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Mallory J. Irwinsky
University of Oklahoma College of Law

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COALBED METHANE DEVELOPMENT IN WYOMING AND MONTANA: THE POTENTIAL IMPACTS OF *MONTANA V. WYOMING*, COALBED METHANE DEVELOPMENT, AND WATER QUALITY ON THE TRIBES OF THE POWDER RIVER AND WIND RIVER BASINS

Mallory Irwinsky*

I. Introduction

For the past few decades, the production of coalbed methane (CBM) across the United States has grown as the demand for fuel has increased across the nation, coupled with a desire for cleaner-burning energy sources. CBM, a form of natural gas, is not only cheaper to produce than conventional natural gas, but it is touted as a “clean energy” projected to eventually constitute a large majority of the energy consumed across the United States.¹ Increased production, however, brings unknowns with potentially disastrous consequences. In particular, questions have arisen about the quantity and quality of water coproduced with CBM. The quality of this coproduced water in particular is concerning, as it is discharged directly back into surface water or into underground aquifers.² Coproduced water can have high salinity and even radioactivity.³ Although new technologies are being developed to test and treat this water for potential reuse in both drilling operations and domestic settings, the feasibility of this technology remains uncertain, and concerns remain about whether coproduced water can be handled in a manner that avoids pollution and potential harm to communities in development areas throughout the entire CBM process.⁴

Development of CBM occurs through a process called “dewatering” where water is removed from coalbeds, allowing methane to rise to the surface. Dewatering results in the coproduction of both methane and

* Second-year student, University of Oklahoma College of Law.

1. Robert J. Duffy, *Political Mobilization, Venue Change, and the Coal Bed Methane Conflict in Montana and Wyoming*, 45 NAT. RESOURCES J. 409, 412-13 (2005).

2. Frank Asche et al., *Gas Versus Oil Prices: The Impact of Shale Gas*, 47 ENERGY POL'Y 117, 124 (2012).

3. Steffen Jenner & A.J. Lamadrid, *Shale Gas Vs. Coal: Policy Implications from Environmental Impact Comparisons of Shale Gas, Conventional Gas, and Coal on Air, Water, and Land in the United States*, 53 ENERGY POL'Y 442, 446 (2013).

4. Asche et al., *supra* note 2, at 124.

billions of barrels of coproduced water.⁵ Coalbeds in regions that produce CBM generally also function as major aquifers and are important groundwater sources in areas that regularly face water scarcity.⁶ Unfortunately, CBM development and the resulting coproduced water deplete aquifers,⁷ as production continues to grow and dewatering inevitably increases.⁸ While natural recharge of the aquifers occurs through rainfall and runoff, the rate of withdrawal from CBM development grossly exceeds this recharge rate, which is often only centimeters per year.⁹ Even in the best case scenario for the aquifers, where CBM development and dewatering would be halted entirely, complete recharge could still take hundreds of years.¹⁰

Water concerns between Montana and Wyoming have recently come to a head over the availability of water and CBM development in the ongoing case of *Montana v. Wyoming*.¹¹ Montana, which is downstream from Wyoming, brought suit in 2007 due to a water shortage in the region.¹² Montana alleged that Wyoming was in violation of the Yellowstone River Compact (Compact), which governs water use between the two states.¹³ As part of this violation, Montana claimed that CBM groundwater withdrawals in Wyoming deplete the surface waters belonging to their junior downstream users under the Compact.¹⁴ The U.S. Supreme Court appointed Special Master Professor Barton H. Thompson in 2008 to preside over this

5. U.S. GEOLOGICAL SURV., COALBED METHANE EXTRACTION AND SOIL SUITABILITY CONCERNS IN THE POWDER RIVER BASIN, MONTANA AND WYOMING (2006) [hereinafter USGS, COALBED METHANE EXTRACTION], available at http://pubs.usgs.gov/fs/2006/3137/pdf/fs06-3137_508.pdf.

6. James Murphy, *Slowing the Onslaught and Forecasting Hope for Change: Litigation Efforts Concerning the Environmental Impacts of Coalbed Methane Development in the Powder River Basin*, 24 PACE ENVTL. L. REV. 399, 400 (2007).

7. U.S. GEOLOGICAL SURV., WATER PRODUCED WITH COAL-BED METHANE (2000) [hereinafter USGS, WATER PRODUCED], available at <http://pubs.usgs.gov/fs/fs-0156-00/fs-0156-00.pdf>.

8. USGS, COALBED METHANE EXTRACTION, *supra* note 5.

9. Tom Myers, *Groundwater Management and Coal Bed Methane Development in the Powder River Basin of Montana*, 368 J. HYDROLOGY 178, 181 (2009).

10. *Id.*

11. 131 S. Ct. 1765 (2011).

12. Michelle Bryan Mudd, *Montana v. Wyoming: An Opportunity to Right the Course for Coalbed Methane Development and Prior Appropriation*, 5 GOLDEN GATE U. ENVTL. L.J. 297, 298, 301 (2012).

13. *Id.* at 299.

14. *Id.* at 298.

matter.¹⁵ While Professor Thompson has made his First Interim Report, which was affirmed by the Supreme Court,¹⁶ he has not yet ruled on whether Wyoming violated the Compact by allowing CBM groundwater withdrawals to deplete surface waters belonging to Montana.¹⁷ Still to be considered, however, is the impact these water issues have on tribes in this region, who are in close proximity to much of the CBM development and whose reservations are dependent on water from the Yellowstone River and its tributaries. In particular, the tribes of the Northern Cheyenne Indian Reservation and the Wind River Reservation stand to be affected by the ongoing litigation and the continued CBM development in the area.

The Northern Cheyenne Indian Reservation is home to the Northern Cheyenne Tribe. Located in southeastern Montana, the reservation is about 445,000 acres in size¹⁸ and lies adjacent to the Tongue River, a tributary of the Yellowstone River.¹⁹ The Wind River Reservation, located in southwestern Wyoming, is home to both the Eastern Shoshone and Northern Arapaho Tribes and encompasses over two million acres of land.²⁰ These reservations are both situated within basins rich in natural resources, such as CBM, that are rapidly being developed and exploited, often with little regulation or consideration of the impact that this development will have on tribal land and water near the development operations.²¹ While conflicts over tribal surface water rights are governed by the *Winters* doctrine,²² tribal rights to certain quantities of groundwater and to a certain quality of water have not been widely addressed.²³

The *Winters* doctrine dictates when the federal government sets aside a certain portion of land for a tribal reservation, the amount of surface water needed to fulfill the purposes of that reservation is impliedly reserved to the tribe. However, this right to water does not extend, as it arguably and

15. *Montana v. Wyoming*, 129 S. Ct. 480 (2008).

16. *Montana v. Wyoming*, 131 S. Ct. 1765, 1769 (2011).

17. Mudd, *supra* note 12, at 299-300.

18. *Northern Cheyenne Tribe*, MONT. GOVERNOR'S OFFICE OF INDIAN AFF., <http://www.tribalnations.mt.gov/northerncheyenne.aspx> (last visited Mar. 23, 2015).

19. Henry Loble, *Interstate Water Compacts and Mineral Development (with Emphasis on the Yellowstone River Compact)*, 21 ROCKY MTN. MIN. L. INST. 24 (1976).

20. *Wind River Agency*, U.S. DEP'T. OF THE INTERIOR: INDIAN AFFAIRS, <http://www.bia.gov/WhoWeAre/RegionalOffices/RockyMountain/WeAre/WindRiver/> (last visited Mar. 24, 2015).

21. Mudd, *supra* note 12, at 313.

22. *See Winters v. United States*, 207 U.S. 564 (1908).

23. Judith V. Royster, *A Primer on Indian Water Rights: More Questions than Answers*, 30 TULSA L.J. 61, 67 (1994) [hereinafter Royster, *A Primer*].

logically should, to groundwater, even though the scientific community almost unanimously accepts that surface water and groundwater are hydrologically connected. Only the Wyoming Supreme Court has addressed whether tribes have a right to groundwater, and unfortunately it ruled in the negative.²⁴ Furthermore, the additional *Winters* rights issue of whether tribes have a right to a certain quality of water also remains undecided.²⁵

Tribal rights to groundwater and water quality in the northwestern United States—a region that has a semi-arid climate, little rainfall, and rapidly increasing CBM development—must be defined and regulated in order to keep up with the ever-increasing race to develop natural resources.²⁶ Although avenues of cleaner energy are crucial to our nation's future and should be explored, we must remember the potential impacts that CBM development may have on those nearby who depend on groundwater to sustain their ways of life, which often include agriculture and other land uses requiring large quantities of water.²⁷ These issues are becoming increasingly important as CBM is likely to affect both the quality and quantity of water available to tribes. The water coproduced with CBM production can be highly saline, and its disposal into the surface water can impact crops and ecosystems. Furthermore, the amount of water withdrawn from the aquifers through the dewatering process is crucial in a region that is already prone to water shortages. While the current suit between Montana and Wyoming does not address tribal water rights, should these rights be impaired and the Compact violated, the tribes would likely be able to either participate in the ongoing litigation or bring suit on their own. It is important that the law consider and define these rights for the benefit of both the tribes and the states, and take a forward-looking approach that is proactive rather than reactive.²⁸ This comment will first analyze the CBM-producing basins in both Montana and Wyoming and discuss the potential consequences of CBM production. Next, tribal rights with respect to water quality will be investigated, with particular focus on the tribes of Montana and Wyoming in close proximity to CBM production. Finally, the ongoing litigation between the two states will be discussed, as well as the potential impacts of a major decision concerning water rights in the region.

