

Surplus Water at Fossil Butte National Monument

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Introduction

The enabling legislation for Fossil Butte National Monument (P.L. 92-537) contains an unusual provision regarding water resources of the monument. The act provides that the Secretary of Interior is, “authorized to provide for the disposition and use of water *surplus to the needs of the monument*, to a point or points outside the boundaries of the monument” (emphasis added). This report is being prepared 35 years after the monument was created to assist park staff in determining how to define and manage “surplus” water. The report includes a review of the legislative history and a general description of the water resources of the monument. Concurrent with this report, Eric Lord (Water Rights Specialist, WRD) is preparing a water rights assessment for the monument.

Currently (2008) the only disposition of surplus water is seasonal diversion of a portion of the flow from Cundick Spring to BLM land on the east side of the monument. Recommendations are provided for assessment of potential future requests for surplus water.

Enabling Legislation (P.L. 92-537) and Legislative History

Most of the land that became Fossil Butte National Monument was managed by the Bureau of Land Management (BLM) as grazing allotments for local cattle and sheep operations. Committee reports and hearing transcripts of the U.S. House of Representatives and Senate contain much discussion regarding the potential impact of withdrawing the 8,000-plus acres from grazing. There also seems to have been concern regarding the loss of access to springs and other water sources in the monument for livestock use.

The enabling legislation for Fossil Butte National Monument addressed these potential impacts by allowing grazing to continue for a 10-year period, and then for not more than ten additional years thereafter if extended (grazing actually lasted until 1989; or 17 years), after authorizing the monument and allowing use of lands in the monument for stock driveways in perpetuity. Additionally, Section 4(b) of the enabling legislation (P.L. 92-537) provides that after termination of grazing on monument lands, “...*the Secretary is authorized to provide for the disposition and use of water surplus to the needs of the monument, to a point or points outside the boundaries of the monument.*” Over the years, there has been much discussion and debate about whether the intent was to define surplus water as all water that was in excess of that needed for administrative or facility development and/or how to account for the water needed to support natural ecosystems.

The general policy of the National Park Service is that there is no surplus water, anymore than there are surplus trees, animals, or other natural resources. Water is considered a vital part of the park environment. The primary responsibility of the National Park Service is the preservation

and protection of park resources, including water resources and the water dependent environment, for the enjoyment of future generations. While this would seem to make moot any discussion of surplus water for diversion to BLM grazing lands, there must have been some intent to the inclusion of Section 4(b) in the enabling legislation.

There seems to be a basic conflict between the legislative intent to mitigate for the loss of grazing land and access to springs, and the NPS mission to preserve and protect park resources. There is a recurring theme of concern regarding the loss of grazing capacity in the legislative history. The not-to-exceed twenty year transition time for elimination of grazing on monument lands and the provision to provide surplus water to a point outside the boundary appear to be efforts to allow a transitional plan to be developed by the BLM and local ranchers to mitigate the loss of access to the spring(s) in the monument. The argument could be made (and has been) that providing water to adjacent BLM grazing land is mitigation for the loss of grazing land on the monument and the loss of access to several springs on the monument for stock watering.

Prior to establishment of Fossil Butte National Monument, the Federal land within the monument provided 1,100 animal unit months (AUMs) of grazing per year. Fossil Butte's 8,198 acres of pasture represented 10% of the Rock Creek Grazing Allotment's 80,000 acres administered by the BLM in 1987. BLM developed a plan in 1987 (Phinney, 1987) that determined that all of the monument's AUMs could be absorbed by improving the production capacity of the remaining acreage by 3% per year for five years. There was a Secretarial decision in 1989 that directed the Kemmerer Resource Area (BLM) to absorb all AUMs being removed from the monument. There were 3 or 4 grazing permits in effect for the Rock Creek Allotment that included allotment pasture lands that were eventually incorporated into the monument. The enabling legislation for the monument provided for continuation of grazing and stock watering in the newly established monument for up to twenty years (House Report 92-1219) to allow local ranchers to adjust their operations to the loss of a portion of the traditional grazing areas.

Section 4(b) of the enabling legislation provides that after termination of grazing on monument lands, "*...the Secretary is authorized to provide for the disposition and use of water surplus to the needs of the monument, to a point or points outside the boundaries of the monument.*" Note that it doesn't say "shall", only that the Secretary "is authorized" to provide water. Providing the water for use outside the monument is discretionary.

