

## **Appendix A**

# **Interviews with Local Ranchers in the Bighorn and Powder River Basins**

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## Introduction

A field-based data gathering and analysis exercise was undertaken to gather effects data specific to users of water bodies in Wyoming. In-person and telephone interviews were conducted on a handful of ranchers in the Bighorn and Powder River structural basins in Wyoming to gather information on the nature and extent of produced or natural water usage and effects noted from use. Where available, data was obtained from these ranchers to quantitatively evaluate the effects from exposure to the various sources of water. Interviews were given with:

<b>Name</b>	<b>Basin Affiliation</b>
1. Mr. Greg Flitner, and Mr. Dave Flitner	Bighorn
2. Mr. Mick McCarty	Bighorn
3. Mr. Don Meike	Powder River
4. Dr. Trey Patterson	Powder River
5. Mr. Don Schlaf	Bighorn
6. Mr. Frank Shepperson	Powder River

The following sections describe the information given by the various ranchers during the interviews.

## **In-person interview with Mr. Greg and Dave Flitner, 10/24/06**

The Flitners manage beef cattle, sheep and some horses. They ranch all their cows (~950 head in 2005) in the spring and fall on BLM lands adjacent to Dry Creek near the Cody Highway. Dry Creek has average sulfate and TDS concentrations of 2,720 mg/L and 5,080 mg/L, respectively. Produced water sources account for 100% of water availability on these lands, because drought has eliminated other natural reservoirs. The Flitners have additional, private lands in the Bighorn basin and leases on Heart Mountain and Johnson County, and the cattle typically graze there during the summer months. Water resources in these areas originate from natural sources, with estimated concentrations of 1,180 mg/L and 2,310 mg/L sulfate and TDS, respectively, based on average background concentrations.

In 2005, herd size on produced water pastures totaled 950 cows. Total herd size was 950 cows, 800 yearlings, 150-200 qtr horses. Due to drought, herd size has been reduced an estimated 50% since 1997.

The Flitners noted no variation in cattle quality between lands containing produced water discharges and natural waters, and in fact related that sometimes production from pastures utilizing produced water is better due to increased water availability. No cattle refusal of water was noted. Weaning weights were recorded in calves that started out the spring in various produced water and natural water-associated pastures (Table A-1). These records demonstrate that no adverse effect on weaning weights occurred on calves that drank the produced water containing elevated sulfate and TDS relative to natural sources. Seven-year average weaning weights from the Dry Creek (produced water) pastures were in fact higher than the pastures that did not have produced water availability. The Flitners do not utilize a supplemental mineral program.

If produced water were to stop being available, Mr. Greg Flitner estimates they would have to cut ~50% of the herd size, with associated employee cuts. The Flitners currently employ 40 full and part time jobs. In addition, the Flitners stated that loss of the produced water in Dry Creek would result in them vacating these pastures, as they would no longer be economic to graze. Conflicts between cattle, wildlife, and wild horses would be expected to increase without the produced waters.



## **In-person interview with Mr. Mick McCarty, 10/23/06**

McCarty Ranching, LLC, a family owned company, operates several ranches in the Bighorn basin, with a total herd size of about 2,000 head. They utilize 4 pastures totaling 1600 acres of private and 28,000 acres of BLM lands which contain exclusively produced water sources originating from the Oregon Basin facility. The herd size on these lands is between 400 and 600 head, all cattle. The pastures include Avon, South/North Oil Wells, Lake and Highway pastures. The produced water from the Oregon Basin is discharged into Dry Creek, which runs throughout these pastures. Oregon Basin produces approx. 500,000 barrels of water/day, of which 100,000 BPD is surface discharged and the rest reinjected (M. Blakesley, pers. comm). Surface water concentrations near these pastures average 4,830 mg/L TDS and 2,300 mg/L sulfate, with maximums as high as 5,390 mg/L TDS and 3,100 mg/L sulfate (measured between 2002 and 2006). Lake pasture has 1 water well in addition to the produced water sources. Mr. McCarty noted that the cattle seem to prefer drinking the water near the outfall point where the produced water is discharged to Dry Creek, perhaps due to the warmer temperature of the water.

The cows utilize the produced water pastures between November and May. Two out of 4 pastures are used per year (allowing a 2-year fallow period). The cattle only forage on the open range, plus they are given a mineral supplement package and protein formulated by Dr. Trey Patterson. They prefer winter fat, kochia, grasses, and salt sage where available. There are other ranches owned or leased by McCarty Ranching LLC that receive only natural water sources.

