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Climate Change and Compact Breaches: How The Supreme Court Missed an Opportunity to Incentivize Future Interstate-Water-Compact Compliance in *Kansas v. Nebraska*

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Climate Change and Compact Breaches: How The Supreme Court Missed an Opportunity to Incentivize Future Interstate-Water-Compact Compliance in *Kansas v. Nebraska*

Caitlin Brown*

Recklessly gambling with Kansas's water rights to the Republican River, Nebraska used 17 percent more water than it was allocated by the interstate Republican River Compact during a drought in 2005–06. Kansas sued Nebraska for this breach of compact in the Supreme Court. While the Court ultimately found that Nebraska breached the Republican River Compact, the remedy was only damages for Kansas's loss and partial disgorgement of Nebraska's profits. By failing to require complete disgorgement of profits, the Court arguably failed to disincentivize future breaches of other interstate water compacts.

*This lack of disincentive is especially concerning given climate change predictions in the arid western United States. These predictions forecast higher temperatures and longer dry spells for this region. These impacts will make it increasingly difficult for states to comply with interstate water compacts unless the compacts themselves are adaptable to the impacts or there is a heavy penalty for noncompliance. As the Court has effectively taken the heavy penalty off the table through its ruling in *Kansas v. Nebraska*, it is important to understand the specific climate change impacts threatening the river basins and how adaptable the interstate water compacts are to these impacts.*

*This Note discusses the Court's decision in *Kansas v. Nebraska*, explains why a breach of compact is not desirable even when the water might have a higher market value in the states that breach, and then examines both the Republican River Compact and basin and the Rio Grande Compact and basin*

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to discuss the possibility of future climate change impact induced water compact breaches.

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INTRODUCTION

As climate change brings drier and hotter seasons to the western United States,¹ breaches in interstate water compacts will occur more frequently. In *Kansas v. Nebraska*, the Supreme Court missed an opportunity to discourage future breaches of interstate water compacts by crafting remedies that would have extracted all profits from Nebraska's breach.² The Court's holding will likely not discourage future breaches of this and other interstate water compacts as states realize that a profitable breach of the compact is possible.

This Note first examines the controversy over the Republican River Compact in *Kansas v. Nebraska* and the equitable remedies fashioned by the Court. While Nebraska's breach might be considered efficient in an economic sense, I will argue that this narrow view fails to accurately account for the impacts on the communities depending on water deliveries. Working from the view that efficient breach does not actually exist in the water compact context, the Note then considers how likely states will be to breach interstate water

1. JERRY M. MELILLO ET AL., U.S. Global Change Research Program, Climate Change Impacts in the United States: The Third National Climate Assessment 26 (2014), http://s3.amazonaws.com/nca2014/high/NCA3_Climate_Change_Impacts_in_the_United%20States_HighRes.pdf.

2. 135 S. Ct. 1042 (2015).

compacts in the future as the impacts of climate change decrease the amount of available water. Understanding a compact's vulnerability to climate change is important because the analysis indicates that there will likely be future compact breaches. This analysis specifically examines the Republican River Compact, at issue in *Kansas v. Nebraska*,³ and the Rio Grande Compact, currently being litigated in *Texas v. New Mexico and Colorado*.⁴ It builds upon a previously established framework⁵ to examine the vulnerability of each compact basin to climate change, and the ability of each compact to adapt to climate change's impacts and avoid a breach. Compacts that are more adaptable to the types of expected climate change impacts will be less likely to be unintentionally breached. Professor Noah Hall of Wayne State University Law School developed the original framework,⁶ which I use and expand on in this Note to predict the likelihood of a breach.

I selected the Republican River and Rio Grande Compacts because of the recent litigation over both. The Republican River Compact has not been analyzed under the framework since the ruling in *Kansas v. Nebraska*, and the Rio Grande Compact has likewise not been analyzed under the framework since Texas filed its claim against New Mexico in the Supreme Court. The analysis indicates that both basins face severe climate change impacts,⁷ that the Republican River Compact is only somewhat adequate to address those impacts, and that the Rio Grande Compact is inadequate to do so.⁸

I. BACKGROUND ON INTERSTATE WATER COMPACT DISPUTES

Interstate water compacts are agreements between the states to apportion interstate rivers, streams, and sometimes, groundwater. There are currently twenty-seven interstate compacts that manage water allocation in the United States.⁹ These compacts are an example of cooperative vertical and horizontal federalism; while states agree to the terms of apportionment, Congress must vote to ratify the compact.¹⁰ Cooperative "vertical federalism" can be distinguished from "horizontal federalism."¹¹ Vertical federalism describes the relationship between the federal government and states and includes national environmental laws such as the Clean Air Act and the Clean Water Act, where

3. *Id.*

4. *Texas v. New Mexico*, 134 S. Ct. 1050 (2014).

