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Castle Mountains National Monument Springs and Water Resources Inventory

Natural Resource Report NPS/MOJN/NRR—2016/1345

ON THE COVER
Photograph of the Castle Mountains looking north from the Piute Range.
Photograph courtesy of the National Park Service.

Castle Mountains National Monument Springs and Water Resources Inventory

Natural Resource Report NPS/MOJN/NRR—2016/1345

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Contents

Contents (continued)

Figures

Page

Tables

Page

Abstract

On October 19 and 20, Mojave Desert Network Inventory and Monitoring (MOJN I&M) staff conducted an inventory of seven potential spring or water resource locations in the recently-established Castle Mountains National Monument (CAMO). Several of these springs have been reported in the past to be important water resources for wildlife, particularly bighorn sheep. Data were collected on several spring characteristics following the MOJN I&M Desert Springs monitoring protocol (Moret et al. in revision) as well as the protocol developed by Sada (2002) for the MOJN I&M Springs Inventory.

Surface water was found only at Lewis Holes, which is just outside the park boundary in Nevada. Kidney Spring and Quail Spring were dry at the time of visit, although flowing water has been observed at both locations within the past 20 years. There was an active wildlife drinker system at Kidney Spring. Both Stray Cow Well and Stagecoach Spring appeared to be manmade features. Water was present in the wells at both locations; however, the water was several meters below the surface and not accessible to wildlife. No water resources were found at the locations of Mouser Water and Unnamed Spring 54.

Introduction

Castle Mountains National Monument

Castle Mountains National Monument (CAMO) was created by presidential proclamation on February 12, 2016. The monument was specifically established to protect the "outstanding natural, cultural, and historical values representing some of the finest characteristics of the eastern Mojave Desert" (Establishment of Castle Mountains National Monument 2016).

Among the outstanding natural values of CAMO are a dense Joshua tree forest as well as a rare desert grassland. The California Native Plant Society has conducted extensive surveys of CAMO and identified 36 special status plant species. They have also identified at least 28 different native grasses, several of which are uncommon, such as burrograss and false buffalograss (Bell and André 2015). CAMO also provides an important wildlife corridor between the New York Mountains to the northwest and the Piute Range to the southeast. The monument supports a herd of desert bighorn sheep, as well as other large mammals like mountain lions, bobcats, and mule deer. Wildlife of special concern include several bat and bird species and the federally-listed desert tortoise (Federal Register 2016).

The historical and cultural values of CAMO encompass a vibrant human presence spanning hundreds of years. The Mojave and Chemehuevi tribes have both occupied the monument, and petroglyphs and archaeological sites left by even earlier peoples can be found within CAMO. The Rock Springs Land & Cattle Company was incorporated in 1894 and quickly acquired a significant amount of land in the monument. Many of the wells, windmills, and diversions still standing at springs today were built by the cattle company (King and Casebier 1976). Following a brief gold rush to CAMO in 1908, there were 600 to 700 people living and working within the monument at the boomtown of Hart (Shumway et al. 1980). By 1920, however, Hart had become a ghost town.

More recently, mining in CAMO resumed in 1991 when Viceroy Gold Corporation of Canada excavated three open pits at the Castle Mountain Mine, one of which has since been backfilled. Viceroy produced 1.26 million ounces of gold over ten years, but mining ultimately ceased in 2001 when gold prices dropped (Testa and Pompy 2007). NewCastle Gold of Canada currently owns the rights to the Castle Mountain Mine and has expressed interest in moving forward with mining operations. The land will transfer to the National Park Service after mining is completed or after ten years if no mining occurs (Federal Register 2016).

Mojave Desert Network Inventory and Monitoring Program Springs Inventory

The Mojave Desert Network Inventory and Monitoring Program (MOJN I&M) was established with the purpose of providing park managers with a broad-based understanding about the status and trends of natural resources to be used in making management decisions, working with other agencies, and communicating with the public (NPS 2015). One of the tasks undertaken by MOJN I&M was an inventory of springs and water resources in the MOJN parks. In addition to providing baseline information about park aquatic resources, the inventory data were used in the design of the MOJN I&M Desert Springs monitoring protocol (Moret et al. in revision).