Upon acquiring the land associated with produced water sources, Mr. McCarty Ranching, LLC retained Dr. Trey Patterson to design a supplemental protein and mineral package to maximize production from these pastures. Because Dr. Patterson's experience is that the higher sulfates in the water can render copper and other trace metals less available for absorption by the cattle, the mineral package contains a chelated copper form which remains bioavailable even when consumed with water containing high sulfates. Dr. Patterson related that the cattle in the area perform very well, above industry standards and production numbers.

Mr. McCarty noted that there were no adverse effects on the livestock that use the pastures with produced water as compared to their pastures at which there are natural water sources. He related the following measurement comparisons:

<u>Measure:</u>	<u>Produced water</u>	<u>Natural water</u>
1) Body condition	5	same
2) Breeding percentage	96%	same
3) Death rate	2%, cows	same
4) Calf weaning rate	94-95%	same
5) Weaning weight	Varies by calving time.	same

A few other natural water bodies used to exist on some of the land but have dried up due to drought. The pastures east of highway 120 rely exclusively on produced water sources. The droughts have also reduced their total herd size, from about 2,500 to 1,700 this year, and perhaps another drop in herd size next year.

The presence of produced water on the BLM lands has resulted in cost savings for McCarty Ranching LLC, since obtaining other water sources (wells, hauling water) would be very expensive. Ranching would not be economic to them without the produced water. He speculates that it would also affect hundreds of other ranchers in the Bighorn basin.

**Telephone interview with Mr. Don Meike, 11/1/06**

Mr. Don Meike ranches cattle (500 head) and sheep (2,500 head) on 45,280 acres along the in the Powder River basin near the juncture of Salt Creek and Powder River. He has ranched in this area since 1901. Herd sizes have declined 50% due to drought and rabbit infestation. Mr. Meike recalled that before 1950, Salt Creek and Powder River were unusable 9 months out of the year due to the high salinity concentrations in the water. Cattle were typically moved to a meadow pasture or to lower Powder River, or to land in the mountains. In addition to the chemical concentrations causing adverse effects on cattle, physical risk of cattle getting stuck in the muddy river bottom was a concern.

With the advent of produced water, Salt Creek and Powder River are now usable on a year-round basis. Management of the herds has increased, and flexibility of management is greater, as a result of the increased water supply. No adverse effects on the cattle herds were seen using produced water sources compared to natural water sources previously. The cattle graze on the open range and also receive a mineral supplement package.

## Telephone interview with Dr. Trey Patterson, 11/1/06

Dr. Patterson is a manager at the Padlock Ranch located in north central Wyoming and Southern Montana. The ranch is large, one of the top six in the US. From their website ([www.padlockranch.com](http://www.padlockranch.com)), the Padlock Ranch employs 45 people, and raise and market over 9,000 calves a year. The ranch grazes cow-calf pairs on native grassland in Montana and Wyoming. Grazing lands are a mixture of private and leased land. In support of grazing operations, the ranch irrigates 5,000 acres of farmland, including an annual production of 10,000 tons of dry hay, 20,000 tons of corn silage, 15,000 tons of hay silage and barley. The production supports the winter feeding program and feedlots.

Cattle graze year round in the area. The ranch lands receive produced water from a CBNG facility near Decker, Montana. The produced water is discharged to a reservoir which is fenced off, and into stock tanks.

Water quality samples are taken periodically.. Concentrations generally reported are between 1 mg/L and < 500 mg/L sulfate and up to ~3600 mg/L TDS (as measured in 2001 and 2002). Sodium is a large proportion of the total TDS. At times, the sodium level is high enough that the mineral supplementation program for the cattle is altered.

In contrast, some natural water in the area has much higher sulfate and TDS, between 1,500 and 2,000 sulfate and up to 3,700 TDS. Produced water contributions have helped to lower the levels of sulfate and TDS in year-round water that cattle consume.

No negative effects of consuming produced water on cattle have been seen or noted. Weaning weights recorded over several years do not indicate any difference between cows raised on land with produced water compared to land with other water sources. Generally, Dr. Patterson notes that the increase in available water has resulted in an increase in cattle performance and forage utilization. Costs to the rancher are reduced because additional water does not have to be hauled.