5. Noah D. Hall, *Interstate Water Compacts and Climate Change Adaptation*, 5 *Env'tl. & Energy L. & Pol'y J.* 237, 261–65 (2010).

6. *Id.*

7. *Infra* Parts IV.B.1, IV.C.1.

8. *Infra* Parts IV.B.2, IV.C.2.

9. Hall, *supra* note 5, at 239–40.

10. Joseph F. Zimmerman, *Interstate Water Compacts: Intergovernmental Efforts to Manage America's Water Resources* 25 (2012).

11. Noah D. Hall, *Toward a New Horizontal Federalism: Interstate Water Management in the Great Lakes Region*, 77 *U. Colo. L. Rev.* 405, 409–10 (2006).

the federal government sets national standards that the states then enforce.¹² Horizontal federalism refers to state-to-state relationships.¹³ Interstate water compacts are an example of both horizontal and vertical federalism because Article I, section 10 of the Constitution requires states to obtain the consent of Congress before entering into a compact with other states.¹⁴ However, “interstate compacts increase the power of the states at the expense of the federal government,” meaning that horizontal federalism is more frequently used as states work together to manage their shared waters.¹⁵ But when states are not able to solve water compact disputes, they turn to the Supreme Court.

When there is a dispute between states or breach of a compact, the Supreme Court has original jurisdiction to hear the case, although it is not required to hear these cases.¹⁶ States must file a motion for leave to file a complaint and a supporting brief to allow the Court to decide if it will take the case.¹⁷ If the Court decides to grant the motion it appoints a special master, generally an expert in water law,¹⁸ to gather evidence and recommend both factual and legal findings to the Court.¹⁹ The special master presents his or her findings to the Court, after which the parties submit exceptions to, or disagreements with, the recommendations.²⁰ After considering the special master’s report and the parties’ submissions, the Court then decides which recommendations or exceptions to adopt.²¹

II. KANSAS V. NEBRASKA

In *Kansas v. Nebraska*, while the Supreme Court ultimately found that Nebraska breached the Republican River Compact, the remedy was only damages for Kansas’s loss and partial disgorgement of Nebraska’s profits.²² By failing to require complete disgorgement of profits, the Court arguably failed to disincentive future breaches of other interstate water compacts. I will first briefly discuss a previous dispute between Kansas and Nebraska over the Republican River Compact, and then I will turn to the dispute at issue in

12. *Id.* at 409.

13. *Id.*

14. U.S. CONST. art. I, § 10.

15. Hall, *supra* note 11, at 411.

16. Judiciary Act of 1789, 28 U.S.C. § 1251(a) (2012).

17. Zimmerman, *supra* note 10, at 112.

18. See Anne-Marie C. Carstens, *Lurking in the Shadows of Judicial Process: Special Masters in the Supreme Court’s Original Jurisdiction Cases*, 86 Minn. L. Rev. 625, 648 (2002).

19. Zimmerman, *supra* note 10, at 113.

20. *Kansas v. Nebraska*, 134 S. Ct. 981 (2014) (noting that the special master’s report was received and filed and exceptions to the report should be filed).

21. *Kansas v. Nebraska*, 135 S. Ct. 1042, 1051 (2015) (“overrul[ing] all exceptions and adopt[ing] the Master’s recommendations”); *Kansas v. Colorado*, 533 U.S. 1, 15–16 (2001) (adopting all of the special master’s recommendations except his recommendation on the year “prejudgment interest should begin to accrue”).

22. *Id.*

Kansas v. Nebraska. I will summarize the special master's findings and recommendations, explain the Court's adoption of these findings and its remedies, and analyze the dissent's alternative remedies.

In 2011 the Court granted Kansas leave to file a complaint against Nebraska for allegedly violating the terms of the Republican River Compact by consuming about 17 percent more water than it had been allocated.²³ This case was not the first dispute over water rights between the states.²⁴ In 1998 Kansas complained that Nebraska's groundwater pumping was depleting the surface water in the Republican River Basin.²⁵ A settlement agreement, reached in 2002 and approved by the Supreme Court in 2003, found that groundwater pumping was depleting the surface water in violation of the compact.²⁶

The dispute at issue in *Kansas v. Nebraska* began in 2010, when Kansas complained of Nebraska's continued overconsumption of water.²⁷ The Court referred the matter to a special master.²⁸ The special master recommended holding that while Nebraskan officials did not "deliberately set out to violate the Compact," they did breach it knowingly.²⁹ He wrote in the special master report that "Nebraska knowingly exposed Kansas to a substantial risk that Nebraska's" first attempt to comply with the 2002 settlement would not adequately prepare Nebraska for compliance in drought years.³⁰ Because Nebraska was upstream from Kansas, it was able to pay "more attention to its internal concerns than to its obligations to the downstream state."³¹ However, the special master found "no evidence that Nebraska deliberately opted for noncompliance in 2006."³² It was not a "consciously opportunistic breach" only because "[Nebraska's] efforts in 2006 to reduce the scope of its ensuing noncompliance—albeit too late and too little—were earnest and substantial enough."³³ The Court later rephrased this finding, in the holding of the case: "Nebraska recklessly gambled with Kansas's rights, consciously disregarding a substantial probability that its actions would deprive Kansas of the water to which it was entitled."³⁴

23. *Kansas v. Nebraska*, 131 S. Ct. 1847 (2011) (mem).