24. *In re* General Adjudication of All Rights to Use Water in the Big Horn River System (*Big Horn I*), 753 P.2d 76, 99-100 (Wyo. 1988).

25. Royster, *A Primer*, *supra* note 23, at 84.

26. Murphy, *supra* note 6, at 401.

27. *Id.*

28. *Id.*

II. Geologic History

The CBM reserves of the western United States are an important alternative energy source for the future in a nation constantly attempting to minimize dependence on foreign oil and move towards domestically produced cleaner-burning fuels to supplement its growing needs. CBM produced nationwide is currently estimated to make up five to seven percent of the total natural gas consumed in the United States, and is expected to contribute even more in the future.²⁹ Increasing the amount of gas in our energy profile can reduce emissions, supply more clean electric power, and replace coal in many instances.³⁰ It is a viable alternative worth pursuing now and in the future. The instability of the global market only emphasizes the need to pursue self-sustaining energies that reduces dependency on foreign energy sources.

The Powder River and Wind River Basins of Montana and Wyoming are among thirteen basins in the United States that hold the majority of recoverable CBM deposits.³¹ Estimations of CBM natural gas reserves in the two basins total approximately seven hundred trillion cubic feet in volume, though not all of this gas may be feasibly recoverable.³² The Powder River Basin, which stretches from southwestern Montana to northeastern Wyoming,³³ is one of largest CBM reserves in North America.³⁴ Its reserves are estimated at around thirty-nine trillion cubic feet, about two-thirds of which are currently feasible to recover.³⁵ Over the past two decades, however, the amount of producing CBM wells in both basins has increased at an amazing rate due to improved recovery efficiency and production rates achieved through technological developments.³⁶

The coalbeds in each basin share a similar geologic history. Both are approximately sixty-five million years old (formed during the Cretaceous to early Tertiary eras), and can vary in thickness.³⁷ The Powder River Basin is

29. Duffy, *supra* note 1, at 412.

30. Jenner & Lamadrid, *supra* note 3, at 451.

31. PHILLIP WM. LEAR & J. MATTHEW SNOW, COAL AND COALBED METHANE DEVELOPMENT CONFLICTS REVISITED: THE OIL AND GAS PERSPECTIVE § 10.03 (Rocky Mountain Mineral Law Special Inst. 2003).

32. Murphy, *supra* note 6, at 402-03.

33. *Geology of Wyoming*, WYO. ST. GEOLOGICAL SURV., <http://www.wsgs.wyo.gov/Research/Geology/> (last visited Dec. 21, 2014).

34. LEAR & SNOW, *supra* note 31, at 10.

35. Murphy, *supra* note 6, at 404.

36. Duffy, *supra* note 1, at 412-13.

37. LEAR & SNOW, *supra* note 31, at 10.

made up of a geologic system called the “Tertiary Upper-Cretaceous coalbed methane total petroleum system,”³⁸ which is surrounded by several mountain ranges, all formed during the Laramide Orogeny—a mountain-building event which occurred in the late Cretaceous to Tertiary period.³⁹ The basinal coalbeds within the basin are deepest in the center, where the Fort Union coalbeds are up to fifty feet thick and the Wasatch coalbeds are around twenty-five feet thick.⁴⁰ In total, the Powder River Basin spans about 25,800 square miles, over twice the size of the Wind River Basin.⁴¹

The Wind River Basin, located in central to southwestern Wyoming, is bound on all sides by Laramide uplifts⁴² and spans about 11,700 square miles. It contains coalbeds which produce both CBM and oil.⁴³ In addition, sandstone units in the basin are also a source of CBM.⁴⁴

A. Coalbed Methane Formation

In 2012, Wyoming was first in the nation in coal production and fifth in natural gas production,⁴⁵ while Montana was seventh in coal production and twentieth in natural gas production.⁴⁶ That same year, the two states combined produced over seven trillion British thermal units (BTU) of coal, and more than two trillion BTU of marketed natural gas,⁴⁷ making them crucial players in the fight for energy independence in the United States. These resources are located largely in the Powder River and Wind River Basins, in coalbeds formed from the accumulation and compression of

38. ROMEO M. FLORES, U.S. GEOLOGICAL SURVEY, COALBED METHANE IN THE POWDER RIVER BASIN, WYOMING AND MONTANA: AN ASSESSMENT OF THE TERTIARY-UPPER CRETACEOUS COALBED METHANE TOTAL PETROLEUM SYSTEM 1 (2004), http://pubs.usgs.gov/dds/dds-069/dds-069-c/REPORTS/Chapter_2.pdf (chapter 2 of TOTAL PETROLEUM SYSTEM AND ASSESSMENT OF COALBED GAS IN THE POWDER RIVER BASIN PROVINCE, WYOMING AND MONTANA (USGS Powder River Basin Province Assessment Team comp., 2004)).

39. *Id.*

40. *Id.* at 10.

41. *Id.*

42. *Wind River Reservation*, U.S. OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, https://www1.eere.energy.gov/tribalenergy/guide/pdfs/wind_river.pdf (last visited Sept. 26, 2014).

43. *Id.*

44. *Id.*

45. *Wyoming*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/state/?sid=WY> (last visited Sept. 22, 2014).

46. *Montana*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/state/?sid=MT> (last visited Sept. 22, 2014).

47. *Wyoming*, *supra* note 45; *Montana*, *supra* note 46.

decaying plant material over time through a series of chemical reactions often referred to as “coalification.”⁴⁸



*Fig. 1: Regional map of the northwest United States. The Powder River Basin and Wind River Basin are both major sources of CBM development in the region.*⁴⁹

During coalification, methane and other gases are generated and accumulate within the natural pores of the coalbeds.⁵⁰ In the past, this gas was considered useless and was released into the air as waste during mining.⁵¹ Today, however, it is recognized as an important source of natural gas that can be collected, stored, and used to power homes, cars, and

48. LEAR & SNOW, *supra* note 31, at 10.

49. *Bill Barrett Corporation: Common Stock*, NASDAQ, <http://www.nasdaq.com/markets/ipo/filing.ashx?filingid=3133777> (last visited Jan. 6, 2015).

50. LEAR & SNOW, *supra* note 31, at 10.

51. *Id.*

businesses.⁵² Moreover, these coalbeds are not only sources of CBM; due to their naturally fractured nature, like many sandstone units in the region, these coalbeds also serve as functioning aquifers and are an important source of municipal, public, and private water.⁵³

CBM production from coalbeds has been ongoing since the 1980s in Wyoming and the late 1990s in Montana.⁵⁴ During CBM development, water is removed from the coalbeds through pumping, which allows the pressure of the bed to decrease, and the methane to detach from the surfaces of the coal and flow through fractures in the beds to the surface.⁵⁵ This process results in a large amount of produced water, which varies in volume depending on recovery techniques used and the lithology of the beds.⁵⁶ Dewatering, however, can cause up to fifteen meters of water in these coalbed aquifers to drawdown over a twenty-year period,⁵⁷ which can devastate aquifers that typically have a very low natural recharge rate.⁵⁸ Furthermore, these coalbed aquifers contribute a large volume of the flow to the Powder and Tongue Rivers.⁵⁹ The coalbeds of the Fort Union formation, for example, make up the “most continuous hydrogeologic unit in the Powder River Basin,” a quality typically attributed to sandstone aquifers in the region, which are considered more traditional water-bearing formations.⁶⁰ Over a forty-year period, production of CBM is estimated to remove so much water from the beds that the area would need over two hundred uninterrupted years of recharge to recover—an extremely unlikely event given the growing popularity of CBM in the global energy market.⁶¹ CBM produced water and the dewatering process are extremely important side effects to consider and must be dealt with in order for CBM development to proceed safely and with minimal environmental impact. Dewatering affects not only the coalbeds, but the beds around it as well, leading to widespread impacts on the development of other natural resources in the area.⁶²

