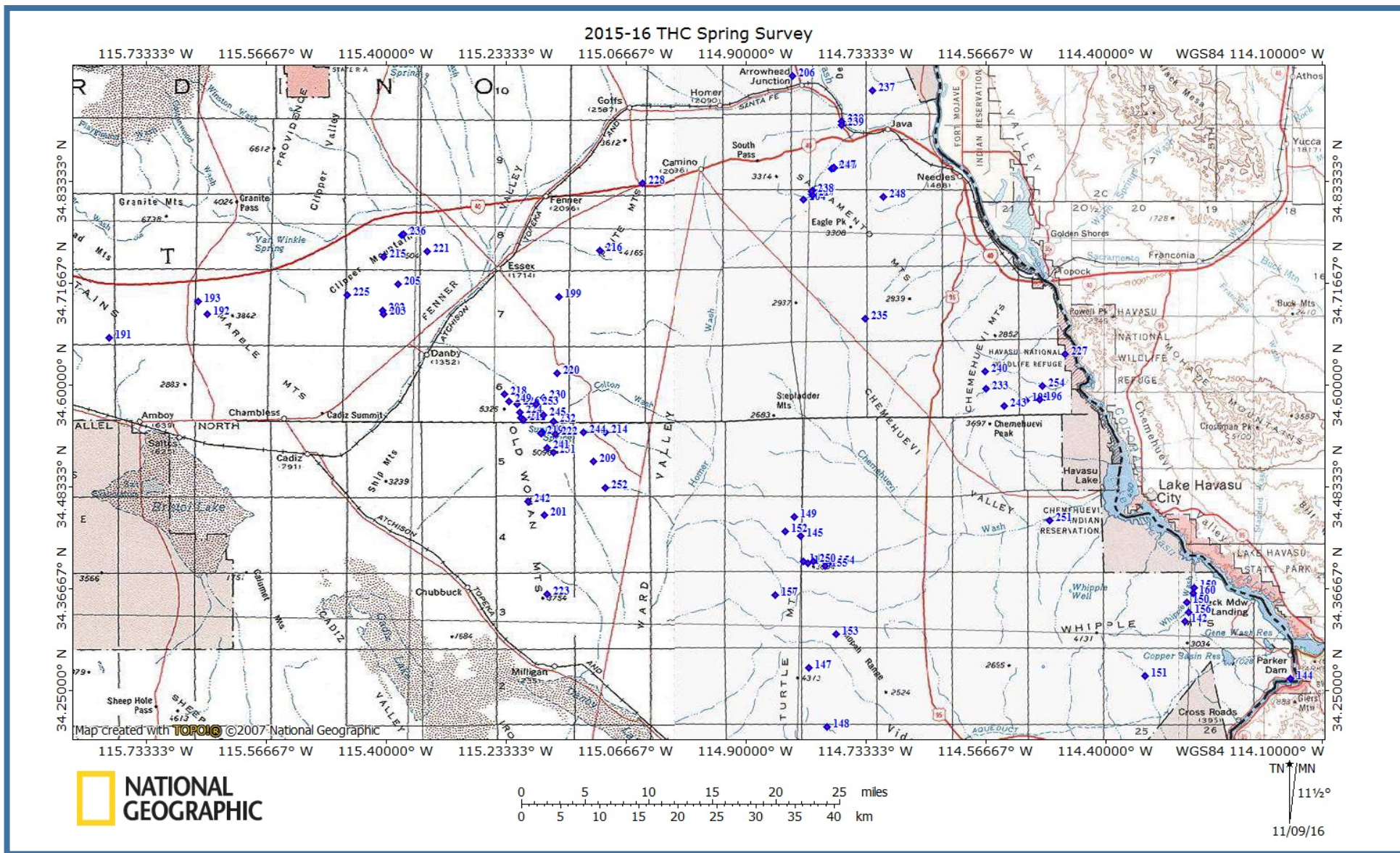


Figure 16  
BLM Needles  
District,  
Southeast  
Mojave and  
Colorado Desert  
Area Springs

Date: Nov 9, 2016  
Project: THC Springs



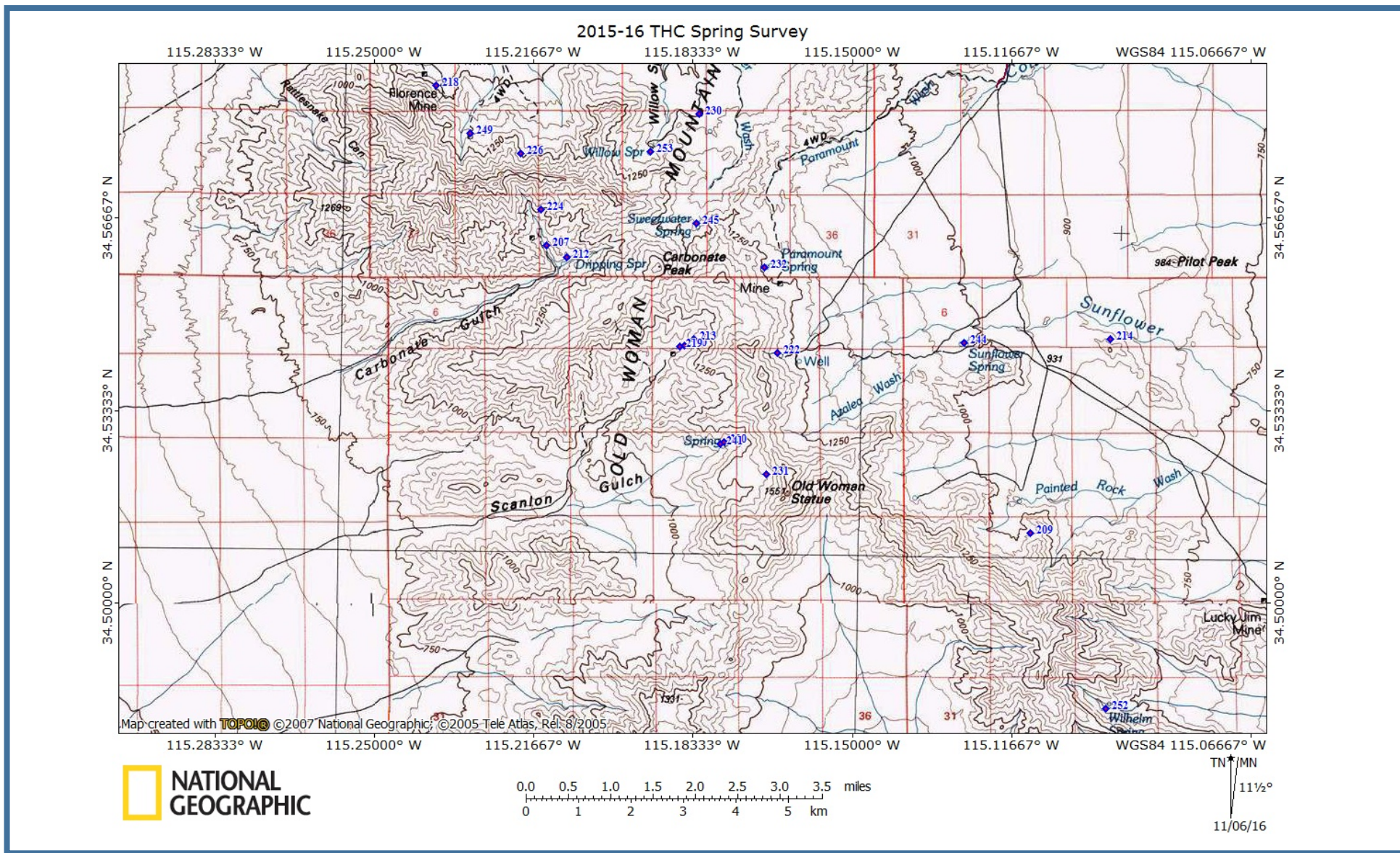


Figure 17  
BLM Needles  
District  
(Southeast  
Mojave), Old  
Woman  
Mountains  
Springs

Date: Nov 9, 2016  
Project: THC Springs



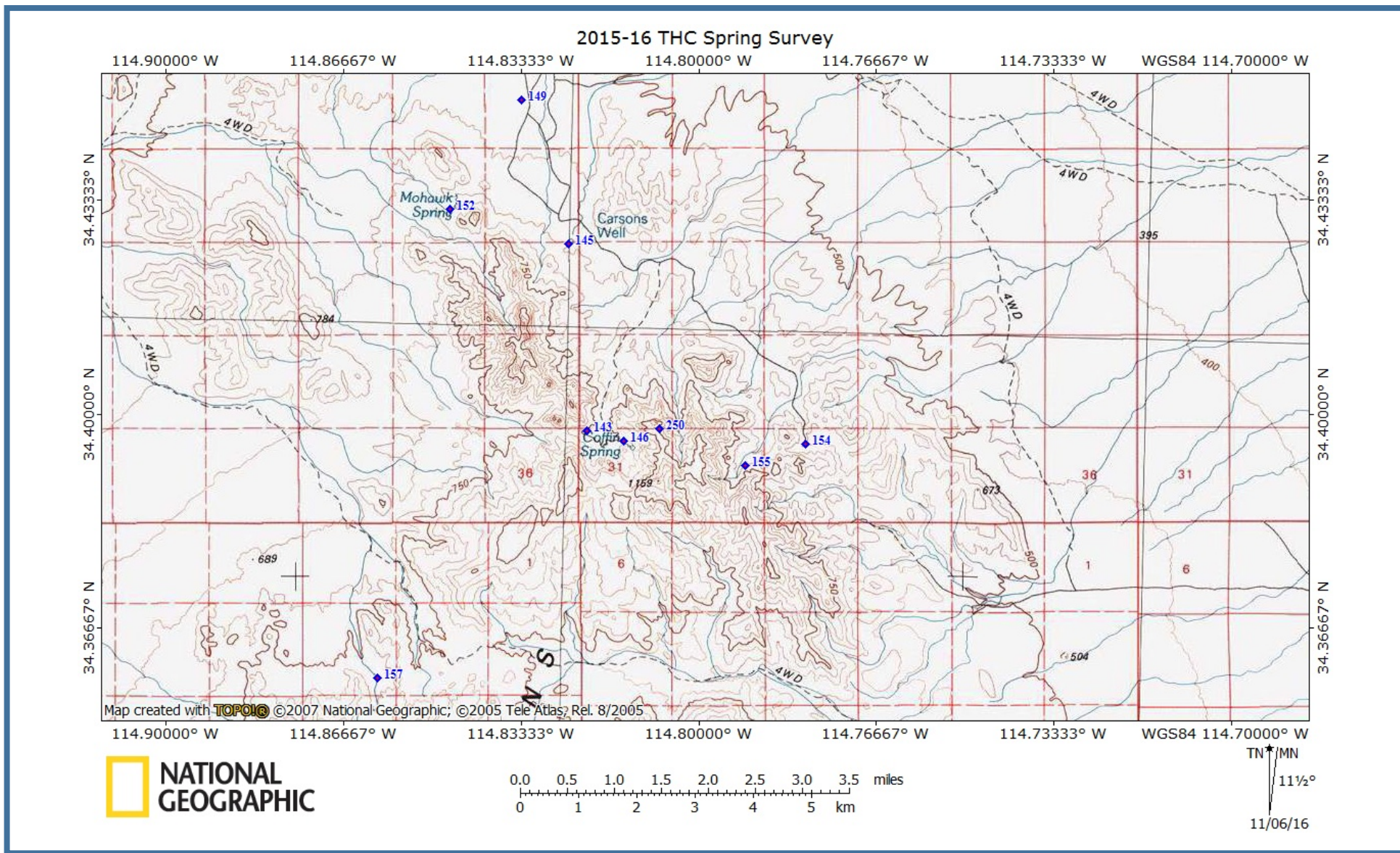


Figure 18  
BLM Needles  
District  
(Colorado  
Desert), North  
Turtle Mountains  
Springs

Date: Nov 9, 2016  
Project: THC Springs



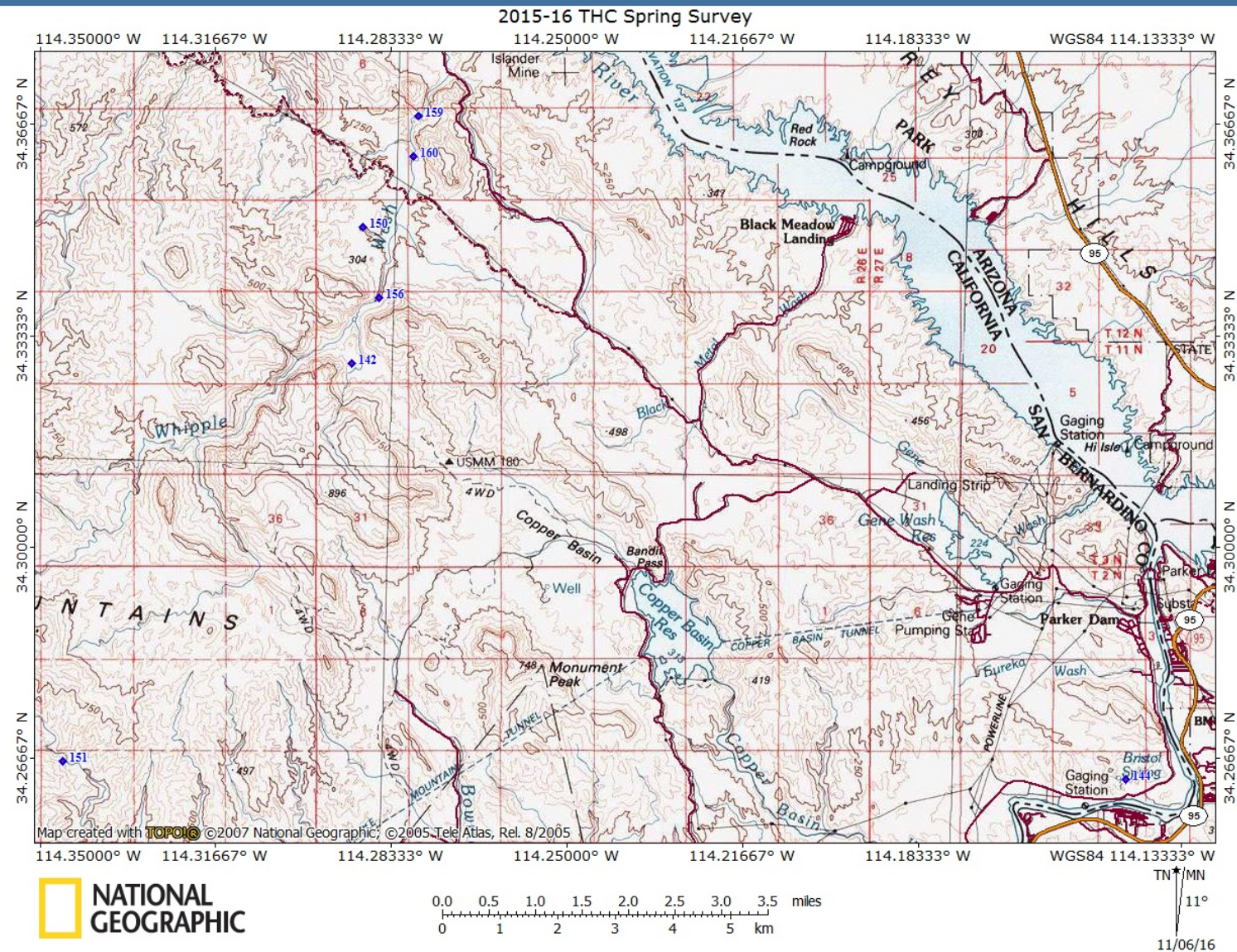


Figure 19  
BLM Needles  
District  
(Colorado  
Desert), Whipple  
Mountains Area  
Springs

Date: Nov 9, 2016  
Project: THC Springs



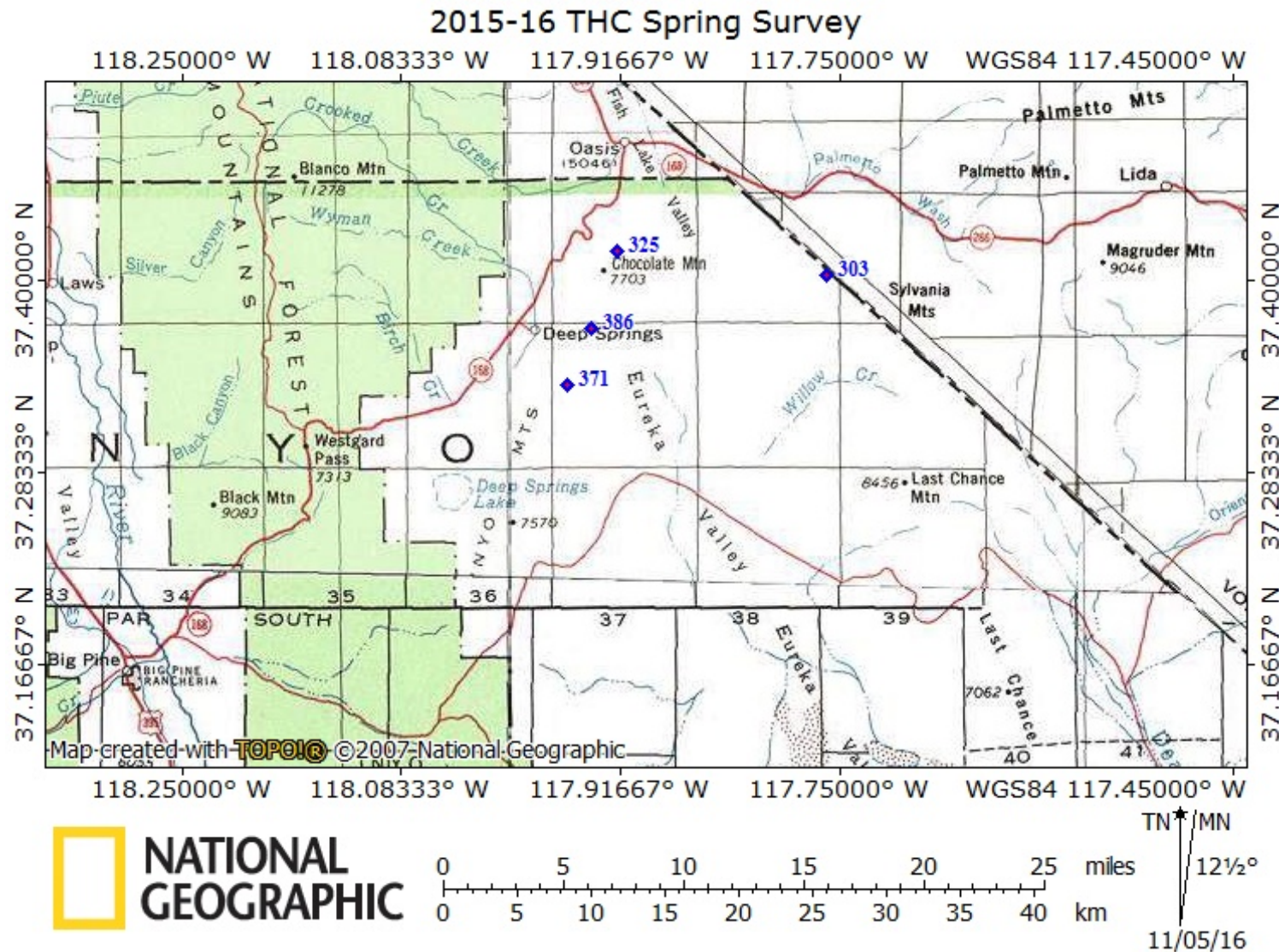


Figure 20  
BLM Ridgecrest  
District (Northern  
Mojave –  
Owens/Panamint)  
Chocolate Mtn-  
Fish Lake Valley  
Area Springs