Initial proposals for establishment of the monument did not garner enough local support to proceed. Some of the local residents were of the opinion that the proposed size of the monument (nearly 30,000 acres) was too large. Too much land would have been removed from grazing. It seems that a compromise was reached after the size was reduced to 8,200 acres (Senate Hearing Report, Feb. 28, 1972).

The report of the Senate Hearing (Feb. 28, 1972; page 5) states, "There was some question in the beginning concerning the conflict between setting aside this area as a national monument and existing driveway, water, and stock use. I understand the differences have been substantially resolved by language in the legislation." (Statement of Clifford P. Hanson, U.S. Senator from Wyoming) This statement could be interpreted as indicating that Section 4(b) of the legislation was meant to mitigate for the loss of stock watering sources inside the monument.

House Report 92-1219 provides a section-by-section analysis of the bill to establish Fossil Butte National Monument (H.R. 1553, 92nd Congress 2nd Session). With regard to Section 4 of the legislation it states, “...and allows the Secretary to provide for the disposition of unneeded water to points outside the boundary of the monument when the grazing permits expire.” Pages 6-8 of House Report 92-1219 contain a report to the Committee from the Assistant Secretary of the Interior which states in part, “Section 4(b) provides that....the Secretary may provide for the disposition of water, surplus to the needs of the monument, outside the area for watering stock.”

The documents composing the legislative history never explicitly define surplus water. However, there appears to have been some effort to mitigate the loss of grazing land within the monument by increasing the amount of water available for stock watering on adjacent BLM lands to increase the grazing capacity of those lands. Indeed, the BLM Rock Creek Allotment Management Plan (1987) implied that through improvements, such as water development, they would be able to absorb the monument’s 1,100 AUMs in the remaining 80,000 acre allotment within a five-year period. It is my sense that the general tone of the documents was that an agreement had been reached between the proponents for establishing the monument and the local ranchers. That agreement was a gentlemen’s understanding that water from within the monument would be provided to adjacent lands for stock watering.

Water Resources in the Monument

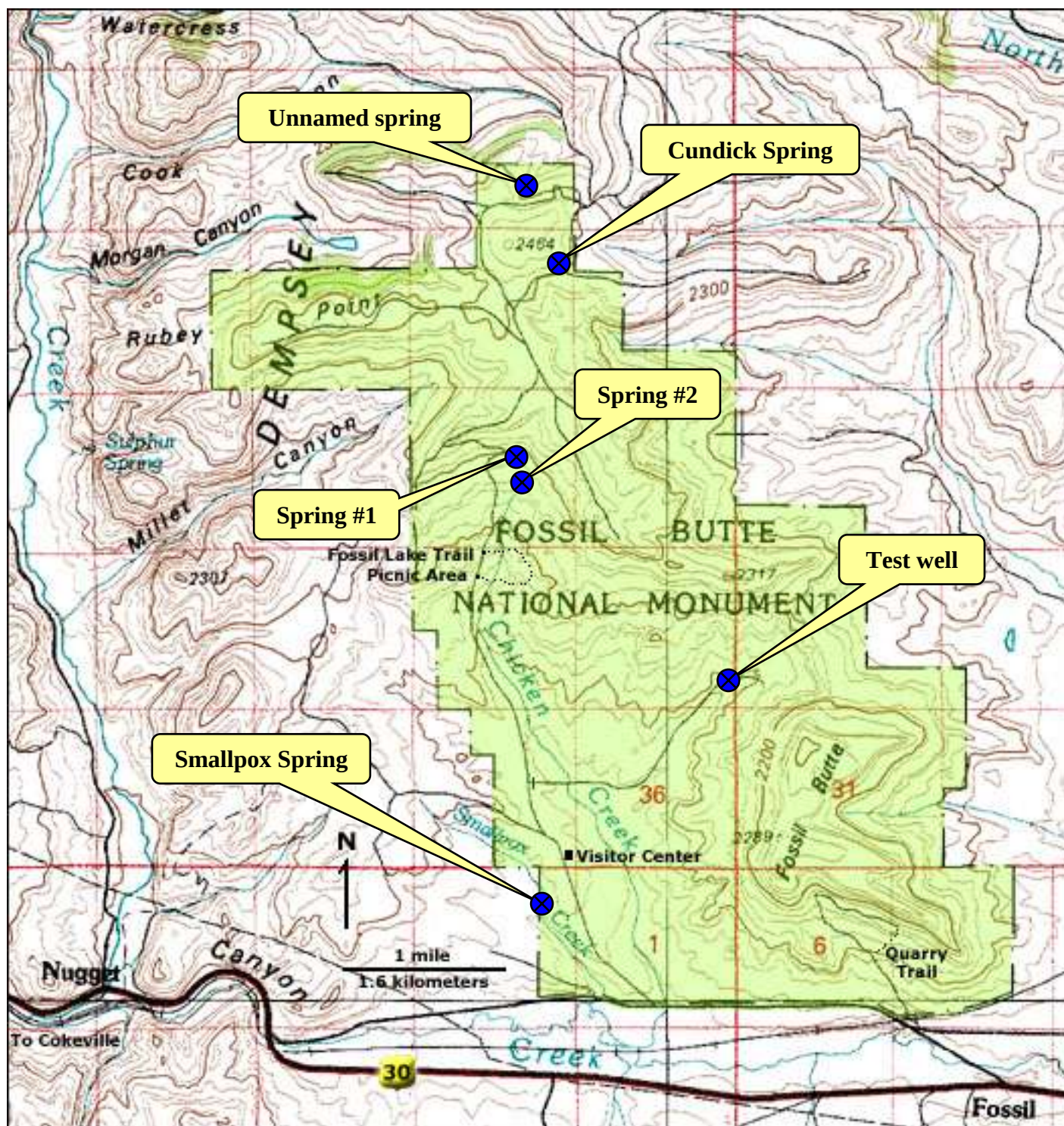
There are no perennial streams in the monument. Some streams have short perennial reaches immediately downstream of spring/seep areas, but the flow generally disappears underground within a relatively short distance downstream of the source. Groundwater resources are limited by the predominance of generally low permeability of geologic formations. Most of the spring/seep areas discharge low volumes of water. Only Cundick Spring and Spring #2 (at the head of the Chicken Creek drainage) have sufficient flow to have been developed as water-supply sources.