With the addition of CAMO to MOJN, it was decided to carry out an inventory of springs and water resources within the monument. Potential locations were selected based on a review of the available documents, particularly BLM field notes provided to the NPS. Recently-drilled wells used by the mine were not included, nor were any sites on the mine property visited. Data were collected on spring condition, associated vegetation, water quality, and disturbance following the protocol developed by Sada (2002) for the MOJN I&M Springs Inventory.

On October 19 and 20, 2016, MOJN I&M staff inventoried seven potential spring and water resource locations in and near CAMO (see Figure 1). Some of the springs had not been documented for several decades, and their exact coordinates and conditions were not well known. The following report presents the initial assessments and recommendations of this field effort.

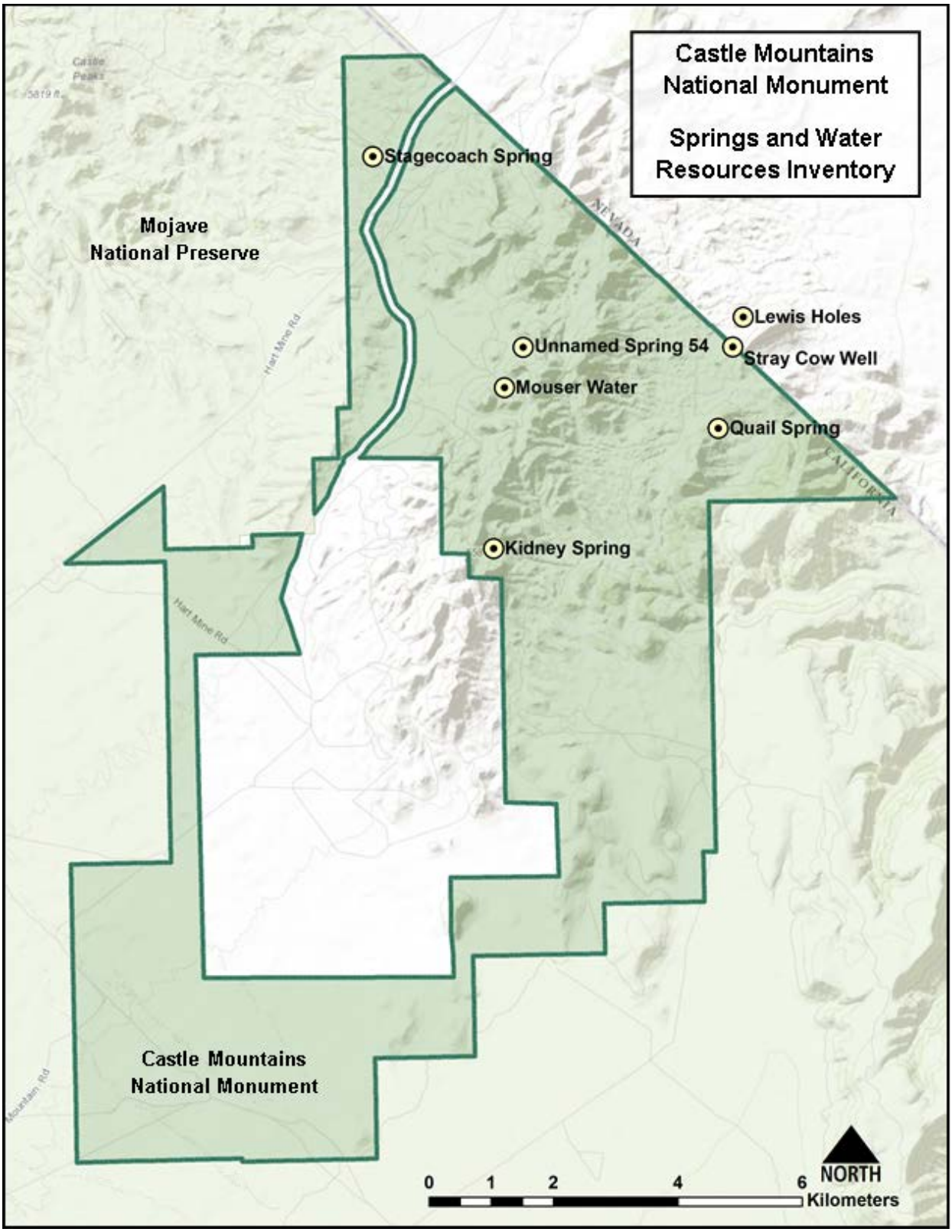

Figure 1. Map of potential spring and water resource locations scouted during the initial visit to CAMO for the Springs Inventory and Desert Springs monitoring protocol, October 19 and 20, 2016.