Date: Nov 9, 2016  
Project: THC Springs



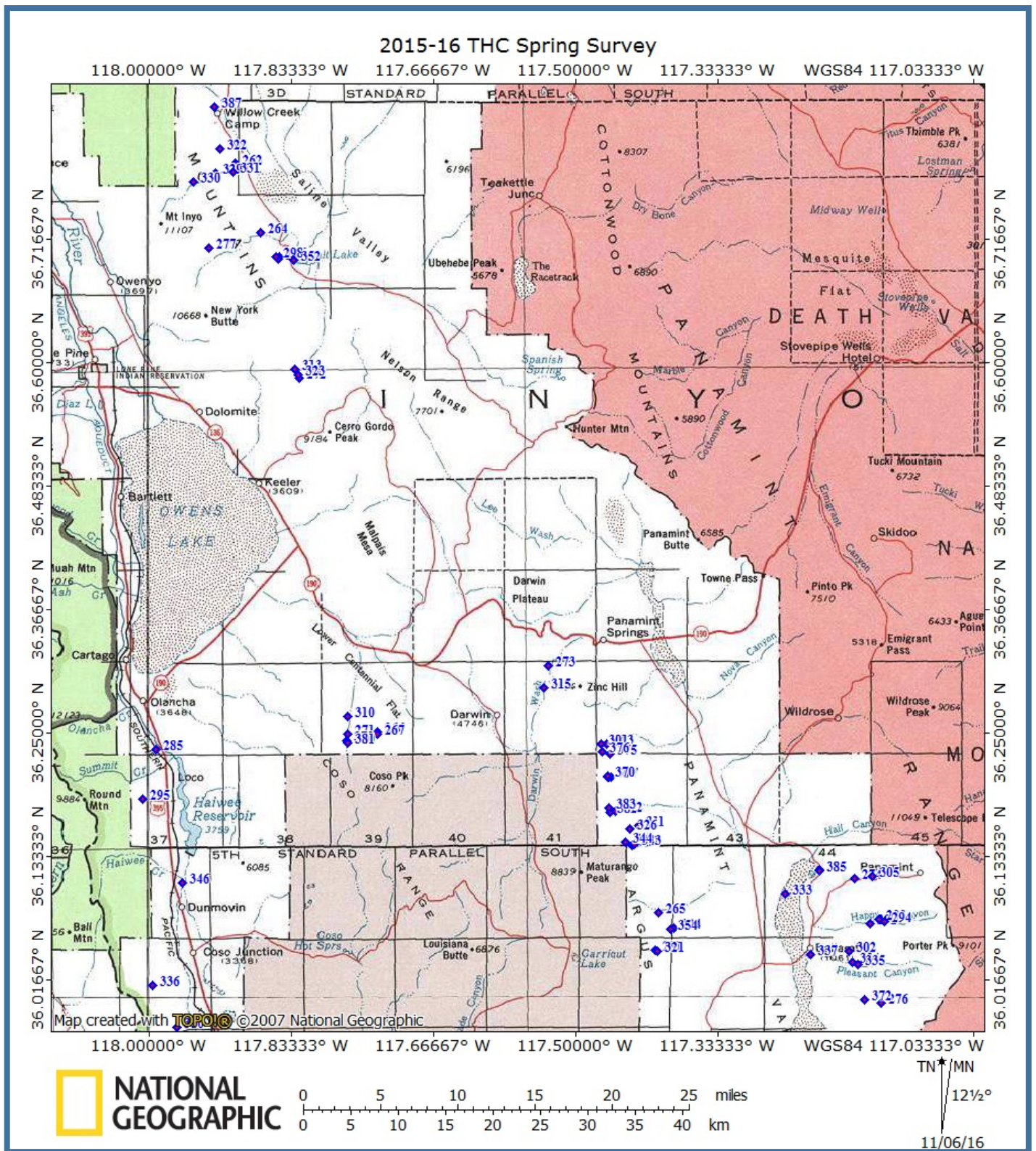


Figure 21: BLM Ridgecrest  
—Northern Springs





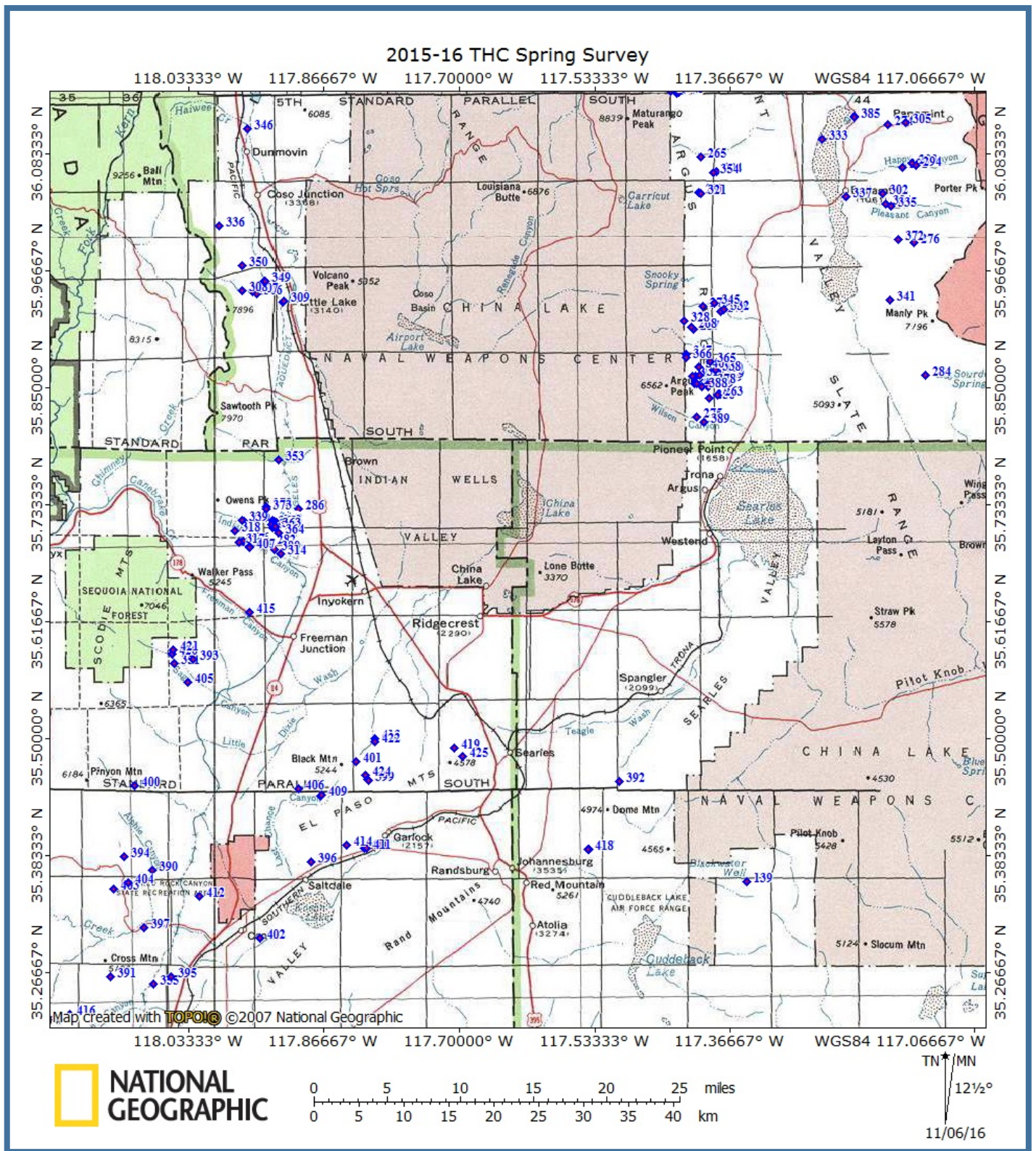


Figure 22: BLM Ridgecrest  
—Southern Springs





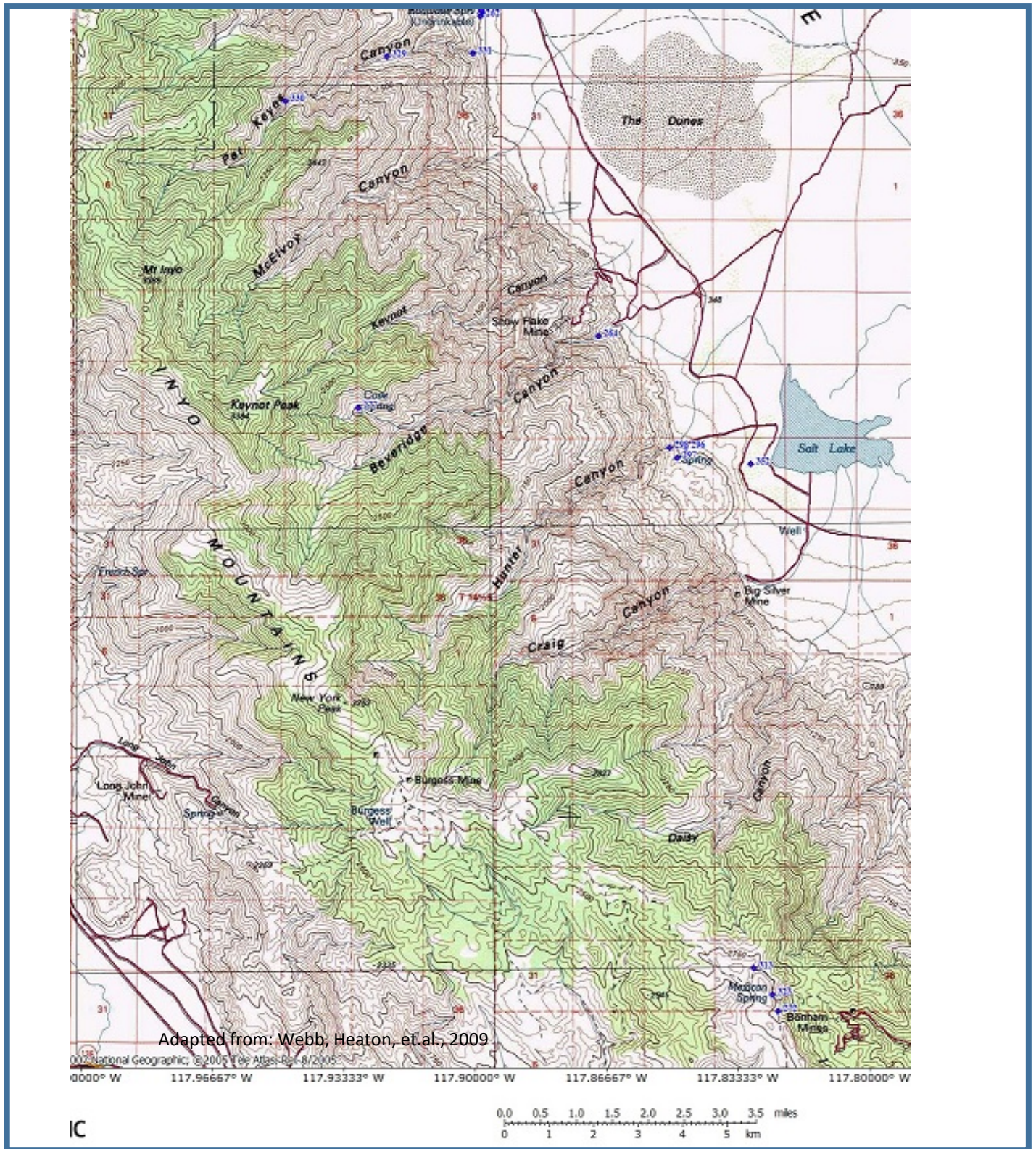
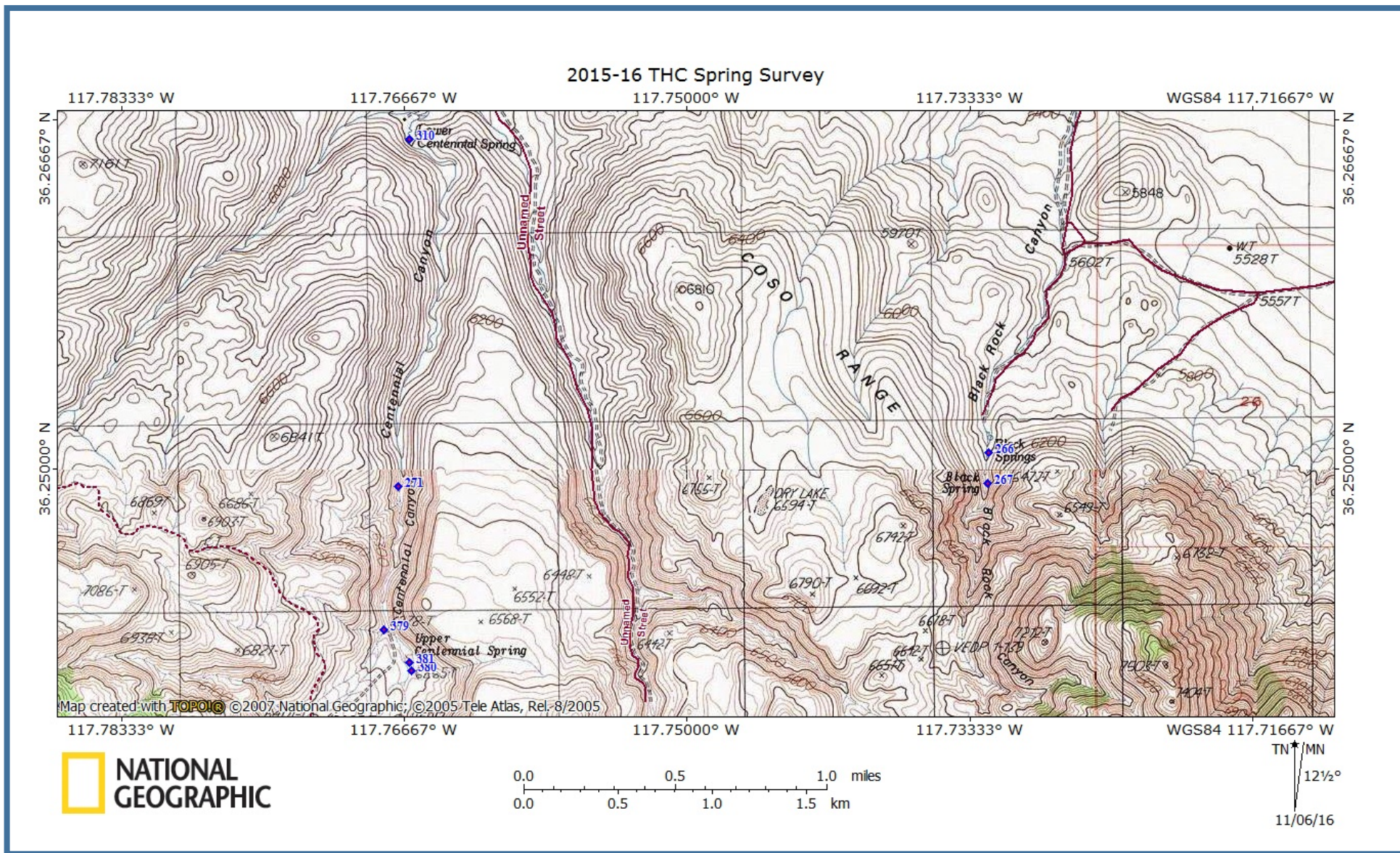


Figure 23: BLM Ridgecrest District (Northern Mojave), Saline Valley Area Springs







**Figure 24**  
**BLM Ridgecrest**  
**District (Northern**  
**Mojave –**  
**Owens/Panamint)**  
**Centennial**  
**Canyon Area**  
**Springs**

Date: Nov 9, 2016  
 Project: THC Springs



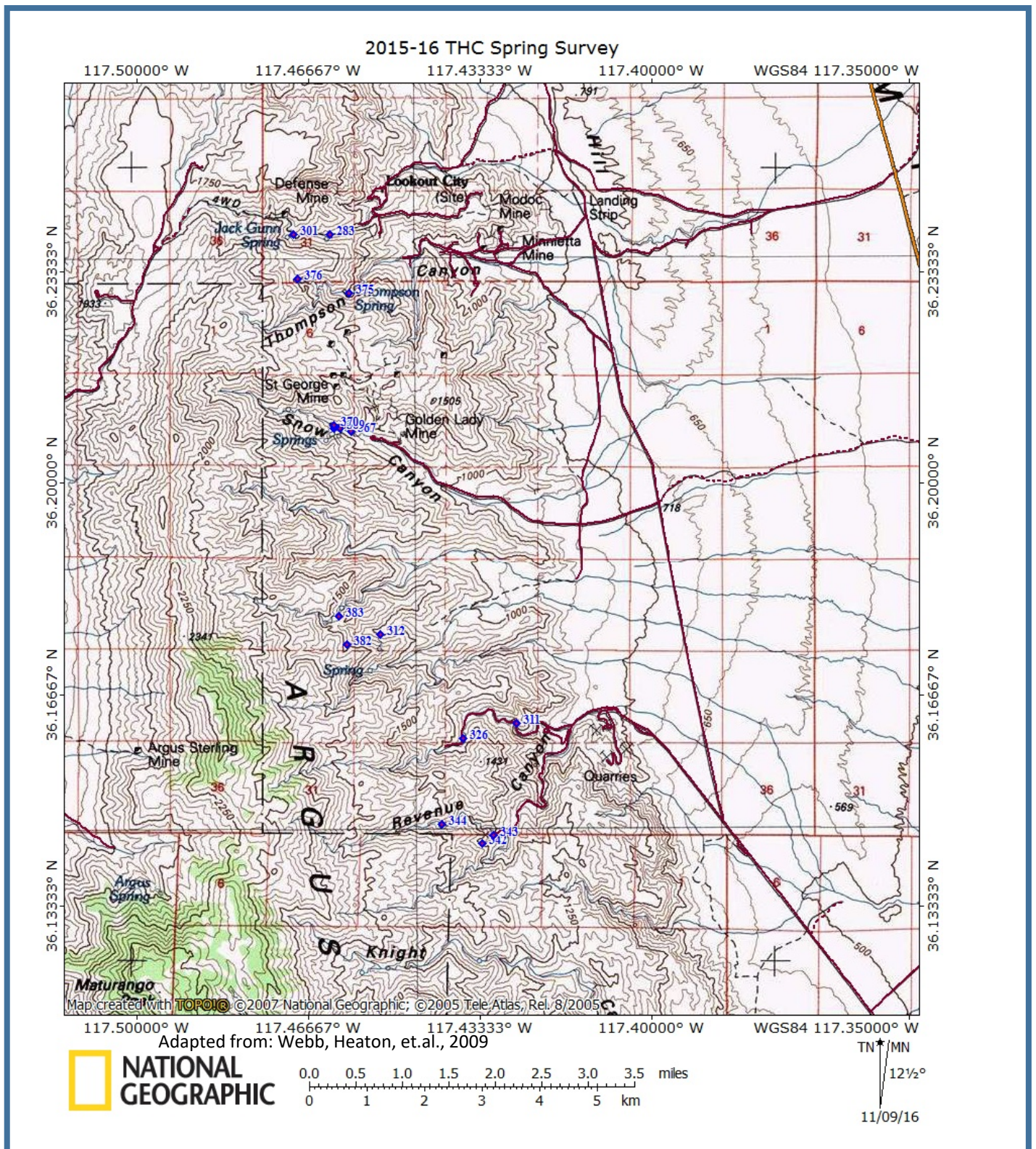


Figure 25: BLM Ridgecrest District  
(Northern Mojave), Northern Argus  
Range Springs





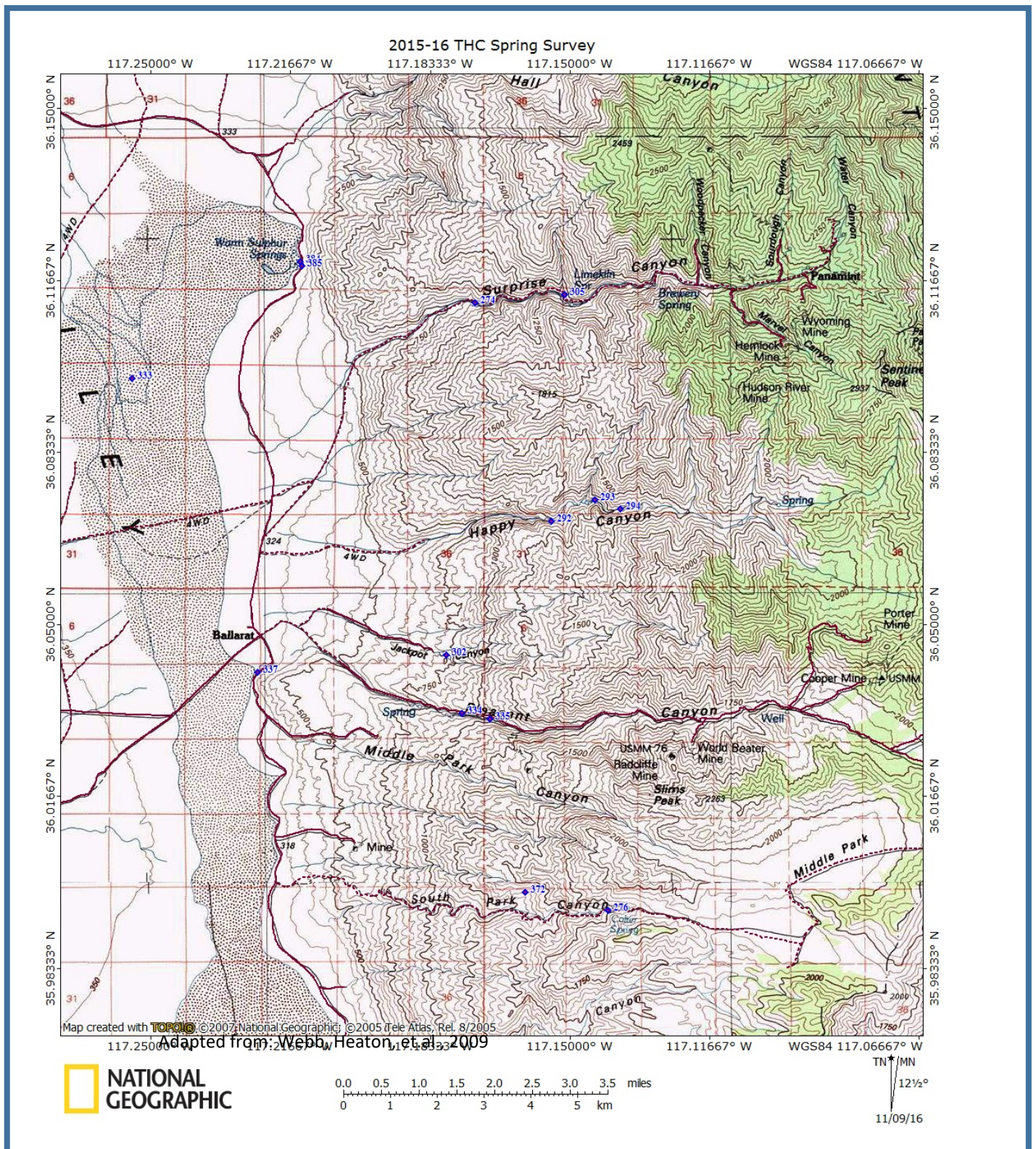


Figure 26: BLM Ridgecrest District (Northern Mojave), Ballarat Area Springs





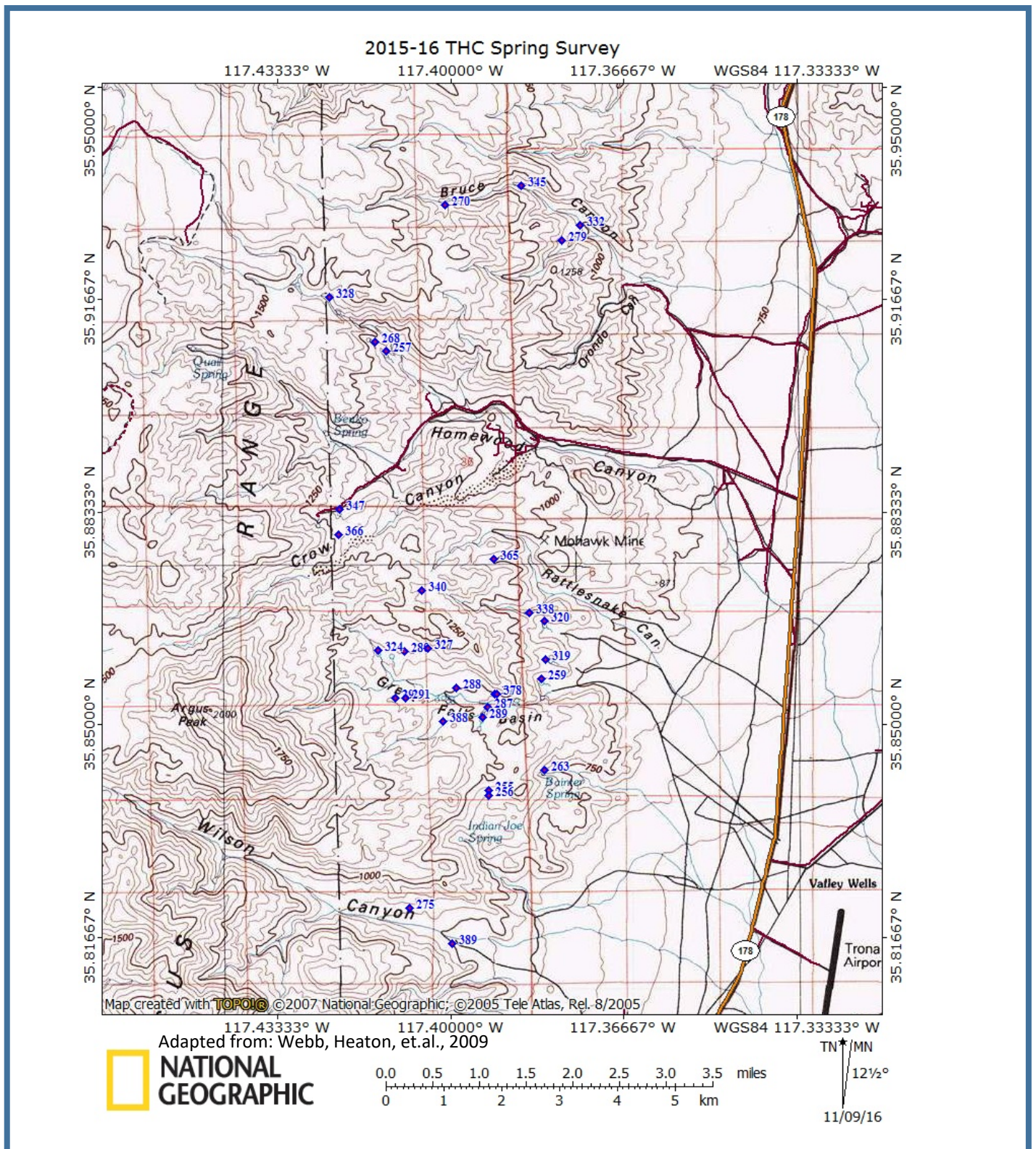


Figure 27: BLM Ridgecrest District  
 (Northern Mojave), Southern Argus  
 Range Springs





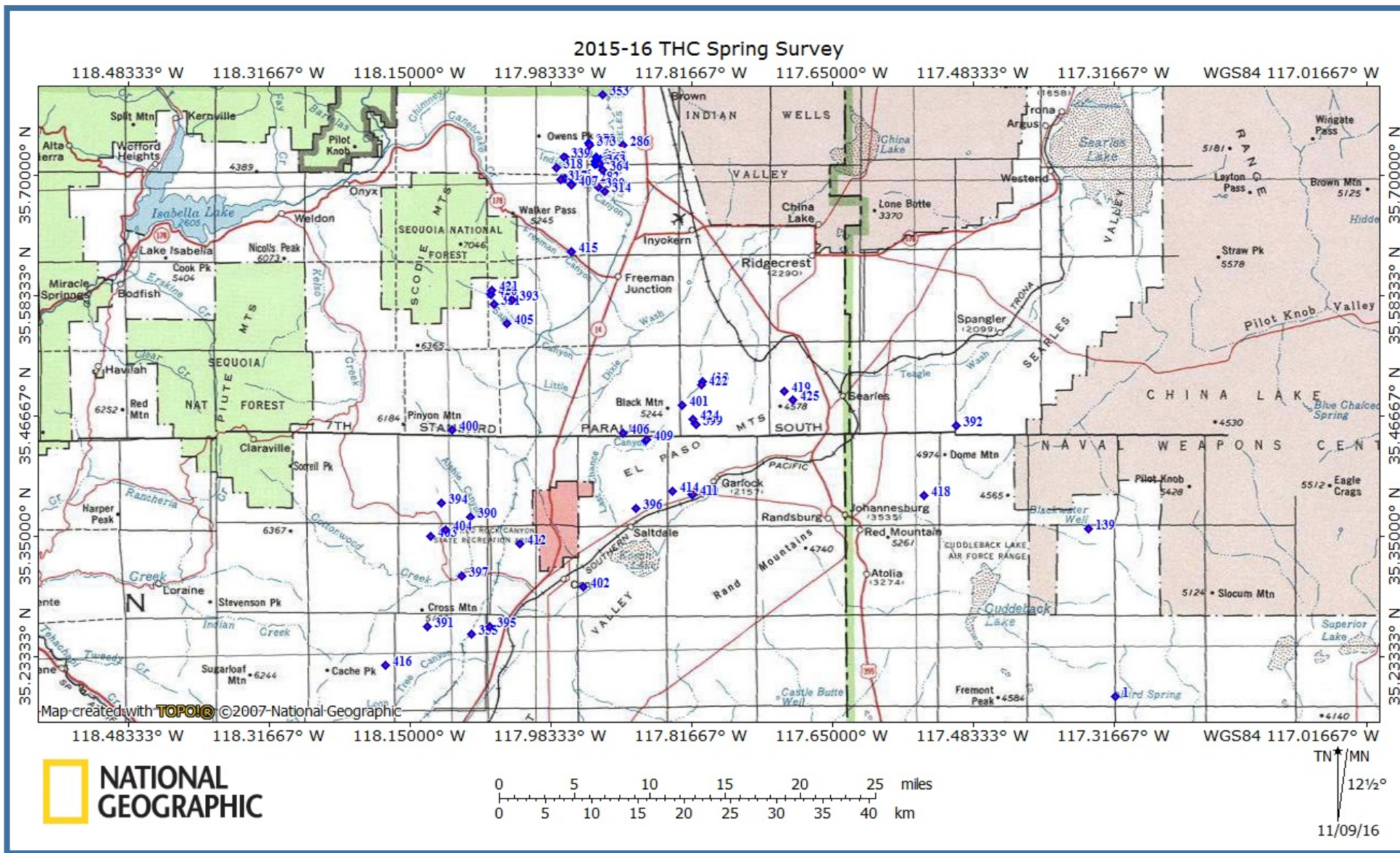


Figure 28  
BLM Ridgecrest  
District (Northern  
Mojave –  
Owens/Panamint)  
El Paso  
Mountains Region