Groundwater Resources

The Main Body of the Wasatch Formation is the only viable target aquifer for well construction in the geologic formations underlying the monument (Huntoon, 1978). However, Huntoon noted that all of the existing wells in the vicinity of the monument that were completed in the Main Body of the Wasatch yield only small quantities of poor-quality water. Other geologic formations are less permeable, and therefore less likely to provide groundwater to wells, than the Main Body of the Wasatch.

A test well was constructed in 1977 near the then proposed site for a visitor center (Figure 1). The well was drilled to 465 feet and initially had artesian flow of a few gallons per minute. Test pumping of the well showed that the sustained yield would be less than 1 gallon per minute (gpm). The water quality was poor, having total dissolved solids of 5400 mg/l, mostly due to high concentrations of sodium and chloride. The well has never been used.

There is no reason to believe that additional test wells in other parts of the monument would produce larger quantities or better quality water. Construction of additional test wells in the monument would be a waste of resources.



Elevations in meters
Contour interval 200 meters

Figure 1. Locations of springs and a test well at Fossil Butte National Monument

Springs and Seeps

There are several springs and seep areas at Fossil Butte National Monument (Figure 1). Huntoon (1978) identified two main springs in the headwaters of the Chicken Creek drainage basin which he named Spring #1 and Spring #2. Spring #2 was developed as the water source for the park. There are also several spring/seep areas associated with “The Bullpen” in the northern part of the monument. (“The Bullpen” is a named topographic feature on the USGS 7.5’ map. It is the high point in the northern part of the monument. See Figure 2.) Cundick Spring is a large area of diffuse springflow on the south-southeast side of The Bullpen and has been developed as a water source for livestock on adjacent BLM land to the east of The Bullpen. Smallpox Spring is a low-yield spring in the southwest part of the monument.

Spring #1 and #2 discharge from the base of the Fossil Butte Member of the Green River Formation, at the contact with the underlying Main Body of the Wasatch Formation (Huntoon, 1978). The Fossil Butte Member is composed of jointed limestone, shaley limestone, and mudstone. The Fossil Butte Member has greater permeability and storage capacity than other geologic formations in the area, as evidenced by the perennial flow of springs from this unit. McGrew and Casilliano (1975) describe the Fossil Butte Member as consisting of a 45-foot thick basal unit of mudstone and siltstone overlain by a 75-foot thick limestone unit. In either case, the hydrogeologic model is that of a limestone bed (the aquifer) overlying a confining unit of claystone or mudstone. Groundwater can’t percolate down through the confining unit and is forced to flow laterally until it discharges where the limestone outcrops along the side of the hillslope.