52. *Id.*

53. Myers, *supra* note 9, at 180.

54. USGS, COALBED METHANE EXTRACTION, *supra* note 5.

55. FLORES, *supra* note 38, at 7.

56. USGS, COALBED METHANE EXTRACTION, *supra* note 5.

57. Myers, *supra* note 9, at 181.

58. *Id.*

59. *Id.*

60. FLORES, *supra* note 38, at 7.

61. Myers, *supra* note 9, at 190-91.

62. Tim A. Moore, *Coalbed Methane: A Review*, 101 INT'L J. COAL GEOLOGY 36, 69 (2012).

B. CBM Produced Water

Concerns associated with coproduced water typically revolve around the salinity of water,⁶³ although the presence of arsenic, barium, and zinc in some areas can be a problem.⁶⁴ Although coproduced water can vary in composition based on location, recovery techniques, and various other factors, it tends to have similar characteristics from site to site, such as high concentrations of sodium and bicarbonate and low concentrations of calcium, magnesium, and sulfate.⁶⁵ The high sodium adsorption ratio is often most concerning, however, as high salinity is detrimental to plants and animals not equipped to handle waters with a high salt content.⁶⁶ This is especially problematic in regions such as the northwest United States, where crop growth in such an arid environment is heavily dependent on irrigation. Treatment of coproduced water can be difficult, however, due to the large volume of water usually associated with production, and the lack of existing facilities equipped to process and remove impurities.⁶⁷ While treatment options exist and are being pursued by researchers, many are not feasible due to their cost.⁶⁸ As an increasing number of companies are faced with the challenges of dealing with excess water, however, treatment of coproduced water will certainly become a priority.⁶⁹

CBM wells in the Powder River Basin produce about ten gallons of coproduced water per minute on average.⁷⁰ Between 2006 and 2029, wells in the Powder River Basin alone are estimated to produce eleven billion barrels of coproduced water in total.⁷¹ Some wells have been known to produce an astounding 17,280 gallons in just one day,⁷² with most

63. NAT'L ACAD. OF SCI. ET AL., MANAGEMENT AND EFFECTS OF COAL BED METHANE PRODUCED WATER IN THE WESTERN UNITED STATES (Report in Brief, 2010), available at <http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/Coalbed-Methane-Report-Brief-Final.pdf>.

64. PEDRO RAMIREZ, JR., U.S. FISH & WILDLIFE SERV., ASSESSMENT OF CONTAMINANTS ASSOCIATED WITH COAL BED METHANE-PRODUCED WATER AND ITS SUITABILITY FOR WETLAND CREATION OR ENHANCEMENT PROJECTS 1, 2 (Contaminant Rep. No. R6/721C/05, 2005), available at <http://www.fws.gov/mountain-prairie/contaminants/papers/documents/r6721c05.pdf>.

65. Moore, *supra* note 62, at 70.

66. *Id.*

67. *Id.*

68. *Id.*

69. *Id.*

70. RAMIREZ, JR., *supra* note 64, at 2.

71. Mudd, *supra* note 12, at 313.

72. Murphy, *supra* note 6, at 405-06.

producing around 12,600 gallons (or 400 barrels) per day on average.⁷³ The method of disposal chosen depends on the quality of water as well as state regulations.⁷⁴ Disposal options for coproduced water in Wyoming and Montana typically include disposal by re-injection into the subsurface, disposal directly into surface water bodies, storage in some type of above-ground structure, and reuse.⁷⁵

In the Powder River Basin, coproduced water is often discharged into surface water.⁷⁶ As with most coproduced water, the salinity of this water is the main concern, as highly saline water can have extreme consequences for downstream users when deposited into freshwater streams and lakes with a much lower base salinity.⁷⁷ High salinity water can be detrimental when the water is used for irrigation, affecting crops and soil quality, as well as wildlife in the area who rely heavily on surface water.⁷⁸ Coproduced water usually contains sodium, bicarbonate, and chloride,⁷⁹ all of which can render soil irrigated by this water essentially useless for crop growth when present in elevated levels.⁸⁰ Furthermore, the discharge of a large volume of coproduced water into surface water bodies can increase the flow rate downstream, resulting in negative impacts on ecosystems that rely on a consistent flow rate.⁸¹ Overall, the conditions in which water is reused and disposed of in Wyoming and Montana have not been widely studied to assess the impact of coproduced water on both crop growth and wildlife. Although reuse and disposal into surface water is much cheaper than treatment and storage, it will be crucial for the impact of coproduced water in the region to be studied in more depth as CBM production in the region increases.

III. Winters Rights and Water Quality

To understand the complexities of tribal water rights in the West, one must first understand the *Winters* doctrine, also known as the reserved rights doctrine, established in *Winters v. United States*.⁸² The Supreme

73. *Id.* at 407.

74. *Id.* at 408.

75. *Id.*

76. RAMIREZ, JR., *supra* note 64, at 2.

77. *Id.* at 6.

78. *Id.* at 2.

79. USGS, WATER PRODUCED, *supra* note 7.

80. Murphy, *supra* note 6, at 410.

81. *Id.* at 408.

82. 207 U.S. 564 (1908).

Court held in *Winters* that when the government creates an Indian reservation, it impliedly reserves water rights to the tribes occupying the territory in an amount sufficient to carry out the purpose of the reservation.⁸³ The United States, acting as trustee, essentially preserves a right for the tribes that they already had—the right to water on their land—regardless of whether the reservation itself was established by treaty or by Executive Order.⁸⁴ These water rights vest on the date of creation of the reservation, and cannot be lost through nonuse.⁸⁵ Due to the unique way in which tribal water rights vest, tribes are usually the most senior water right holders in a state.⁸⁶ The Supreme Court affirmed *Winters* over fifty years later in *Arizona v. California*, holding that *Winters* rights include the amount of water necessary to fulfill the purpose of the reservation. In *Arizona*, the Court found the purpose of the reservation was agriculture, and therefore by creating the reservation, the federal government reserved enough water to the tribes in order for them to irrigate their land.⁸⁷ The Court further held that subject to *Winters*, the quantity of water reserved to the tribes should be measured by the “practicably irrigable acreage” (PIA) of the reservation.⁸⁸ Absent a more workable standard, courts continue to apply PIA when determining the quantity of water a reservation receives, even though the purpose of a reservation may be something other than agriculture.⁸⁹ Notably, however, the Arizona Supreme Court stepped away from this doctrine in 2001 and instead chose to define the purpose of reservations as Indian homesteads, an approach more consistent with reality and history since reservations were created as permanent homes for tribes.⁹⁰ The Court found that while PIA could be a factor to consider, it is better to look at the overall circumstances of a tribe, ranging from its history and values to its expected population growth and economic future.⁹¹ This view is much more practical and in line with modern views, and hopefully other

83. Royster, *A Primer*, *supra* note 23, at 66.

84. Peter Capossela, *Indian Reserved Water Rights in the Missouri River Basin*, 6 GREAT PLAINS NAT. RESOURCES J. 131, 136 (2002).

85. Judith V. Royster, *Climate Change and Tribal Water Rights: Removing Barriers to Adaptation Strategies*, 26 TUL. ENVTL. L.J. 197, 203 (2013) [hereinafter Royster, *Climate Change*].

86. *Id.* at 204.

87. *Arizona v. California*, 373 U.S. 546 (1963).

88. Royster, *Climate Change*, *supra* note 85, at 204.

89. *See id.* at 206.

90. *See In re General Adjudication of All Rights to Use Water in Gila River System and Source*, 35 P.3d 68, 73 (2001).

91. Royster, *Climate Change*, *supra* note 85, at 206.

courts will follow this view in the future as they evaluate how much water is guaranteed to a reservation.