Date: Nov 9, 2016  
Project: THC Springs



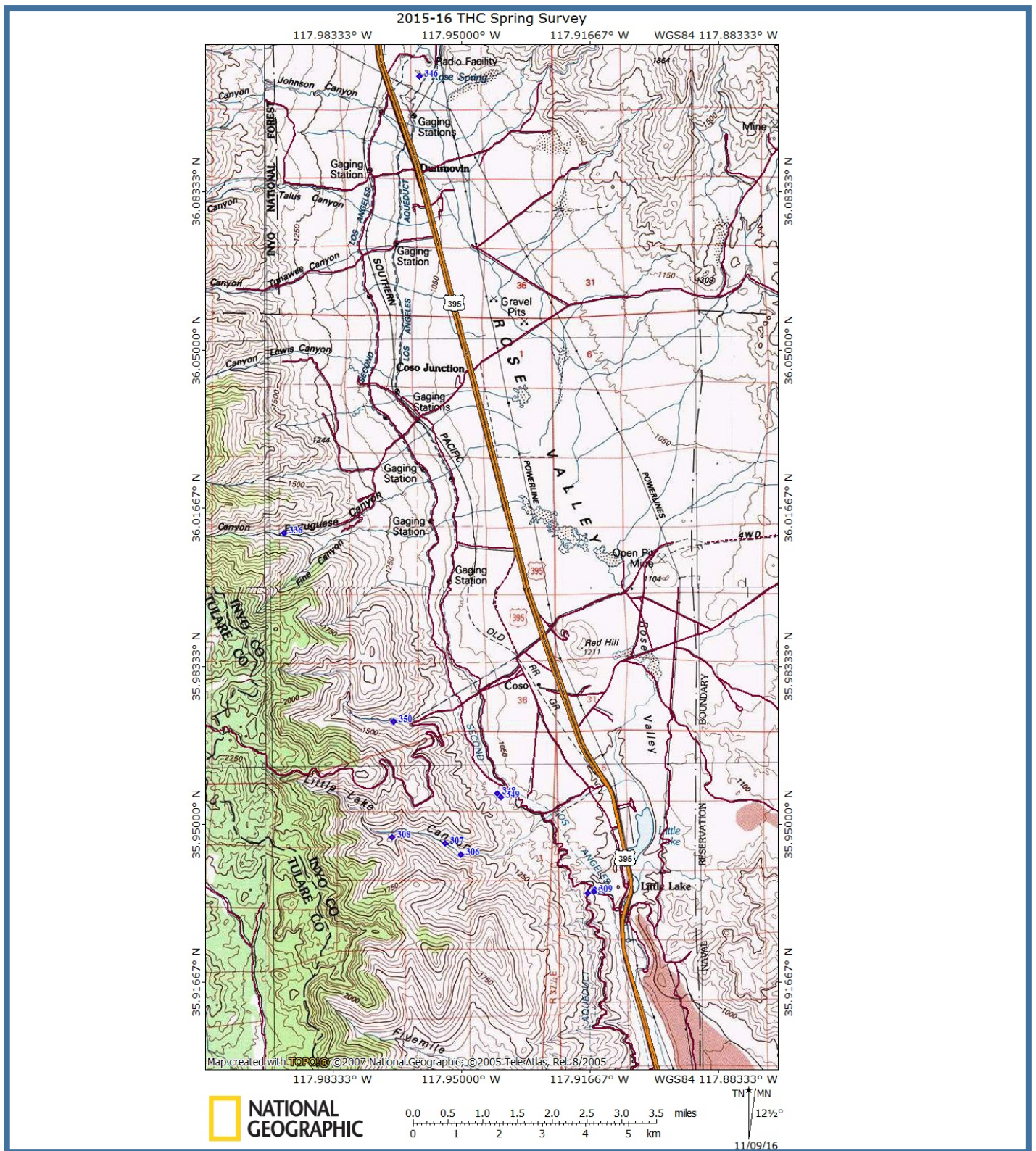


Figure 29: BLM Ridgecrest District (Northern Mojave), Rose Valley Area Springs





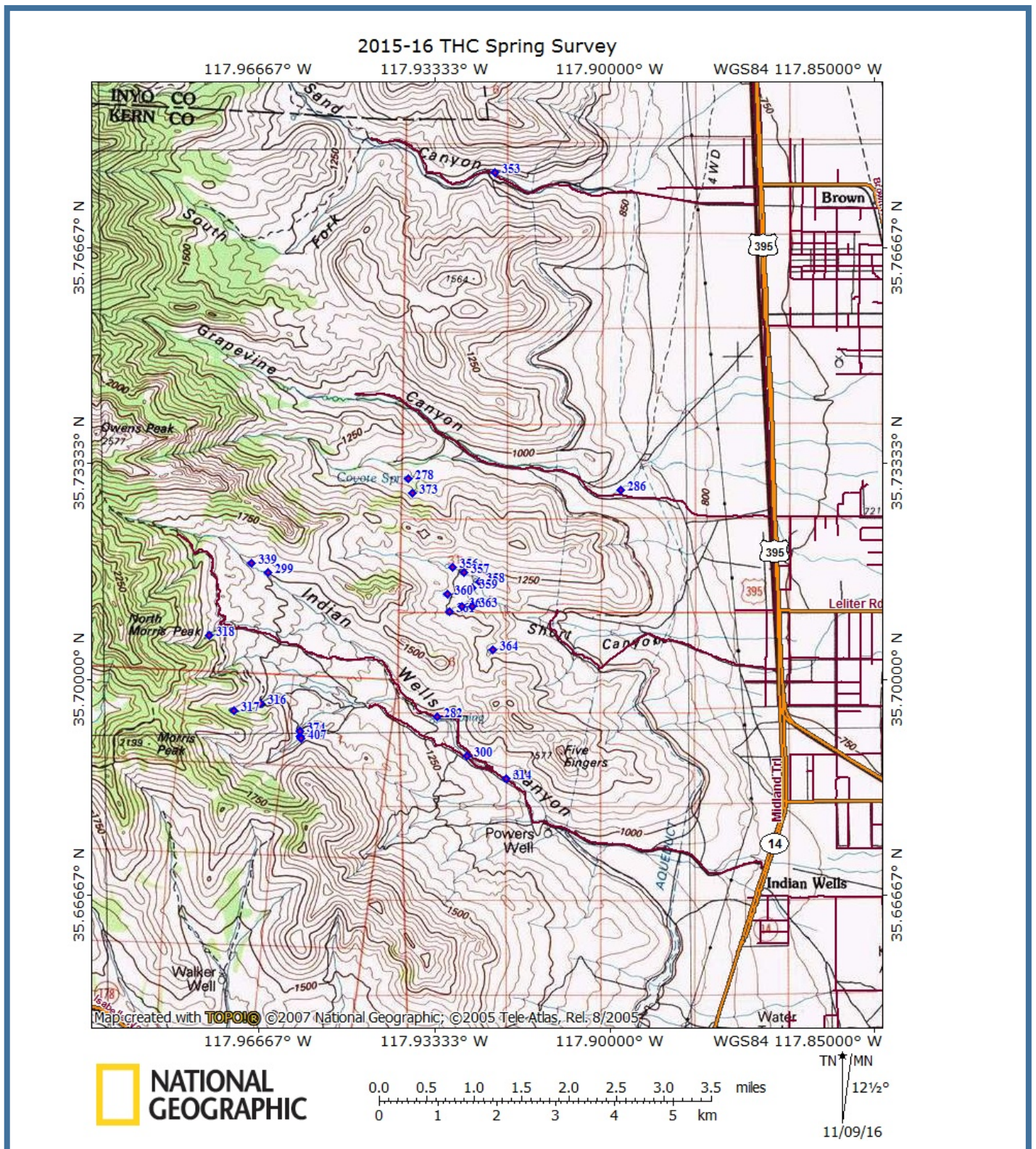


Figure 30: BLM Ridgecrest District (Northern Mojave), Owens Peak Area Springs





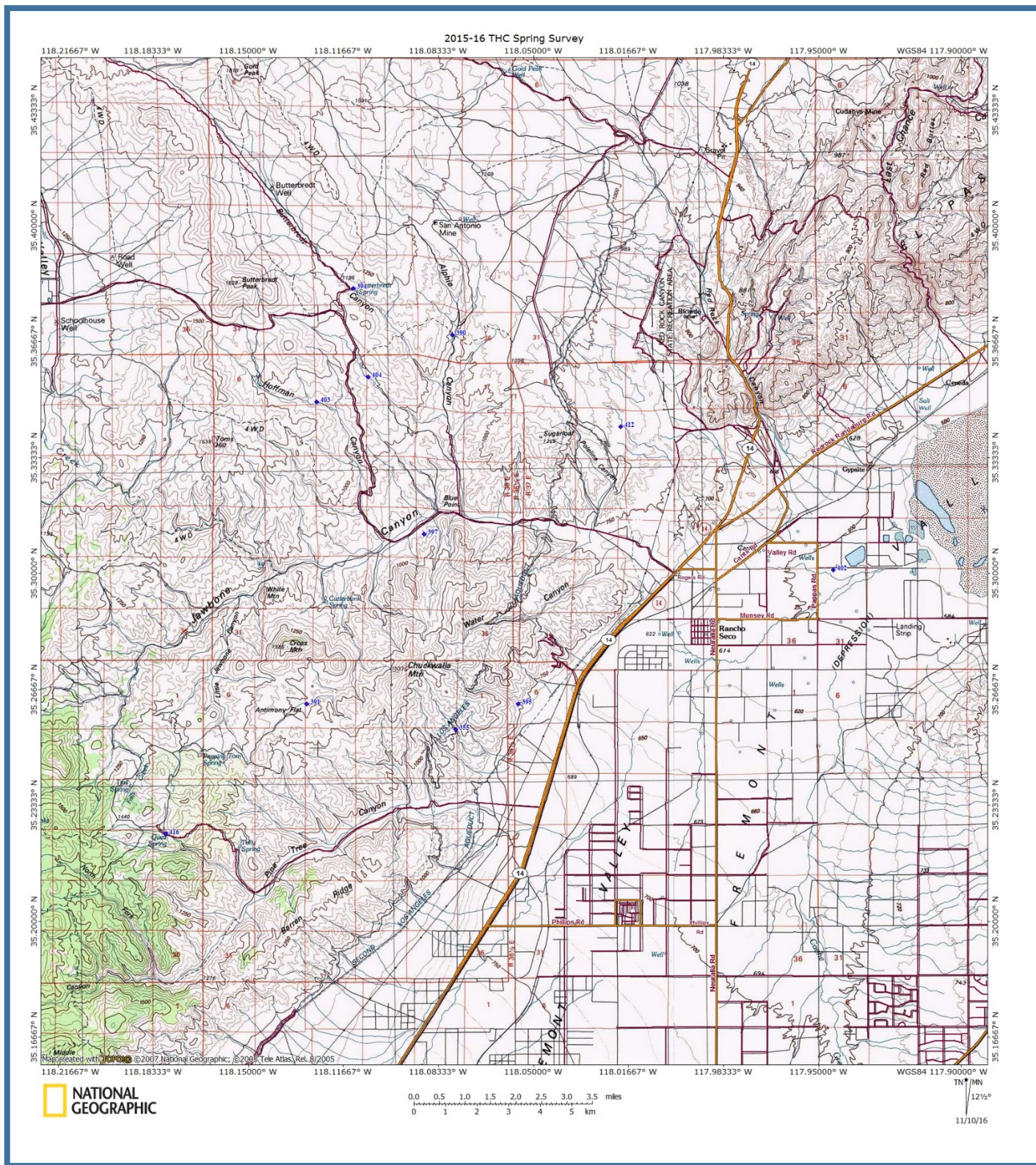


Figure 31: BLM Ridgecrest District  
(West Mojave), Butterbrecht Area  
Springs





# 2015-16 THC Spring Survey

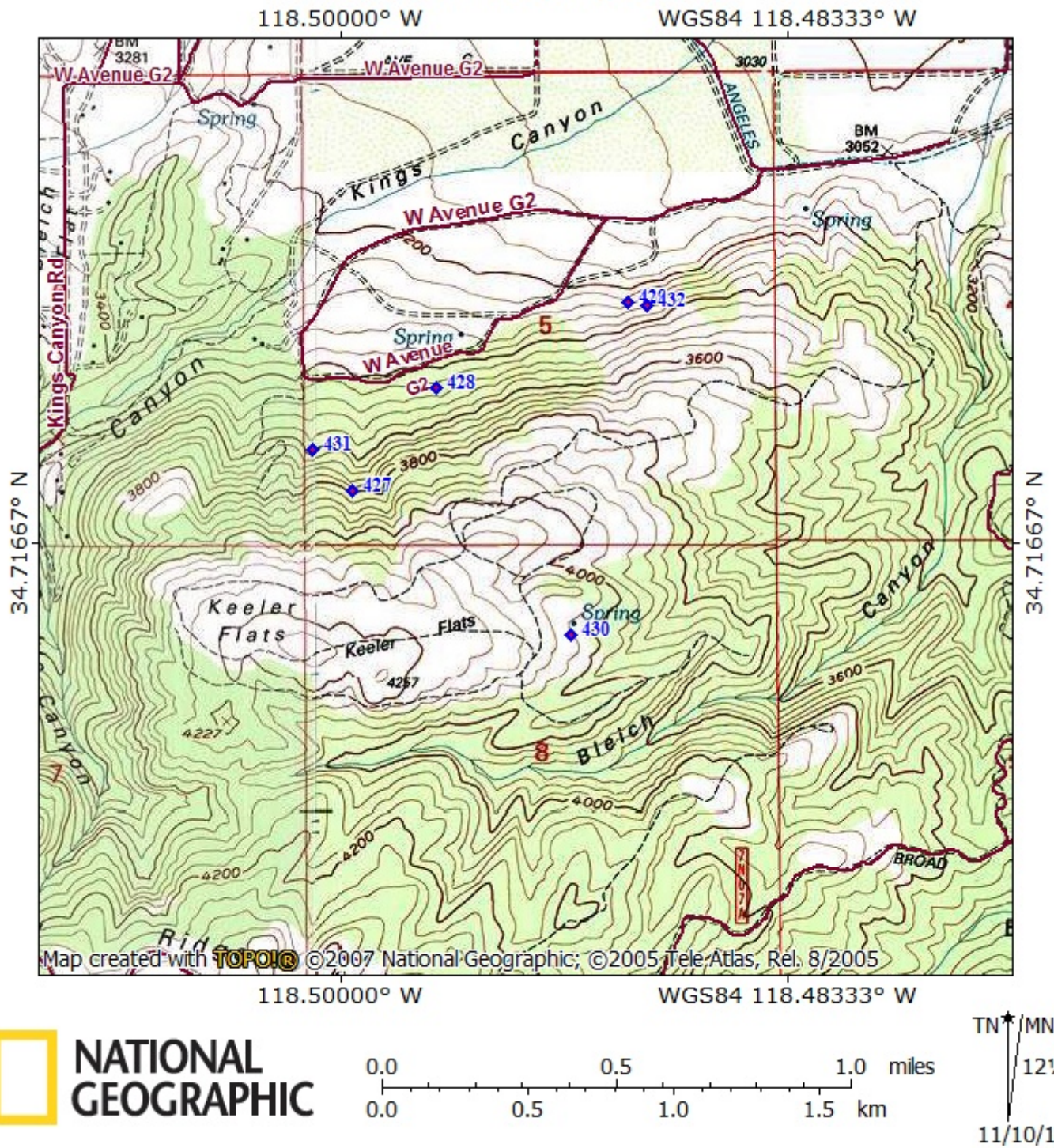
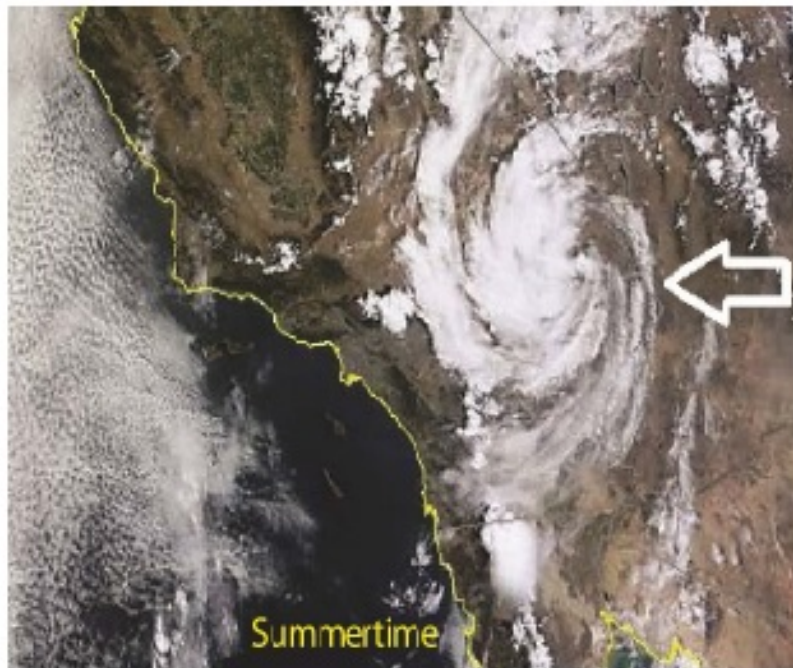
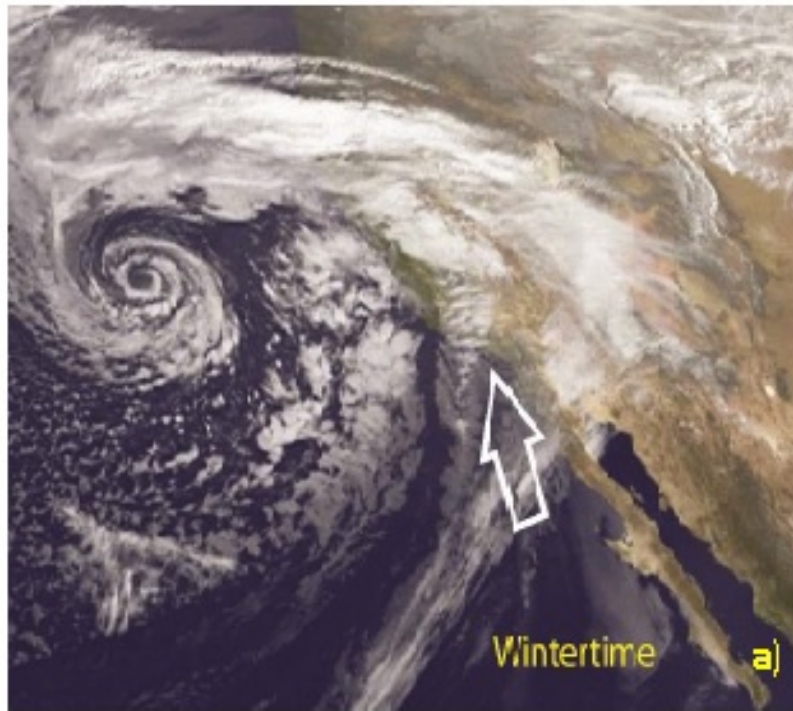


Figure 32: BLM Ridgecrest District  
(West Mojave), Portal Ridge Area  
Springs





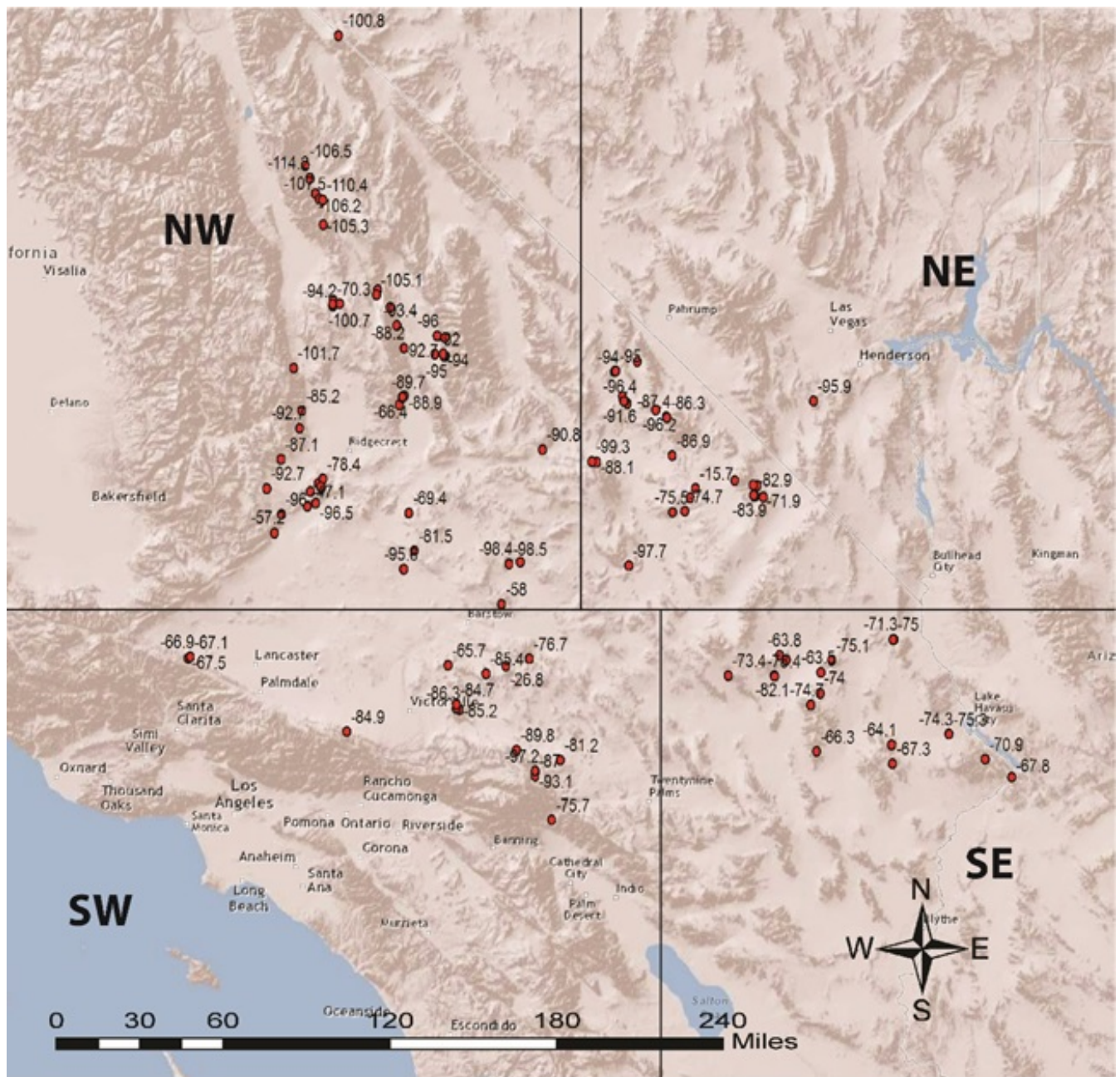


Wintertime polar air convergence with subtropical moisture yields precipitation mostly in the northern and western Mojave, while b) during summer monsoonal moisture from Gulf of California produces rain in the eastern Mojave, southern Nevada, and Arizona

Figure 33: Seasonal Air Convergence Patterns





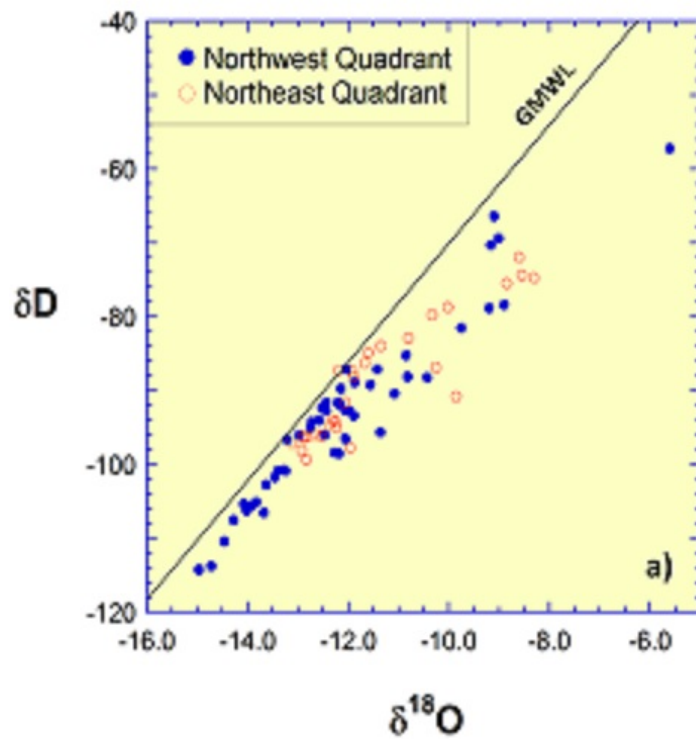


The Mojave spring sample locations are separated into quadrants that attempt to capture regional differences in precipitation sources for purposes of plots shown in Figure 32

Figure 35: Quadrant Plot of Wintertime Precipitation







Distribution of  $\delta D$  and  $\delta^{18}O$  values for spring water values plotted relative to the Global Meteoric Water Line are generally of lower values than their southern counterparts.

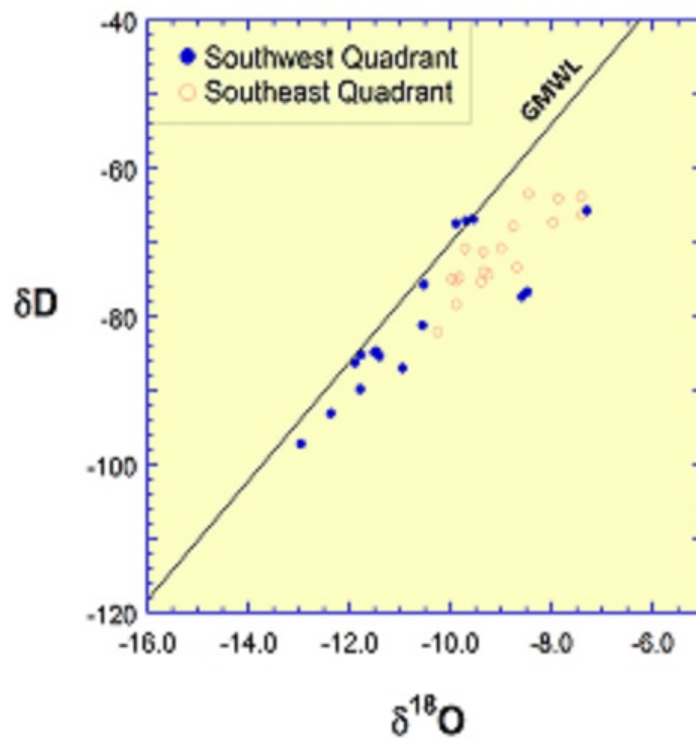


Figure 36: Distribution of  $\delta D$  and  $\delta^{18}O$  Plotted to GMWL



## TABLES



**TABLE 1**  
**SPRING LOCATIONS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Area	Land Owner	BLM Dist	Ecoregion
1	Bird Spring (private)	35.19471	-117.31459	3170	Gravel Hills	BLM	Barstow	Central Mojave
2	Black's Ranch (private)	35.01764	-117.22958	2030	Harper Valley	Private	Barstow	Central Mojave
3	Coyote Well	35.02505	-116.76439	2000	Mojave River	BLM	Barstow	Central Mojave
4	Deep Cave Spring	35.10705	-116.91607	3030	Lane Mountain	BLM	Barstow	Central Mojave
5	Epsom Spring	35.02702	-116.14914	995	Mojave River	BLM	Barstow	Central Mojave
6	Jack Spring	35.15482	-116.75648	2383	Paradise Range	BLM	Barstow	Central Mojave
7	Opal Spring	35.15182	-117.17645	3138	Gravel Hills	BLM	Barstow	Central Mojave
8	Paradise Spring Central	35.15526	-116.81407	2591	Paradise Range	BLM	Barstow	Central Mojave
9	Paradise Spring Cool (private)	35.14526	-116.81445	2421	Paradise Range	Private	Barstow	Central Mojave
10	Paradise Spring Hot (private)	35.14575	-116.81408	2408	Paradise Range	Private	Barstow	Central Mojave
11	Paradise Spring North	35.15544	-116.81314	2585	Paradise Range	BLM	Barstow	Central Mojave
12	Paradise Spring Northwest	35.15661	-116.81547	2672	Paradise Range	BLM	Barstow	Central Mojave
13	Paradise Spring Tub (private)	35.14568	-116.18392	2401	Paradise Range	Private	Barstow	Central Mojave
14	Sweetwater Spring	34.97193	-116.85037	3046	Calico Mountains	BLM	Barstow	Central Mojave
15	Amargosa Cyn Spring 3	35.82701	-116.21942	1262	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
16	Amargosa Cyn Spring 4	35.83473	-116.22274	1372	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
17	Amargosa Cyn Spring 5	35.83602	-116.22243	1372	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
18	Borax Spring	35.88804	-116.25789	1340	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
19	Borehole Spring	35.88620	-116.23439	1340	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
20	Chappo Spring	35.94775	-116.18944	2016	Amargosa	Tribal	Barstow	Northern Mojave - Amargosa
21	China Ranch Cyn Spring	35.80335	-116.14099	1770	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
22	Christian Spring (aka Am. Cyn. Spg. 1)	35.83943	-116.22397	1298	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
23	Cottonrod Seep (in Shoshone Spg Complex)	35.97975	-116.27260	1598	Amargosa	Private	Barstow	Northern Mojave - Amargosa
24	Cottonwood Spring	35.59139	-116.38649	1647	Amargosa- Avawatz	BLM	Barstow	Northern Mojave - Amargosa
25	Denning Spring	35.58727	-116.46915	1921	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
26	Dodge City Spring	35.88018	-116.22955	1399	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
27	East Tecopa Seep	35.86690	-116.22260	1423	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
28	Goldenrod Seep 1	35.97987	-116.27299	1598	Amargosa	Private	Barstow	Northern Mojave - Amargosa
29	Goldenrod Seep 2	35.97984	-116.27313	1598	Amargosa	Private	Barstow	Northern Mojave - Amargosa
30	Goldenrod Seep 3	35.97997	-116.27264	1598	Amargosa	Private	Barstow	Northern Mojave - Amargosa
31	Goldenrod Seep 4	35.97986	-116.27268	1598	Amargosa	Private	Barstow	Northern Mojave - Amargosa
32	Good/Barnes Well	35.84216	-116.20419	1474	Amargosa	Private	Barstow	Northern Mojave - Amargosa
33	Historic Spring	35.98044	-116.27367	1605	Amargosa	Private	Barstow	Northern Mojave - Amargosa
34	Ibex Hills Spring	35.91630	-116.38577	2533	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
35	Old Mormon Spring	35.51538	-116.25577	2079	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
36	One Palm Seep	35.86019	-116.22212	1432	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
37	Owl Hole Spring	35.63943	-116.64758	1943	Amargosa - Owlshead Mtns	BLM	Barstow	Northern Mojave - Amargosa
38	Phragmites Seep	35.97634	-116.27470	1581	Amargosa	Private	Barstow	Northern Mojave - Amargosa
39	Quail Spring	35.63369	-116.86746	4122	Amargosa- Owlshead Mtns	BLM	Barstow	Northern Mojave - Amargosa
40	Red Trail Seep	35.98158	-116.26932	1585	Amargosa	Private	Barstow	Northern Mojave - Amargosa
41	Resting Spring	35.87720	-116.15694	1767	Amargosa	Private	Barstow	Northern Mojave - Amargosa
42	Riley Spring	35.95215	-116.26620	1503	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
43	Salt Spring	35.62614	-116.28089	526	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
44	Scotfield Spring	35.87350	-116.12078	2051	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
45	Sheep Creek Spring	35.58858	-116.36027	1703	Amargosa - Avawatz	BLM	Barstow	Northern Mojave - Amargosa
46	Shoshone Spring	35.98056	-116.27384	1615	Amargosa	Private	Barstow	Northern Mojave - Amargosa
47	Slough Spring (Hog Farm Well)	36.28748	-116.37854	2024	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
48	Still Spring	35.95903	-116.25961	1511	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
49	Stormy Spring	35.85212	-116.22059	1378	Amargosa	BLM	Barstow	Northern Mojave - Amargosa

**TABLE 1**  
**SPRING LOCATIONS**

50	Tecopa Hot Spring	35.87191	-116.23215	1415	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
51	Tecopa Hot Spring (at TNC)	35.87744	-116.23618	1332	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
52	Thom Spring	35.85661	-116.22677	1406	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
53	Tule Spring	35.81691	-116.05540	2326	Amargosa - Kingston Range	BLM	Barstow	Northern Mojave - Amargosa
54	Twelvemile Spring	36.02195	-116.15530	2208	Amargosa - Nopah Range	BLM	Barstow	Northern Mojave - Amargosa
55	Vole Hot Spring	35.85092	-116.22320	1369	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
56	West Side Spring	35.84324	-116.22879	1301	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
57	Wild Bath Spring	35.87277	-116.21932	1411	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
58	Willow Spring 1	35.80569	-116.18264	1445	Amargosa	Private	Barstow	Northern Mojave - Amargosa
59	Willow Spring 2	35.80097	-116.19438	1236	Amargosa	Private	Barstow	Northern Mojave - Amargosa
60	Yerba Mansa Seep	35.86925	-116.22356	1416	Amargosa	BLM	Barstow	Northern Mojave - Amargosa
61	4600-ft Spring	34.37228	-117.11794	4510	San Bernardino Mtns	BLM	Barstow	South-central Mojave
62	Amaral Spring	34.51771	-117.06475	3699	Granite Mountains	BLM	Barstow	South-central Mojave
63	Andes Trail Seep	34.37608	-117.13461	4335	San Bernardino Mtns	BLM	Barstow	South-central Mojave
64	Arrastre Canyon Spring (at Tahiti Falls)	34.39216	-117.11429	4001	San Bernardino Mtns	BLM	Barstow	South-central Mojave
65	Arrastre Canyon Spring Low	34.39442	-117.11714	3943	San Bernardino Mtns	BLM	Barstow	South-central Mojave
66	Arrastre Canyon Spring midlow	34.39340	-117.11483	3962	San Bernardino Mtns	BLM	Barstow	South-central Mojave
67	Arrastre Canyon Spring midupper	34.38513	-117.10476	4287	San Bernardino Mtns	BLM	Barstow	South-central Mojave
68	Arrastre Canyon Spring Upper	34.38232	-117.10211	4457	San Bernardino Mtns	BLM	Barstow	South-central Mojave
69	Arrastre Seep #1	34.32673	-116.76232	4444	San Bernardino Mtns	BLM	Barstow	South-central Mojave
70	Arrastre Seep #2	34.32989	-116.76345	4424	San Bernardino Mtns	BLM	Barstow	South-central Mojave
71	Arrastre side canyon	34.38760	-117.11181	4204	San Bernardino Mtns	BLM	Barstow	South-central Mojave
72	Aztec Spring	34.70624	-116.82166	4347	Ord Mountains	BLM	Barstow	South-central Mojave
73	Badger Spring	34.65462	-116.91755	4380	Ord Mountains	BLM	Barstow	South-central Mojave
74	Bighorn Seep #1	34.33582	-116.63983	3669	San Bernardino Mtns	BLM	Barstow	South-central Mojave
75	Bighorn Seep #2	34.33562	-116.63856	3732	San Bernardino Mtns	BLM	Barstow	South-central Mojave
76	Bobcat Scat Seep	34.30101	-116.51708	4196	San Bernardino Mtns	BLM	Barstow	South-central Mojave
77	Bullion Spring	34.60890	-116.18154	2565	Bullion Mountains	BLM	Barstow	South-central Mojave
78	Burns Spring	34.20452	-116.58249	4943	San Bernardino Mtns	BLM	Barstow	South-central Mojave
79	Cottonwood Spring	34.38670	-117.15622	4169	San Bernardino Mtns	BLM	Barstow	South-central Mojave
80	Coxey Road North Spring	34.37472	-117.10861	4764	San Bernardino Mtns	BLM	Barstow	South-central Mojave
81	Coyote Hole Spring	34.11656	-116.30801	2957	Joshua Tree	Multiple	Barstow	South-central Mojave
82	Crossroads Spring	34.23717	-116.65979	5771	San Bernardino Mtns	BLM	Barstow	South-central Mojave
83	Dixie Mine Spring	34.27722	-116.53109	4643	San Bernardino Mtns	BLM	Barstow	South-central Mojave
84	Dove Spring	34.34674	-116.75973	4101	San Bernardino Mtns	BLM	Barstow	South-central Mojave
85	Dry Morongo Springs	34.05390	-116.62640	3294	San Bernardino Mtns	BLM	Barstow	South-central Mojave
86	Dry Willow Spring	34.36939	-117.11891	4721	San Bernardino Mtns	BLM	Barstow	South-central Mojave
87	Fisher Spring	34.67309	-116.77015	4632	Ord Mountains	BLM	Barstow	South-central Mojave
88	Furnace Spring	34.35850	-116.92860	4550	San Bernardino Mtns	BLM	Barstow	South-central Mojave
89	Goat Spring	34.67263	-116.92681	4340	Ord Mountains	BLM	Barstow	South-central Mojave
90	Granite Well	34.68401	-116.93618	3961	Ord Mountains	BLM	Barstow	South-central Mojave
91	Grapevine Canyon Spring	34.39000	-117.06528	5139	San Bernardino Mtns	BLM	Barstow	South-central Mojave
92	Grapevine Spring	34.39742	-117.06440	4229	San Bernardino Mtns	BLM	Barstow	South-central Mojave
93	Greenwalt #1 Spring	34.38420	-117.12140	4146	San Bernardino Mtns	BLM	Barstow	South-central Mojave
94	Hidden Spring (aka Upper Willy Boy Spring)	34.30549	-116.52897	4127	Little San Bernardino Mtns	BLM	Barstow	South-central Mojave
95	High Road Spring	34.39347	-117.03181	4020	San Bernardino Mtns	BLM	Barstow	South-central Mojave
96	Horse Spring	34.52201	-117.08195	3892	Granite Mountains	BLM	Barstow	South-central Mojave
97	Horse Spring SE	34.52108	-117.08107	4041	Granite Mountains	BLM	Barstow	South-central Mojave
98	Hyten Spring	34.91871	-116.05721	3016	Bristol Mountains	BLM	Barstow	South-central Mojave
99	Juniper Flats Spring east	34.38320	-117.12879	4074	San Bernardino Mtns	BLM	Barstow	South-central Mojave