Cundick Spring, in the northern part of the monument, discharges from the base of the Bullpen Member of the Wasatch Formation. The Bullpen Member is predominantly sand and gravel, rather than the muds of the main body of the Wasatch Formation. The confining unit causing emergence of the springs is either a clay unit at the base of the Bullpen Member or the top of the Angelo Member of the Green River Formation. The hydrogeologic setting is similar to that of Spring #1 and #2—a permeable unit (an aquifer) overlying a mudstone/claystone layer (a confining unit), causing groundwater to discharge at the base of the aquifer where it outcrops on the hillside.

Smallpox Spring discharges from the side of the valley of Smallpox Creek in the southwestern part of the monument. The flow at Smallpox Spring was measured several times in 1988 and ranged from 2-3 gpm. The spring provides baseflow for the creek and supports riparian vegetation for about 1,000 feet downstream. Development of the water from Smallpox Spring and exportation of the water to adjacent BLM land would require pumping to convey the water from the valley of Smallpox Creek to adjacent upland areas. Export of the water would likely result in unacceptable impacts to the riparian resources because the total flow from the spring is small and export of even a small amount of water would be a relatively large percentage of the total flow from the spring/seep area. BLM has developed a small stock pond on the segment of Smallpox Creek that is outside the monument boundary.

An unnamed spring in the northern part of the monument was considered for development in 1979. The water would have been exported to adjacent BLM land for stock watering. The proposal was rejected because it was thought it would have unacceptable impacts on the riparian

resources associated with the spring. BLM subsequently developed a spring 2,200 feet to the northeast, on BLM land outside the monument (Figure 2).

There are several other spring/seep areas in the monument that could conceivably be developed as water sources for exportation for stock watering outside the monument. However, these spring/seep areas generally yield only small quantities of water. It would be difficult and expensive to develop the water sources and transport the water to points of use outside the monument. Additionally, capture of even small amounts of water from low-yield springs represents a relatively large percentage of the total flow and therefore would cause significant impacts to the riparian resources associated with those spring/seep areas.