The *Winters* doctrine has primarily been litigated in western states using the prior appropriation doctrine, rather than in eastern states that utilize the doctrine of riparian rights.⁹² Montana and Wyoming are appropriation states, and thus *Winters* rights apply.⁹³ Appropriation is most often defined as “first in time, first in right,” with three limiting principles: (1) beneficial use, (2) the no-injury rule, and (3) the doctrine of recapture.⁹⁴ These three principles govern what senior appropriators may do with their water, and prevent them from violating the rights of junior appropriators.⁹⁵ The first principle—the doctrine of beneficial use—limits a senior appropriator to “the amount of water that is necessary to irrigate his land by making reasonable use of the water.”⁹⁶ The no-injury rule requires senior appropriators refrain from taking more water than they need for beneficial use, and prevents injury to junior appropriators who stand to be harmed by an increased intake of water by senior appropriator.⁹⁷ Finally, the doctrine of recapture gives senior appropriators the right to their specific amount of water, including any waste or runoff that occurs from irrigation.⁹⁸

The priority date of tribal water rights is set by the date the reservation was created.⁹⁹ This means tribal water rights usually pre-date state water rights, which are often perfected much later.¹⁰⁰ “[T]ribal reserved rights may be satisfied from any available source of surface water, with a strong preference for reservation-based streams.”¹⁰¹ However, *Winters* rights do not expressly deal with groundwater.¹⁰² The only court to specifically address this issue is the Wyoming Supreme Court in *In re General Adjudication of All Rights to Use Water in the Big Horn River System (Big Horn I)*.¹⁰³ In this case, “the court held that reserved rights did not extend to

92. *Id.* at 203.

93. *Id.* at 205, 208.

94. Andrew S. Bennett, *Montana v. Wyoming: A Rising Tide of Water Issues*, 36 ENVIRONS ENVTL L. & POL’Y J. 115, 118 (2013).

95. *Id.* at 118.

96. *Id.* at 119 (quoting 1 CLESSON S. KINNEY, A TREATISE ON THE LAW OF IRRIGATION AND WATER RIGHTS § 586, at 1007-08 (2d ed. 1912)).

97. *Id.*

98. *Id.*

99. Capossela, *supra* note 84, at 138.

100. *Id.*

101. Royster, *A Primer*, *supra* note 23, at 67-68.

102. *Id.* at 68.

103. 753 P.2d 76 (Wyo. 1988).

groundwater, on the basis that no other court had ever found such a right.”¹⁰⁴ While this case has been heavily criticized due to its lack of analysis and broad generalizations about *Winters* rights and groundwater,¹⁰⁵ it unfortunately remains the only case to directly deal with this issue. Revisiting and re-litigating this topic in the future will be crucial if tribes are to fully realize the amount of water guaranteed to them. Furthermore, with the effects of climate change looming, it is highly likely that tribes will become increasingly dependent on groundwater.¹⁰⁶ Overlooking such an important component of the hydrologic system, shown to be inextricably connected to the surface water, could therefore prove to be detrimental to the culture and survival of many tribes.

The final remaining issue in the context of *Winters* rights is whether or not tribes have a right to water quality (in addition to water quantity).¹⁰⁷ With the increasing production of CBM in both the Wind River and Powder River Basins, water quality is likely to become very important to the tribes, especially those of the Wind River Reservation who have CBM development already occurring on their land. The quality of produced water associated with CBM wells is shown to be highly saline and to contain a high amount of total dissolved solids.¹⁰⁸ This does not bode well for tribes downstream from production areas who rely heavily on surface water for their wellbeing and survival, both for their citizens and their livestock and irrigation needs.

What may become the most crucial point of contention is what courts find to be the “purpose” of their reservations in revisiting the issues of how much and what kind of water is guaranteed to these tribes.¹⁰⁹ If found to be agriculture, then highly saline waters would be extremely harmful to both the soils and crops, and could affect fish and local ecosystems, upsetting the balance of wildlife in the regions and affecting tribal fishing rights.¹¹⁰ Furthermore, the quantity of water allocated to each tribe could potentially be impractically based on PIA, rather than looking at the actual needs of the

104. Royster, *A Primer*, *supra* note 23, at 68.

105. *Id.*

106. Royster, *Climate Change*, *supra* note 85, at 219.

107. Royster, *A Primer*, *supra* note 23, at 85.

108. STACY M. KINSEY & DAVID A. NIMICK, USGS, POTENTIAL WATER-QUALITY EFFECTS OF COAL-BED METHANE PRODUCTION WATER DISCHARGED ALONG THE UPPER TONGUE RIVER, WYOMING AND MONTANA 1, 2 (Scientific Investigations Rep. 2011-5196, 2011), available at <http://pubs.usgs.gov/sir/2011/5196/report/sir2011-5196.pdf>.

109. Royster, *A Primer*, *supra* note 23, at 85-86.

110. *Id.*

tribe.¹¹¹ In *Big Horn I*, the Wyoming Supreme Court did just this, finding that the purpose of the Wind River Reservation was agriculture, and therefore used the PIA standard to measure the amount of water reserved to the tribes.¹¹² Considering the arid nature of the land in the northwest United States, measuring the water allotted to a tribe merely by irrigable acreage is both impractical and senseless. The court, in reaching this decision, failed to consider the realities faced by the tribes and their members, and unfortunately may have set them up for failure should they choose to turn to another method of generating income, such as tourism.

A. Northern Cheyenne Tribe

The Northern Cheyenne Indian Reservation, located in southeastern Montana, was created in 1884 by an Executive Order¹¹³ and overlies much of the CBM-bearing Fort Union formation located in the Powder River Basin.¹¹⁴ Although formerly nomadic, the tribe turned to agriculture and ranching on the reservation in the early nineteenth hundreds in an effort to improve its economy and wellbeing.¹¹⁵ It was not until 1954, when a paved road and electricity were installed, that the reservation was finally connected to the outside world.¹¹⁶ In 1900, a second Executive Order expanded the eastern boundary of the reservation to the “middle of the channel of the Tongue River”¹¹⁷ and brought the reservation to its present size of about 445,000 acres.¹¹⁸

Coal mining and CBM development surround the reservation, but the tribe itself has not yet moved into coal development.¹¹⁹ However, economic concerns could change this, even though political swings within tribal government have recently hindered progress towards any formal decision.¹²⁰ Though the potential resources in the subsurface have been

111. *Id.*

112. Royster, *Climate Change*, *supra* note 85, at 205.

113. NORTHERN CHEYENNE TRIBE, THE NORTHERN CHEYENNE TRIBE AND ITS RESERVATION 2-1, 2-1 (2002) (chapter 2, “An Overview of Northern Cheyenne Culture and History”).

114. Kate Whittle, *Hidden Treasure*, MONT. NATIVE NEWS PROJECT 2011, <http://native.news.jour.umt.edu/2011/cheyenne.html> (last visited May 15, 2015).

115. NORTHERN CHEYENNE TRIBE, *supra* note 113, at 2-22.

116. *Id.* at 2-26.

117. Brief for Northern Cheyenne Tribe as Amicus Curiae Supporting Plaintiff at 1, *Montana v. Wyoming*, No. 137 (May 1, 2008), 2008 WL 8118501.

118. *Id.*

119. Whittle, *supra* note 114.

120. *Id.*

recognized since the 1920s, it was not until 1926 through the Northern Cheyenne Allotment Act that Congress reserved coal and other minerals for the benefit of the tribe.¹²¹ This act, however, “provided that coal, oil and gas and other mineral[s] underlying allotments would become the property of the respective allottees or their heirs after 50 years.”¹²² Later, the tribe requested that Congress clarify these rights due to fear of individual members leasing their allotments;¹²³ Congress responded by terminating this grant in 1968 and reserving the mineral rights for the benefit of the tribe.¹²⁴ In *Northern Cheyenne Tribe v. Hollowbreast*, the Supreme Court agreed with this decision.¹²⁵

B. Wind River Basin

The Wind River Reservation, established in 1868 by the Second Fort Bridger Treaty, is home to both the Eastern Shoshone and Northern Arapaho Tribes.¹²⁶ Although originally home to only the Eastern Shoshone Tribe, the Northern Arapaho Tribe was moved onto the reservation in 1878 as a temporary measure that eventually became permanent.¹²⁷ Each tribe holds a half interest in the reservation’s resources, and the two tribes historically held joint council meetings in order to manage and evaluate their joint interests through a Joint Business Council (JBC),¹²⁸ although their tribal governments operated separately of one another.¹²⁹ However, the Northern Arapaho Business Council recently voted to dissolve the JBC in order for the tribes to operate in their own best interests.¹³⁰ In a letter to the Northern Arapaho Tribe in September of 2014, the Northern Arapaho Business Council explained the decision to its members, stating the move

121. NORTHERN CHEYENNE TRIBE, *supra* note 113, at 2-26.

122. *Id.* at 2-27.

123. *Id.*

124. *Id.*

125. 425 U.S. 649 (1976); NORTHERN CHEYENNE TRIBE, *supra* note 113, at 2-27.

126. *The Rez*, PBS: CHIEFS, <http://www.pbs.org/independentlens/chiefs/rez.html> (last visited Nov. 3, 2014).

127. *Id.*

128. *Background*, NORTHERN ARAPAHO TRIBE, <http://www.northernarapaho.com/background> (last visited Nov. 3, 2014).