**TABLE 1**  
**SPRING LOCATIONS**

100	Kane Spring trough	34.73943	-116.69914	3176	Newberry Mountains	BLM	Barstow	South-central Mojave
101	Kane Springs east	34.74042	-116.69624	3153	Newberry Mountains	BLM	Barstow	South-central Mojave
102	Kane Springs west	34.74002	-116.70075	3231	Newberry Mountains	BLM	Barstow	South-central Mojave
103	Kynna Spring	34.33285	-116.64174	3713	San Bernardino Mtns	BLM	Barstow	South-central Mojave
104	Lower Rattle Spring	34.29500	-116.65222	4783	San Bernardino Mtns	BLM	Barstow	South-central Mojave
105	McInnis Spring (aka Milpas Drive Spring)	34.53230	-117.10190	3291	Granite Mountains	BLM	Barstow	South-central Mojave
106	Mesquite Spring	34.21328	-116.07555	1762	Twentynine Palms	BLM	Barstow	South-central Mojave
107	Mojo Spring	34.30347	-116.53236	4191	San Bernardino Mtns	BLM	Barstow	South-central Mojave
108	Morongo Canyon Spgs	34.04835	-116.56824	2512	Little San Bernardino Mtns	BLM/SB County	Barstow	South-central Mojave
109	Mound Spring	34.25621	-116.65656	5432	San Bernardino Mtns	BLM	Barstow	South-central Mojave
110	One Hole Spring	34.33426	-116.63425	3683	San Bernardino Mtns	BLM	Barstow	South-central Mojave
111	Quail Spring	34.53704	-117.08167	3327	Granite Mountains	BLM	Barstow	South-central Mojave
112	Quill Spring	34.64393	-116.89098	4483	Ord Mountains	BLM	Barstow	South-central Mojave
113	Rattlesnake Spring	34.33406	-116.70469	3888	San Bernardino Mtns	BLM	Barstow	South-central Mojave
114	Rock Corral Spring east (in Rock Corral Spring)	34.31741	-116.55328	3990	San Bernardino Mtns	BLM	Barstow	South-central Mojave
115	Rock Corral Spring west (in Rock Corral Spring)	34.31693	-116.55824	3998	San Bernardino Mtns	BLM	Barstow	South-central Mojave
116	RZ Spring	34.71092	-117.18664	3350	Stoddard Mountain	BLM	Barstow	South-central Mojave
117	Seventh Spring	34.30876	-116.53748	4269	San Bernardino Mtns	BLM	Barstow	South-central Mojave
118	Sheep Spring	34.73253	-116.60659	3104	Rodman Mountains (wilderness)	BLM	Barstow	South-central Mojave
119	Sherman Shady Springs	34.07910	-116.60220	3942	San Bernardino Mtns	BLM near private	Barstow	South-central Mojave
120	Silver Creek Spring	34.37250	-116.98514	4495	San Bernardino Mtns	BLM	Barstow	South-central Mojave
121	Stoddard Mountain Spring	34.70683	-117.12815	3700	Stoddard Mountain	BLM	Barstow	South-central Mojave
122	Stone Spring	34.38231	-117.16439	4298	San Bernardino Mtns	BLM	Barstow	South-central Mojave
123	Sweetwater Spring Lower	34.69229	-116.82356	4779	Ord Mountains	BLM	Barstow	South-central Mojave
124	Sweetwater Spring Upper	34.69236	-116.82494	4894	Ord Mountains	BLM	Barstow	South-central Mojave
125	Two Hole Spring	34.33826	-116.69183	3832	San Bernardino Mtns	BLM	Barstow	South-central Mojave
126	Vaughn Spring	34.25890	-116.65941	5401	San Bernardino Mtns	BLM	Barstow	South-central Mojave
127	Veggie Burrito Spring	34.37145	-117.12310	4532	San Bernardino Mtns	BLM	Barstow	South-central Mojave
128	Vine Spring	34.37711	-117.10850	4589	San Bernardino Mtns	BLM	Barstow	South-central Mojave
129	White Knob Milepost 61 Seep	34.37431	-116.99306	4613	San Bernardino Mtns	BLM	Barstow	South-central Mojave
130	White Knob Milepost 61 West Spring	34.37458	-116.99444	4568	San Bernardino Mtns	BLM	Barstow	South-central Mojave
131	White Knob Milepost 63 Northeast Spring	34.37875	-116.99556	4271	San Bernardino Mtns	BLM	Barstow	South-central Mojave
132	White Knob Milepost 63 Northwest Spring	34.37767	-116.99722	4390	San Bernardino Mtns	BLM	Barstow	South-central Mojave
133	White Knob Milepost 63 Southeast Spring	34.37597	-116.99611	4563	San Bernardino Mtns	BLM	Barstow	South-central Mojave
134	White Knob Milepost 63 Southwest Seep	34.37667	-117.00069	4500	San Bernardino Mtns	BLM	Barstow	South-central Mojave
135	White Knob Milepost 71 Spring A	34.36806	-117.00500	4961	San Bernardino Mtns	BLM	Barstow	South-central Mojave
136	Willow Spring	34.61468	-116.81991	4068	Ord Mountains	BLM	Barstow	South-central Mojave
137	Willow Spring	34.37949	-117.01069	4428	San Bernardino Mtns	BLM	Barstow	South-central Mojave
138	Willy Boy Spring	34.30634	-116.52808	4094	Little San Bernardino Mtns	BLM	Barstow	South-central Mojave
139	Blackwater Well	35.35766	-117.34645	3520	Gravel Hills	BLM	Barstow	Western Mojave
140	McDonald Well	35.11528	-117.37045	2558	Fremont Peak	BLM	Barstow	Western Mojave
141	Stump Spring	35.98366	-115.82550	2822	Amargosa	BLM	Las Vegas	Northern Mojave - Amargosa
142	Berrberry Spring (coords. appx.)	34.32900	-114.29090	1100	Whipple Mtns (wilderness)	BLM	Needles	Colorado Desert
143	Bluebird Spring	34.39732	-114.82105	2424	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
144	Bristol Spring	34.26339	-114.14389	491	Parker Dam Road/Colorado River	BLM	Needles	Colorado Desert
145	Carson's Well	34.42649	-114.82447	1951	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
146	Coffin Spring	34.39577	-114.81416	2539	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
147	Granite Spring	34.27539	-114.81397	2713	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
148	Horn Spring	34.20815	-114.78854	2036	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
149	July Spring	34.44891	-114.83330	1709	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert



**TABLE 1**  
**SPRING LOCATIONS**

150	Lee's Seep	34.35040	-114.28873	837	Whipple Mtns (wilderness)	BLM	Needles	Colorado Desert
151	Louie Spring	34.26619	-114.34572	3000	Whipple Mountains	BLM	Needles	Colorado Desert
152	Mohawk Spring	34.43185	-114.84670	2136	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
153	Mopah Spring	34.31427	-114.77562	2215	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
154	Perlite Pool	34.39540	-114.78004	1957	Turtle Mountains	BLM	Needles	Colorado Desert
155	Pickie Poke Spring	34.39199	-114.79130	2322	Turtle Mountains	BLM	Needles	Colorado Desert
156	Scrub Spring	34.33931	-114.28570	903	Whipple Mtns (wilderness)	BLM	Needles	Colorado Desert
157	Tamarisk Seep	34.35894	-114.86029	2343	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
158	Turtle Spring	34.14236	-114.80293	1625	Turtle Mountains (wilderness)	BLM	Needles	Colorado Desert
159	Whipple Wash Lower	34.36799	-114.27823	622	Whipple Mtns (wilderness)	BLM	Needles	Colorado Desert
160	Whipple Wash Middle	34.36165	-114.27920	674	Whipple Mtns	BLM	Needles	Colorado Desert
161	Antimony Spring	35.49943	-115.51537	4599	Clark Mountains	BLM	Needles	Eastern Mojave
162	Bull Spring	35.44228	-115.86491	3971	Turquoise Hills	BLM	Needles	Eastern Mojave
163	Burro Spring east	35.50251	-115.52968	4663	Clark Mountains	BLM	Needles	Eastern Mojave
164	Burro Spring west	35.50221	-115.53278	4752	Clark Mountains	BLM	Needles	Eastern Mojave
165	Cambria Spring	35.45841	-115.53007	4812	Mescal Range	BLM	Needles	Eastern Mojave
166	China Spring	35.45486	-115.50921	4871	Mescal Range	BLM	Needles	Eastern Mojave
167	Cree Spring	35.37753	-115.95614	2875	Turquoise Hills	BLM	Needles	Eastern Mojave
168	Francis Spring	35.48194	-115.83831	3942	Turquoise Hills	Private	Needles	Eastern Mojave
169	Groaner Spring	35.45385	-115.52347	4888	Mescal Range	BLM	Needles	Eastern Mojave
170	Halloran Spring	35.38318	-115.89291	2984	Turquoise Hills	BLM	Needles	Eastern Mojave
171	Hardrock Queen Spring	35.45582	-115.52756	4835	Mescal Range	BLM	Needles	Eastern Mojave
172	Lone Tree Spring (aka No Name Spring)	35.47503	-115.84624	4095	Turquoise Hills	BLM	Needles	Eastern Mojave
173	McDonald Spring	35.44840	-115.48191	4511	Mescal Range	BLM	Needles	Eastern Mojave
174	Mineral Spring	35.41141	-115.46250	4345	Mineral Hill (Kokoweef Cyn)	BLM	Needles	Eastern Mojave
175	Pachalka Spring	35.51793	-115.63094	4954	Clark Mountains	MDLT	Needles	Eastern Mojave
176	Quail Spring	35.31906	-115.04650	3982	Castle Mountains	BLM	Needles	Eastern Mojave
177	Ricky Spring	35.45001	-115.48118	4395	Mescal Range	BLM	Needles	Eastern Mojave
178	Valley Wells spring	35.46627	-115.68298	3708	Clark Mountains	BLM	Needles	Eastern Mojave
179	Wheaton Spring	35.45568	-115.47984	4164	Mescal Range	BLM	Needles	Eastern Mojave
180	Beck Spring	35.78336	-115.92303	4450	Amargosa	Private	Needles	Northern Mojave - Amargosa
181	Coyote Holes	35.64095	-115.95894	2161	Amargosa	BLM	Needles	Northern Mojave - Amargosa
182	Crystal Spring	35.79503	-115.96176	3877	Amargosa - Kingston Range	BLM	Needles	Northern Mojave - Amargosa
183	Horsethief Spring	35.77294	-115.88824	4600	Amargosa - Kingston Range	BLM	Needles	Northern Mojave - Amargosa
184	Kingston Spring	35.62071	-115.96389	2272	Amargosa	BLM	Needles	Northern Mojave - Amargosa
185	Rabbithole Spring	35.71302	-116.05174	2120	Amargosa	BLM	Needles	Northern Mojave - Amargosa
186	Tule Well	35.81174	-116.04908	2297	Amargosa - Kingston Range	BLM	Needles	Northern Mojave - Amargosa
187	Upper Wild Horse Spring	35.78515	-115.99353	3369	Amargosa - Kingston Range	BLM	Needles	Northern Mojave - Amargosa
188	Wild Horse Spring	35.78804	-115.99766	3108	Amargosa - Kingston Range	BLM	Needles	Northern Mojave - Amargosa
189	Flattop Tenaja	34.81815	-114.81006	1873	Sacramento Mtns	BLM	Needles	Southeastern Mojave
190	Gemco Mine Spring (Upper)	34.54455	-115.18513	3699	Old Woman Mtns (wilderness)	BLM	Needles	Southeastern Mojave
191	Miller's Cabin Spring	34.65362	-115.78619	3087	Bristol Mountains	BLM	Needles	Southeastern Mojave
192	Teresa Spring	34.68073	-115.64958	2456	Marble Mountains	BLM	Needles	Southeastern Mojave
193	Vernandyles Spring	34.69522	-115.66143	2568	Marble Mountains	BLM	Needles	Southeastern Mojave
194	West Well	34.44415	-114.47887	768	Chemehuevi Wash	BLM	Needles	Southeastern Mojave
195	Amahl1 Spring	34.58249	-114.51212	1210	Chemehuevi Mtns	BLM	Needles	South-eastern Mojave
196	Amahl2 Spring	34.58318	-114.49332		Chemehuevi Mountains	BLM	Needles	South-eastern Mojave
197	Arrowweed Spring A	34.84802	-114.78209	1572	Sacramento Mtns	BLM	Needles	South-eastern Mojave
198	Arrowweed Spring B	34.84811	-114.78249	1574	Sacramento Mtns	BLM	Needles	South-eastern Mojave
199	Barrel Spring	34.70131	-115.16106	2634	Piute Mountains (wilderness)	BLM	Needles	South-eastern Mojave

**TABLE 1**  
**SPRING LOCATIONS**

200	Bert Spring	34.52796	-115.17693	3745	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
201	Black Metal Spring	34.45105	-115.18107	3092	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
202	Bonanza Spring	34.68513	-115.40538	2105	Clipper Mtns	BLM	Needles	South-eastern Mojave
203	Bonanza Spring Lower	34.68060	-115.40378	1980	Clipper Mtns	BLM	Needles	South-eastern Mojave
204	Brown's Camp Spring	34.81221	-114.82119	1978	Sacramento Mtns	BLM	Needles	South-eastern Mojave
205	Burnt Spring	34.71593	-115.38404	2436	Clipper Mtns	BLM	Needles	South-eastern Mojave
206	Camp Ibis Spring (Well)	34.95375	-114.83646	1753	Homer Mtn	BLM	Needles	South-eastern Mojave
207	Carbonate Spring	34.56192	-115.21404	3721	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
208	Chuckwalla Spring	34.77187	-115.37955	2935	Clipper Mtns (wilderness)	BLM	Needles	South-eastern Mojave
209	Craig Spring	34.51211	-115.11285	3496	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
210	Crestview Seep	34.82291	-114.80858	1837	Sacramento Mtns	BLM	Needles	South-eastern Mojave
211	Crying Spring	35.01764	-114.72645	1811	Dead Mountains	BLM	Needles	South-eastern Mojave
212	Dripping Spring	34.55990	-115.20972	3611	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
213	English Spring (aka Brady Spring)	34.54571	-115.18320	3828	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
214	Eva Spring	34.54565	-115.09595	3109	Old Woman Mountains	BLM	Needles	South-eastern Mojave
215	Fall Spring	34.74650	-115.40418	3314	Clipper Mtns (wilderness)	BLM	Needles	South-eastern Mojave
216	Fenner Spring	34.75404	-115.10393	3111	Piute Mountains (wilderness)	BLM	Needles	South-eastern Mojave
217	Flattop Mountain Spring	34.81709	-114.80781	1901	Sacramento Mtns	BLM	Needles	South-eastern Mojave
218	Florence Spring (aka Mesquite Spring)	34.58969	-115.23705	3216	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
219	Gemco Mine Spring (Lower)	34.54449	-115.18612	3662	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
220	Honeymoon Spring	34.61283	-115.16332	3319	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
221	Hummingbird Spring	34.75338	-115.34409	2326	Clipper Mtns (wilderness)	BLM	Needles	South-eastern Mojave
222	Kane Spring	34.54340	-115.16560	4223	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
223	Kilbeck Spring	34.36029	-115.17673	2493	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
224	Lone Spring	34.56818	-115.21511	4419	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
225	Lost Dutch Oven Spring	34.70248	-115.45463	2687	Clipper Mtns	BLM	Needles	South-eastern Mojave
226	Lyons Seep	34.57786	-115.21934	2643	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
227	Mohave Canyon Spring	34.63567	-114.45716	715	Chemehuevi Mtns (havasu wilderness)	Nat Wildlife Ref	Needles	South-eastern Mojave
228	Mountain Spring (private)	34.83083	-115.04501	2707	Sacramento Mtns	Private	Needles	South-eastern Mojave
229	North Klinefelter Spring	34.90225	-114.76823	1255	Dead Mountains	BLM	Needles	South-eastern Mojave
230	Old Ranch Spring	34.58471	-115.18205	3380	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
231	Olive Spring	34.52238	-115.16801	4228	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
232	Paramount Spring	34.55820	-115.16840	4052	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
233	Parish Spring	34.59572	-114.56717	1993	Chemehuevi Mtns (wilderness)	BLM	Needles	South-eastern Mojave
234	Picture Canyon Spring	35.07048	-114.74929	1943	Dead Mountains	BLM	Needles	South-eastern Mojave
235	Pipeline Seep	34.67624	-114.73482	1940	Chemehuevi Valley	BLM	Needles	South-eastern Mojave
236	Rattler Spring	34.77290	-115.37646	2848	Clipper Mtns	BLM	Needles	South-eastern Mojave
237	Red Spring	34.93762	-114.72479	840	Dead Mountains	BLM	Needles	South-eastern Mojave
238	Rustler Spring	34.82163	-114.80935	1851	Sacramento Mtns	BLM	Needles	South-eastern Mojave
239	Sacramento Spring	34.89742	-114.76863	1244	Sacramento Mtns	BLM	Needles	South-eastern Mojave
240	Samantha (wildcat) Spring	34.61506	-114.56910	823	Chemehuevi Mountains	BLM	Needles	South-eastern Mojave
241	Sammy's Spring	34.52762	-115.17769	3664	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
242	Sheep Camp Spring Upper	34.46688	-115.20308	3696	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
243	Studio Spring 1	34.57610	-114.54250	1591	Chemehuevi Mtns (wilderness)	BLM	Needles	South-eastern Mojave
244	Sunflower Spring	34.54511	-115.12666	3368	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
245	Sweetwater Spring	34.56570	-115.18270	3898	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
246	Tan-Tan Spring	34.84834	-114.77834	1565	Sacramento Mtns	BLM	Needles	South-eastern Mojave
247	Tan-Tan Well (Trebles Ranch)	34.84826	-114.77914	1568	Sacramento Mtns	BLM	Needles	South-eastern Mojave
248	Teddybear Cholla Spring (coords appx)	34.81559	-114.71002	3000	Sacramento Mtns	BLM	Needles	South-eastern Mojave
249	Tie Cabin Spring	34.58138	-115.22988	3775	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave

**TABLE 1**  
**SPRING LOCATIONS**

250	Wes' Weep Spring	34.39774	-114.80735	3000	Turtle Mountains	BLM	Needles	South-eastern Mojave
251	West Well Spring	34.44470	-114.47950	761	Chemehuevi Wash	BLM	Needles	South-eastern Mojave
252	Wilhelm Spring	34.48173	-115.09694	2669	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
253	Willow Spring	34.57810	-115.19230	3710	Old Woman Mtns (wilderness)	BLM	Needles	South-eastern Mojave
254	Wimpy Spring	34.59869	-114.48874	1136	Chemehuevi Mountains	BLM	Needles	South-eastern Mojave
255	Allen Spring north	35.83973	-117.39277	3009	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
256	Allen Spring south	35.83899	-117.39277	2957	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
257	AlphaSpring	35.90870	-117.41250	3752	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
258	Aqueduct Spring	35.93547	-117.91722	3350	Little Lakes Area	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
259	Austin Spring	35.85728	-117.38254	2592	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
260	Badwater Springs middle	36.78863	-117.89828	1567	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
261	Badwater Springs north	36.78903	-117.89845	1560	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
262	Badwater Springs south	36.78784	-117.89861	1565	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
263	Bainter Spring	35.84283	-117.38197	2650	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
264	Beveridge Canyon Spg.	36.72266	-117.86869	1943	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
265	Billie Spring	36.08063	-117.40308	3179	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
266	Black Springs - Lower	36.25078	-117.73221	6019	Coso	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
267	Black Springs - Upper	36.24930	-117.73227	6100	Coso	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
268	Bobcat Spring	35.91003	-117.41451	3886	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
269	Buena Vista Cyn Spring (aka Meadow upper)	35.69117	-117.95882	4752	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
270	Cabin Spring	35.93160	-117.40116	3609	Argus Range	BLM/Private	Ridgecrest	Northern Mojave - Owens/Pan.
271	Centennial Tenaja	36.24918	-117.76701	6165	Coso	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
272	Cerro Gordo Spring	36.58505	-117.82317	8840	Inyo Mountains	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
273	China Garden Spring	36.31396	-117.53197	3140	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
274	Chris Wicht Camp Spring	36.11229	-117.17275	2779	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
275	Christmas Spring	35.82118	-117.40797	2652	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
276	Colter Spring	35.99450	-117.14100	5624	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
277	Cove Spring	36.70798	-117.92972	8584	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
278	Coyote Spring	35.73108	-117.93830	3650	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
279	Dripping Spring	35.92590	-117.37860	3904	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
280	Elliot Spring	35.86150	-117.40895	3713	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
281	Etta Spring	36.04450	-117.40616	3530	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
282	Five Fingers Spring	35.69420	-117.93300	3968	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
283	French Madam Spring	36.23916	-117.46260	4281	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
284	Goler Wash Spring	35.86201	-117.12658	2511	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
285	Grant Spring	36.23405	-117.99227	3852	Owens Valley	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
286	Grapevine Canyon Spring (Lower)	35.72929	-117.89806	2886	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
287	Great Falls Springs east	35.85278	-117.39288	3086	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
288	Great Falls Springs north	35.85580	-117.39897	3275	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
289	Great Falls Springs south	35.85113	-117.39386	3108	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
290	Great Falls Springs west1	35.85427	-117.41061	3530	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
291	Great Falls Springs west2	35.85421	-117.40862	3535	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
292	Happy Canyon Spring lower	36.06998	-117.15450	3262	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
293	Happy Canyon Spring middle	36.07421	-117.14402	3738	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
294	Happy Canyon Spring Upper	36.07231	-117.13796	4145	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
295	Hogback Spring	36.18705	-118.00684	4523	Owens Valley	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
296	Hunter Cyn Spring 1	36.69991	-117.84668	1568	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
297	Hunter Cyn Spring 2	36.69790	-117.84870	1801	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
298	Hunter Cyn Spring 3	36.69983	-117.85068	3048	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
299	Indian Wells Cyn Spring	35.71654	-117.96492	4954	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.



**TABLE 1**  
**SPRING LOCATIONS**

300	Indian Wells Cyn Spring 2	35.68823	-117.92719	3791	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
301	Jack Gunn Spring	36.23923	-117.46953	4521	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
302	Jackpot Canyon Spring	36.04410	-117.17962	2338	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
303	Kinkade Spring	37.40319	-117.75945	6714	Sylvania Mountains	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
304	Koko Spring	36.06547	-117.38406	2644	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
305	Limekiln Spring	36.11400	-117.15131	3886	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
306	Little Lake Canyon Spring lower	35.94359	-117.95009	4275	Sacatar Trail Wilderness	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
307	Little Lake Canyon Spring middle	35.94600	-117.95429	4295	Sacatar Trail Wilderness	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
308	Little Lake Canyon Spring upper	35.94726	-117.96800	4680	Sacatar Trail Wilderness	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
309	Lower Aqueduct Spring	35.93586	-117.91566	3304	Little Lakes Area	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
310	Lower Centennial Spring	36.26574	-117.76639	5624	Coso	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
311	Lower North Revenue Spring	36.16210	-117.42630	3257	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
312	Lower Wood Cyn Spring (in Wood Canyon Spring Complex)	36.17611	-117.45278	4161	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
313	Mexican Spring	36.59380	-117.82942	9113	Inyo Mountains	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
314	Mid Indian Wells Cyn Spring	35.68468	-117.91984	3638	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
315	Miller's Spring	36.29228	-117.53738	3501	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
316	Miner's Spring (aka Morris Peak Spring)	35.69627	-117.96625	4938	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
317	Morris Peak Canyon Spring (aka Siebert, Glass Cyn Spring)	35.69527	-117.97132	5178	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
318	Morris Spring (aka Dempsey Canyon Spring)	35.70687	-117.97606	5604	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
319	Mumford Springs	35.86026	-117.38173	2832	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
320	Nadeau Spring	35.86635	-117.38201	2763	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
321	Nina Spring	36.04360	-117.40370	3345	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
322	No Name Canyon Spring	36.80190	-117.91688	2381	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
323	No Name Spring	36.58839	-117.82462	9040	Inyo Mountains	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
324	North Fork Spring (and Arrastra Spring)	35.86170	-117.41400	3694	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
325	North Piper Mountain Spring	37.41753	-117.91941	6114	Deep Springs / Fish Lake	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
326	North Revenue Spring	36.15972	-117.43674	3867	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
327	Orchard Spring	35.86203	-117.40450	3725	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
328	Orondo Spring (and Ruby Spring)	35.91702	-117.42341	4736	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
329	Pat Keyes Canyon spring east	36.77963	-117.92244	3625	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
330	Pat Keyes Canyon spring west	36.77053	-117.94816		Inyo Moutains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
331	Pat Keyes Spring	36.78024	-117.90071	1802	Inyo Moutains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
332	Peach Tree Spring	35.92840	-117.37510	3461	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
333	Playa Spring	36.09776	-117.25455	1048	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
334	Pleasant Canyon Creek	36.03283	-117.17576	2848	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
335	Pleasant Canyon Spring east	36.03165	-117.16918	3155	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
336	Portugese Canyon Spring	36.01150	-117.99605	4930	Sacatar Trail Wilderness	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
337	Post Office Spring	36.04073	-117.22460	1061	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
338	Pothole Spring	35.86756	-117.38496	2927	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
339	Power Holding Corral Spring	35.71801	-117.96800	5018	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
340	Rattlesnake Spring	35.87110	-117.40560	3860	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
341	Redlands Spring-	35.93720	-117.17020	2561	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
342	Revenue Canyon Spring	36.14318	-117.43297	4079	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
343	Revenue Spring east	36.14450	-117.43080	3813	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
344	Revenue Spring west	36.14630	-117.44080	4464	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
345	Rock Spring (aka Middle Spring)	35.93455	-117.38650	3725	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
346	Rose Spring	36.10776	-117.96098	3586	Owens Valley	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
347	Ruth Spring	35.88376	-117.42142	3832	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
348	Sacatar Spring North	35.95657	-117.94073	3656	Sacatar Trail Wilderness	BLM	Ridgecrest	Northern Mojave - Owens/Pan.