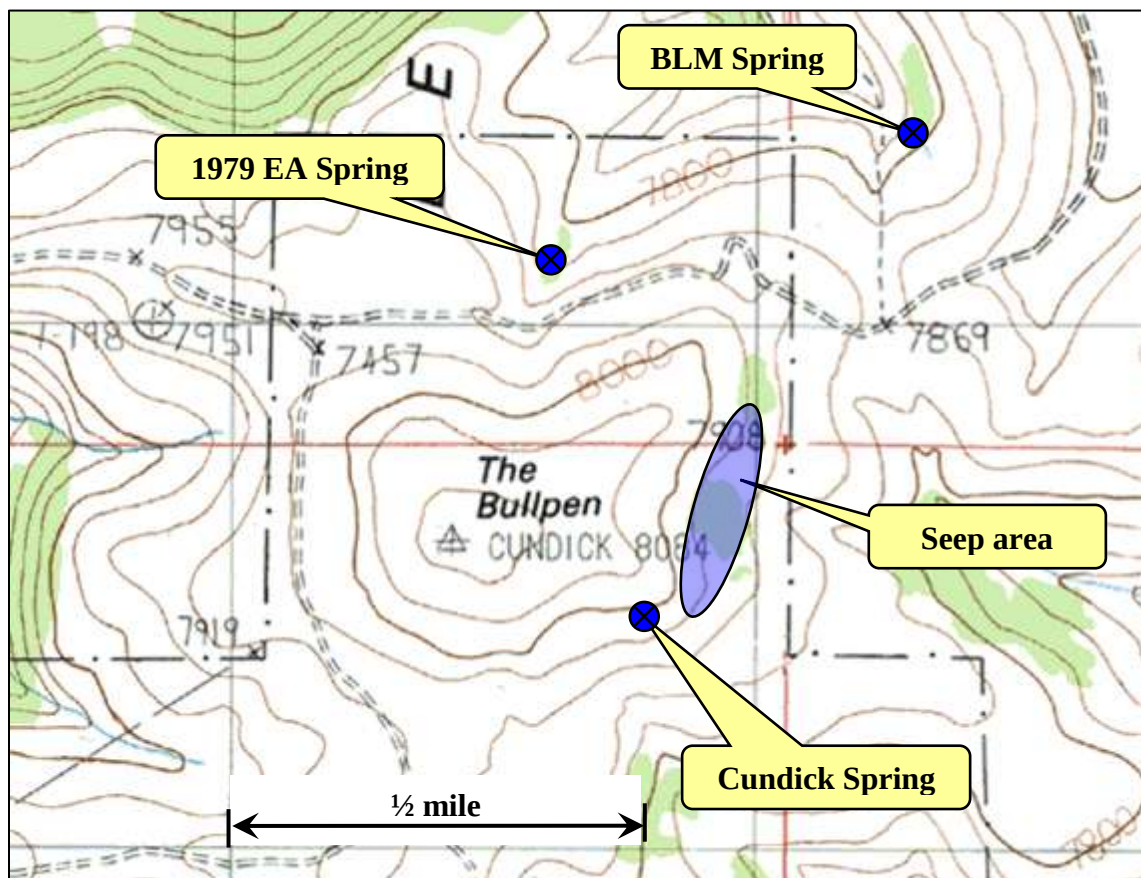


Figure 2. Locations of springs at The Bullpen in the northern part of the monument.

Development of Cundick Spring

In December 1976, BLM proposed developing Cundick Spring to pipe the water to stock tanks on BLM land outside the monument. This was apparently done in anticipation of the eventual fencing and closure of the monument to grazing, which would eliminate access to the spring as a source of stock water. NPS issued a special use permit (SUP) for development of the spring to BLM for a 20-year period from 1977-96. The SUP has not been renewed, but the parties have continued to operate under the terms and conditions of the expired permit.

Although records are incomplete, it appears that the spring was developed by the BLM through horizontal drilling and inserting a perforated pipe into the drill hole. Horizontal drilling was used to minimize surface disturbance, as the area is an archeological site. The horizontal well was drilled approximately 80 feet into the hillside in 1977. No actual record exists regarding construction of the horizontal well. BLM records show that 80 feet of pipe, along with other materials, were purchased for the project.

The pipeline from the horizontal well to the stock tanks was not installed until 1979. A new SUP for the pipeline was issued for a 10-year period from September 1979 to September 1989. Water was piped to one stock watering trough inside the monument and one trough outside the monument. In 1987, the stock tank was removed from the monument, and BLM replaced the plastic distribution pipe with new pipe that was buried from the spring to the stock tanks.

In July 2008 there were two stock tanks on BLM land on the ridge east of the monument. One tank is a few hundred feet east of the monument boundary and the other is about 7,000 feet east of the monument boundary. There is a third location about 4,000 feet east of the monument boundary with valves and connections from the pipeline, but no trough.

Water use from Cundick Spring is not metered. Water usage is estimated from the number of animals having access to the watering troughs. Approximately 300 head of cattle are grazed on the pasture in a four-pasture rotation system. Use of the Cundick Pasture rotates yearly; mid-May to mid-June one year, mid-June to mid-July the next year, mid-July to early-August the next year, and early-August to late-September the next year, then repeating the cycle. The peak water use would occur in a year when cattle are on the pasture for 7½ weeks from early-August to late-September. Beef cattle on the open range will consume about 15 gallons of water per day in hot weather. If we assume that half of their total daily water needs are provided from the troughs fed from Cundick Spring, then the demand from the horizontal well collection system is 2,250 gallons per day, or about 1½ gpm. This assumes that cattle get the remainder of their water from the creeks in the valleys adjacent to the ridge where the water troughs are located. Vegetation in the valleys is much lusher than on the ridgetops and it seems reasonable to assume that cattle will spend the majority of their time where food and water are available. Better estimates of the amount of water exported from the Cundick Spring environment could be obtained by putting a water meter on the distribution line downstream of the overflow/return flow pipe on the distribution line.

Total flow from Cundick Spring can not be measured. Springflow is diffused over a large area, several hundred feet in diameter. Much of the flow is consumed by evapotranspiration. Surface flow is continuous for a short distance downstream in channels before being totally consumed or infiltrating into the streambed. In July 2008, the total flow from various locations in the spring/seep area was estimated (by the author) to be 10 gpm. There were no obvious differences in the vegetation pattern in the immediate vicinity of the horizontal well. It appears that the temporary, seasonal diversion of a small percentage of the flow from Cundick Spring has had no discernible impact on the spring or its associated riparian resources. This diversion has been occurring for about 30 years.