129. *Eastern Shoshone*, MONT. WYO. TRIBAL LEADERS COUNCIL, <https://web.archive.org/web/20130911085215/http://www.mtwytlc.com/tribes/eastern-shoshone.html> (last visited May 15, 2015).

130. Trevor Gaff, *Eastern Shoshone Reject Northern Arapaho Dissolution of Joint Business Council*, CASPER STAR-TRIBUNE, Oct. 1, 2014, http://trib.com/news/state-and-regional/eastern-shoshone-reject-northern-arapaho-dissolution-of-joint-business-council/article_1e8a23ff-b86a-51c7-9530-a3ae5854a2b5.html.

would lead to “greater self-government and independence,” and touting the decision as a “powerful message of tribal sovereignty.”¹³¹ The Eastern Shoshone are strongly against this dissolution, however, and have decided to manage the JBC for both tribes in the interim in the hopes that they can reach a resolution.¹³² This divide between the two tribes may complicate future decision-making regarding the natural resources proven to exist below the tribal lands.

Over time, the tribes have worked together in leasing land for multiple purposes, and they have come together in order to provide sources of income for their people through “construction, fisheries, gaming, mining and tourism.”¹³³ Unfortunately, however, both tribes still face economic hardships including high unemployment and poverty rates.¹³⁴ Historically, the JBC has been reluctant to allow CBM development to move forward on the reservation,¹³⁵ but pending any type of joint-council reformation, the lack of cooperation between the tribes in managing their shared interests could result in conflict. Tribal members have been split over CBM development in the region. Some view it as a way for the tribes to improve their standards of living, but others argue that allowing such development would harm their homelands and bring nothing but problems.¹³⁶ These disputes have influenced tribal politics, and will likely continue to do so.

1. Eastern Shoshone

The Eastern Shoshone Tribe remains the only tribe that decided the location of its reservation, choosing to reside on the Wind River Reservation.¹³⁷ In 1865, the United States set aside the region for the Eastern Shoshone Tribe, and in 1868, further defined these boundaries through the Second Treaty of Fort Bridger.¹³⁸ Although originally nomadic buffalo hunters, the tribe later converted to farming and ranching out of necessity when the amount of buffalo decreased, but quickly became reliant

131. Letter from Northern Arapaho Business Council to Members of the Northern Arapaho Tribe (Sept. 9, 2014), *available at* <http://www.northernarapaho.com/sites/northernarapaho.com/files/LF%20NABC%20to%20NAT%20members%209-9-14.pdf>.

132. Gaff, *supra* note 130.

133. *The Rez*, *supra* note 126.

134. *Id.*

135. *Coalbed Methane Industry Eyes Reservation Waters*, WIND RIVER ALLIANCE, <http://www.windriveralliance.org/news/newsletter/2005a/index.php> (last visited Nov. 3, 2014).

136. *Id.*

137. *The Rez*, *supra* note 126.

138. *Big Horn I*, 753 P.2d 76, 83 (Wyo. 1988).

on the government when these efforts failed.¹³⁹ As a result, the tribe was forced to sell some of its land back to the United States and fell on hard times until the arrival of miners in the region, which gave it a source of revenue.¹⁴⁰ Members of the tribe worked as manual laborers, renting and selling their land to settlers who arrived to mine.¹⁴¹ Nearly four decades later, in 1940, the Secretary of the Interior began restoring lands to tribal ownership.¹⁴²

2. Northern Arapaho

The Northern Arapaho, like the Eastern Shoshone, were originally nomadic buffalo hunters.¹⁴³ The tribe was formerly located across the Plains, from present-day Oklahoma and Kansas to New Mexico and South Dakota.¹⁴⁴ The Northern Arapaho and Eastern Shoshone, formerly enemies, were forced to coexist when the Northern Arapaho were relocated to the Wind River Reservation in 1878 after conflicts with settlers.¹⁴⁵ Like the Shoshone, the Northern Arapaho faced economic hardship and were forced to heavily rely on the government.¹⁴⁶ Over time, the tribes were largely able to work together for the greater good of both, although each is still separate in government and identity.¹⁴⁷

C. Big Horn I and the Wind River Reservation

In 1988, the Wyoming Supreme Court became the first to tackle the issue of whether *Winters* rights extended to groundwater.¹⁴⁸ The litigation dealt with the Big Horn drainage basin, also known as Water Division No. 3, located in Wyoming.¹⁴⁹ The litigation began when Wyoming enacted a statute¹⁵⁰ which authorized “the [s]tate to commence system-wide adjudications of water rights.”¹⁵¹ The case was split into three phases, one

139. *Id.* at 83-84.

140. *Id.* at 84.

141. *Id.*

142. *Id.*

143. *History of the Northern Arapaho Tribe*, ARAPAHO PROJECT, <http://www.colorado.edu/csilw/arapahoproject/contemporary/history.htm> (last visited Nov. 3, 2014).

144. *Id.*

145. *Big Horn I*, 753 P.2d at 83.

146. *The Rez*, *supra* note 126.

147. *Id.*

148. *Big Horn I*, 753 P.2d at 83.

149. *Id.*

150. WYO. STAT. ANN. § 1-37-106 (2013).

151. *Big Horn I*, 753 P.2d at 84.

of which (Phase I) dealt with tribal water rights.¹⁵² The tribes of the Wind River Reservation originally challenged the Wyoming statute on the basis of jurisdiction, claiming that the state had no right to adjudicate tribal water rights. Ultimately, the Wyoming Supreme Court found it did have jurisdiction under both the Wyoming Constitution and the McCarran Amendment, which allows state courts to adjudicate tribal water rights in general stream adjudications.¹⁵³

The Court found that Congress “intended to reserve water for the Wind River Indian Reservation when it was created in 1868,” and next looked to the purpose of the reservation to determine the amount of water reserved.¹⁵⁴ Finding the purpose was agriculture, the Court ignored facts showing the tribes were also involved in fishing, claiming the “evidence [was] not sufficient to imply a fishery flow right absent a treaty provision.”¹⁵⁵ The Court also denied the tribes sufficient water rights to develop minerals, finding again that absent a treaty provision, no such right could be impliedly reserved, even though the tribes had since made use of water for these purposes.¹⁵⁶ In further denying water to the tribes for wildlife and aesthetic preservation, the Court again stated that the treaty did not speak to such a purpose, and therefore it could not be found by the Court.¹⁵⁷

The Court further dismissed any right the tribes had to groundwater, while acknowledging that surface water and groundwater “are often interconnected.”¹⁵⁸ The decision of the Court on this issue has been particularly criticized, in large part because the Court’s logic in denying such a right was solely because it would be the first court to recognize such a right.¹⁵⁹ This sadly set a precedent in Wyoming that will require a reversal in order to set things right for tribal water rights in the region. The lack of precedent on the issue allowed the Court the chance to be proactive and to consider a multitude of scientific evidence, which would have easily proven the inextricable connection between ground and surface water. The inseparable nature of the components of the hydrologic cycle alone defy the Court’s decision, and tribal reserved water rights should be protected accordingly. Although the Court acknowledged in its decision the impact

152. *Id.*

153. *Id.* at 86.

154. *Id.* at 94.

155. *Id.* at 98.

156. *Id.*

157. *Id.* at 99.

158. *Id.*

159. *See id.* at 99-100.

that its opinion would have, and noted that no other cases had found a reserved right to groundwater, it nevertheless held that “the reserved water doctrine does not extend to groundwater.”¹⁶⁰

Having found that the sole purpose of the Reservation was agriculture, the Court used the PIA standard to determine how much water was reserved to the Tribes. Pursuant to *Arizona v. California*, states determine the amount of water reserved to a reservation by looking at PIA.¹⁶¹ While the PIA approach has been criticized for its failure to consider other equally important reservation uses, courts have not yet found an alternative.¹⁶² The Wyoming Supreme Court ultimately awarded the tribes of the Wind River Reservation 480,000 acre-feet of water, sufficient to irrigate about 108,000 acres.¹⁶³

In his dissent, Justice Thomas disagreed with the majority’s limitation on the tribes’ reserved water rights, stating that the purpose of an Indian reservation was “to provide a homeland for Indian peoples.”¹⁶⁴ Justice Thomas further noted that by limiting the purpose of the reservation to agriculture alone, it inherently limited both the economic and societal growth the Tribes could obtain.¹⁶⁵ This is a common criticism of the PIA standard. As Justice Thomas points out, while land may be theoretically irrigable, this alone does not make agriculture practical.¹⁶⁶ Furthermore, tribes should be allowed to grow and develop freely, instead of being confined to one option to provide for themselves.