Kidney Spring

Historical Data

Kidney Spring was first mentioned in an inventory by King and Casebier (1976). They noted that the spring did not appear on any topographic maps, which is also the case today. The spring was reported to have flowing water throughout the 1960s and into the early 1970s. BLM field notes (1999) indicate that the California Department of Fish and Game (now Fish and Wildlife) installed a small gabion to fence out debris around the spring circa 1970, and that the wall looked the same during visits in the late 1990s.

According to Wehausen and Hansen (1986), perennial surface water in CAMO was only available at Kidney Spring. They mentioned that water was also found during the winter of 1985 at two other sites near the state line, possibly referring to Quail Spring and Lewis Holes. Their bighorn sheep sightings "totaled three groups: one at Hart, one at Kidney Spring, and one across the Nevada border," and they found "a few areas of more concentrated use, especially the Kidney Spring basin."

The BLM visited Kidney Spring several times in the late 1990s. During their first recorded visit on January 1, 1997, they described the small spring as having water "year round" and being the "only water in Castle Mountains proper," although it is not clear how they determined this. They also observed a band of 10 bighorn sheep near the spring. During their visit on August 26, 1997, Kidney Spring was dry. They shored up the gabion and left behind a shovel. On April 6, 1998, they described the spring as "full," with no sign of cattle, burro, or tamarisk. During their last recorded visit on July 12, 1999, the BLM found Kidney Spring "almost dry," and they dug out the spring to expose about 1 quart of water. Historical discharge data are listed in Table 1.

Table 1. Historical discharge data from Kidney Spring.

Date Measured	Discharge	Source
ca 1960	10 gal/hr	King and Casebier 1976
Aug 1971	seepage	"
1 Jan 1997	water present	BLM 1999
26 Aug 1997	dry	"
6 Apr 1998	full	"
12 Jul 1999	dry	"
19 Oct 2016	dry	This report

MOJN Data

During our visit on October 19, 2016, Kidney Spring was dry. No water was found at the historical spring source near the gabion, which was still standing. We searched for another source in a dense thicket of woody vegetation (hackberry) lower down in the wash, but no riparian vegetation or obvious signs of a spring were discovered.

Between the gabion and the woody vegetation was a series of three tanks (Figure 2). One tank was fed by pipe from the dry source protected by the gabion. Another tank was fed by pipe from a large rainwater collector with dimensions of about 10 m by 10 m. This rainwater collector appeared to be active and a recent addition. The lowermost tank fed into a metal drinker that was full of water. We did not measure water quality or quantity at the drinker because that water originated from rainwater, as opposed to the natural groundwater that is of interest to the Desert Springs protocol.

Looking at the Google Earth imagery, there were only two tanks and no rainwater collector in June of 2013. However, all three tanks and the rainwater collector were present by January 2015. Two of the tanks were placed there over 20 years ago, but the rest of the drinker system was installed by the Society for the Conservation of Bighorn Sheep in late 2013 or 2014. There was also a wildlife camera next to the drinker that was installed by MOJA in July 2016 (N. Darby, NPS, personal communication, 27 October 2016). Incidentally, an abandoned desert tortoise burrow was found on the hill a few meters above the tanks.

Although Kidney Spring was dry during our visit, flowing water has been observed there in the past 20 years, so it is possible that the spring is currently dry due to the ongoing drought. Because we visited the spring in early fall, it is also possible that no water was observed because the spring is only seasonally wet during the winter

Figure 2. Kidney Spring. Top: Rainwater collector above tanks. Middle: Three tanks with pipe from rainwater collector. Bottom left: Gabion enclosing dry spring source. Bottom right: Drinker full of water below tanks.

Lewis Holes (Outside CAMO Boundary)

Historical Data

The earliest account of Lewis Holes comes from Captain George F. Price of the Second California Cavalry, who led an expedition across the desert from California to Utah in 1864. Price described arriving at the spring and not being able to obtain enough water for his men and horses (Price 1867).