Water from Cundick Spring flows downhill, toward the south and east, in several discrete channels. The water infiltrates within a few hundred feet downstream from the spring/seep area, as evidenced by the diminishing ribbon of green vegetation in Figure 4. Some of that water probably returns to the surface at spring/seep areas such as the forested area in the lower left side of Figure 4. Small forested areas are common in the monument and are generally associated with areas of groundwater discharging to the surface along low permeability rock outcrops in canyons and valleys. Water discharging from the spring/seep areas downgradient from Cundick Spring flows toward the south and east in a valley that carries the water outside the monument within a very short distance. Under natural flow conditions, water exported from the Cundick Spring area would have remained in the monument for only a short distance before the stream channel exits the monument.

Figures 3-7 show photos of the Cundick Spring/seep area and the stock tanks on the ridge to the east of the monument.

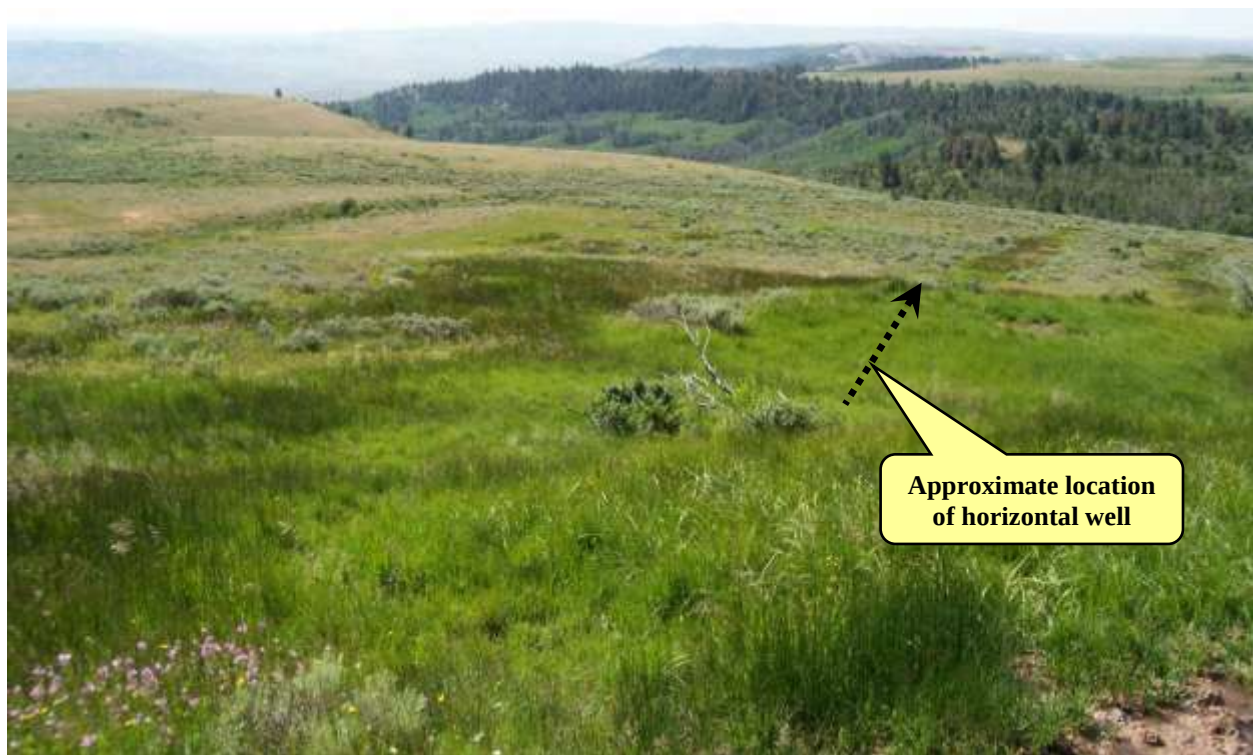


Figure 3. Photo of Cundick Spring from the hill slope above the spring.
View is toward the SE.



Figure 4. Google Earth map of the Cundick Spring area.