It is well recognized that the freedom to change and grow is what allows for the best use of resources. Restricting tribal ability to adapt is counterproductive and will not allow tribes to succeed in an ever-changing future that requires quick thinking, innovation, and the resources to accomplish new goals. While the tribes may have turned to ranching and agriculture in the past, this is no longer a feasible reality. It is important that courts in the future accept the true purpose of reservations created so many years ago—as a permanent home for the Indians that occupy them. Tribes should enjoy the freedom to develop the land they call home in the same way as the rest of society. It is crucial for tribal leaders to be unrestricted by impractical methods of determining water allotments as they make

160. *Id.* at 100.

161. Royster, *Climate Change*, *supra* note 85, at 205.

162. *Id.*

163. Capossela, *supra* note 84, at 141.

164. *Big Horn I*, 753 P.2d at 119 (Thomas, J., dissenting).

165. *Id.* at 119 (Thomas, J., dissenting).

166. *Id.* (Thomas, J., dissenting).

important decisions for the future of their people. It is no secret that many reservations struggle with high rates of poverty, crime, and unemployment. To resolve these issues, tribal governments need the flexibility and water in order to encourage other routes of income, such as fishing and resource development. Bringing in new income and a better way of life for tribal members not only benefits the tribes themselves, but can improve the economy of the states in which the reservations exist. The availability of water to a society is crucial to accomplish any of these goals, and it would be a tragic misstep to stand by as tribal governments struggle and ultimately fail simply because courts were still functioning under misguided concepts of the past.

D. The Pavillion Problem: Pavillion, Wyoming and the CBM Development Impacts on Groundwater in the Wind River Basin

The town of Pavillion, Wyoming, has been a recent hotspot of controversy between the tribes of the Wind River Reservation, the state of Wyoming, and Pavillion residents. Hydraulic fracturing in the area and the quality of the town's groundwater have been under a high level of scrutiny in the past ten years, and are of concern to not only the residents of Pavillion, but also to tribal members living nearby. Pavillion is a town of about 200 residents located inside the Wind River Reservation in Fremont County, Wyoming, although the town is not considered a part of the Reservation itself due to congressional action that opened up the lands for settlement and homesteading.¹⁶⁷ Pavillion has seen drilling and gas production since the late 1960s, and in 2004, Encana acquired these production outfits.¹⁶⁸ Over the next three years, Encana drilled forty-four new wells in the field, and in 2005, it received its first complaint from residents about drinking water quality.¹⁶⁹ Water quality is a significant concern since the town gets its municipal water from groundwater wells. Encana tested water quality as a result of the complaint, but no conclusions were reached and no action was taken.¹⁷⁰ In 2008, Pavillion's residents contacted the Environmental Protection Agency (EPA) with concerns about

167. *Pavillion Groundwater Investigation*, EPA, <http://www2.epa.gov/region8/pavillion> (last visited Dec. 21, 2014).

168. *Why Encana Refutes U.S. EPA Pavillion Groundwater Report*, ENCANA, <http://www.encana.com/news-stories/news-releases/details.html?release=632327> (last visited Dec. 21, 2014).

169. *Id.*

170. *Id.*

the quality of their water.¹⁷¹ Encana has maintained throughout the investigation that poor water quality existed in Pavillion prior to drilling, and therefore it is not responsible for any impurities or dangers which may exist.¹⁷²

As a result of these complaints, the EPA conducted testing by sampling private water wells and installing monitoring wells to determine the extent of the effects of hydraulic fracturing on the town's water supply.¹⁷³ In 2011, the EPA published an initial report stating that hydraulic fracturing likely was affecting the water supply, but unfortunately the report was not peer reviewed and, unsurprisingly, faced subsequent challenges from both industry and the state of Wyoming.¹⁷⁴ A further study in 2012, conducted by both the EPA and the United States Geological Survey (USGS), reached similar results as the first report, but also faced criticism.¹⁷⁵ As a result of these challenges and pressures, the EPA announced in 2013 that while it would not continue to pursue peer review of its draft, it would instead "support[] the State of Wyoming in its further investigation of drinking water quality" in Pavillion.¹⁷⁶

For many, this retreat by the EPA is a very unsatisfactory outcome to a six-year-long ordeal. The failure to fully investigate this issue by both the EPA and outside sources could prove troubling if the tribes were to someday choose to litigate a claim asserting a right to a certain level of water quality, since the town of Pavillion is located within the reservation itself. Furthermore, both tribes claim the EPA did not consult them in the ruling. In June of 2013, the Northern Arapaho Business Council expressed its concerns in a letter to Robert Perciaseppe, the Acting and Deputy Director of the EPA, asking him to reconsider the EPA's decision and fulfill its duties to the tribes before finalizing its decision.¹⁷⁷ Unfortunately, however, the decision has been finalized, and the EPA has chosen to move

171. *Pavillion Groundwater Investigation*, *supra* note 167.

172. *Why Encana Refutes U.S. EPA Pavillion Groundwater Report*, *supra* note 168.

173. Keith B. Hall, *Hydraulic Fracturing and the Baseline Testing of Groundwater*, 48 U. RICH. L. REV. 857, 891 (2014).

174. *Id.*

175. Monika Ehrman, *The Next Great Compromise: A Comprehensive Responsive to Opposition Against Shale Gas Development Using Hydraulic Fracturing in the United States*, 46 TEX. TECH L. REV. 423, 437-38 (2014).

176. *Pavillion Groundwater Investigation*, *supra* note 167.

177. Letter from Darrell O'Neal, Sr., Chairman, Northern Arapaho Business Council to Robert Perciaseppe, Acting and Deputy Director of the Environmental Protection Agency (June 24, 2013), *available at* http://wyofile.com/wp-content/uploads/2013/06/nativenotes_tribesepa.pdf.

forward in working with the state of Wyoming and the Wyoming Oil and Gas Commission to determine whether drilling has in fact affected water quality.¹⁷⁸

Further EPA action involving the town of Pavillion and the Wind River Reservation continues to affect both the tribes and the citizens of Pavillion. Prior to the dissolution of the JBC, the Northern Arapaho and Eastern Shoshone tribes applied to the EPA, asking it to consider the Wind River Reservation a state for the purposes of the Clean Air Act (CAA).¹⁷⁹ In December of 2013, the EPA approved this request.¹⁸⁰ In doing so it redefined the boundaries of the Wind River Reservation to include three towns (including Pavillion) as reservation lands,¹⁸¹ despite a 1905 act that opened these same lands for homesteading, annexing them from the reservation.¹⁸² The EPA approval makes these towns once again subject to the rules and regulations of the reservation for purposes of the CAA, which could have far-reaching consequences in terms of land management and regulatory matters handled by the tribes.

The justification for this action was set out in a letter from Hilary C. Tompkins, Solicitor of the Department of the Interior, to Scott C. Fulton, General Counsel for the EPA. Pursuant to the EPA request for an opinion regarding the Wind River Reservation boundaries, Ms. Tompkins advised Mr. Fulton that under a three-prong test set out in *Solem* and subsequent Supreme Court cases, to determine whether a reservation boundary has been altered by a congressional action one must first look at congressional intent, inferred from the statute's language.¹⁸³ Next, one must consider the events that led up to the passage of the act purportedly altering the reservation boundaries, and finally, one must look at the results of the passage of the act.¹⁸⁴ Based on the results of this three-prong test, Ms.

178. *Pavillion Groundwater Investigation*, *supra* note 167.

179. *Wind River Treatment in the Same Manner as a State Approval*, EPA, <http://www2.epa.gov/region8/wind-river-treatment-same-manner-state-approval> (last visited Dec. 21, 2014).

180. *Id.*

181. *Id.*

182. Act of Mar. 3, 1905, ch. 1452, 33 Stat. 1016.

183. *Solemn v. Bartlett*, 465 U.S. 463, 470 (1975); Letter from Hilary C. Tompkins, Solicitor, Dep't of the Interior, to Scott C. Fulton, General Counsel, EPA 1, 2 (Oct. 26, 2011), available at <http://www2.epa.gov/sites/production/files/2013-12/documents/epawr009733.pdf>.