Lewis Holes was next mentioned in a USGS report by Thompson from 1921, but nothing was known about the spring at the time. From a later report by Thompson in 1929, the spring issued from a canyon in the northeast Castle Mountains, and there was a "small flow in the canyon in the winter." The spring was owned by the Rock Spring Land & Cattle Company and was equipped with a windmill and used as a watering place for cattle.

BLM field notes (1999) indicate that a small pool of about 2 gallons was found in a clump of cattail and tamarisk when the spring was visited on July 11, 1999, "during a pretty dry period." The BLM cut all tamarisk in November of 1997 and conducted a follow-up tamarisk removal on July 11, 1999. Historical discharge data are listed in Table 2.

Table 2. Historical discharge data for Lewis Holes.

Date Measured	Discharge	Source
Jun 1864	water present	Price 1867
ca 1929	small flow in winter	Thompson 1929
15 Jun 1997	small pool (2 gal)	BLM 1999
19 Jun 2016	small pool (20 x 20 cm); flow <1 L/min	This report

MOJN Data

During our visit on October 19, 2016, water was again present at Lewis Holes during an ongoing period of drought. There was no surface flow, but there was a small, shaded pool with dimensions of 20 cm by 20 cm and a depth of 10 cm (Figure 3). The pool appeared to have been excavated by wildlife. There were numerous small rodent droppings and visible grazing of cattails by large mammals, possibly bighorn sheep or mule deer. We collected water quality data at the spring using an ExStik PH100 and YSI 85 (see Table 3).

Table 3. Water quality data for Lewis Holes.

Parameter	Value
Temperature	15.3 °C
pH	7.59
Specific Conductivity	1041 µS/cm

Dominant vegetation around the spring included baccharis, sacaton, and cattail. The presence of riparian vegetation, like cattail, suggests that the spring has had reliable surface water in recent years. There was also a very large tamarisk >4 m tall near the spring, providing further evidence for a

significant supply of water at or near the surface. Behind the tamarisk, about 20 m southeast of the spring, was an old trough. There were additional twisted scraps of metal in the wash below Razorback Ridge where we parked. No windmill was observed.

Figure 3. Lewis Holes. Top: Looking down on Lewis Holes from the northwest. Bottom: Close-up of excavated spring source. Cattails visible in lower right corner.

Mouser Water

Historical Data

Thompson (1929) placed Mouser Water near Hart Peak, but did not know its exact location. Mouser Water has not appeared on any topographic maps reviewed by MOJN I&M. In the 1920s, Mouser Water was property of the Rock Spring Land & Cattle Company, and water was obtained via a 200 ft long trench that was piped to a trough. Mouser Water was estimated to provide about 1,500 gallons per day to cattle (Thompson 1929).

BLM field notes (1999) refer to this location as X Spring, possibly because the name Mouser Water was mentioned only once in a single document from 1929. During their visit on December 27, 1997, the BLM noted “old pipes where cattlemen once collected water in a small dug out pond” that was completely dry at the time of their visit. They did not observe any evidence of cattle or sheep nearby. Historical discharge data are listed in Table 4.

Table 4. Historical discharge data for Mouser Water.

Date Measured	Discharge	Source
ca 1929	1500 gal/day	Thompson 1929
27 Dec 1997	dry	BLM 1999
20 Oct 2016	dry	This report

MOJN Data

During our visit on October 20, 2016, Mouser Water was dry. There was a hand-dug or excavated source, probably the same as the small dug out pond noted by the BLM (Figure 4). There were many pipes, wooden posts, and rusted metal scraps littering the wash from the source down to the road about 150 m below. There was no riparian vegetation near the source or in the wash.

Based on our observations, we infer that Mouser Water was a manmade feature built by the Rock Spring Land & Cattle Company that fell into disrepair once ranching ended. There is no evidence suggesting that there is surface water at the location today.

Figure 4. Mouser Water. Top: Standing below the spring source, looking up the wash. Bottom: Close-up of the excavated spring source.

Quail Spring

Historical Data

Quail Spring was mentioned in a USGS report by Thompson from 1921, but the author did not have any firsthand knowledge of the spring. Quail Spring also appeared in an inventory prepared by King and Casebier (1976), where it was reported to have flowing water during the 1960s. Notes indicate that the spring was developed for livestock and had a cattle trough during this time.