**TABLE 1**  
**SPRING LOCATIONS**

349	Sacatar Spring South	35.95573	-117.93970	3852	Sacatar Trail Wilderness	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
350	Sacatar Wilderness Spring	35.97168	-117.96765	4216	Sacatar Trail Wilderness	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
351	Sage Canyon Seep	35.57514	-118.05066	4191	Sierra Nevada (south of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
352	Saline Marsh Spring	36.69648	-117.83023	1069	Inyo Moutains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
353	Sand Canyon Creek (not a spring)	35.77824	-117.92203	3111	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
354	Sarah Spring	36.06444	-117.38785	2762	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
355	See Line Spring	35.25514	-118.07737	3205	Sierra Nevada (south of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
356	Short Canyon Spring 1	35.71741	-117.92998	4156	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
357	Short Canyon Spring 2	35.71657	-117.92779	4033	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
358	Short Canyon Spring 3	35.71516	-117.92493	3885	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
359	Short Canyon Spring 4	35.71422	-117.92626	3800	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
360	Short Canyon Spring 5	35.71327	-117.93089	4135	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
361	Short Canyon Spring 6	35.71057	-117.93048	4088	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
362	Short Canyon Spring 7	35.71132	-117.92815	3966	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
363	Short Canyon Spring 8	35.71129	-117.92628	3903	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
364	Short Canyon Spring 9	35.70465	-117.92238	3800	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
365	Sidehill Spring	35.87600	-117.39180	3351	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
366	Skull Spring	35.87988	-117.42162	3952	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
367	Snow Canyon Spring Lower	36.20816	-117.45841	3965	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
368	Snow Canyon Spring middle	36.20860	-117.46169	4139	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
369	Snow Canyon Spring midlow	36.20856	-117.46052	4069	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
370	Snow Canyon Spring Upper	36.20909	-117.46175	4105	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
371	Soldier Pass Spring	37.33616	-117.95710	5004	Deep Springs / Fish Lake	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
372	South Park Canyon Spring	35.99806	-117.16068	4593	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
373	Stardust Spring	35.72887	-117.93757	3996	Sierra Nevada (south of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
374	Stone Canyon Spring	35.69206	-117.95893	4668	Sierra Nevada (north of 178)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
375	Thompson Spring	36.22990	-117.45880	4055	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
376	Thompson Spring upper west	36.23210	-117.46870	4869	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
377	Twin Springs (North)	35.85491	-117.39143	3153	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
378	Twin Springs (South)	35.85477	-117.39112	3130	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
379	Upper Centennial Spring north	36.24232	-117.76787	6259	Coso	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
380	Upper Centennial Spring south	36.24035	-117.76624	6292	Coso	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
381	Upper Centennial Spring south - box	36.24074	-117.76638	6288	Coso	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
382	Upper Wood Cyn Spring (in Wood Canyon Spring Complex)	36.17451	-117.45910	4841	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
383	Upper Wood Cyn Spring north (in Wood Cyn Spg Complex)	36.17909	-117.46080	4620	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
384	Warm Sulphur Spring north	36.12033	-117.21435	1044	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
385	Warm Sulphur Spring south	36.11942	-117.21397	1066	Panamint	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
386	Wheelbarrow Spring	37.37138	-117.93931	5445	Deep Springs / Fish Lake	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
387	Willow Creek Camp Spring	36.84212	-117.92284	2451	Inyo Mountains (Saline)	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
388	Willow Spring	35.85050	-117.40150	3350	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
389	Wilson Canyon Seep	35.81576	-117.39971	2428	Argus Range	BLM	Ridgecrest	Northern Mojave - Owens/Pan.
390	Alphie Spring	35.36869	-118.07844	3741	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
391	Antimony Spring	35.26248	-118.12949	3991	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
392	Bedrock Spring	35.45715	-117.50303	3273	Lava Mountains	BLM	Ridgecrest	Western Mojave
393	Boulder Spring	35.57900	-118.02827	4049	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
394	Butterbredt Spring	35.38206	-118.11320	3892	Sierra Nevada (south of 178)	Private	Ridgecrest	Western Mojave
395	Chanze Spring (Tenaja)	35.26246	-118.05547	2561	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
396	Coffee Can Spring	35.37725	-117.88306	2127	El Paso Mountains	BLM	Ridgecrest	Western Mojave
397	Cowboy Spring (aka Riccomini Springs)	35.31128	-118.08838	2825	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
398	Cut Tree Spring (north)	35.45970	-117.81261	3631	El Paso Mountains	BLM	Ridgecrest	Western Mojave

**TABLE 1**  
**SPRING LOCATIONS**

399	Cut Tree Spring (south)	35.45835	-117.81167	3676	El Paso Mountains	BLM	Ridgecrest	Western Mojave
400	Dove Spring	35.45305	-118.10049	4265	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
401	Easter Spring	35.47656	-117.82769	3762	El Paso Mountains	BLM	Ridgecrest	Western Mojave
402	Fremont Valley Spring	35.30106	-117.94499	1936	Fremont Valley	BLM	Ridgecrest	Western Mojave
403	Hoffman Canyon Spring	35.34942	-118.12601	3616	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
404	Hoffman Well Spring (aka Hoffman Spring)	35.35649	-118.10809	3688	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
405	Horse Canyon Well	35.55655	-118.03461	3759	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
406	Last Chance Spring	35.44997	-117.89761	3465	El Paso Mountains	BLM	Ridgecrest	Western Mojave
407	Meadow Spring Upper (aka Buena Vista Spring)	35.69097	-117.95866	4705	Sierra Nevada (north of 178)	BLM	Ridgecrest	Western Mojave
408	Mesa Spring	35.44273	-117.87077	3617	El Paso Mountains	BLM	Ridgecrest	Western Mojave
409	Mesa Spring - Upper	35.44330	-117.86925	3590	El Paso Mountains	BLM	Ridgecrest	Western Mojave
410	Mesquite Spring West	35.39003	-117.81648	2120	El Paso Mountains	BLM	Ridgecrest	Western Mojave
411	Mesquite Springs	35.39007	-117.81468	2099	El Paso Mountains	BLM	Ridgecrest	Western Mojave
412	Nudist Spring	35.34227	-118.01954	2782	Southern Sierra Nevada	BLM	Ridgecrest	Western Mojave
413	Petroglyph Spring (aka Louise Spring)	35.49961	-117.80404	3373	El Paso Mountains	BLM	Ridgecrest	Western Mojave
414	Poison Spring	35.39413	-117.83908	2298	El Paso Mountains	BLM	Ridgecrest	Western Mojave
415	Public Spring	35.62549	-117.95907	4054	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
416	Quail Spring	35.22510	-118.17910	4425	Sierra Nevada (south of 178)	MGOV status	Ridgecrest	Western Mojave
417	Riffle Spring east	35.38895	-117.54097	3391	Red Mountain	BLM	Ridgecrest	Western Mojave
418	Riffle Spring west	35.38921	-117.54192	3427	Red Mountain	BLM	Ridgecrest	Western Mojave
419	Rinaldi's Well	35.49089	-117.70661	3496	El Paso Mountains	BLM	Ridgecrest	Western Mojave
420	Sage Canyon	35.58433	-118.05383	4160	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
421	Sage Canyon Spring	35.58861	-118.05252	4353	Sierra Nevada (south of 178)	BLM	Ridgecrest	Western Mojave
422	Sheep Spring	35.49716	-117.80444	3437	El Paso Mountains	BLM	Ridgecrest	Western Mojave
423	Smithson Spring	34.41384	-117.65638	4783	Pinon Hills	Private	Ridgecrest	Western Mojave
424	Steel Box Spring	35.46329	-117.81515	3544	El Paso Mountains	BLM	Ridgecrest	Western Mojave
425	Willow Spring	35.48235	-117.69671	3861	El Paso Mountains	BLM	Ridgecrest	Western Mojave
426	Boardwalk Spring - Torrance Ranch	37.00390	-116.72397	3665	Oasis Valley	TNC	THC	Northern Mojave - Amargosa
427	Ahn Spring	34.71829	-118.49961	3783	Portal Ridge	THC	THC	Western Mojave
428	Buckeye Spring	34.72144	-118.49645	3465	Portal Ridge	THC	THC	Western Mojave
429	Grass Spring	34.72407	-118.48930	3674	Portal Ridge	THC	THC	Western Mojave
430	Keeler Flats Spring	34.71380	-118.49143	4040	Portal Ridge	THC	THC	Western Mojave
431	Pinecrest Spring	34.71952	-118.50110	3609	Portal Ridge	THC	THC	Western Mojave
432	Portal Seep	34.72400	-118.48860	3319	Portal Ridge	THC	THC	Western Mojave
433	Kiosk Spring - Torrance Ranch	37.00304	-116.74256	3669	Oasis Valley	TNC	TNC	Northern Mojave - Amargosa
434	Parker Ranch - TNC #1 Spring	36.96725	-116.72338	3594	Oasis Valley	TNC	TNC	Northern Mojave - Amargosa
435	Parker Ranch - TNC #2 Spring	36.96751	-116.72362	3594	Oasis Valley	TNC	TNC	Northern Mojave - Amargosa
436	Parker Ranch Spring	36.96480	-116.72412	3603	Oasis Valley	Private	TNC	Northern Mojave - Amargosa
437	Revert Spring at TNC	36.91551	-116.75311	3890	Oasis Valley	TNC	TNC	Northern Mojave - Amargosa



**TABLE 2**  
**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
1	Bird Spring (private)	35.19471	-117.31459	3170	BLM	Barstow	Central Mojave		
2	Black's Ranch (private)	35.01764	-117.22958	2030	Private	Barstow	Central Mojave		
3	Coyote Well	35.02505	-116.76439	2000	BLM	Barstow	Central Mojave	-	
4	Deep Cave Spring	35.10705	-116.91607	3030	BLM	Barstow	Central Mojave	BLM S011508	
5	Epsom Spring	35.02702	-116.14914	995	BLM	Barstow	Central Mojave	-	
6	Jack Spring	35.15482	-116.75648	2383	BLM	Barstow	Central Mojave	-	
7	Opal Spring	35.15182	-117.17645	3138	BLM	Barstow	Central Mojave		
8	Paradise Spring Central	35.15526	-116.81407	2591	BLM	Barstow	Central Mojave		PWR
9	Paradise Spring Cool (private)	35.14526	-116.81445	2421	Private	Barstow	Central Mojave		
10	Paradise Spring Hot (private)	35.14575	-116.81408	2408	Private	Barstow	Central Mojave		
11	Paradise Spring North	35.15544	-116.81314	2585	BLM	Barstow	Central Mojave		PWR
12	Paradise Spring Northwest	35.15661	-116.81547	2672	BLM	Barstow	Central Mojave		PWR
13	Paradise Spring Tub (private)	35.14568	-116.18392	2401	Private	Barstow	Central Mojave		
14	Sweetwater Spring	34.97193	-116.85037	3046	BLM	Barstow	Central Mojave	-	
15	Amargosa Cyn Spring 3	35.82701	-116.21942	1262	BLM	Barstow	Northern Mojave - Amargosa		
16	Amargosa Cyn Spring 4	35.83473	-116.22274	1372	BLM	Barstow	Northern Mojave - Amargosa	-	
17	Amargosa Cyn Spring 5	35.83602	-116.22243	1372	BLM	Barstow	Northern Mojave - Amargosa		
18	Borax Spring	35.88804	-116.25789	1340	BLM	Barstow	Northern Mojave - Amargosa	BLM S011511	
19	Borehole Spring	35.88620	-116.23439	1340	BLM	Barstow	Northern Mojave - Amargosa	BLM F011163S, S013824	
20	Chappo Spring	35.94775	-116.18944	2016	Tribal	Barstow	Northern Mojave - Amargosa	-	
21	China Ranch Cyn Spring	35.80335	-116.14099	1770	BLM	Barstow	Northern Mojave - Amargosa	-	
22	Christian Spring (aka Am. Cyn. Spg. 1)	35.83943	-116.22397	1298	BLM	Barstow	Northern Mojave - Amargosa	-	
23	Cottonrod Seep (in Shoshone Spg Complex)	35.97975	-116.27260	1598	Private	Barstow	Northern Mojave - Amargosa		
24	Cottonwood Spring	35.59139	-116.38649	1647	BLM	Barstow	Northern Mojave - Amargosa	-	
25	Denning Spring	35.58727	-116.46915	1921	BLM	Barstow	Northern Mojave - Amargosa	-	
26	Dodge City Spring	35.88018	-116.22955	1399	BLM	Barstow	Northern Mojave - Amargosa	BLM S012486	PWR
27	East Tecopa Seep	35.86690	-116.22260	1423	BLM	Barstow	Northern Mojave - Amargosa		
28	Goldenrod Seep 1	35.97987	-116.27299	1598	Private	Barstow	Northern Mojave - Amargosa		
29	Goldenrod Seep 2	35.97984	-116.27313	1598	Private	Barstow	Northern Mojave - Amargosa		
30	Goldenrod Seep 3	35.97997	-116.27264	1598	Private	Barstow	Northern Mojave - Amargosa		
31	Goldenrod Seep 4	35.97986	-116.27268	1598	Private	Barstow	Northern Mojave - Amargosa		
32	Good/Barnes Well	35.84216	-116.20419	1474	Private	Barstow	Northern Mojave - Amargosa		
33	Historic Spring	35.98044	-116.27367	1605	Private	Barstow	Northern Mojave - Amargosa		
34	Ibex Hills Spring	35.91630	-116.38577	2533	BLM	Barstow	Northern Mojave - Amargosa	-	
35	Old Mormon Spring	35.51538	-116.25577	2079	BLM	Barstow	Northern Mojave - Amargosa	BLM S012501	
36	One Palm Seep	35.86019	-116.22212	1432	BLM	Barstow	Northern Mojave - Amargosa		
37	Owl Hole Spring	35.63943	-116.64758	1943	BLM	Barstow	Northern Mojave - Amargosa	BLM S011510	PWR
38	Phragmites Seep	35.97634	-116.27470	1581	Private	Barstow	Northern Mojave - Amargosa		
39	Quail Spring	35.63369	-116.86746	4122	BLM	Barstow	Northern Mojave - Amargosa	-	
40	Red Trail Seep	35.98158	-116.26932	1585	Private	Barstow	Northern Mojave - Amargosa		
41	Resting Spring	35.87720	-116.15694	1767	Private	Barstow	Northern Mojave - Amargosa	Private S016071	
42	Riley Spring	35.95215	-116.26620	1503	BLM	Barstow	Northern Mojave - Amargosa	BLM S011501	
43	Salt Spring	35.62614	-116.28089	526	BLM	Barstow	Northern Mojave - Amargosa	BLM S011162	
44	Scofield Spring	35.87350	-116.12078	2051	BLM	Barstow	Northern Mojave - Amargosa		
45	Sheep Creek Spring	35.58858	-116.36027	1703	BLM	Barstow	Northern Mojave - Amargosa	BLM S011509	
46	Shoshone Spring	35.98056	-116.27384	1615	Private	Barstow	Northern Mojave - Amargosa	-	
47	Slough Spring (Hog Farm Well)	36.28748	-116.37854	2024	BLM	Barstow	Northern Mojave - Amargosa		
48	Still Spring	35.95903	-116.25961	1511	BLM	Barstow	Northern Mojave - Amargosa		
49	Stormy Spring	35.85212	-116.22059	1378	BLM	Barstow	Northern Mojave - Amargosa	BLM S013823	
50	Tecopa Hot Spring	35.87191	-116.23215	1415	BLM	Barstow	Northern Mojave - Amargosa		
51	Tecopa Hot Spring (at TNC)	35.87744	-116.23618	1332	BLM	Barstow	Northern Mojave - Amargosa	-	
52	Thom Spring	35.85661	-116.22677	1406	BLM	Barstow	Northern Mojave - Amargosa	-	

**TABLE 2**  
**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
53	Tule Spring	35.81691	-116.05540	2326	BLM	Barstow	Northern Mojave - Amargosa	BLM S014585	
54	Twelvemile Spring	36.02195	-116.15530	2208	BLM	Barstow	Northern Mojave - Amargosa	-	
55	Vole Hot Spring	35.85092	-116.22320	1369	BLM	Barstow	Northern Mojave - Amargosa	BLM S013822	
56	West Side Spring	35.84324	-116.22879	1301	BLM	Barstow	Northern Mojave - Amargosa	-	
57	Wild Bath Spring	35.87277	-116.21932	1411	BLM	Barstow	Northern Mojave - Amargosa	-	
58	Willow Spring 1	35.80569	-116.18264	1445	Private	Barstow	Northern Mojave - Amargosa	Private 17404	
59	Willow Spring 2	35.80097	-116.19438	1236	Private	Barstow	Northern Mojave - Amargosa	Private 17404	
60	Yerba Mansa Seep	35.86925	-116.22356	1416	BLM	Barstow	Northern Mojave - Amargosa		
61	4600-ft Spring	34.37228	-117.11794	4510	BLM	Barstow	South-central Mojave		
62	Amaral Spring	34.51771	-117.06475	3699	BLM	Barstow	South-central Mojave	-	
63	Andes Trail Seep	34.37608	-117.13461	4335	BLM	Barstow	South-central Mojave		
64	Arrastre Canyon Spring (at Tahiti Falls)	34.39216	-117.11429	4001	BLM	Barstow	South-central Mojave	BLM S011515	PWR
65	Arrastre Canyon Spring Low	34.39442	-117.11714	3943	BLM	Barstow	South-central Mojave	-	
66	Arrastre Canyon Spring midlow	34.39340	-117.11483	3962	BLM	Barstow	South-central Mojave	-	
67	Arrastre Canyon Spring midupper	34.38513	-117.10476	4287	BLM	Barstow	South-central Mojave	-	
68	Arrastre Canyon Spring Upper	34.38232	-117.10211	4457	BLM	Barstow	South-central Mojave	-	
69	Arrastre Seep #1	34.32673	-116.76232	4444	BLM	Barstow	South-central Mojave		
70	Arrastre Seep #2	34.32989	-116.76345	4424	BLM	Barstow	South-central Mojave		
71	Arrastre side canyon	34.38760	-117.11181	4204	BLM	Barstow	South-central Mojave	-	
72	Aztec Spring	34.70624	-116.82166	4347	BLM	Barstow	South-central Mojave	Private A029169, BLM S012487	PWR
73	Badger Spring	34.65462	-116.91755	4380	BLM	Barstow	South-central Mojave	Private A029168	
74	Bighorn Seep #1	34.33582	-116.63983	3669	BLM	Barstow	South-central Mojave	BLM S014578	
75	Bighorn Seep #2	34.33562	-116.63856	3732	BLM	Barstow	South-central Mojave	BLM S014579	
76	Bobcat Scat Seep	34.30101	-116.51708	4196	BLM	Barstow	South-central Mojave		
77	Bullion Spring	34.60890	-116.18154	2565	BLM	Barstow	South-central Mojave		
78	Burns Spring	34.20452	-116.58249	4943	BLM	Barstow	South-central Mojave	BLM S008034	
79	Cottonwood Spring	34.38670	-117.15622	4169	BLM	Barstow	South-central Mojave	BLM S011516	
80	Coxey Road North Spring	34.37472	-117.10861	4764	BLM	Barstow	South-central Mojave		
81	Coyote Hole Spring	34.11656	-116.30801	2957	Multiple	Barstow	South-central Mojave	-	
82	Crossroads Spring	34.23717	-116.65979	5771	BLM	Barstow	South-central Mojave	BLM S012504	
83	Dixie Mine Spring	34.27722	-116.53109	4643	BLM	Barstow	South-central Mojave	BLM S012505	
84	Dove Spring	34.34674	-116.75973	4101	BLM	Barstow	South-central Mojave	Private A029167	
85	Dry Morongo Springs	34.05390	-116.62640	3294	BLM	Barstow	South-central Mojave	-	
86	Dry Willow Spring	34.36939	-117.11891	4721	BLM	Barstow	South-central Mojave		
87	Fisher Spring	34.67309	-116.77015	4632	BLM	Barstow	South-central Mojave		
88	Furnace Spring	34.35850	-116.92860	4550	BLM	Barstow	South-central Mojave	Private S013702; S016579	
89	Goat Spring	34.67263	-116.92681	4340	BLM	Barstow	South-central Mojave	BLM F011159	PWR
90	Granite Well	34.68401	-116.93618	3961	BLM	Barstow	South-central Mojave		
91	Grapevine Canyon Spring	34.39000	-117.06528	5139	BLM	Barstow	South-central Mojave		
92	Grapevine Spring	34.39742	-117.06440	4229	BLM	Barstow	South-central Mojave	BLM S011514	PWR
93	Greenwalt #1 Spring	34.38420	-117.12140	4146	BLM	Barstow	South-central Mojave	Private A001675	
94	Hidden Spring (aka Upper Willy Boy Spring)	34.30549	-116.52897	4127	BLM	Barstow	South-central Mojave	BLM S012899	
95	High Road Spring	34.39347	-117.03181	4020	BLM	Barstow	South-central Mojave		
96	Horse Spring	34.52201	-117.08195	3892	BLM	Barstow	South-central Mojave	-	
97	Horse Spring SE	34.52108	-117.08107	4041	BLM	Barstow	South-central Mojave		
98	Hyten Spring	34.91871	-116.05721	3016	BLM	Barstow	South-central Mojave	-	
99	Juniper Flats Spring east	34.38320	-117.12879	4074	BLM	Barstow	South-central Mojave	-	
100	Kane Spring trough	34.73943	-116.69914	3176	BLM	Barstow	South-central Mojave	BLM F011160	
101	Kane Springs east	34.74042	-116.69624	3153	BLM	Barstow	South-central Mojave	BLM F011161	
102	Kane Springs west	34.74002	-116.70075	3231	BLM	Barstow	South-central Mojave	BLM F011161	
103	Kynna Spring	34.33285	-116.64174	3713	BLM	Barstow	South-central Mojave	BLM S015192	
104	Lower Rattle Spring	34.29500	-116.65222	4783	BLM	Barstow	South-central Mojave		

**TABLE 2**  
**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
105	McInnis Spring (aka Milpas Drive Spring)	34.53230	-117.10190	3291	BLM	Barstow	South-central Mojave	-	
106	Mesquite Spring	34.21328	-116.07555	1762	BLM	Barstow	South-central Mojave	-	
107	Mojo Spring	34.30347	-116.53236	4191	BLM	Barstow	South-central Mojave	BLM S012899	
108	Morongo Canyon Spgs	34.04835	-116.56824	2512	BLM/SB County	Barstow	South-central Mojave	-	
109	Mound Spring	34.25621	-116.65656	5432	BLM	Barstow	South-central Mojave	BLM S012503	
110	One Hole Spring	34.33426	-116.63425	3683	BLM	Barstow	South-central Mojave	BLM S012506	
111	Quail Spring	34.53704	-117.08167	3327	BLM	Barstow	South-central Mojave	-	
112	Quill Spring	34.64393	-116.89098	4483	BLM	Barstow	South-central Mojave	-	
113	Rattlesnake Spring	34.33406	-116.70469	3888	BLM	Barstow	South-central Mojave	BLM S011521	
114	Rock Corral Spring east (in Rock Corral Spring)	34.31741	-116.55328	3990	BLM	Barstow	South-central Mojave	BLM A018388	
115	Rock Corral Spring west (in Rock Corral Spring)	34.31693	-116.55824	3998	BLM	Barstow	South-central Mojave	BLM A018388	
116	RZ Spring	34.71092	-117.18664	3350	BLM	Barstow	South-central Mojave	-	
117	Seventh Spring	34.30876	-116.53748	4269	BLM	Barstow	South-central Mojave	BLM S011522	
118	Sheep Spring	34.73253	-116.60659	3104	BLM	Barstow	South-central Mojave	-	
119	Sherman Shady Springs	34.07910	-116.60220	3942	BLM near private	Barstow	South-central Mojave	BLM S012488	PWR
120	Silver Creek Spring	34.37250	-116.98514	4495	BLM	Barstow	South-central Mojave		
121	Stoddard Mountain Spring	34.70683	-117.12815	3700	BLM	Barstow	South-central Mojave		
122	Stone Spring	34.38231	-117.16439	4298	BLM	Barstow	South-central Mojave	BLM S014188	
123	Sweetwater Spring Lower	34.69229	-116.82356	4779	BLM	Barstow	South-central Mojave	BLM S012512	
124	Sweetwater Spring Upper	34.69236	-116.82494	4894	BLM	Barstow	South-central Mojave		
125	Two Hole Spring	34.33826	-116.69183	3832	BLM	Barstow	South-central Mojave	Private A029172; BLM S011520	
126	Vaughn Spring	34.25890	-116.65941	5401	BLM	Barstow	South-central Mojave	BLM S012502	PWR
127	Veggie Burrito Spring	34.37145	-117.12310	4532	BLM	Barstow	South-central Mojave	-	
128	Vine Spring	34.37711	-117.10850	4589	BLM	Barstow	South-central Mojave		
129	White Knob Milepost 61 Seep	34.37431	-116.99306	4613	BLM	Barstow	South-central Mojave		
130	White Knob Milepost 61 West Spring	34.37458	-116.99444	4568	BLM	Barstow	South-central Mojave		
131	White Knob Milepost 63 Northeast Spring	34.37875	-116.99556	4271	BLM	Barstow	South-central Mojave		
132	White Knob Milepost 63 Northwest Spring	34.37767	-116.99722	4390	BLM	Barstow	South-central Mojave		
133	White Knob Milepost 63 Southeast Spring	34.37597	-116.99611	4563	BLM	Barstow	South-central Mojave		
134	White Knob Milepost 63 Southwest Seep	34.37667	-117.00069	4500	BLM	Barstow	South-central Mojave		
135	White Knob Milepost 71 Spring A	34.36806	-117.00500	4961	BLM	Barstow	South-central Mojave		
136	Willow Spring	34.61468	-116.81991	4068	BLM	Barstow	South-central Mojave	BLM F011160	
137	Willow Spring	34.37949	-117.01069	4428	BLM	Barstow	South-central Mojave	BLM S011517, Private S018096	PWR
138	Willy Boy Spring	34.30634	-116.52808	4094	BLM	Barstow	South-central Mojave	-	
139	Blackwater Well	35.35766	-117.34645	3520	BLM	Barstow	Western Mojave		
140	McDonald Well	35.11528	-117.37045	2558	BLM	Barstow	Western Mojave	-	
141	Stump Spring	35.98366	-115.82550	2822	BLM	Las Vegas	Northern Mojave - Amargosa		
142	Berrberry Spring (coords. appx.)	34.32900	-114.29090	1100	BLM	Needles	Colorado Desert	-	
143	Bluebird Spring	34.39732	-114.82105	2424	BLM	Needles	Colorado Desert		
144	Bristol Spring	34.26339	-114.14389	491	BLM	Needles	Colorado Desert	-	
145	Carson's Well	34.42649	-114.82447	1951	BLM	Needles	Colorado Desert	-	
146	Coffin Spring	34.39577	-114.81416	2539	BLM	Needles	Colorado Desert	BLM S012586	PWR
147	Granite Spring	34.27539	-114.81397	2713	BLM	Needles	Colorado Desert		
148	Horn Spring	34.20815	-114.78854	2036	BLM	Needles	Colorado Desert	-	
149	July Spring	34.44891	-114.83330	1709	BLM	Needles	Colorado Desert		
150	Lee's Seep	34.35040	-114.28873	837	BLM	Needles	Colorado Desert	-	
151	Louie Spring	34.26619	-114.34572	3000	BLM	Needles	Colorado Desert		
152	Mohawk Spring	34.43185	-114.84670	2136	BLM	Needles	Colorado Desert	-	
153	Mopah Spring	34.31427	-114.77562	2215	BLM	Needles	Colorado Desert	-	
154	Perlite Pool	34.39540	-114.78004	1957	BLM	Needles	Colorado Desert	BLM F0078945	PWR
155	Pickie Poke Spring	34.39199	-114.79130	2322	BLM	Needles	Colorado Desert	BLM S012587	PWR
156	Scrub Spring	34.33931	-114.28570	903	BLM	Needles	Colorado Desert		