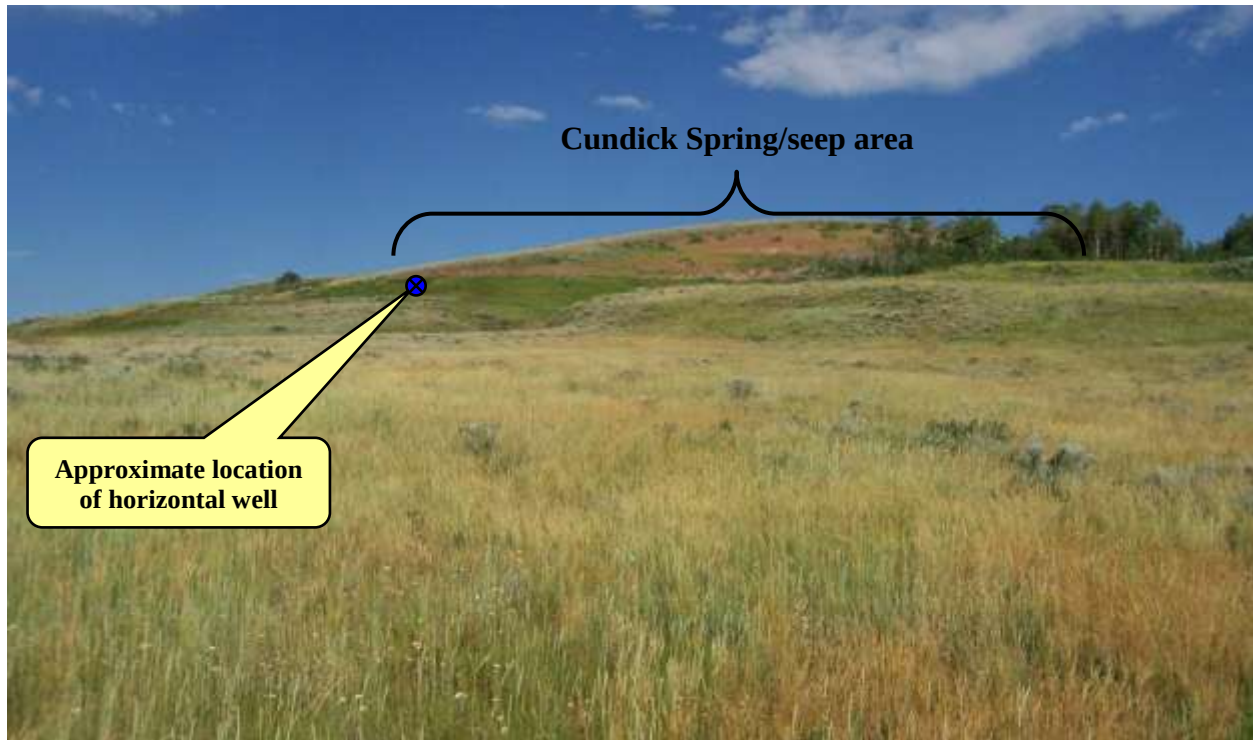


Figure 5. Photo of the spring/seep area from slope below. View is toward the NNW.



Figure 6. Photo of a stock watering trough on BLM land with Cundick Spring on the hillslope in the background.



Figure 7. Photo of stock tank 7,000 feet east of the monument.
This tank is at the distal end of the pipeline. View is toward the West.

1979 Spring Development Environmental Assessment

Martin and Kasperak (1979) prepared a short environmental assessment (EA) for the proposed development of an unnamed spring on the north slope of The Bullpen (Figure 2). The proposal was to drill a horizontal well into the spring/seep area and pipe the water outside the monument for livestock watering on BLM land. It was thought that uncontrolled flow from a horizontal well at that spring site might result in dewatering of the perched aquifer and loss of the riparian resources associated with the spring. In contrast, they refer to the already existing horizontal well at Cundick Spring as capturing surface flow after it has emerged from the spring.

The “No-Action” alternative was selected as the environmentally preferred alternative. The riparian resources associated with the spring have an intrinsic value and it was feared that development of the spring/seep area would permanently intercept the majority of the water emerging at ground surface to support the riparian resources. There were no mitigating measures that could have offset the potential negative impacts. BLM subsequently developed a spring about 2,200 feet northeast of the NPS spring that had been the subject of the proposed development.

Stock Driveways

Section 4 of the enabling legislation for the monument provided for the perpetual use of stock driveways to allow access to grazing land adjacent to the monument. Stock drives of sheep are south to north through the monument once or twice a year, generally in June. Due to the distance the sheep are driven to get them through the park in a day, water must be provided at a resting area for the sheep midway through the monument.