The BLM (1999) visited Quail Spring on December 5, 1996, and found cattails in damp dirt. About 100 ft below the cattails was the old cattle trough with water dribbling into the trough through a pipe. There was no evidence of cattle use in recent years. Below the trough, one deer track, one sheep track, and 10-year-old ram bones were found. The BLM cut tamarisk and installed a plastic bucket in the trough below the dribbling pipe. On July 15, 1997, the BLM visited the spring again, but it was dry. They returned on November 23, 1997, and installed a 25 gallon plastic barrel. Abundant deer tracks were also observed. During their last recorded visit on July 11, 1999, the spring was dry. Historical discharge data are listed in Table 5.

Table 5. Historical discharge data for Quail Spring.

Date Measured	Discharge	Source
no date	5 gal/hr	King and Casebier 1976
ca 1960	5 gal/hr	“
Jul 1968	weak	“
5 Dec 1996	water dribbling from pipe	BLM 1999
15 Jun 1997	dry	“
23 Nov 1997	no data	“
11 Jul 1999	dry	“
19 Oct 2016	dry	This report

MOJN Data

During our visit on October 19, 2016, Quail Spring was dry. We identified the approximate source using coordinates from the USGS National Hydrography Dataset. These coordinates placed the source about 65 m above the old cattle trough, which was also dry (Figure 5). The most abundant vegetation was baccharis and several species of native bunchgrass, including big galleta grass. There was also catclaw acacia hosting mistletoe within a few meters of the source. No cattails were observed at the source or in the wash above the trough. Invasive red brome was present at the source and throughout the wash. Wildlife spotted at the spring during our visit included a phainopepla and a ground squirrel.

Although Quail Spring was dry during our visit in early fall, flowing water has been observed there in the past 20 years, so the spring may be temporarily inactive due to the ongoing drought, or it may flow seasonally during the winter.

Figure 5. Quail Spring. Top left: Standing above spring source, looking down the wash. Top right: Standing below spring source, looking up the wash. Bottom: Old cattle trough and pipe. Plastic bucket visible in trough.

Stagecoach Spring

Historical Data

King and Casebier (1976) included Stagecoach Spring in their inventory and noted the presence of two tanks and a windmill at the spring. The spring was also reported to have flowing water from 1971 to 1973, although it was intermittently dry during that time. Freiwald (1983) reported that the spring was dry on August 26, 1981. Historical discharge data are listed in Table 6

Table 6. Historical discharge data for Stagecoach Spring.

Date Measured	Discharge	Source
Aug 1971	3 gal/min	King and Casebier 1976
Jan 1973	dry	“
Dec 1973	1.50 gal/min	“
26 Aug 1981	dry	Freiwald 1983
20 Oct 2016	>3 m depth to water	This report

MOJN Data

Stagecoach Spring appeared to be an entirely manmade feature, with a deteriorating windmill and tanks situated beside a deep open well (Figure 6). During our visit on October 20, 2016, there was water present in the bottom of the well. However, the surface of the water was >3 m below the surface of the ground and inaccessible to wildlife.

Figure 6. Stagecoach Spring. Top: Old tank and windmill. Bottom: Close-up of well opening.

Stray Cow Well

Historical Data

Stray Cow Well exists in the USGS National Water Information System database and has the code USGS 352011115021301 214 S30 E62 15C 1. The well depth is 30 ft, and there is a single well measurement of 15.90 ft depth to water level below land surface dating from April 29, 1965. It is not known when the well was constructed or when it fell into disuse.

MOJN Data

Stray Cow Well appeared to be an entirely manmade feature, with a deteriorating windmill situated over a deep well covered by a metal plate and connected to an old tank by pipes (Figure 7). During our visit on October 19, 2016, there was water present in the bottom of the well. However, the surface of the water was >3 m below the surface of the ground and inaccessible to wildlife.

Figure 7. Stray Cow Well.

Unnamed Spring 54

Historical Data

King and Casebier (1976) listed Unnamed Spring 54 with “tentative” township and range coordinates about 1.1 km SSW of Hart Peak. They did not include a citation for these coordinates and noted that the spring did not appear on any topographic maps, which is also the case today. There was no other information pertaining to this spring.