**TABLE 2**  
**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
157	Tamarisk Seep	34.35894	-114.86029	2343	BLM	Needles	Colorado Desert		
158	Turtle Spring	34.14236	-114.80293	1625	BLM	Needles	Colorado Desert		
159	Whipple Wash Lower	34.36799	-114.27823	622	BLM	Needles	Colorado Desert	-	
160	Whipple Wash Middle	34.36165	-114.27920	674	BLM	Needles	Colorado Desert	-	
161	Antimony Spring	35.49943	-115.51537	4599	BLM	Needles	Eastern Mojave	-	
162	Bull Spring	35.44228	-115.86491	3971	BLM	Needles	Eastern Mojave	BLM A017991	
163	Burro Spring east	35.50251	-115.52968	4663	BLM	Needles	Eastern Mojave	-	
164	Burro Spring west	35.50221	-115.53278	4752	BLM	Needles	Eastern Mojave	-	
165	Cambria Spring	35.45841	-115.53007	4812	BLM	Needles	Eastern Mojave		
166	China Spring	35.45486	-115.50921	4871	BLM	Needles	Eastern Mojave	-	PWR
167	Cree Spring	35.37753	-115.95614	2875	BLM	Needles	Eastern Mojave		
168	Francis Spring	35.48194	-115.83831	3942	Private	Needles	Eastern Mojave	BLM S012869, A01799	
169	Groaner Spring	35.45385	-115.52347	4888	BLM	Needles	Eastern Mojave	BLM S012870	PWR
170	Halloran Spring	35.38318	-115.89291	2984	BLM	Needles	Eastern Mojave	BLM S012867, NGO S012438	
171	Hardrock Queen Spring	35.45582	-115.52756	4835	BLM	Needles	Eastern Mojave	-	
172	Lone Tree Spring (aka No Name Spring)	35.47503	-115.84624	4095	BLM	Needles	Eastern Mojave	-	
173	McDonald Spring	35.44840	-115.48191	4511	BLM	Needles	Eastern Mojave		
174	Mineral Spring	35.41141	-115.46250	4345	BLM	Needles	Eastern Mojave	-	
175	Pachalka Spring	35.51793	-115.63094	4954	MDLT	Needles	Eastern Mojave	-	
176	Quail Spring	35.31906	-115.04650	3982	BLM	Needles	Eastern Mojave	-	
177	Ricky Spring	35.45001	-115.48118	4395	BLM	Needles	Eastern Mojave		
178	Valley Wells spring	35.46627	-115.68298	3708	BLM	Needles	Eastern Mojave	BLM A018873	
179	Wheaton Spring	35.45568	-115.47984	4164	BLM	Needles	Eastern Mojave	BLM S013890, Private D000198	
180	Beck Spring	35.78336	-115.92303	4450	Private	Needles	Northern Mojave - Amargosa		
181	Coyote Holes	35.64095	-115.95894	2161	BLM	Needles	Northern Mojave - Amargosa	-	
182	Crystal Spring	35.79503	-115.96176	3877	BLM	Needles	Northern Mojave - Amargosa	BLM S011513, Private A009018	
183	Horsethief Spring	35.77294	-115.88824	4600	BLM	Needles	Northern Mojave - Amargosa	Private A023099; BLM A023112	PWR
184	Kingston Spring	35.62071	-115.96389	2272	BLM	Needles	Northern Mojave - Amargosa	-	
185	Rabbithole Spring	35.71302	-116.05174	2120	BLM	Needles	Northern Mojave - Amargosa		
186	Tule Well	35.81174	-116.04908	2297	BLM	Needles	Northern Mojave - Amargosa		
187	Upper Wild Horse Spring	35.78515	-115.99353	3369	BLM	Needles	Northern Mojave - Amargosa		
188	Wild Horse Spring	35.78804	-115.99766	3108	BLM	Needles	Northern Mojave - Amargosa		
189	Flattop Tenaja	34.81815	-114.81006	1873	BLM	Needles	Southeastern Mojave		
190	Gemco Mine Spring (Upper)	34.54455	-115.18513	3699	BLM	Needles	Southeastern Mojave		
191	Miller's Cabin Spring	34.65362	-115.78619	3087	BLM	Needles	Southeastern Mojave		
192	Teresa Spring	34.68073	-115.64958	2456	BLM	Needles	Southeastern Mojave	BLM S012601	PWR
193	Vernandyles Spring	34.69522	-115.66143	2568	BLM	Needles	Southeastern Mojave		
194	West Well	34.44415	-114.47887	768	BLM	Needles	Southeastern Mojave	Private A027765	PWR
195	Amahl1 Spring	34.58249	-114.51212	1210	BLM	Needles	South-eastern Mojave		
196	Amahl2 Spring	34.58318	-114.49332		BLM	Needles	South-eastern Mojave		
197	Arrowweed Spring A	34.84802	-114.78209	1572	BLM	Needles	South-eastern Mojave		
198	Arrowweed Spring B	34.84811	-114.78249	1574	BLM	Needles	South-eastern Mojave		
199	Barrel Spring	34.70131	-115.16106	2634	BLM	Needles	South-eastern Mojave	Private X003505	
200	Bert Spring	34.52796	-115.17693	3745	BLM	Needles	South-eastern Mojave	Private X003502	
201	Black Metal Spring	34.45105	-115.18107	3092	BLM	Needles	South-eastern Mojave		
202	Bonanza Spring	34.68513	-115.40538	2105	BLM	Needles	South-eastern Mojave	BLM F0043095	
203	Bonanza Spring Lower	34.68060	-115.40378	1980	BLM	Needles	South-eastern Mojave	BLM F0043096	
204	Brown's Camp Spring	34.81221	-114.82119	1978	BLM	Needles	South-eastern Mojave	-	
205	Burnt Spring	34.71593	-115.38404	2436	BLM	Needles	South-eastern Mojave		
206	Camp Ibis Spring (Well)	34.95375	-114.83646	1753	BLM	Needles	South-eastern Mojave		PWR
207	Carbonate Spring	34.56192	-115.21404	3721	BLM	Needles	South-eastern Mojave		
208	Chuckwalla Spring	34.77187	-115.37955	2935	BLM	Needles	South-eastern Mojave	-	

**TABLE 2**  
**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
209	Craig Spring	34.51211	-115.11285	3496	BLM	Needles	South-eastern Mojave		
210	Crestview Seep	34.82291	-114.80858	1837	BLM	Needles	South-eastern Mojave		
211	Crying Spring	35.01764	-114.72645	1811	BLM	Needles	South-eastern Mojave		
212	Dripping Spring	34.55990	-115.20972	3611	BLM	Needles	South-eastern Mojave	BLM F011202	
213	English Spring (aka Brady Spring)	34.54571	-115.18320	3828	BLM	Needles	South-eastern Mojave		
214	Eva Spring	34.54565	-115.09595	3109	BLM	Needles	South-eastern Mojave		
215	Fall Spring	34.74650	-115.40418	3314	BLM	Needles	South-eastern Mojave		
216	Fenner Spring	34.75404	-115.10393	3111	BLM	Needles	South-eastern Mojave	-	
217	Flattop Mountan Spring	34.81709	-114.80781	1901	BLM	Needles	South-eastern Mojave	-	
218	Florence Spring (aka Mesquite Spring)	34.58969	-115.23705	3216	BLM	Needles	South-eastern Mojave		
219	Gemco Mine Spring (Lower)	34.54449	-115.18612	3662	BLM	Needles	South-eastern Mojave		
220	Honeymoon Spring	34.61283	-115.16332	3319	BLM	Needles	South-eastern Mojave	-	
221	Hummingbird Spring	34.75338	-115.34409	2326	BLM	Needles	South-eastern Mojave	-	
222	Kane Spring	34.54340	-115.16560	4223	BLM	Needles	South-eastern Mojave	-	
223	Kilbeck Spring	34.36029	-115.17673	2493	BLM	Needles	South-eastern Mojave		
224	Lone Spring	34.56818	-115.21511	4419	BLM	Needles	South-eastern Mojave	BLM S012598	PWR
225	Lost Dutch Oven Spring	34.70248	-115.45463	2687	BLM	Needles	South-eastern Mojave		
226	Lyons Seep	34.57786	115.21934	2643	BLM	Needles	South-eastern Mojave		
227	Mohave Canyon Spring	34.63567	-114.45716	715	Nat Wildlife Ref	Needles	South-eastern Mojave	-	
228	Mountain Spring (private)	34.83083	-115.04501	2707	Private	Needles	South-eastern Mojave		
229	North Klinefelter Spring	34.90225	-114.76823	1255	BLM	Needles	South-eastern Mojave		
230	Old Ranch Spring	34.58471	-115.18205	3380	BLM	Needles	South-eastern Mojave		
231	Olive Spring	34.52238	-115.16801	4228	BLM	Needles	South-eastern Mojave		
232	Paramount Spring	34.55820	-115.16840	4052	BLM	Needles	South-eastern Mojave	BLM S007892	
233	Parish Spring	34.59572	-114.56717	1993	BLM	Needles	South-eastern Mojave	-	
234	Picture Canyon Spring	35.07048	-114.74929	1943	BLM	Needles	South-eastern Mojave		
235	Pipeline Seep	34.67624	-114.73482	1940	BLM	Needles	South-eastern Mojave		
236	Rattler Spring	34.77290	-115.37646	2848	BLM	Needles	South-eastern Mojave		
237	Red Spring	34.93762	-114.72479	840	BLM	Needles	South-eastern Mojave	BLM F01120145	
238	Rustler Spring	34.82163	-114.80935	1851	BLM	Needles	South-eastern Mojave		
239	Sacramento Spring	34.89742	-114.76863	1244	BLM	Needles	South-eastern Mojave		
240	Samantha (wildcat) Spring	34.61506	-114.56910	823	BLM	Needles	South-eastern Mojave	-	
241	Sammy's Spring	34.52762	-115.17769	3664	BLM	Needles	South-eastern Mojave		
242	Sheep Camp Spring Upper	34.46688	-115.20308	3696	BLM	Needles	South-eastern Mojave	BLM S012585	
243	Studio Spring 1	34.57610	-114.54250	1591	BLM	Needles	South-eastern Mojave	-	
244	Sunflower Spring	34.54511	-115.12666	3368	BLM	Needles	South-eastern Mojave		
245	Sweetwater Spring	34.56570	-115.18270	3898	BLM	Needles	South-eastern Mojave	BLM S012512	
246	Tan-Tan Spring	34.84834	-114.77834	1565	BLM	Needles	South-eastern Mojave	-	
247	Tan-Tan Well (Trebles Ranch)	34.84826	-114.77914	1568	BLM	Needles	South-eastern Mojave	-	
248	Teddybear Cholla Spring (coords appx)	34.81559	-114.71002	3000	BLM	Needles	South-eastern Mojave		
249	Tie Cabin Spring	34.58138	-115.22988	3775	BLM	Needles	South-eastern Mojave		
250	Wes' Weep Spring	34.39774	-114.80735	3000	BLM	Needles	South-eastern Mojave	BLM S012588	PWR
251	West Well Spring	34.44470	-114.47950	761	BLM	Needles	South-eastern Mojave	Private A027765	PWR
252	Wilhelm Spring	34.48173	-115.09694	2669	BLM	Needles	South-eastern Mojave	-	
253	Willow Spring	34.57810	-115.19230	3710	BLM	Needles	South-eastern Mojave		
254	Wimpy Spring	34.59869	-114.48874	1136	BLM	Needles	South-eastern Mojave		
255	Allen Spring north	35.83973	-117.39277	3009	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
256	Allen Spring south	35.83899	-117.39277	2957	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
257	AlphaSpring	35.90870	-117.41250	3752	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S010585, Private A014727	PWR
258	Aqueduct Spring	35.93547	-117.91722	3350	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
259	Austin Spring	35.85728	-117.38254	2592	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
260	Badwater Springs middle	36.78863	-117.89828	1567	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	

**TABLE 2**  
**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
261	Badwater Springs north	36.78903	-117.89845	1560	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
262	Badwater Springs south	36.78784	-117.89861	1565	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
263	Bainter Spring	35.84283	-117.38197	2650	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Privae A015884	
264	Beveridge Canyon Spg.	36.72266	-117.86869	1943	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM F0073825	
265	Billie Spring	36.08063	-117.40308	3179	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
266	Black Springs - Lower	36.25078	-117.73221	6019	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Private S006313	
267	Black Springs - Upper	36.24930	-117.73227	6100	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Private S006314	
268	Bobcat Spring	35.91003	-117.41451	3886	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S010585	
269	Buena Vista Cyn Spring (aka Meadow upper)	35.69117	-117.95882	4752	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
270	Cabin Spring	35.93160	-117.40116	3609	BLM/Private	Ridgecrest	Northern Mojave - Owens/Pan.	-	
271	Centennial Tenaja	36.24918	-117.76701	6165	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
272	Cerro Gordo Spring	36.58505	-117.82317	8840	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM F011171	
273	China Garden Spring	36.31396	-117.53197	3140	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	PWR
274	Chris Wicht Camp Spring	36.11229	-117.17275	2779	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	PWR
275	Christmas Spring	35.82118	-117.40797	2652	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S011316	
276	Colter Spring	35.99450	-117.14100	5624	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A028607	
277	Cove Spring	36.70798	-117.92972	8584	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S011210	
278	Coyote Spring	35.73108	-117.93830	3650	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S012552, Private D029864	
279	Dripping Spring	35.92590	-117.37860	3904	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
280	Elliot Spring	35.86150	-117.40895	3713	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
281	Etta Spring	36.04450	-117.40616	3530	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	PWR
282	Five Fingers Spring	35.69420	-117.93300	3968	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
283	French Madam Spring	36.23916	-117.46260	4281	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S011165	
284	Goler Wash Spring	35.86201	-117.12658	2511	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
285	Grant Spring	36.23405	-117.99227	3852	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
286	Grapevine Canyon Spring (Lower)	35.72929	-117.89806	2886	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
287	Great Falls Springs east	35.85278	-117.39288	3086	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
288	Great Falls Springs north	35.85580	-117.39897	3275	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
289	Great Falls Springs south	35.85113	-117.39386	3108	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
290	Great Falls Springs west1	35.85427	-117.41061	3530	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
291	Great Falls Springs west2	35.85421	-117.40862	3535	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
292	Happy Canyon Spring lower	36.06998	-117.15450	3262	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
293	Happy Canyon Spring middle	36.07421	-117.14402	3738	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
294	Happy Canyon Spring Upper	36.07231	-117.13796	4145	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
295	Hogback Spring	36.18705	-118.00684	4523	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A018265	
296	Hunter Cyn Spring 1	36.69991	-117.84668	1568	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S007380	PWR
297	Hunter Cyn Spring 2	36.69790	-117.84870	1801	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM F0073815, S007954	PWR
298	Hunter Cyn Spring 3	36.69983	-117.85068	3048	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
299	Indian Wells Cyn Spring	35.71654	-117.96492	4954	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
300	Indian Wells Cyn Spring 2	35.68823	-117.92719		BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
301	Jack Gunn Spring	36.23923	-117.46953		BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S011166, Private A015790	
302	Jackpot Canyon Spring	36.04410	-117.17962	2338	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A016640	
303	Kinkade Spring	37.40319	-117.75945		BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
304	Koko Spring	36.06547	-117.38406	2644	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
305	Limekiln Spring	36.11400	-117.15131	3886	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM F006250	PWR
306	Little Lake Canyon Spring lower	35.94359	-117.95009	4275	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
307	Little Lake Canyon Spring middle	35.94600	-117.95429	4295	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
308	Little Lake Canyon Spring upper	35.94726	-117.96800	4680	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
309	Lower Aqueduct Spring	35.93586	-117.91566	3304	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
310	Lower Centennial Spring	36.26574	-117.76639	5624	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Private A001215	
311	Lower North Revenue Spring	36.16210	-117.42630	3257	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Private A016884	
312	Lower Wood Cyn Spring (in Wood Canyon Spring Complex	36.17611	-117.45278	4161	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM F011168	



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**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
313	Mexican Spring	36.59380	-117.82942	9113	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM F011170	
314	Mid Indian Wells Cyn Spring	35.68468	-117.91984	3638	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
315	Miller's Spring	36.29228	-117.53738	3501	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	PWR
316	Miner's Spring (aka Morris Peak Spring)	35.69627	-117.96625	4938	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A021217	
317	Morris Peak Canyon Spring (aka Siebert, Glass Cyn Spring)	35.69527	-117.97132	5178	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A021217	
318	Morris Spring (aka Dempsey Canyon Spring)	35.70687	-117.97606	5604	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
319	Mumford Springs	35.86026	-117.38173	2832	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
320	Nadeau Spring	35.86635	-117.38201	2763	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
321	Nina Spring	36.04360	-117.40370	3345	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
322	No Name Canyon Spring	36.80190	-117.91688	2381	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
323	No Name Spring	36.58839	-117.82462	9040	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S013072	
324	North Fork Spring (and Arrastra Spring)	35.86170	-117.41400	3694	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
325	North Piper Mountain Spring	37.41753	-117.91941	6114	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S012567	
326	North Revenue Spring	36.15972	-117.43674	3867	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Private A017097	
327	Orchard Spring	35.86203	-117.40450	3725	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
328	Orondo Spring (and Ruby Spring)	35.91702	-117.42341	4736	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S008271	
329	Pat Keyes Canyon spring east	36.77963	-117.92244	3625	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
330	Pat Keyes Canyon spring west	36.77053	-117.94816		BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
331	Pat Keyes Spring	36.78024	-117.90071	1802	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S007384	PWR
332	Peach Tree Spring	35.92840	-117.37510	3461	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S012896	
333	Playa Spring	36.09776	-117.25455	1048	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
334	Pleasant Canyon Creek	36.03283	-117.17576	2848	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Domestic (Ballarat) D030440	
335	Pleasant Canyon Spring east	36.03165	-117.16918	3155	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
336	Portugese Canyon Spring	36.01150	-117.99605	4930	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
337	Post Office Spring	36.04073	-117.22460	1061	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S012555	
338	Pothole Spring	35.86756	-117.38496	2927	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
339	Power Holding Corral Spring	35.71801	-117.96800	5018	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
340	Rattlesnake Spring	35.87110	-117.40560	3860	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
341	Redlands Spring	35.93720	-117.17020	2561	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S011211, Private A009233	
342	Revenue Canyon Spring	36.14318	-117.43297	4079	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S011169	
343	Revenue Spring east	36.14450	-117.43080	3813	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
344	Revenue Spring west	36.14630	-117.44080	4464	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
345	Rock Spring (aka Middle Spring)	35.93455	-117.38650	3725	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
346	Rose Spring	36.10776	-117.96098	3586	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
347	Ruth Spring	35.88376	-117.42142	3832	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Private A011393	
348	Sacatar Spring North	35.95657	-117.94073	3656	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
349	Sacatar Spring South	35.95573	-117.93970	3852	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
350	Sacatar Wilderness Spring	35.97168	-117.96765	4216	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
351	Sage Canyon Seep	35.57514	-118.05066	4191	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
352	Saline Marsh Spring	36.69648	-117.83023	1069	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S007953	PWR
353	Sand Canyon Creek (not a spring)	35.77824	-117.92203	3111	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
354	Sarah Spring	36.06444	-117.38785	2762	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
355	See Line Spring	35.25514	-118.07737	3205	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
356	Short Canyon Spring 1	35.71741	-117.92998	4156	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	
357	Short Canyon Spring 2	35.71657	-117.92779	4033	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	
358	Short Canyon Spring 3	35.71516	-117.92493	3885	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	
359	Short Canyon Spring 4	35.71422	-117.92626	3800	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	
360	Short Canyon Spring 5	35.71327	-117.93089	4135	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	
361	Short Canyon Spring 6	35.71057	-117.93048	4088	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	
362	Short Canyon Spring 7	35.71132	-117.92815	3966	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	
363	Short Canyon Spring 8	35.71129	-117.92628	3903	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	
364	Short Canyon Spring 9	35.70465	-117.92238	3800	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM A017450	

**TABLE 2**  
**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
365	Sidehill Spring	35.87600	-117.39180	3351	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
366	Skull Spring	35.87988	-117.42162	3952	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
367	Snow Canyon Spring Lower	36.20816	-117.45841	3965	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
368	Snow Canyon Spring middle	36.20860	-117.46169	4139	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
369	Snow Canyon Spring midlow	36.20856	-117.46052	4069	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
370	Snow Canyon Spring Upper	36.20909	-117.46175	4105	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
371	Soldier Pass Spring	37.33616	-117.95710	5004	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S008199	
372	South Park Canyon Spring	35.99806	-117.16068	4593	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
373	Stardust Spring	35.72887	-117.93757	3996	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S012552, Private D029864	
374	Stone Canyon Spring	35.69206	-117.95893	4668	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
375	Thompson Spring	36.22990	-117.45880	4055	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
376	Thompson Spring upper west	36.23210	-117.46870	4869	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
377	Twin Springs (North)	35.85491	-117.39143	3153	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
378	Twin Springs (South)	35.85477	-117.39112	3130	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
379	Upper Centennial Spring north	36.24232	-117.76787	6259	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
380	Upper Centennial Spring south	36.24035	-117.76624	6292	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
381	Upper Centennial Spring south - box	36.24074	-117.76638	6288	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
382	Upper Wood Cyn Spring (in Wood Canyon Spring Complex)	36.17451	-117.45910	4841	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	F0062415	
383	Upper Wood Cyn Spring north (in Wood Cyn Spg Complex)	36.17909	-117.46080	4620	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	S011167	
384	Warm Sulphur Spring north	36.12033	-117.21435	1044	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S012560	
385	Warm Sulphur Spring south	36.11942	-117.21397	1066	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S012560	
386	Wheelbarrow Spring	37.37138	-117.93931	5445	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	BLM S012566	
387	Willow Creek Camp Spring	36.84212	-117.92284	2451	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	Private A008531	
388	Willow Spring	35.85050	-117.40150	3350	BLM	Ridgecrest	Northern Mojave - Owens/Pan.	-	
389	Wilson Canyon Seep	35.81576	-117.39971	2428	BLM	Ridgecrest	Northern Mojave - Owens/Pan.		
390	Alphie Spring	35.36869	-118.07844	3741	BLM	Ridgecrest	Western Mojave		
391	Antimony Spring	35.26248	-118.12949	3991	BLM	Ridgecrest	Western Mojave	BLM A022165	
392	Bedrock Spring	35.45715	-117.50303	3273	BLM	Ridgecrest	Western Mojave	BLM S011508	
393	Boulder Spring	35.57900	-118.02827	4049	BLM	Ridgecrest	Western Mojave	-	
394	Butterbredt Spring	35.38206	-118.11320	3892	Private	Ridgecrest	Western Mojave	-	
395	Chanze Spring (Tenaja)	35.26246	-118.05547	2561	BLM	Ridgecrest	Western Mojave	-	
396	Coffee Can Spring	35.37725	-117.88306	2127	BLM	Ridgecrest	Western Mojave	Govt (Cal DFW) (A019259)	
397	Cowboy Spring (aka Riccomini Springs)	35.31128	-118.08838	2825	BLM	Ridgecrest	Western Mojave	Govt (Cal DFW) (A012538)	
398	Cut Tree Spring (north)	35.45970	-117.81261	3631	BLM	Ridgecrest	Western Mojave	Govt (Cal DFW) (A012534)	
399	Cut Tree Spring (south)	35.45835	-117.81167	3676	BLM	Ridgecrest	Western Mojave	-	
400	Dove Spring	35.45305	-118.10049	4265	BLM	Ridgecrest	Western Mojave	-	
401	Easter Spring	35.47656	-117.82769	3762	BLM	Ridgecrest	Western Mojave	Govt (Cal DFW) (A019257)	
402	Fremont Valley Spring	35.30106	-117.94499	1936	BLM	Ridgecrest	Western Mojave	-	
403	Hoffman Canyon Spring	35.34942	-118.12601	3616	BLM	Ridgecrest	Western Mojave	-	
404	Hoffman Well Spring (aka Hoffman Spring)	35.35649	-118.10809	3688	BLM	Ridgecrest	Western Mojave	-	
405	Horse Canyon Well	35.55655	-118.03461	3759	BLM	Ridgecrest	Western Mojave	-	
406	Last Chance Spring	35.44997	-117.89761	3465	BLM	Ridgecrest	Western Mojave	-	
407	Meadow Spring Upper (aka Buena Vista Spring)	35.69097	-117.95866	4705	BLM	Ridgecrest	Western Mojave	-	
408	Mesa Spring	35.44273	-117.87077	3617	BLM	Ridgecrest	Western Mojave	-	
409	Mesa Spring - Upper	35.44330	-117.86925	3590	BLM	Ridgecrest	Western Mojave		
410	Mesquite Spring West	35.39003	-117.81648	2120	BLM	Ridgecrest	Western Mojave		
411	Mesquite Springs	35.39007	-117.81468	2099	BLM	Ridgecrest	Western Mojave		
412	Nudist Spring	35.34227	-118.01954	2782	BLM	Ridgecrest	Western Mojave		
413	Petroglyph Spring (aka Louise Spring)	35.49961	-117.80404	3373	BLM	Ridgecrest	Western Mojave		
414	Poison Spring	35.39413	-117.83908	2298	BLM	Ridgecrest	Western Mojave	Govt (Cal DFW) A019262	
415	Public Spring	35.62549	-117.95907	4054	BLM	Ridgecrest	Western Mojave	BLM A022167	

**TABLE 2**  
**ACTIVE WATER RIGHTS, MOJAVE DESERT SPRINGS**

Map No.	Spring Name	Latitude	Longitude	Elevation	Land Owner	BLM Dist	Ecoregion	Water Right	Public Water Reserve
416	Quail Spring	35.22510	-118.17910	4425	MGOV status	Ridgecrest	Western Mojave	-	
417	Riffle Spring east	35.38895	-117.54097	3391	BLM	Ridgecrest	Western Mojave	BLM S007983	
418	Riffle Spring west	35.38921	-117.54192	3427	BLM	Ridgecrest	Western Mojave	BLM S007983	
419	Rinaldi's Well	35.49089	-117.70661	3496	BLM	Ridgecrest	Western Mojave	-	
420	Sage Canyon	35.58433	-118.05383	4160	BLM	Ridgecrest	Western Mojave		
421	Sage Canyon Spring	35.58861	-118.05252	4353	BLM	Ridgecrest	Western Mojave	-	
422	Sheep Spring	35.49716	-117.80444	3437	BLM	Ridgecrest	Western Mojave	-	
423	Smithson Spring	34.41384	-117.65638	4783	Private	Ridgecrest	Western Mojave	Municipal A010871, A023625	
424	Steel Box Spring	35.46329	-117.81515	3544	BLM	Ridgecrest	Western Mojave	Govt (Cal DFW) A019258)	
425	Willow Spring	35.48235	-117.69671	3861	BLM	Ridgecrest	Western Mojave		PWR
426	Boardwalk Spring - Torrance Ranch	37.00390	-116.72397	3665	TNC	THC	Northern Mojave - Amargosa		
427	Ahn Spring	34.71829	-118.49961	3783	THC	THC	Western Mojave	-	
428	Buckeye Spring	34.72144	-118.49645	3465	THC	THC	Western Mojave	-	
429	Grass Spring	34.72407	-118.48930	3674	THC	THC	Western Mojave		
430	Keeler Flats Spring	34.71380	-118.49143	4040	THC	THC	Western Mojave	-	
431	Pinecrest Spring	34.71952	-118.50110	3609	THC	THC	Western Mojave	-	
432	Portal Seep	34.72400	-118.48860	3319	THC	THC	Western Mojave	-	
433	Kiosk Spring - Torrance Ranch	37.00304	-116.74256	3669	TNC	TNC	Northern Mojave - Amargosa		
434	Parker Ranch - TNC #1 Spring	36.96725	-116.72338	3594	TNC	TNC	Northern Mojave - Amargosa		
435	Parker Ranch - TNC #2 Spring	36.96751	-116.72362	3594	TNC	TNC	Northern Mojave - Amargosa		
436	Parker Ranch Spring	36.96480	-116.72412	3603	Private	TNC	Northern Mojave - Amargosa		
437	Revert Spring at TNC	36.91551	-116.75311	3890	TNC	TNC	Northern Mojave - Amargosa		