Historic use of the beaver ponds near the public trails and picnic area for sheep watering was determined to conflict with administrative uses and stopped in 2005. Since 2005, the sheep herding operation has hauled water in a 2,000 gallon tanker to fill sheep watering troughs midway along the south to north drive route. The 2,000 gallons is the amount that seems to be necessary for adequate watering of the approximate 1,500 head of sheep per flock that make the annual pasture rotation through the monument. In some years two flocks of sheep are herded through the monument about a week apart. Parking the water tanker on the main road through the monument, where water is needed during the stock drive, creates a potential traffic safety problem.

The sheep drive permit holder has informally requested use of water from sources in the monument. The enabling legislation discusses the potential for Secretarial authorization for providing water externally, yet is silent about accommodating the same need inside the monument. When grazing was terminated, the monument was to allow stock drives in “perpetuity” where it would not conflict with park administration. Implied with traditional stock drives is the need for water along the route. The monument may need to consider development of infrastructure to collect and store water to accommodate stock drives, while minimizing the potential impact on natural resources and traffic safety issues. This might be accomplished by diverting and storing nonpotable water during the Spring when springflow is more abundant. The storage tank could possibly be refilled after the stock drive to provide an emergency source of water for fighting wildland fires.

Surplus Water

The general policy of the National Park Service is that there is no surplus water. Any and all water inside a park boundary is needed either for administrative use or to support the natural environment. However, the language of the enabling legislation makes it clear that there was some intent to provide water to areas outside the monument boundary to mitigate the loss of grazing land in the monument. There was no mention of how to quantify the amount of water that was “surplus to the needs of the monument.”

Cundick Spring is the only water source in the monument that has been developed to provide “surplus” water to users outside the monument since the monument was established in 1972. There have possibly been other informal verbal inquiries or requests for water, but none have been in writing or otherwise documented (except the 1979 Spring Development EA). Also, on one occasion when Rick Inglis (WRD hydrologist) was on site, a local rancher commented that it was a shame we were taking out a stock dam near the boundary of the monument. Inglis (1997) provided an evaluation of the feasibility of constructing a stock dam and reservoir on BLM land upstream of the park on the west fork tributary of Chicken Creek. Inglis (1997) suggested that it was not practical given the slopes of the terrain. Other proposed water development projects in

the monument were either not feasible, would have adversely impacted park natural resources, or were for water sources that the park is utilizing for its own needs.

The main sources of water in the monument are;

1. Spring #1 and #2, at the headwaters of Chicken Creek. Spring #2 is the source of potable water for facilities in the monument. Springs #1 and #2 provide water for riparian resources in the Chicken Creek valley. Several hundred thousands of dollars have been spent to restore the eroded landscape and vegetation of the Chicken Creek valley. Water not used for potable supplies is needed to support vegetation in the valley. Surface flow in Chicken Creek is rarely sufficient to extend to the southern border of the monument and on into Twin Creek.
2. Discharge from Smallpox Spring is only 2-3 gpm. All of the water is needed to support riparian vegetation in the valley downstream of the springs.
3. The Cundick Spring/seep area discharges perhaps 10 gpm. It's impossible to measure the flow because of the diffuse nature of the outflow. A horizontal well was developed at Cundick Spring about 30 years ago and a small part of the flow has been used most years as a seasonal source of drinking water for cattle on the BLM rangeland east of the spring. There are no apparent adverse effects from the existing use.

Other water sources in the monument generally have insufficient quantity to consider them as potential sources of surplus water. Export of even small quantities of water from low-yield water sources represents a large percentage of the water budget and would almost certainly result in an adverse effect to the natural environment.

Conclusions and Recommendations

1. Continue to provide water from Cundick Spring for seasonal use on the rangeland east of the spring. This usage has occurred for about 30 years with no apparent detrimental effects.
2. Install a covering over the end of the horizontal well to protect the pipe and valve from damage and freezing. Install a meter to allow quantification of the amount of water exported and to monitor for leaks in the distribution system.
3. Spring #1 and #2, at the headwaters of Chicken Creek, and Smallpox Spring do not have surplus water. These waters are needed either for potable supplies or to support riparian resources.
4. Any future request for delivery of "surplus" water should be initially evaluated by park staff, perhaps as an informal EA, with the results documented in park files to avoid unnecessary repetition by future generations of park staff.
5. Develop a plan to provide water for stock drives through the monument.

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