MOJN Data

During our visit on October 20, 2016, we did not find any evidence of Unnamed Spring 54 in the canyon indicated by the township and range coordinates. We scouted up numerous side canyons, but there was neither surface water nor riparian vegetation that would suggest the presence of a spring. Scat and tracks belonging to either bighorn sheep or mule deer were observed high in the canyon beyond the end of the dirt road. Since debris flows with little or no vegetation growing on them were present in the canyon, significant active erosion may have buried any spring or manmade features that were present at one time. Alternatively, the coordinates were incorrect, and there was never any spring in the canyon.

Conclusions

On October 19 and 20, 2016, MOJN I&M staff scouted seven potential spring and water resource locations in and near CAMO for the MOJN I&M Springs Inventory and the Desert Springs monitoring protocol. Of those seven locations, three had springs, two had wells, and two had no identifiable water resources. Brief descriptions of each location are given in Table 7.

Because we conducted our inventory in October, we visited the springs following the hot summer months when seasonal springs are typically dry. While some of the springs may flow seasonally during the winter and early spring or intermittently after heavy precipitation, there appears to be no perennial water in CAMO, with the possible exception of Lewis Holes.

Lewis Holes was the only spring visited that had surface water. There was living riparian vegetation at the spring in the form cattails, so surface water has been reliable at Lewis Holes during the current drought and possibly throughout the summer.

Both Stagecoach Spring and Stray Cow Well had water present within their wells, but the water was deep below the surface (>3 m) and not accessible to wildlife. The well at Stagecoach Spring is currently uncovered and poses a potential safety hazard to wildlife and people, so we recommend covering or fencing off the opening.

We found the excavated source at Mouser Water (X Spring) described by the BLM. However, there was no surface water or evidence of recent spring activity, such as riparian vegetation. Furthermore, no spring discharge has been recorded there since the 1920s. Mouser Water was likely a manmade feature built by cattle ranchers that later fell into disrepair.

We did not find any evidence of Unnamed Spring 54 within the township and range specified by King and Casebier (1976). Apparent erosion within the canyon may have buried any natural spring or manmade feature, or the coordinates may have been inaccurate.

Quail Spring was dry, and there was no riparian vegetation observed near the source in the wash or down by the trough and pipe. However, spring discharge has been recorded there in the past 20 years, so the spring may have been seasonally dry or temporarily dry due to the current drought.

Kidney Spring was dry, and there was no riparian vegetation observed near the source at the gabion or farther down the wash. However, spring discharge has been recorded there in the past 20 years as well, so this spring may also have been seasonally dry or temporarily dry due to the current drought. Previously, Kidney Spring has been called the only perennial source of water in CAMO and an important water resource for bighorn sheep. While the spring is not currently perennial, the recently-installed wildlife drinker system at the location attests to its significance.

Of the seven potential spring and water resource locations that we visited in CAMO, we recommend that MOJN I&M continue to monitor Kidney Spring, Quail Spring, and Lewis Holes for the Desert Springs protocol. While Lewis Holes is just outside the monument on land managed by the BLM in Nevada, the spring appears to be an important water resource for wildlife in the area.

Table 7. Descriptions of potential spring and water resource locations scouted during the initial visit to CAMO for the Springs Inventory and Desert Springs protocol, October 19 and 20, 2016. Coordinates are listed as UTMs, NAD83, Zone 11.

Name	Easting	Northing	Description	Inside CAMO?	Notes
Kidney Spring	673940	3908373	Spring	Yes	spring coordinates from BLM at gabion; active wildlife drinker system near spring
Lewis Holes	678164	3912248	Spring	No	water present at time of visit, but outside of CAMO by about 750 m
Mouser Water	674121	3910916	Historical Excavation	Yes	dry excavated pond found, but no evidence of present-day water availability
Quail Spring	677590	3910269	Spring	Yes	spring coordinates from USGS in wash, flow may also occur from pipe at trough
Stagecoach Spring	672007	3914620	Inactive Well	Yes	water present in well >3 m below ground, but not accessible by wildlife
Stray Cow Well	677778	3911557	Inactive Well	Yes	water present in well >3 m below ground, but not accessible by wildlife
Unnamed Spring 54	--	--	No Water Feature Found	Yes	no evidence of spring found near coords. after extensive search of canyon

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