**TABLE 3**  
**FIELD WATER QUALITY PARAMETERS AND STABLE ISOTOPE RESULTS**  
**MOJAVE DESERT SPRING SURVEY**

Map No.	Spring Name	Latitude	Longitude	Elevation	Flow (gpm)	Temp (C)	pH	EC (μS)	TDS (mg/L)	Salinity (ppm)	D.O. (mg/L)	δD	δ18O	Ecoregion
1	Bird Spring (private)	35.19471	-117.31459	3170	0	12.5	8.66	602	nm	nm	8.85	-81.5	-9.76	Central Mojave
2	Black's Ranch (private)	35.01764	-117.22958	2030	na	na	na	na	na	na	na	na	na	Central Mojave
3	Coyote Well	35.02505	-116.76439	2000	na	na	na	na	na	na	na	na	na	Central Mojave
4	Deep Cave Spring	35.10705	-116.91607	3030	na	na	na	na	na	na	na	na	na	Central Mojave
5	Epsom Spring	35.02702	-116.14914	995	na	na	na	na	na	na	na	na	na	Central Mojave
6	Jack Spring	35.15482	-116.75648	2383	<1	19.8	7.28	1342	673	620	2.58	-78.8	-9.2	Central Mojave
7	Opal Spring	35.15182	-117.17645	3138	0	na	na	na	na	na	na	na	na	Central Mojave
8	Paradise Spring Central	35.15526	-116.81407	2591	0	na	na	na	na	na	na	na	na	Central Mojave
9	Paradise Spring Cool (private)	35.14526	-116.81445	2421	nm	27.4	8.01	770	385	373	0.91	-98.5	-12.19	Central Mojave
10	Paradise Spring Hot (private)	35.14575	-116.81408	2408	5	41.3	8.14	791	396	368	0.29	-98.4	-12.27	Central Mojave
11	Paradise Spring North	35.15544	-116.81314	2585	0	na	na	na	na	na	na	na	na	Central Mojave
12	Paradise Spring Northwest	35.15661	-116.81547	2672	0	na	na	na	na	na	na	na	na	Central Mojave
13	Paradise Spring Tub (private)	35.14568	-116.18392	2401	nm	34.3	8.38	778	389	369	2.8	-97.7	-11.96	Central Mojave
14	Sweetwater Spring	34.97193	-116.85037	3046	<1	26.8	6.98	857	430	373	1.85	-58.0	-4.07	Central Mojave
15	Amargosa Cyn Spring 3	35.82701	-116.21942	1262	nm	nm	nm	nm	nm	nm	nm	na	na	Northern Mojave - Amargosa
16	Amargosa Cyn Spring 4	35.83473	-116.22274	1372	12	26.5	8.18	1268	634	636	2.3	na	na	Northern Mojave - Amargosa
17	Amargosa Cyn Spring 5	35.83602	-116.22243	1372	nm	nm	nm	nm	nm	nm	nm	na	na	Northern Mojave - Amargosa
18	Borax Spring	35.88804	-116.25789	1340	9.4	26.5	9.71	2756	1372	1448	0.74	na	na	Northern Mojave - Amargosa
19	Borehole Spring	35.88620	-116.23439	1340	USGS-nm	36.9	8.52	4000+	2000+	2.016	1.66	-95	-12.9	Northern Mojave - Amargosa
20	Chappo Spring	35.94775	-116.18944	2016	<1	24.4	7.45	696	348	363	0.55	-94	-13	Northern Mojave - Amargosa
21	China Ranch Cyn Spring	35.80335	-116.14099	1770	nm	nm	nm	nm	nm	nm	nm	nm	nm	Northern Mojave - Amargosa
22	Christian Spring (aka Am. Cyn. Spg. 1)	35.83943	-116.22397	1298	70	20.0	8.02	1001	500	500	5.53	-94	-12.9	Northern Mojave - Amargosa
23	Cottonrod Seep (in Shoshone Spg Complex)	35.97975	-116.27260	1598	2	16.2	8.19	1940	971	1088	nm	ns	ns	Northern Mojave - Amargosa
24	Cottonwood Spring	35.59139	-116.38649	1647	<1	13.8	8.05	2857	1428	1632	4.81	-99.3	-12.83	Northern Mojave - Amargosa
25	Denning Spring	35.58727	-116.46915	1921	0	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
26	Dodge City Spring	35.88018	-116.22955	1399	8	23.0	8.60	3564	1780	1924	6.6	-95.3	-12.04	Northern Mojave - Amargosa
27	East Tecopa Seep	35.86690	-116.22260	1423	<1	12.9	7.84	1888	937	nm	nm	-95.9	-12.66	Northern Mojave - Amargosa
28	Goldenrod Seep 1	35.97987	-116.27299	1598	5	19.3	7.79	1408	704	1015	1.56	-94.2	-12.25	Northern Mojave - Amargosa
29	Goldenrod Seep 2	35.97984	-116.27313	1598	1	18.7	7.85	1569	787	899	0.25	ns	ns	Northern Mojave - Amargosa
30	Goldenrod Seep 3	35.97997	-116.27264	1598	10	18.4	8.01	1552	777	1121	1.35	ns	ns	Northern Mojave - Amargosa
31	Goldenrod Seep 4	35.97986	-116.27268	1598	5	20.1	7.59	2193	1094	1420	0.75	-94.7	-12.37	Northern Mojave - Amargosa
32	Good/Barnes Well	35.84216	-116.20419	1474	na	22.2	7.36	969	484	nm	nm	-96.3	-12.81	Northern Mojave - Amargosa
33	Historic Spring	35.98044	-116.27367	1605	13	32.4	7.48	1398	698	754	1.42	-96.1	-12.54	Northern Mojave - Amargosa
34	Ibex Hills Spring	35.91630	-116.38577	2533	na	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
35	Old Mormon Spring	35.51538	-116.25577	2079	0	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
36	One Palm Seep	35.86019	-116.22212	1432	0	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
37	Owl Hole Spring	35.63943	-116.64758	1943	<1	14.4	7.00	3357	1681	1850	0.51	-90.8	-9.86	Northern Mojave - Amargosa
38	Phragmites Seep	35.97634	-116.27470	1581	<1	10.5	8.44	2639	1319	1483	10.1	-94.0	-12.31	Northern Mojave - Amargosa
39	Quail Spring	35.63369	-116.86746	4122	na	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
40	Red Trail Seep	35.98158	-116.26932	1585	<1	15.2	8.63	3291	1646	1945	2.71	-95.0	-12.23	Northern Mojave - Amargosa
41	Resting Spring	35.87720	-116.15694	1767	na	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
42	Riley Spring	35.95215	-116.26620	1503	0	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
43	Salt Spring	35.62614	-116.28089	526	5	10.4	8.21	>4000	>2000	7096	13.61	-81	-9.6	Northern Mojave - Amargosa
44	Scofield Spring	35.87350	-116.12078	2051	na	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
45	Sheep Creek Spring	35.58858	-116.36027	1703	10	18.6	8.09	1083	541	589	2.45	-88.1	-11.90	Northern Mojave - Amargosa
46	Shoshone Spring	35.98056	-116.27384	1615	260	32.3	7.64	1416	708	nm	nm	-93	-12.6	Northern Mojave - Amargosa
47	Slough Spring (Hog Farm Well)	36.28748	-116.37854	2024	na	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
48	Still Spring	35.95903	-116.25961	1511	nm	nm	nm	nm	nm	nm	nm	nm	nm	Northern Mojave - Amargosa
49	Stormy Spring	35.85212	-116.22059	1378	<1	7.3	7.95	2726	1379	1642	2.93	-91.6	-12.06	Northern Mojave - Amargosa
50	Tecopa Hot Spring	35.87191	-116.23215	1415	30	40.2	7.93	3076	1535	1570	1.56	-98.1	-12.93	Northern Mojave - Amargosa
51	Tecopa Hot Spring (at TNC)	35.87744	-116.23618	1332	6	39.4	8.43	>4000	>2000	2126	0.09	-91	-11.3	Northern Mojave - Amargosa
52	Thom Spring	35.85661	-116.22677	1406	1	16.2	7.75	1630	814	779	6.14	-95	-13.1	Northern Mojave - Amargosa
53	Tule Spring	35.81691	-116.05540	2326	<1	18.1	7.53	737	368	377	0.44	-96.2	-12.89	Northern Mojave - Amargosa
54	Twelvemile Spring	36.02195	-116.15530	2208	<1	21.9	7.57	813	411	361	3.23	-97.1	-13.13	Northern Mojave - Amargosa
55	Vole Hot Spring	35.85092	-116.22320	1369	5	18.6	8.28	1809	906	951	7.26	-96.4	-12.89	Northern Mojave - Amargosa
56	West Side Spring	35.84324	-116.22879	1301	nm	nm	nm	nm	nm	nm	nm	na	na	Northern Mojave - Amargosa

**TABLE 3**  
**FIELD WATER QUALITY PARAMETERS AND STABLE ISOTOPE RESULTS**  
**MOJAVE DESERT SPRING SURVEY**

Map No.	Spring Name	Latitude	Longitude	Elevation	Flow (gpm)	Temp (C)	pH	EC (μS)	TDS (mg/L)	Salinity (ppm)	D.O. (mg/L)	δD	δ18O	Ecoregion
57	Wild Bath Spring	35.87277	-116.21932	1411	3	39.8	7.33	1613	802	771	1.47	-95	-13.1	Northern Mojave - Amargosa
58	Willow Spring 1	35.80569	-116.18264	1445	1	12.9	7.55	1703	852	nm	3.91	-95	-12.8	Northern Mojave - Amargosa
59	Willow Spring 2	35.80097	-116.19438	1236	30	22.7	7.93	972	486	484	3.52	na	na	Northern Mojave - Amargosa
60	Yerba Mansa Seep	35.86925	-116.22356	1416	0	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
61	4600-ft Spring	34.37228	-117.11794	4510	0	na	na	na	na	na	na	na	na	South-central Mojave
62	Amaral Spring	34.51771	-117.06475	3699	<1	21.6	6.39	415	209	208	2.69	-85.2	-11.77	South-central Mojave
63	Andes Trail Seep	34.37608	-117.13461	4335	na	na	na	na	na	na	na	na	na	South-central Mojave
64	Arrastre Canyon Spring (at Tahiti Falls)	34.39216	-117.11429	4001	<1	na	na	na	na	na	na	na	na	South-central Mojave
65	Arrastre Canyon Spring Low	34.39442	-117.11714	3943	0	na	na	na	na	na	na	na	na	South-central Mojave
66	Arrastre Canyon Spring midlow	34.39340	-117.11483	3962	0	na	na	na	na	na	na	na	na	South-central Mojave
67	Arrastre Canyon Spring midupper	34.38513	-117.10476	4287	na	na	na	na	na	na	na	na	na	South-central Mojave
68	Arrastre Canyon Spring Upper	34.38232	-117.10211	4457	0	na	na	na	na	na	na	na	na	South-central Mojave
69	Arrastre Seep #1	34.32673	-116.76232	4444	na	na	na	na	na	na	na	na	na	South-central Mojave
70	Arrastre Seep #2	34.32989	-116.76345	4424	na	na	na	na	na	na	na	na	na	South-central Mojave
71	Arrastre side canyon	34.38760	-117.11181	4204	na	na	na	na	na	na	na	na	na	South-central Mojave
72	Aztec Spring	34.70624	-116.82166	4347	<1	12.9	7.63	2463	1230	1341	4.03	-26.8	2.12	South-central Mojave
73	Badger Spring	34.65462	-116.91755	4380	na	na	na	na	na	na	na	na	na	South-central Mojave
74	Bighorn Seep #1	34.33582	-116.63983	3669	na	na	na	na	na	na	na	na	na	South-central Mojave
75	Bighorn Seep #2	34.33562	-116.63856	3732	na	na	na	na	na	na	na	na	na	South-central Mojave
76	Bobcat Scat Seep	34.30101	-116.51708	4196	0	na	na	na	na	na	na	na	na	South-central Mojave
77	Bullion Spring	34.60890	-116.18154	2565	na	na	na	na	na	na	na	na	na	South-central Mojave
78	Burns Spring	34.20452	-116.58249	4943	0	na	na	na	na	na	na	na	na	South-central Mojave
79	Cottonwood Spring	34.38670	-117.15622	4169	0	na	na	na	na	na	na	na	na	South-central Mojave
80	Coxey Road North Spring	34.37472	-117.10861	4764	0	na	na	na	na	na	na	na	na	South-central Mojave
81	Coyote Hole Spring	34.11656	-116.30801	2957	0	na	na	na	na	na	na	na	na	South-central Mojave
82	Crossroads Spring	34.23717	-116.65979	5771	1	7.0	7.59	686	344	326	4.02	-87	-10.95	South-central Mojave
83	Dixie Mine Spring	34.27722	-116.53109	4643	0	na	na	na	na	na	na	na	na	South-central Mojave
84	Dove Spring	34.34674	-116.75973	4101	nm	23.5	7.39	825	411	386	1.54	-89.8	-11.79	South-central Mojave
85	Dry Morongo Springs	34.05390	-116.62640	3294	na	na	na	na	na	na	na	na	na	South-central Mojave
86	Dry Willow Spring	34.36939	-117.11891	4721	0	na	na	na	na	na	na	na	na	South-central Mojave
87	Fisher Spring	34.67309	-116.77015	4632	na	na	na	na	na	na	na	na	na	South-central Mojave
88	Furnace Spring	34.35850	-116.92860	4550	na	na	na	na	na	na	na	na	na	South-central Mojave
89	Goat Spring	34.67263	-116.92681	4340	<1	13.9	7.45	872	436	408	0.45	-85.4	-11.40	South-central Mojave
90	Granite Well	34.68401	-116.93618	3961	0	na	na	na	na	na	na	na	nm	South-central Mojave
91	Grapevine Canyon Spring	34.39000	-117.06528	5139	na	na	na	na	na	na	na	na	na	South-central Mojave
92	Grapevine Spring	34.39742	-117.06440	4229	na	na	na	na	na	na	na	na	na	South-central Mojave
93	Greenwalt #1 Spring	34.38420	-117.12140	4146	na	na	na	na	na	na	na	na	na	South-central Mojave
94	Hidden Spring (aka Upper Willy Boy Spring)	34.30549	-116.52897	4127	0	na	na	na	na	na	na	na	na	South-central Mojave
95	High Road Spring	34.39347	-117.03181	4020	na	na	na	na	na	na	na	na	na	South-central Mojave
96	Horse Spring	34.52201	-117.08195	3892	<1	22.4	6.94	815	407	377	nm	-86.3	-11.89	South-central Mojave
97	Horse Spring SE	34.52108	-117.08107	4041	0	na	na	na	na	na	na	na	na	South-central Mojave
98	Hyten Spring	34.91871	-116.05721	3016	na	na	na	na	na	na	na	na	na	South-central Mojave
99	Juniper Flats Spring east	34.38320	-117.12879	4074	na	na	na	na	na	na	na	na	na	South-central Mojave
100	Kane Spring trough	34.73943	-116.69914	3176	1	23.4	7.49	576	288	nm	nm	-76.7	-8.47	South-central Mojave
101	Kane Springs east	34.74042	-116.69624	3153	0	na	na	na	na	na	na	na	na	South-central Mojave
102	Kane Springs west	34.74002	-116.70075	3231	1	20.1	8.06	542	270	nm	1.85	-77.3	-8.58	South-central Mojave
103	Kynna Spring	34.33285	-116.64174	3713	na	na	na	na	na	na	na	na	na	South-central Mojave
104	Lower Rattle Spring	34.29500	-116.65222	4783	na	na	na	na	na	na	na	na	na	South-central Mojave
105	McInnis Spring (aka Milpas Drive Spring)	34.53230	-117.10190	3291	na	na	na	na	na	na	na	na	na	South-central Mojave
106	Mesquite Spring	34.21328	-116.07555	1762	0	na	na	na	na	na	na	na	na	South-central Mojave
107	Mojo Spring	34.30347	-116.53236	4191	na	na	na	na	na	na	na	na	na	South-central Mojave
108	Morongo Canyon Spgs	34.04835	-116.56824	2512	nm	18.7	7.49	1267	633	701	2.78	-75.7	-10.52	South-central Mojave
109	Mound Spring	34.25621	-116.65656	5432	2	12.2	8.17	534	266	231	nm	-97.2	-12.96	South-central Mojave
110	One Hole Spring	34.33426	-116.63425	3683	na	na	na	na	na	na	na	na	na	South-central Mojave
111	Quail Spring	34.53704	-117.08167	3327	1.5	20.9	6.82	688	344	348	0.4	-84.7	-11.46	South-central Mojave

**TABLE 3**  
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**MOJAVE DESERT SPRING SURVEY**

Map No.	Spring Name	Latitude	Longitude	Elevation	Flow (gpm)	Temp (C)	pH	EC (μS)	TDS (mg/L)	Salinity (ppm)	D.O. (mg/L)	δD	δ18O	Ecoregion
112	Quill Spring	34.64393	-116.89098	4483	0	na	na	na	na	na	na	na	nm	South-central Mojave
113	Rattlesnake Spring	34.33406	-116.70469	3888	na	na	na	na	na	na	na	na	na	South-central Mojave
114	Rock Corral Spring east (in Rock Corral Spring)	34.31741	-116.55328	3990	na	na	na	na	na	na	na	na	na	South-central Mojave
115	Rock Corral Spring west (in Rock Corral Spring)	34.31693	-116.55824	3998	na	na	na	na	na	na	na	na	na	South-central Mojave
116	RZ Spring	34.71092	-117.18664	3350	na	na	na	na	na	na	na	na	na	South-central Mojave
117	Seventh Spring	34.30876	-116.53748	4269	0	na	na	na	na	na	na	na	na	South-central Mojave
118	Sheep Spring	34.73253	-116.60659	3104	0	na	na	na	na	na	na	na	na	South-central Mojave
119	Sherman Shady Springs	34.07910	-116.60220	3942	na	na	na	na	na	na	na	na	na	South-central Mojave
120	Silver Creek Spring	34.37250	-116.98514	4495	na	na	na	na	na	na	na	na	na	South-central Mojave
121	Stoddard Mountain Spring	34.70683	-117.12815	3700	<1	11.0	7.37	3335	1668	1818	3.41	-65.7	-7.3	South-central Mojave
122	Stone Spring	34.38231	-117.16439	4298	0	na	na	na	na	na	na	na	na	South-central Mojave
123	Sweetwater Spring Lower	34.69229	-116.82356	4779	na	na	na	na	na	na	na	na	na	South-central Mojave
124	Sweetwater Spring Upper	34.69236	-116.82494	4894	na	na	na	na	na	na	na	na	na	South-central Mojave
125	Two Hole Spring	34.33826	-116.69183	3832	na	na	na	na	na	na	na	na	na	South-central Mojave
126	Vaughn Spring	34.25890	-116.65941	5401	2	10.7	7.49	860	425	294	2.26	-93.1	-12.37	South-central Mojave
127	Veggie Burrito Spring	34.37145	-117.12310	4532	0	na	na	na	na	na	na	na	na	South-central Mojave
128	Vine Spring	34.37711	-117.10850	4589	0	na	na	na	na	na	na	na	na	South-central Mojave
129	White Knob Milepost 61 Seep	34.37431	-116.99306	4613	na	na	na	na	na	na	na	na	na	South-central Mojave
130	White Knob Milepost 61 West Spring	34.37458	-116.99444	4568	na	na	na	na	na	na	na	na	na	South-central Mojave
131	White Knob Milepost 63 Northeast Spring	34.37875	-116.99556	4271	na	na	na	na	na	na	na	na	na	South-central Mojave
132	White Knob Milepost 63 Northwest Spring	34.37767	-116.99722	4390	na	na	na	na	na	na	na	na	na	South-central Mojave
133	White Knob Milepost 63 Southeast Spring	34.37597	-116.99611	4563	na	na	na	na	na	na	na	na	na	South-central Mojave
134	White Knob Milepost 63 Southwest Seep	34.37667	-117.00069	4500	na	na	na	na	na	na	na	na	na	South-central Mojave
135	White Knob Milepost 71 Spring A	34.36806	-117.00500	4961	na	na	na	na	na	na	na	na	na	South-central Mojave
136	Willow Spring	34.61468	-116.81991	4068	0	na	na	na	na	na	na	na	na	South-central Mojave
137	Willow Spring	34.37949	-117.01069	4428	na	na	na	na	na	na	na	na	na	South-central Mojave
138	Willy Boy Spring	34.30634	-116.52808	4094	<0.5	9.3	7.22	848	425	471	1.76	-81.2	-10.55	South-central Mojave
139	Blackwater Well	35.35766	-117.34645	3520	0	16.3	8.30	502	nm	nm	nm	-69.4	-9.01	Western Mojave
140	McDonald Well	35.11528	-117.37045	2558	<1	21.1	7.34	1243	620	629	4.24	-95.6	-11.36	Western Mojave
141	Stump Spring	35.98366	-115.82550	2822	0	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
142	Berrberry Spring (coords. appx.)	34.32900	-114.29090	1100	na	na	na	na	na	na	na	na	na	Colorado Desert
143	Bluebird Spring	34.39732	-114.82105	2424	0	na	na	na	na	na	na	na	na	Colorado Desert
144	Bristol Spring	34.26339	-114.14389	491	2	18.6	7.73	1035	517	521	1.99	-67.8	-8.76	Colorado Desert
145	Carson's Well	34.42649	-114.82447	1951	0	na	na	na	na	na	na	na	na	Colorado Desert
146	Coffin Spring	34.39577	-114.81416	2539	0	na	na	na	na	na	na	na	na	Colorado Desert
147	Granite Spring	34.27539	-114.81397	2713	na	na	na	na	na	na	na	na	na	Colorado Desert
148	Horn Spring	34.20815	-114.78854	2036	0	na	na	na	na	na	na	na	na	Colorado Desert
149	July Spring	34.44891	-114.83330	1709	0	na	na	na	na	na	na	na	na	Colorado Desert
150	Lee's Seep	34.35040	-114.28873	837	0	na	na	na	na	na	na	na	na	Colorado Desert
151	Louie Spring	34.26619	-114.34572	3000	na	na	na	na	na	na	na	na	na	Colorado Desert
152	Mohawk Spring	34.43185	-114.84670	2136	0	na	na	na	na	na	na	na	na	Colorado Desert
153	Mopah Spring	34.31427	-114.77562	2215	<1	21.5	6.90	808	424	nm	0.77	-67.3	-7.96	Colorado Desert
154	Perlite Pool	34.39540	-114.78004	1957	<1	24.7	6.94	216	nm	nm	3.5	-64.1	-7.87	Colorado Desert
155	Pickie Poke Spring	34.39199	-114.79130	2322	0	na	na	na	na	na	na	na	na	Colorado Desert
156	Scrub Spring	34.33931	-114.28570	903	<0.1	14.0	7.41	572	287	nm	nm	-70.9	-9.71	Colorado Desert
157	Tamarisk Seep	34.35894	-114.86029	2343	na	na	na	na	na	na	na	na	na	Colorado Desert
158	Turtle Spring	34.14236	-114.80293	1625	na	na	na	na	na	na	na	na	na	Colorado Desert
159	Whipple Wash Lower	34.36799	-114.27823	622	0	na	na	na	na	na	na	na	na	Colorado Desert
160	Whipple Wash Middle	34.36165	-114.27920	674	0	na	na	na	na	na	na	na	na	Colorado Desert
161	Antimony Spring	35.49943	-115.51537	4599	<1	9.1	7.48	1255	627	nm	1.30	-78.7	-10.02	Eastern Mojave
162	Bull Spring	35.44228	-115.86491	3971	<1	nm	8.11	632	313	303	nm	-74.4	-8.55	Eastern Mojave
163	Burro Spring east	35.50251	-115.52968	4663	0	na	na	na	na	na	na	na	na	Eastern Mojave
164	Burro Spring west	35.50221	-115.53278	4752	<1	11.5	7.54	1211	604	560	4.41	-79.7	-10.33	Eastern Mojave
165	Cambria Spring	35.45841	-115.53007	4812	<1	nm	nm	nm	nm	nm	nm	-82.9	-10.80	Eastern Mojave
166	China Spring	35.45486	-115.50921	4871	0	na	na	na	na	na	na	na	na	Eastern Mojave
167	Cree Spring	35.37753	-115.95614	2875	0	nm	8.23	1345	678	714	nm	-75.5	-8.85	Eastern Mojave





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**MOJAVE DESERT SPRING SURVEY**

Map No.	Spring Name	Latitude	Longitude	Elevation	Flow (gpm)	Temp (C)	pH	EC (μS)	TDS (mg/L)	Salinity (ppm)	D.O. (mg/L)	δD	δ18O	Ecoregion
223	Kilbeck Spring	34.36029	-115.17673	2493	<1	56.6	7.45	2508	1258	nm	6.1	-66.3	-7.4	South-eastern Mojave
224	Lone Spring	34.56818	-115.21511	4419	na	na	na	na	na	na	na	na	na	South-eastern Mojave
225	Lost Dutch Oven Spring	34.70248	-115.45463	2687	na	na	na	na	na	na	na	na	na	South-eastern Mojave
226	Lyons Seep	34.57786	-115.21934	2643	na	na	na	na	na	na	na	na	na	South-eastern Mojave
227	Mohave Canyon Spring	34.63567	-114.45716	715	na	na	na	na	na	na	na	na	na	South-eastern Mojave
228	Mountain Spring (private)	34.83083	-115.04501	2707	0	na	na	na	na	na	na	na	na	South-eastern Mojave
229	North Klinefelter Spring	34.90225	-114.76823	1255	0	na	na	na	na	na	na	na	na	South-eastern Mojave
230	Old Ranch Spring	34.58471	-115.18205	3380	na	na	na	na	na	na	na	na	na	South-eastern Mojave
231	Olive Spring	34.52238	-115.16801	4228	na	na	na	na	na	na	na	na	na	South-eastern Mojave
232	Paramount Spring	34.55820	-115.16840	4052	na	na	na	na	na	na	na	na	na	South-eastern Mojave
233	Parish Spring	34.59572	-114.56717	1993	na	na	na	na	na	na	na	na	na	South-eastern Mojave
234	Picture Canyon Spring	35.07048	-114.74929	1943	na	na	na	na	na	na	na	na	na	South-eastern Mojave
235	Pipeline Seep	34.67624	-114.73482	1940	0	na	na	na	na	na	na	na	na	South-eastern Mojave
236	Rattler Spring	34.77290	-115.37646	2848	0	na	na	na	na	na	na	na	na	South-eastern Mojave
237	Red Spring	34.93762	-114.72479	840	na	na	na	na	na	na	na	na	na	South-eastern Mojave
238	Rustler Spring	34.82163	-114.80935	1851	0	na	na	na	na	na	na	na	na	South-eastern Mojave
239	Sacramento Spring	34.89742	-114.76863	1244	0	na	na	na	na	na	na	na	na	South-eastern Mojave
240	Samantha (wildcat) Spring	34.61506	-114.56910	823	na	na	na	na	na	na	na	na	na	South-eastern Mojave
241	Sammy's Spring	34.52762	-115.17769	3664	0	na	na	na	na	na	na	na	na	South-eastern Mojave
242	Sheep Camp Spring Upper	34.46688	-115.20308	3696	na	na	na	na	na	na	na	na	na	South-eastern Mojave
243	Studio Spring 1	34.57610	-114.54250	1591	na	na	na	na	na	na	na	na	na	South-eastern Mojave
244	Sunflower Spring	34.54511	-115.12666	3368	0	na	na	na	na	na	na	na	na	South-eastern Mojave
245	Sweetwater Spring	34.56570	-115.18270	3898	na	na	na	na	na	na	na	na	na	South-eastern Mojave
246	Tan-Tan Spring	34.84834	-114.77834	1565	0	na	na	na	na	na	na	na	na	South-eastern Mojave
247	Tan-Tan Well (Trebles Ranch)	34.84826	-114.77914	1568	<1	21.7	7.03	568	285	240	1.64	-75.0	-9.98	South-eastern Mojave
248	Teddybear Cholla Spring (coords appx)	34.81559	-114.71002	3000	na	na	na	na	na	na	na	na	na	South-eastern Mojave
249	Tie Cabin Spring	34.58138	-115.22988	3775	na	na	na	na	na	na	na	na	na	South-eastern Mojave
250	Wes' Weep Spring	34.39774	-114.80735	3000	na	na	na	na	na	na	na	na	na	South-eastern Mojave
251	West Well Spring	34.44470	-114.47950	761	<1	5.8	7.66	3434	1715	1929	5.60	-74.3	-9.24	South-eastern Mojave
252	Wilhelm Spring	34.48173	-115.09694	2669	0	na	na	na	na	na	na	na	-8.92	South-eastern Mojave
253	Willow Spring	34.57810	-115.19230	3710	na	na	na	na	na	na	na	na	na	South-eastern Mojave
254	Wimpy Spring	34.59869	-114.48874	1136	na	na	na	na	na	na	na	na	na	South-eastern Mojave
255	Allen Spring north	35.83973	-117.39277	3009	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
256	Allen Spring south	35.83899	-117.39277	2957	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
257	AlphaSpring	35.90870	-117.41250	3752	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
258	Aqueduct Spring	35.93547	-117.91722	3350	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
259	Austin Spring	35.85728	-117.38254	2592	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
260	Badwater Springs middle	36.78863	-117.89828	1567	2	23.4	7.53	2170	1083	1085	2.06	-114.2	-14.97	Northern Mojave - Owens/Pan.
261	Badwater Springs north	36.78903	-117.89845	1560	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
262	Badwater Springs south	36.78784	-117.89861	1565	4.5	19.2	8.16	1703	849	918	nm	-113.7	-14.72	Northern Mojave - Owens/Pan.
263	Bainter Spring	35.84283	-117.38197	2650	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
264	Beveridge Canyon Spg.	36.72266	-117.86869	1943	100	15.5	8.35	530	266	267	3.4	-106.2	-14.02	Northern Mojave - Owens/Pan.
265	Billie Spring	36.08063	-117.40308	3179	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
266	Black Springs - Lower	36.25078	-117.73221	6019	<1	13.3	6.73	626	313	286	1.56	-102.7	-13.63	Northern Mojave - Owens/Pan.
267	Black Springs - Upper	36.24930	-117.73227	6100	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
268	Bobcat Spring	35.91003	-117.41451	3886	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
269	Buena Vista Cyn Spring (aka Meadow upper)	35.69117	-117.95882	4752	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
270	Cabin Spring	35.93160	-117.40116	3609	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
271	Centennial Tenaja	36.24918	-117.76701	6165	0	11.2	8.50	257	128	77.4	5.7	-70.3	-9.17	Northern Mojave - Owens/Pan.
272	Cerro Gordo Spring	36.58505	-117.82317	8840	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
273	China Garden Spring	36.31396	-117.53197	3140	20	20.3	7.26	602	301	272	1.36	-105.5	-13.92	Northern Mojave - Owens/Pan.
274	Chris Wicht Camp Spring	36.11229	-117.17275	2779	200	9.2	8.37	742	371	213	9.22	-96.6	-13.22	Northern Mojave - Owens/Pan.
275	Christmas Spring	35.82118	-117.40797	2652	2.5	24.8	7.69	676	338	324	2.73	-91.6	-12.21	Northern Mojave - Owens/Pan.
276	Colter Spring	35.99450	-117.14100	5624	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
277	Cove Spring	36.70798	-117.92972	8584	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
278	Coyote Spring	35.73108	-117.93830	3650	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.