184. Letter from Hilary C. Tompkins to Scott C. Fulton, *supra* note 183, at 3.

Tompkins concluded that the boundaries of the Wind River Reservation remained unchanged for three reasons.¹⁸⁵

First, the language of the 1905 act did not “evidence the present and total surrender of all tribal interests” in the land, as required by *Solem*.¹⁸⁶ Second, the 1905 act did not include any type of compensation to the tribes for relinquishment of the land.¹⁸⁷ Third, the lands mentioned in the 1905 act were not “ceded . . . to the public domain[.]” and “[i]n fact, members of Congress disclaimed any intent to do so.”¹⁸⁸ Furthermore, the circumstances pre- and post-passage of the 1905 act did not indicate that Congress intended to alter the reservation boundaries.¹⁸⁹ Based upon analysis of these three factors, Ms. Tompkins, and the EPA, concluded that the 1905 act did not diminish the boundaries of the Wind River Reservation, and therefore the towns of Pavillion, Riverton, and Kinnear were part of the reservation itself.¹⁹⁰

So far, the state of Wyoming has chosen not to comply with the EPA ruling; it requested a stay of the ruling in January, 2014.¹⁹¹ Following this request, and requests for stays by both tribes, the EPA granted a stay pending administrative or judicial rulings on the issue in February of 2014.¹⁹² The EPA ruling is likely to affect the tribes and the citizens of Pavillion with regards to the ongoing controversy regarding groundwater contamination in the area. Although development has occurred in Pavillion, the tribes have been reluctant to allow drilling on their land. If Pavillion falls under the jurisdiction of the reservation, the clash over whether to drill will become even more problematic. Furthermore, if drilling is to continue in Pavillion, the water resources of the tribes could potentially be affected by their proximity to the drilling operations. The overarching issue surrounding the Pavillion conflict, however, may be decided by the recent litigation between Montana and Wyoming. Montana’s allegation that drilling and production in Wyoming are depleting their downstream resources may affect the Pavillion drilling operations, and thus the tribes, even though they may have little to no say in the outcome.

185. *Id.* at 23.

186. 465 U.S. at 470; Letter from Hilary C. Tompkins to Scott C. Fulton, *supra* note 183, at 7.

187. Letter from Hilary C. Tompkins to Scott C. Fulton, *supra* note 183, at 7.

188. *Id.* at 8.

189. *Id.* at 11, 13.

190. *Id.* at 23.

191. *Wind River Treatment in the Same Manner as a State Approval*, *supra* note 179.

192. *Id.*

IV. Montana v. Wyoming

A. History of the Yellowstone Compact

Western appropriation states commonly use water compacts to decide how each party may use and divide a particular body of water.¹⁹³ The Supreme Court has original jurisdiction in disputes between states over these agreements.¹⁹⁴ Montana and Wyoming entered into the Yellowstone Compact in 1950 after almost twenty years of negotiation.¹⁹⁵ The Compact governs water use of the Clarks Fork, Big Horn, Tongue, and Powder Rivers between Montana, Wyoming, and North Dakota.¹⁹⁶ It provides for the express adoption of the prior appropriation doctrine to govern the Compact.¹⁹⁷ The Clarks Fork, Big Horn, Tongue, and Powder Rivers are tributaries of the Yellowstone River, which originates in Wyoming and extends into Montana and North Dakota.¹⁹⁸ Article V of the Compact provides that “all appropriative rights existing as of January 1, 1950, ‘shall continue to be enjoyed.’”¹⁹⁹ This gives priority to water users with pre-1950s water rights, then to those “constructing storage or developing direct flow diversions for new uses.”²⁰⁰ The Compact also states in its preamble that the parties “desir[e] to remove all causes of present and future controversy between [the] states”²⁰¹

The ongoing litigation in *Montana v. Wyoming* deals with Wyoming’s alleged violation of the Compact. Montana filed suit in 2007, alleging Wyoming violated Article V of the Compact by increasing its consumption and depriving Montana of the water it was granted under the Compact.²⁰² As Article V gives priority to water rights acquired before 1950,²⁰³ Montana’s allegation in regards to its CBM groundwater claim deals with use arising after ratification of the Compact.²⁰⁴ Additionally, Montana also claimed that groundwater pumping related to CBM development was

193. Bennett, *supra* note 94, at 117.

194. *Id.* at 120.

195. Lawrence J. MacDonnell, *Montana v. Wyoming: Sprinklers, Irrigation Water Use Efficiency and the Doctrine of Recapture*, 5 GOLDEN GATE U. ENVTL. L.J. 265, 267 (2012).

196. Loble, *supra* note 19, at 24.

197. Mudd, *supra* note 12, at 299.

198. *Montana v. Wyoming*, 131 S. Ct. 1765, 1769 (2011).

199. MacDonnell, *supra* note 195, at 267.

200. *Id.* at 268.

201. Yellowstone River Compact, Pub. L. No. 82-231, 65 Stat. 663 (1951).

202. Bennett, *supra* note 94, at 120.

203. *Id.*

204. Mudd, *supra* note 12, at 304.

decreasing the amount of surface water that Montana was receiving and was entitled to under the Compact.²⁰⁵ The litigation between Montana and Wyoming has the potential to affect not only CBM development, but also anyone in the region who relies on groundwater.²⁰⁶ Between 2000 and 2006, both the Tongue and Powder Rivers experienced a shortage of water in Montana.²⁰⁷ During the shortage, Montana asked “Wyoming [to] regulate its post-1950 water rights so that Montana’s pre-1950 water rights holders could receive water.”²⁰⁸ Wyoming refused, saying that it had already done so, and Montana subsequently filed suit.²⁰⁹

In 2010, Special Master Professor Barton H. Thompson issued his First Interim Report.²¹⁰ The Supreme Court affirmed the Special Master’s findings, holding that under the doctrine of appropriation, water users could “improve their irrigation systems, even to the detriment of downstream appropriators”²¹¹ While this report did not address the claims regarding CBM development, the Special Master did state that groundwater withdrawals were within the scope of the Compact, and furthermore, if Wyoming was found to have been allowing CBM groundwater withdrawals to deplete surface waters belonging to Montana, then it would be in violation of the Compact.²¹² Montana has offered proof that both the Tongue and Powder Rivers have shown a decrease in the amount of water available downstream to Montana.²¹³

Wyoming argued the Compact does not cover groundwater since it fails to mention it explicitly.²¹⁴ However, it is an accepted scientific fact that groundwater and surface water are inextricably connected, and the Special Master found that the Compact includes groundwater.²¹⁵ This is an important conclusion, and certainly a step in the right direction. The hydrologic cycle is now clearly understood to be linked; it would be folly to ignore scientific evidence merely because our predecessors had not yet discovered and understood the connection between ground and surface water.

205. MacDonnell, *supra* note 195, at 265.

206. *Id.* at 268.

207. *Id.*

208. *Id.*

209. *Id.*

210. *Montana v. Wyoming*, 131 S. Ct. 1765, 1769 (2011).

211. *Id.* at 1777.

212. Mudd, *supra* note 12, at 299-300.

213. *Id.* at 301.

214. *Id.* at 307.

215. *Id.*

B. The Tribes and the Compact: What the Future May Hold

The Yellowstone Compact does not govern water use between the states and tribes. However, Article VI of the Compact states that “[n]othing contained in this compact shall be so construed or interpreted as to affect adversely any rights to the use of the waters of Yellowstone River and its tributaries owned by or for Indians, Indian tribes, and their reservations.”²¹⁶ While Article VI is not at issue in the current litigation, this limitation on the states to protect tribal water rights may be a crucial provision for the tribes to consider as the litigation between the states moves forward. The Northern Cheyenne Tribe and the tribes of the Wind River Reservation certainly have a stake in the outcome of this litigation due to their water rights on the Yellowstone River and its tributaries.

While the Wind River Reservation tribes have not participated in the litigation itself, the Northern Cheyenne Tribe, in response to the Motion to Dismiss initially filed by Wyoming, filed a brief in support of Montana.²¹⁷ In the brief, it described the origin of its water rights, which stem from the Northern Cheyenne Compact made with Montana entered in 1995, giving the tribe water and storage rights in the Tongue River, the Tongue River Reservoir, Rosebud Creek (a tributary of the Yellowstone river), and the Big Horn Reservoir.²¹⁸ The tribe further states that under Article VI of the Yellowstone Compact, its rights to the use of water in the Yellowstone River and its tributaries are protected, and argues that it could file suit if its water interests were adversely affected by the outcome of the litigation over the Compact.²¹⁹ In addition, the tribe also argued that Wyoming’s new uses of water for irrigation and CBM development do in fact violate the Compact if the uses cause insufficient water to reach Montana, therefore failing to satisfy the pre-Compact rights.²²⁰

While tribes of the Wind River Reservation have not participated in the litigation, as upstream users with CBM drilling and development located within their land in the town of Pavillion and the surrounding areas, they too are in a position to argue that they have a stake in the outcome. Should the Supreme Court reach a decision regarding the Compact which restricts the amount of water the tribes are guaranteed, they, like the Northern Cheyenne Tribe, would be in a position to join the litigation. Furthermore,

216. Yellowstone River Compact, Pub. L. No. 82-231, 65 Stat. 663 (1951).

217. *Montana v. Wyoming*, 131 S. Ct. 1765, 1777 (2011).