The drought has affected many natural water sources, limiting their use or rendering them unusable. At times, the ranch has had to wean earlier due to drought levels.



Dr. Patterson also related that his experience with cattle ranch in South Dakota. Natural water sources at the ranch containing about 4,000 mg/L sulfates resulted in incidences of polio in the cattle that consumed this water source. A supplemental mineral program was instituted there to help mitigate the effects of the high sulfates, and although some cattle continued to be affected, the ranch continued to use the water source because it was the only water available in the area. Despite this, the ranch was able to make a profit.

### **Telephone interview with Mr. Don Schlaf, 11/1/06**

Mr. Schlaf has ranched his lands since 1904. He currently ranches cattle (~300 head), and historically has also ranched sheep. Mr. Schlaf utilizes BLM pastures associated with the Dry Creek drainage, east of Cody. These allotments include Elk, 15-mile and Dorsey. He rotated his cattle on a 5-month schedule on each of the pastures at Dry Creek. At times, Dry Creek was the only source of water available as other stock ponds had dried up. Mr. Schlaf had a cow die inexplicably in the past, and sent brain tissue samples into the veterinarian for analysis of sulfate levels, as sulfates were typically higher in Dry Creek than for other water bodies. The results showed that the sulfate levels in Dry Creek did not cause the death of the cow. Lab results indicated, “the amount of sulfur in the tissue sample was not sufficient to cause polio.”

Mr. Schlaf also related that, in the past when Dry Creek was an intermittent stream, incidences of polio and blindness occurred in his cattle as a result of drinking evapoconcentrated pools of water.

## Telephone interview with Mr. Frank Shepperson, 11/1/06

Mr. Frank Shepperson owns ~1,500 head of cattle on 80,000 acres in the Salt Creek valley of the Powder River basin in Wyoming (Commerce, Natrona and Johnson counties). The ranch includes the bulk of the Salt Creek oil field. It has 25.8 miles of frontage on Salt Creek, including the sections immediately adjacent to the discharge points. It also has access to several tributaries (such as Coal Draw and Castle Creek).

Salt Creek is the main water source on his lands. Other creeks in the area (above Salt Creek) include Teapot and Castle creeks, both of which have natural water sources. The natural water sources contain an average of 2,000 mg/L TDS and 1,200 mg/L sulfates in 2003 and 2004, but concentrations are at times as high as 4,000 mg/L sulfate and 7,000 mg/L TDS. Downstream of produced water inputs, concentrations average 1,100 mg/L sulfate and 4,300 mg/L TDS.

Mr. Shepperson's cattle use both the natural and produced water sources, and he notes that produced water sources are the preferred water to use for his cattle. The use of natural waters in the area have, at times, caused breeding rates and number of head to decline relative to other areas in Wyoming receiving natural water sources. Other effects of the natural water sources included dehydration, blindness, disorientation and death typically due to consumption of evapoconcentrated puddles of water left in the dry creek beds. Wildlife densities also appeared to decline when only natural water sources were available. According to Mr. Shepperson, weight data collected by the University of Wyoming indicated that cattle weights were significantly affected in areas where access was limited to only natural water sources. Conversely, the weight data did not indicate that produced water sources adversely affected cattle weights.

Another positive effect of produced water sources is that the creeks now run year-round, instead of being intermittent. The intermittent nature of the creeks before the event of produced water resulted in isolated, concentrated water puddles surrounded by thick mud. The cattle would not only drink the concentrated water, but would also get stuck in the mud, causing physical injury.

Mr. Shepperson also noted that wildlife appeared to be using the water downstream of the outfalls, and densities appear greater than populations present upstream of the outfalls. Mr. Shepperson speculates that this phenomenon is a result both of changing water quantity as well as quality.

**Table A-1. Weaning rates of calves on the Flitners' ranches between 1999 and 2005. The Dry Creek pasture is associated with produced water sources, whereas the remaining pastures have access to only natural water sources.**

<b>Year</b>	<b>Dry Creek</b>	<b>Potato Ridge</b>	<b>Home Place</b>	<b>Whistle Creek</b>
1999	473	451	469	483
2000	501	492	476	500
2001	462	454	473	465
2002	487	509	512	525
2003	522	503	497	503
2004	515	498	526	486
2005	526	482	501	492
<b>Average:</b>	<b>498</b>	<b>484</b>	<b>493</b>	<b>493</b>