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Map No.	Spring Name	Latitude	Longitude	Elevation	Flow (gpm)	Temp (C)	pH	EC (μS)	TDS (mg/L)	Salinity (ppm)	D.O. (mg/L)	gD	g18O	Ecoregion
279	Dripping Spring	35.92590	-117.37860	3904	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
280	Elliot Spring	35.86150	-117.40895	3713	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
281	Etta Spring	36.04450	-117.40616	3530	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
282	Five Fingers Spring	35.69420	-117.93300	3968	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
283	French Madam Spring	36.23916	-117.46260	4281	0.5	15.7	7.80	573	288	nm	nm	-89.2	-11.56	Northern Mojave - Owens/Pan.
284	Goler Wash Spring	35.86201	-117.12658	2511	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
285	Grant Spring	36.23405	-117.99227	3852	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
286	Grapevine Canyon Spring (Lower)	35.72929	-117.89806	2886	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
287	Great Falls Springs east	35.85278	-117.39288	3086	<1	17.4	6.61	1255	627	619	2.67	-66.4	-9.10	Northern Mojave - Owens/Pan.
288	Great Falls Springs north	35.85580	-117.39897	3275	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
289	Great Falls Springs south	35.85113	-117.39386	3108	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
290	Great Falls Springs west1	35.85427	-117.41061	3530	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
291	Great Falls Springs west2	35.85421	-117.40862	3535	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
292	Happy Canyon Spring lower	36.06998	-117.15450	3262	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
293	Happy Canyon Spring middle	36.07421	-117.14402	3738	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
294	Happy Canyon Spring Upper	36.07231	-117.13796	4145	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
295	Hogback Spring	36.18705	-118.00684	4523	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
296	Hunter Cyn Spring 1	36.69991	-117.84668	1568	100	21.9	8.43	718	359	376	3.18	-107.5	-14.28	Northern Mojave - Owens/Pan.
297	Hunter Cyn Spring 2	36.69790	-117.84870	1801	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
298	Hunter Cyn Spring 3	36.69983	-117.85068	3048	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
299	Indian Wells Cyn Spring	35.71654	-117.96492	4954	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
300	Indian Wells Cyn Spring 2	35.68823	-117.92719		na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
301	Jack Gunn Spring	36.23923	-117.46953		na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
302	Jackpot Canyon Spring	36.04410	-117.17962	2338	<1	24.2	7.80	1421	710	726	2.28	-92.4	-12.52	Northern Mojave - Owens/Pan.
303	Kinkade Spring	37.40319	-117.75945		1.5	16.3	7.64	903	449	462	6.68	-100.8	-13.25	Northern Mojave - Owens/Pan.
304	Koko Spring	36.06547	-117.38406	2644	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
305	Limekiln Spring	36.11400	-117.15131	3886	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
306	Little Lake Canyon Spring lower	35.94359	-117.95009	4275	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
307	Little Lake Canyon Spring middle	35.94600	-117.95429	4295	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
308	Little Lake Canyon Spring upper	35.94726	-117.96800	4680	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
309	Lower Aqueduct Spring	35.93586	-117.91566	3304	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
310	Lower Centennial Spring	36.26574	-117.76639	5624	<1	12.5	6.76	1571	786	765	1.31	-100.9	-13.4	Northern Mojave - Owens/Pan.
311	Lower North Revenue Spring	36.16210	-117.42630	3257	1	10.4	7.34	1089	549	452	3.69	-93.4	-11.89	Northern Mojave - Owens/Pan.
312	Lower Wood Cyn Spring (in Wood Canyon Spring Complex)	36.17611	-117.45278	4161	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
313	Mexican Spring	36.59380	-117.82942	9113	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
314	Mid Indian Wells Cyn Spring	35.68468	-117.91984	3638	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
315	Miller's Spring	36.29228	-117.53738	3501	8	19.7	7.50	594	298	268	0.89	-105.1	-13.83	Northern Mojave - Owens/Pan.
316	Miner's Spring (aka Morris Peak Spring)	35.69627	-117.96625	4938	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
317	Morris Peak Canyon Spring (aka Siebert, Glass Cyn Spring)	35.69527	-117.97132	5178	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
318	Morris Spring (aka Dempsey Canyon Spring)	35.70687	-117.97606	5604	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
319	Mumford Springs	35.86026	-117.38173	2832	<1	8.7	7.28	549	272	235	7.93	-88.9	-11.87	Northern Mojave - Owens/Pan.
320	Nadeau Spring	35.86635	-117.38201	2763	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
321	Nina Spring	36.04360	-117.40370	3345	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
322	No Name Canyon Spring	36.80190	-117.91688	2381	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
323	No Name Spring	36.58839	-117.82462	9040	<1	10.2	7.10	228	114	99	3.33	-105.3	-14.07	Northern Mojave - Owens/Pan.
324	North Fork Spring (and Arrastra Spring)	35.86170	-117.41400	3694	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
325	North Piper Mountain Spring	37.41753	-117.91941	6114	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
326	North Revenue Spring	36.15972	-117.43674	3867	<1	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
327	Orchard Spring	35.86203	-117.40450	3725	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
328	Orondo Spring (and Ruby Spring)	35.91702	-117.42341	4736	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
329	Pat Keyes Canyon spring east	36.77963	-117.92244	3625	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
330	Pat Keyes Canyon spring west	36.77053	-117.94816		na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
331	Pat Keyes Spring	36.78024	-117.90071	1802	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
332	Peach Tree Spring	35.92840	-117.37510	3461	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
333	Playa Spring	36.09776	-117.25455	1048	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.



**TABLE 3**  
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**MOJAVE DESERT SPRING SURVEY**

Map No.	Spring Name	Latitude	Longitude	Elevation	Flow (gpm)	Temp (C)	pH	EC (μS)	TDS (mg/L)	Salinity (ppm)	D.O. (mg/L)	δD	δ18O	Ecoregion
334	Pleasant Canyon Creek	36.03283	-117.17576	2848	30	19.3	8.36	948	474	474	5.34	-94.0	-12.58	Northern Mojave - Owens/Pan.
335	Pleasant Canyon Spring east	36.03165	-117.16918	3155	15	22.2	8.20	941	471	454	2.30	-95.0	-12.75	Northern Mojave - Owens/Pan.
336	Portugese Canyon Spring	36.01150	-117.99605	4930	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
337	Post Office Spring	36.04073	-117.22460	1061	<1	8.7	6.83	>4000	>2000	4886	5.35	-92.0	-12.16	Northern Mojave - Owens/Pan.
338	Pothole Spring	35.86756	-117.38496	2927	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
339	Power Holding Corral Spring	35.71801	-117.96800	5018	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
340	Rattlesnake Spring	35.87110	-117.40560	3860	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
341	Redlands Spring	35.93720	-117.17020	2561	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
342	Revenue Canyon Spring	36.14318	-117.43297	4079	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
343	Revenue Spring east	36.14450	-117.43080	3813	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
344	Revenue Spring west	36.14630	-117.44080	4464	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
345	Rock Spring (aka Middle Spring)	35.93455	-117.38650	3725	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
346	Rose Spring	36.10776	-117.96098	3586	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
347	Ruth Spring	35.88376	-117.42142	3832	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
348	Sacatar Spring North	35.95657	-117.94073	3656	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
349	Sacatar Spring South	35.95573	-117.93970	3852	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
350	Sacatar Wilderness Spring	35.97168	-117.96765	4216	1	20.2	7.88	681	338	343	7.16	-101.7	-13.46	Northern Mojave - Owens/Pan.
351	Sage Canyon Seep	35.57514	-118.05066	4191	nm	nm	nm	nm	nm	nm	nm	nm	nm	Northern Mojave - Owens/Pan.
352	Saline Marsh Spring	36.69648	-117.83023	1069	30	23.9	8.01	1178	586	552	3.06	-110.4	-14.46	Northern Mojave - Owens/Pan.
353	Sand Canyon Creek (not a spring)	35.77824	-117.92203	3111	nm	17.1	7.70	1116	558	544	5.94	-85.2	-10.85	Northern Mojave - Owens/Pan.
354	Sarah Spring	36.06444	-117.38785	2762	1	24.1	7.53	2720	1362	1488	0.33	-88.2	-10.43	Northern Mojave - Owens/Pan.
355	See Line Spring	35.25514	-118.07737	3205	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
356	Short Canyon Spring 1	35.71741	-117.92998	4156	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
357	Short Canyon Spring 2	35.71657	-117.92779	4033	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
358	Short Canyon Spring 3	35.71516	-117.92493	3885	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
359	Short Canyon Spring 4	35.71422	-117.92626	3800	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
360	Short Canyon Spring 5	35.71327	-117.93089	4135	2	19.4	7.12	296	148	nm	4.56	-92.7	-12.44	Northern Mojave - Owens/Pan.
361	Short Canyon Spring 6	35.71057	-117.93048	4088	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
362	Short Canyon Spring 7	35.71132	-117.92815	3966	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
363	Short Canyon Spring 8	35.71129	-117.92628	3903	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
364	Short Canyon Spring 9	35.70465	-117.92238	3800	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
365	Sidehill Spring	35.87600	-117.39180	3351	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
366	Skull Spring	35.87988	-117.42162	3952	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
367	Snow Canyon Spring Lower	36.20816	-117.45841	3965	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
368	Snow Canyon Spring middle	36.20860	-117.46169	4139	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
369	Snow Canyon Spring midlow	36.20856	-117.46052	4069	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
370	Snow Canyon Spring Upper	36.20909	-117.46175	4105	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
371	Soldier Pass Spring	37.33616	-117.95710	5004	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
372	South Park Canyon Spring	35.99806	-117.16068	4593	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
373	Stardust Spring	35.72887	-117.93757	3996	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
374	Stone Canyon Spring	35.69206	-117.95893	4668	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
375	Thompson Spring	36.22990	-117.45880	4055	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
376	Thompson Spring upper west	36.23210	-117.46870	4869	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
377	Twin Springs (North)	35.85491	-117.39143	3153	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
378	Twin Springs (South)	35.85477	-117.39112	3130	1	23.3	7.03	420	195	nm	nm	-89.7	-12.15	Northern Mojave - Owens/Pan.
379	Upper Centennial Spring north	36.24232	-117.76787	6259	<1	17.2	7.62	678	339	330	1.52	-100.7	-13.27	Northern Mojave - Owens/Pan.
380	Upper Centennial Spring south	36.24035	-117.76624	6292	<1	8.0	6.21	2068	1035	whe	2.22	-94.2	-12.72	Northern Mojave - Owens/Pan.
381	Upper Centennial Spring south - box	36.24074	-117.76638	6288	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
382	Upper Wood Cyn Spring (in Wood Canyon Spring Complex)	36.17451	-117.45910	4841	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
383	Upper Wood Cyn Spring north (in Wood Cyn Spg Complex)	36.17909	-117.46080	4620	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
384	Warm Sulphur Spring north	36.12033	-117.21435	1044	<1	13.2	7.09	>4000	>2000	9566	1.04	-92.7	-12.05	Northern Mojave - Owens/Pan.
385	Warm Sulphur Spring south	36.11942	-117.21397	1066	<1	20.4	7.69	3611	1806	2030	3.41	-96.0	-12.97	Northern Mojave - Owens/Pan.
386	Wheelbarrow Spring	37.37138	-117.93931	5445	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
387	Willow Creek Camp Spring	36.84212	-117.92284	2451	25	15.7	7.13	1744	880	660	0.44	-106.5	-13.68	Northern Mojave - Owens/Pan.
388	Willow Spring	35.85050	-117.40150	3350	na	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.

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**MOJAVE DESERT SPRING SURVEY**

Map No.	Spring Name	Latitude	Longitude	Elevation	Flow (gpm)	Temp (C)	pH	EC (μS)	TDS (mg/L)	Salinity (ppm)	D.O. (mg/L)	δD	δ18O	Ecoregion
389	Wilson Canyon Seep	35.81576	-117.39971	2428	0	na	na	na	na	na	na	na	na	Northern Mojave - Owens/Pan.
390	Alphie Spring	35.36869	-118.07844	3741	na	na	na	na	na	na	na	na	na	Western Mojave
391	Antimony Spring	35.26248	-118.12949	3991	na	na	na	na	na	na	na	na	na	Western Mojave
392	Bedrock Spring	35.45715	-117.50303	3273	0	na	na	na	na	na	na	na	na	Western Mojave
393	Boulder Spring	35.57900	-118.02827	4049	<1	20.5	7.05	628	315	273	1.33	-87.1	-11.42	Western Mojave
394	Butterbredt Spring	35.38206	-118.11320	3892	0	na	na	na	na	na	na	na	na	Western Mojave
395	Chanze Spring (Tenaja)	35.26246	-118.05547	2561	0	8.1	7.75	724	361	330	11.18	-57.2	-5.61	Western Mojave
396	Coffee Can Spring	35.37725	-117.88306	2127	<1	19.0	8.51	1597	797	794	8.02	-47.1	-0.23	Western Mojave
397	Cowboy Spring (aka Riccomini Springs)	35.31128	-118.08838	2825	0	na	na	na	na	na	na	na	na	Western Mojave
398	Cut Tree Spring (north)	35.45970	-117.81261	3631	1	12.2	7.39	1731	864	914	1.84	-87.1	-12.04	Western Mojave
399	Cut Tree Spring (south)	35.45835	-117.81167	3676	0	na	na	na	na	na	na	na	na	Western Mojave
400	Dove Spring	35.45305	-118.10049	4265	3	19.5	7.09	679	335	226	2.31	-92.7	-11.99	Western Mojave
401	Easter Spring	35.47656	-117.82769	3762	1	13.4	7.29	>4000	>2000	nm	3.47	-90.4	-11.08	Western Mojave
402	Fremont Valley Spring	35.30106	-117.94499	1936	0	na	na	na	na	na	na	na	na	Western Mojave
403	Hoffman Canyon Spring	35.34942	-118.12601	3616	na	na	na	na	na	na	na	na	na	Western Mojave
404	Hoffman Well Spring (aka Hoffman Spring)	35.35649	-118.10809	3688	0	na	na	na	na	na	na	na	na	Western Mojave
405	Horse Canyon Well	35.55655	-118.03461	3759	0	na	na	na	na	na	na	na	na	Western Mojave
406	Last Chance Spring	35.44997	-117.89761	3465	0	na	na	na	na	na	na	na	na	Western Mojave
407	Meadow Spring Upper (aka Buena Vista Spring)	35.69097	-117.95866	4705	na	na	na	na	na	na	na	na	na	Western Mojave
408	Mesa Spring	35.44273	-117.87077	3617	0.5	13.4	7.86	1107	555	524	0.41	-88.1	-10.82	Western Mojave
409	Mesa Spring - Upper	35.44330	-117.86925	3590	0	na	na	na	na	na	na	na	na	Western Mojave
410	Mesquite Spring West	35.39003	-117.81648	2120	0	na	na	na	na	na	na	na	na	Western Mojave
411	Mesquite Springs	35.39007	-117.81468	2099	0	na	na	na	na	na	na	na	na	Western Mojave
412	Nudist Spring	35.34227	-118.01954	2782	<1	22.6	7.10	857	497	377	0.15	-96.0	-12.47	Western Mojave
413	Petroglyph Spring (aka Louise Spring)	35.49961	-117.80404	3373	0	na	na	na	na	na	na	na	na	Western Mojave
414	Poison Spring	35.39413	-117.83908	2298	1.5	23.7	7.19	3393	1699	1643	5.67	-96.5	-12.06	Western Mojave
415	Public Spring	35.62549	-117.95907	4054	0	na	na	na	na	na	na	na	na	Western Mojave
416	Quail Spring	35.22510	-118.17910	4425	na	na	na	na	na	na	na	na	na	Western Mojave
417	Riffle Spring east	35.38895	-117.54097	3391	0	na	na	na	na	na	na	na	na	Western Mojave
418	Riffle Spring west	35.38921	-117.54192	3427	0	na	na	na	na	na	na	na	na	Western Mojave
419	Rinaldi's Well	35.49089	-117.70661	3496	0	na	na	na	na	na	na	na	na	Western Mojave
420	Sage Canyon	35.58433	-118.05383	4160	0	na	na	na	na	na	na	na	na	Western Mojave
421	Sage Canyon Spring	35.58861	-118.05252	4353	0	na	na	na	na	na	na	na	na	Western Mojave
422	Sheep Spring	35.49716	-117.80444	3437	<1	11.6	7.67	1170	584	595	2.15	-78.4	-8.90	Western Mojave
423	Smithson Spring	34.41384	-117.65638	4783	8	14.4	7.61	663	331	358	nm	-84.9	-11.51	Western Mojave
424	Steel Box Spring	35.46329	-117.81515	3544	<1	9.4	7.14	2572	1277	2152	1.00	-91.6	-12.44	Western Mojave
425	Willow Spring	35.48235	-117.69671	3861	0	na	na	na	na	na	na	na	na	Western Mojave
426	Boardwalk Spring - Torrance Ranch	37.00390	-116.72397	3665	16	20.9	8.07	852	424	nm	5.57	na	na	Northern Mojave - Amargosa
427	Ahn Spring	34.71829	-118.49961	3783	<1	16.6	7.02	474	253	204	0.68	-67.5	-9.89	Western Mojave
428	Buckeye Spring	34.72144	-118.49645	3465	0	na	na	na	na	na	na	na	na	Western Mojave
429	Grass Spring	34.72407	-118.48930	3674	<1	17.8	7.36	376	187	nm	nm	-66.9	-9.55	Western Mojave
430	Keeler Flats Spring	34.71380	-118.49143	4040	0	na	na	na	na	na	na	na	na	Western Mojave
431	Pinecrest Spring	34.71952	-118.50110	3609	0	na	na	na	na	na	na	na	na	Western Mojave
432	Portal Seep	34.72400	-118.48860	3319	<1	17.5	7.42	317	159	nm	nm	-67.1	-9.69	Western Mojave
433	Kiosk Spring - Torrance Ranch	37.00304	-116.74256	3669	<1	22.3	7.89	1289	644	nm	2.37	na	na	Northern Mojave - Amargosa
434	Parker Ranch - TNC #1 Spring	36.96725	-116.72338	3594	<1	30.6	7.48	1214	608	nm	1.71	na	na	Northern Mojave - Amargosa
435	Parker Ranch - TNC #2 Spring	36.96751	-116.72362	3594	na	na	na	na	na	na	na	na	na	Northern Mojave - Amargosa
436	Parker Ranch Spring	36.96480	-116.72412	3603	45	29.7	7.43	1232	618	nm	1.4	na	na	Northern Mojave - Amargosa
437	Revert Spring at TNC	36.91551	-116.75311	3890	311	28.7	8.48	573	287	nm	3.37	na	na	Northern Mojave - Amargosa

**TABLE 4**  
**BIRDS OBSERVED BY ECOREGION**

	Northern Mojave (Amargosa)	Northern Mojave (Owens-Panamint)	West Mojave	Central Mojave	Southcentral Mojave	East Mojave	South-eastern Mojave	Colorado Desert
Mallard	X							
Ring-necked Duck	X							
California Quail		X	X		X			
Gambel's Quail	X	X				X	X	X
Chukar		X				X		
Pie-billed Grebe	X							
American White Pelican		X						
American Bittern	X							
Least Bittern	X							
Great Blue Heron	X							
Green Heron	X							
Turkey Vulture					X	X		
Northern Harrier	X	X						
Sharp-shinned Hawk			X				X	X
Cooper's Hawk	X	X			X			
Red-tailed Hawk	X	X	X	X	X	X	X	X
American Coot	X							
Sora					X			
Killdeer	X							
Long-billed Dowitcher		X						
Wilson's Snipe	X							
Mourning Dove	X		X		X	X		
Greater Roadrunner	X	X						
Long-eared Owl	X	X	X		X			
Great Horned Owl		X	X		X			
Burrowing Owl								X
Common Poorwill			X					
White-throated Swift	X							
Anna's Hummingbird		X			X			
Costa's Hummingbird	X					X		
Hummingbird (sp.)	X	X	X	X	X	X	X	X
Williamson's Sapsucker		X						
Red-naped Sapsucker	X							
Nuttal's Woodpecker					X			
Ladder-backed Woodpecker	X	X	X		X			



**TABLE 4**  
**BIRDS OBSERVED BY ECOREGION**

	Northern Mojave (Amargosa)	Northern Mojave (Owens-Panamint)	West Mojave	Central Mojave	Southcentral Mojave	East Mojave	South-eastern Mojave	Colorado Desert
Downy Woodpecker	X	X	X					
Northern Flicker	X	X	X		X	X	X	
Gilded Flicker								X
Peregrine Falcon	X							
Prairie Falcon		X			X			
American Kestral		X	X				X	
Western Wood-Pee wee					X			
Western Flycatcher					X			
Hammond's Flycatcher		X						
Black Phoebe	X							
Say's Phoebe	X	X	X					X
Vermillion Flycatcher	X							
Ash-throated Flycatcher	X							
Brown-crested Flycatcher	X							
Western Kingbird	X							
Loggerhead Shrike	X	X					X	X
Bell's Vireo	X							
Western Scrub-Jay		X	X		X	X		
Pinyon Jay		X						
Clark's Nutcracker		X						
Common Raven	X	X	X	X	X	X	X	X
Horned Lark		X	X					
Tree Swallow	X							
Northern Rough-winged Swallow	X							
Mountain Chickadee		X	X		X			
Oak Titmouse		X	X					
Verdin	X	X		X	X	X	X	X
Brown Creeper					X			
Bewick's Wren	X	X	X		X		X	
House Wren			X					X
Marsh Wren	X	X		X				
Cactus Wren			X			X	X	
Canyon Wren	X						X	X
Rock Wren	X	X	X	X	X	X	X	X

**TABLE 4**  
**BIRDS OBSERVED BY ECOREGION**

	Northern Mojave (Amargosa)	Northern Mojave (Owens-Panamint)	West Mojave	Central Mojave	Southcentral Mojave	East Mojave	South-eastern Mojave	Colorado Desert
Black-tailed Gnatcatcher	X	X				X	X	X
Blue-gray Gnatcatcher	X	X						
American Dipper		X						
Ruby-crowned Kinglet	X	X	X		X	X	X	
Mountain Bluebird		X	X					
Western Bluebird	X						X	
American Robin			X					
Northern Mockingbird	X		X				X	
California Thrasher			X			X		
Crissal Thrasher	X					X	X	
LeConte's Thrasher			X		X			
Phainopepla	X				X	X	X	X
Orange-crowned Warbler	X		X		X	X		
Lucy's Warbler		X						
MacGillivray's Warbler					X			
Common Yellowthroat	X							
Yellow Warbler	X	X	X		X			
Yellow-rumped Warbler	X	X	X		X		X	
Wilson's Warbler	X		X	X	X			
Yellow-breasted Chat	X							
Spotted Towhee	X	X						
California Towhee		X	X		X			
California "Inyo" Towhee		X						
Abert's Towhee								X
Chipping Sparrow		X						
Sage Sparrow	X	X	X	X			X	
Black-throated Sparrow	X	X	X		X	X	X	X
Savannah Sparrow						X		
Song Sparrow	X							
Lincoln's Sparrow	X	X						
Dark-eyed Junco	X	X	X		X			
White-crowned Sparrow	X	X	X		X			
Western Tanager	X		X		X			
Black-headed Grosbeak		X						

**TABLE 4**  
**BIRDS OBSERVED BY ECOREGION**

	Northern Mojave (Amargosa)	Northern Mojave (Owens-Panamint)	West Mojave	Central Mojave	Southcentral Mojave	East Mojave	South-eastern Mojave	Colorado Desert
Lazuli Bunting			X			X		
Blue Grosbeak	X							
Brewer's Blackbird							X	
Western Meadowlark	X		X					
Scott's Oriole						X		
Bullock's Oriole					X			
Purple Finch		X						
House Finch	X	X	X	X	X	X	X	X
Pine Siskin		X						
Lesser Goldfinch		X	X		X	X		



**TABLE 5**  
**PROPOSED SPRINGS FOR FUTURE MONITORING**

Spring Name	Latitude	Longitude	Elevation	Area	BLM Dist	Ecoregion
Jack Spring	35.15482	-116.75648	2383	Paradise Range	Barstow	Central Mojave
Borehole Spring	35.88620	-116.23439	1340	Amargosa	Barstow	Northern Mojave - Amargosa
Salt Spring	35.62614	-116.28089	526	Amargosa	Barstow	Northern Mojave - Amargosa
Tecopa Hot Spring	35.87191	-116.23215	1415	Amargosa	Barstow	Northern Mojave - Amargosa
Thom Spring	35.85661	-116.22677	1406	Amargosa	Barstow	Northern Mojave - Amargosa
Arrastre Canyon Spring (at Tahiti Falls)	34.39216	-117.11429	4001	San Bernardino Mtns	Barstow	South-central Mojave
Goat Spring	34.67263	-116.92681	4340	Ord Mountains	Barstow	South-central Mojave
Kane Spring trough	34.73943	-116.69914	3176	Newberry Mountains	Barstow	South-central Mojave
Morongo Canyon Spgs	34.04835	-116.56824	2512	Little San Bernardino Mtns	Barstow	South-central Mojave
Mound Spring	34.25621	-116.65656	5432	San Bernardino Mtns	Barstow	South-central Mojave
Quail Spring	34.53704	-117.08167	3327	Granite Mountains	Barstow	South-central Mojave
Vaughn Spring	34.25890	-116.65941	5401	San Bernardino Mtns	Barstow	South-central Mojave
Blackwater Well	35.35766	-117.34645	3520	Gravel Hills	Barstow	Western Mojave
McDonald Well	35.11528	-117.37045	2558	Fremont Peak	Barstow	Western Mojave
Bristol Spring	34.26339	-114.14389	491	Parker Dam Road/Colorado River	Needles	Colorado Desert
Mopah Spring	34.31427	-114.77562	2215	Turtle Mountains (wilderness)	Needles	Colorado Desert
Halloran Spring	35.38318	-115.89291	2984	Turquoise Hills	Needles	Eastern Mojave
Crystal Spring	35.79503	-115.96176	3877	Amargosa - Kingston Range	Needles	Northern Mojave - Amargosa
Teresa Spring	34.68073	-115.64958	2456	Marble Mountains	Needles	Southeastern Mojave
West Well	34.44415	-114.47887	768	Chemehuevi Wash	Needles	Southeastern Mojave
Bonanza Spring	34.68513	-115.40538	2105	Clipper Mtns	Needles	South-eastern Mojave
Bonanza Spring Lower	34.68060	-115.40378	1980	Clipper Mtns	Needles	South-eastern Mojave
Dripping Spring	34.55990	-115.20972	3611	Old Woman Mtns (wilderness)	Needles	South-eastern Mojave
Hummingbird Spring	34.75338	-115.34409	2326	Clipper Mtns (wilderness)	Needles	South-eastern Mojave
Sacramento Spring	34.89742	-114.76863	1244	Sacramento Mtns	Needles	South-eastern Mojave
West Well Spring	34.44470	-114.47950	761	Chemehuevi Wash	Needles	South-eastern Mojave
China Garden Spring	36.31396	-117.53197	3140	Argus Range	Ridgecrest	Northern Mojave - Owens/Pan.
Chris Wicht Camp Spring	36.11229	-117.17275	2779	Panamint	Ridgecrest	Northern Mojave - Owens/Pan.
Lower Centennial Spring	36.26574	-117.76639	5624	Coso	Ridgecrest	Northern Mojave - Owens/Pan.
Miller's Spring	36.29228	-117.53738	3501	Argus Range	Ridgecrest	Northern Mojave - Owens/Pan.
Saline Marsh Spring	36.69648	-117.83023	1069	Inyo Moutains (Saline)	Ridgecrest	Northern Mojave - Owens/Pan.
Willow Creek Camp Spring	36.84212	-117.92284	2451	Inyo Mountains (Saline)	Ridgecrest	Northern Mojave - Owens/Pan.
Butterbredt Spring	35.38206	-118.11320	3892	Sierra Nevada (south of 178)	Ridgecrest	Western Mojave
Coffee Can Spring	35.37725	-117.88306	2127	El Paso Mountains	Ridgecrest	Western Mojave
Dove Spring	35.45305	-118.10049	4265	Sierra Nevada (south of 178)	Ridgecrest	Western Mojave
Ahn Spring	34.71829	-118.49961	3783	Portal Ridge	THC	Western Mojave