218. *Id.*

219. *Id.*

220. *Id.*

the tribes could assert that they have a right to a certain quality of water, a logically accepted guarantee within the *Winters* doctrine, which has been infringed upon by CBM drilling operations around Pavillion.²²¹ Although the EPA's investigation has largely been halted, the presence of both tribal business councils in the EPA proceedings and the Clean Air Act boundary issues make it likely that both the Eastern Shoshone and Northern Arapaho Tribes will be proactive in protecting their interests in land and resources.

Although the outcome of *Montana v. Wyoming* is uncertain, the importance of water to the survival and growth of the tribes on both reservations is an established necessity. The tribes have struggled historically to make a living due to a lack of capital and adequate planning, and are in need of income to survive.²²² The availability of water in order to accomplish tribal economic goals through development and the implementation of infrastructure is key.

C. Improving Tribal Quality of Life: The Importance of Water

On the Wind River Reservation, both the Eastern Shoshone and Northern Arapaho tribes have struggled with high crime rates, high unemployment, and poor health care.²²³ The lack of infrastructure and income has forced tribal members to look outside the reservation for basic amenities and jobs, although many do not have the money to do so. The current average income of Indian families on the reservation is roughly \$6400 per year—an amount well below the poverty line and indicative of the problems the reservation faces.²²⁴ While “[a] 1976 plan for economic development on the reservation suggested that increasing irrigated agriculture, mining gypsum and uranium, or developing a recreation and tourism industry centered around the blue-ribbon trout fishing along the Wind River might provide a needed economic stimulus,” the tribes need capital—something they lack—in order to implement these suggestions.²²⁵ Furthermore, the reservation itself lacks basic infrastructure most functioning towns take for granted, such as “basic transportation, garbage services, adequate housing, medical care, and

221. See Walter Rusinek, *A Preview of Coming Attractions? Wyoming v. United States and the Reserved Rights Doctrine*, 17 *ECOLOGY L.Q.* 355 (1990).

222. *Id.* at 381.

223. Timothy Williams, *Brutal Crimes Grip an Indian Reservation*, *N.Y. TIMES*, Feb. 2, 2012, http://www.nytimes.com/2012/02/03/us/wind-river-indian-reservation-where-brutality-is-banal.html?_r=2&.

224. Rusinek, *supra* note 221, at 381.

225. *Id.*

supervised recreation for children”²²⁶ The reality is that the tribes currently face an uphill battle to better their lives, and they need adequate water resources in order to accomplish any kind of improvement.

The determination by the Wyoming Supreme Court that the purpose of the Wind River Reservation was fact agriculture is a decision that has continued to hobble any type of growth.²²⁷ This limitation prevents the tribes from accessing water that could go towards a number of uses, including improvements that would generate income and tourism.²²⁸ The Court instead chose to narrowly interpret the Tribe’s water needs as only agricultural purposes, stating that since “[m]unicipal, domestic, livestock, and commercial uses” fell under agriculture, no additional water allotment was required to be handed down.²²⁹ The tribes are therefore restricted to agriculture and irrigation as a way to make their living, although irrigation itself in such an arid region of the country is neither sustainable nor feasible.²³⁰ Irrigation in the region requires massive infrastructure that is costly to both build and maintain, and furthermore, lands that have not previously been farmed will be resistant and affected by the introduction of constant irrigation and pesticide application.²³¹

The failure of the Wyoming Supreme Court to foresee the consequences resulting from its decision counteracts progress made to preserve the land on which the tribes live and will continue to live.²³² It is crucial for the future of reservations that courts deal with these issues in a way that demands ecological and environmental responsibility from all sides. Sustainability should be a goal that all strive to reach in order to ensure tribal lands continue to be a place where the importance of natural resources are recognized, economic growth is encouraged, and the importance of environmental stewardship is always kept in mind.

Although the tribes of the Wind River Reservation have struggled in the past, their situation is an important indication of where other tribes in the region may be headed, and where the courts may in fact force them to go if another path is not championed. The growth of the tribes is growth for everyone. Improving tribal economies will in turn bring growth to the economies of nearby cities, and thus the states in which the reservations are

226. *Id.* at 382.

227. *Id.* at 384.

228. *Id.*

229. *Id.* at 386.

230. *Id.* at 410.

231. *Id.*

232. *Id.* at 411.

located. The courts are in a position to take a step towards this type of growth by recognizing that agriculture is not the only way of life on a reservation. By listening to tribal governments about their issues and goals for the future, the benefit will be widespread. Water is a resource that must be managed without thought to political pressures or previous conflict. Implementing policies and practices that encourage growth and responsibility in the battle over water in the West is key to a sustainable future. Reservations and state water users must coexist, and the courts must be mindful of the different scenarios affecting all users who come to the table with complaints and concerns in order to maintain this resource that is crucial to the success and survival of all parties involved.

V. Conclusion

The interplay between the importance of human dependence both on water and on energy has emerged as an issue that will define our nation in years to come. The relationship between energy, water, and humans is a delicate balance that is often taken for granted. In some areas of the country, however, turning on the tap for clean water may not be as simple as it is for others. The availability of water in quantities sufficient to sustain ways of life, such as irrigation and raising livestock, is crucial for many Americans, and also for many Native American tribes. While CBM development in the northwestern United States is predicted to be a great contributor to our nation's ability to be energy independent, its impact on water is equally important.

The Yellowstone River Compact, which governs water usage between the two states, may have a greater impact on those it does not govern: the Northern Cheyenne, Northern Arapaho, and Eastern Shoshone tribes. The ongoing litigation over water usage and amounts available to specific users does not take into consideration the tribes who live along tributaries of the River and are dependent on their guaranteed amounts to fulfill their ways of life. Although CBM development has brought both jobs and profit into Wyoming, the volume of water necessary to produce the CBM affects not only the tribes, but also state users who rely upon guaranteed quantities of water.

In addition, the quality of coproduced water from CBM development is already of concern to the residents of Pavillion, Wyoming, and will likely be of concern to others in the area as CBM development spreads. While the *Winters* doctrine does not explicitly state that tribes have a right to a certain quality of groundwater, it is likely that this is exactly what tribes will argue

if they are subject to the contamination that CBM development can bring. Furthermore, the EPA is likely poised to play an increasingly important role in the research that will be necessary to determine whether contamination directly results from CBM development itself. Strong industry pressures exist on governmental agencies such as the EPA and USGS to look the other way in terms of potential contamination in order to avoid bad press and any holds on development. The tribes may be able to use their influence in both state and federal government, however, to work towards a more compatible solution that addresses the concerns of all parties involved.

The strong tribal presence in the region is a prime opportunity for the issues of water quality and quantity to finally be addressed in the courts. It is established that surface water and groundwater are connected, and it is only logical that a quantity of groundwater should also be reserved to the tribes through the *Winters* doctrine. The amount they are entitled to should additionally be measured by more practical methods than the historically-used PIA method. Not every reservation is involved in agriculture, and for some, agriculture is altogether impractical and unfeasible. The purpose of the reservations, as courts have begun to realize, is to preserve a home for the tribes, rather than just to preserve an area they can farm. It is more practical to realize the tribes will use their land in ways that will benefit their people and economy, and therefore irrigation is not the only use they have for their water. Supporting their growth benefits all parties involved, and allows tribal members to improve their own lives and the lives of their children for generations to come.

The Supreme Court, in *Montana v. Wyoming*, is uniquely poised to encourage this attitude of sustainability, growth, and responsibility with regards to water rights for all parties. The outcome of this case will define how water users must act in the Northwest where there are multiple water users with concerns ranging from municipal use, agriculture, tourism, and development of natural resources. CBM development is poised to benefit the nation, but the cost at which this alternative energy is obtained must be considered. In the future, the tribes will play a large role in defining the place of CBM development in America's energy future, and it is the job of the courts to respond to their concerns and form practical solutions. These solutions must be comprehensive and all-encompassing to benefit the tribes and all parties involved. This can be accomplished through resolution of the Yellowstone River Compact litigation with the tribes in mind, or through a thorough review of the purposes of the reservations in the region that the tribes call home. The litigation between the two states affects not only the citizens who rely on the water for daily life, municipal and commercial

purposes, and as a source of income through tourism industries such as fishing, but also the tribes on the reservations within those states. These tribes are not merely occupying the land as tenants or as a temporary measure—it is their home. Water is the key to this improvement, and to their economic growth and success, whether that be through tourism or through the development of natural resources.