24. Motion for Leave to File Bill of Complaint, Bill of Complaint, and Brief in Support of Motion for Leave to File Bill of Complaint, *Kansas v. Nebraska*, 135 S. Ct. 1042 (2015) (No. 126), 1998 WL 35862312.

25. *Id.*

26. *Kansas v. Nebraska*, 538 U.S. 720 (2003).

27. Plaintiff's Motion for Leave to File Petition, Petition, and Brief in Support, *Kansas v. Nebraska*, 131 S. Ct. 1847 (2015) (No. 126), 2010 WL 10807806, at *6.

28. *Kansas v. Nebraska*, 528 U.S. 1001 (1999).

29. Report of the Special Master at 111–12, *Kansas v. Nebraska*, 131 S. Ct. 1847 (2015) (No. 126) [hereinafter Special Master Report].

30. *Id.* at 130–31.

31. *Id.*

32. *Id.*

33. *Id.*

34. *Kansas v. Nebraska*, 135 S. Ct. 1042, 1056 (2015).

Put another way, Nebraska profited from breaching the compact. Since Nebraska passed legislation in 2007 and now has procedures in place to achieve compliance with the compact, the special master found that neither an injunction³⁵ nor a complete disgorgement³⁶ was a necessary or appropriate remedy. Kansas also argued for an injunction, which would have punished future breaches immediately, but the special master did not grant it because Kansas failed to carry its burden of “establishing a ‘cognizable danger of recurrent violation.’”³⁷

Kansas and Nebraska did agree that a remedy should be monetary damages rather than specific performance, which would have required a water delivery equaling Nebraska’s overuse.³⁸ The monetary damages that the special master recommended totaled \$5.5 million. He found that \$3.7 million was a “fair estimate” of Kansas’s loss, and because water is more valuable in Nebraska than in Kansas, recommended an additional award of \$1.8 million, representing “a [partial] disgorgement of the amount by which Nebraska’s gain exceed[ed] Kansas’ loss.”³⁹ The special master noted that, in reality, “Nebraska’s gain was . . . very much larger than Kansas’ loss, likely by more than several multiples,” but he believed that the remedy would be enough to discourage future breaches by Nebraska.⁴⁰ Kansas argued for complete disgorgement; it estimated the profit to total nearly \$62 million,⁴¹ which according to the special master was on the “high side.”⁴²

The Court adopted all of the special master’s recommendations.⁴³ First, it found that Kansas and Nebraska agreed that Nebraska had exceeded its allocation of water by about 17 percent in 2005–06, and that this had resulted in a \$3.7 million loss to Kansas, which Nebraska agreed to pay.⁴⁴ Second, the Court found that the violation of the compact was knowing, and that the \$1.8 million disgorgement of Nebraska’s gain was thus a “‘fair and equitable’ remedy for Nebraska’s breach.”⁴⁵ The Court declined to increase the award because the Court found that the special master had applied the “appropriate considerations—weighing Nebraska’s incentives, past behavior, and more

35. Special Master Report, *supra* note 29, at 116–19; NEB. REV. STAT. § 46-715(4)(b), (6) (2016).

36. Special Master Report, *supra* note 29, at 179.

37. *Id.* at 182.

38. *Id.* at 129.

39. *Id.* at 179.

40. *Id.* at 178. *See* *Kansas v. Nebraska*, 135 S. Ct. 1042, 1056, 1058 (2015). The special master also recommended revising an appendix in the 2002 settlement agreement to more accurately measure how groundwater withdrawals affect surface streamflow. This appendix was a part of the 2002 settlement agreement and described how water diverted from other river basins would not be counted as a state’s use of Republican River water. *Kansas v. Nebraska*, 135 S. Ct. at 1059–64. For purposes of this Note, an in-depth understanding of this revision is not necessary.

41. Special Master Report, *supra* note 29, at 172.

42. *Id.* at 178.

43. *Kansas v. Nebraska*, 135 S. Ct. at 1049, 1051.

44. *Id.*

45. *Id.* at 1055, 1057 (quoting *Texas v. New Mexico*, 482 U.S. 124, 134 (1987)).

recent compliance efforts—in determining the kind of signal necessary to prevent another breach.”⁴⁶ Finally, the Court rejected Kansas’s request for an injunction.⁴⁷

Rather than fashion remedies as if the water compact were a simple contract, the majority instead used the equitable remedies devised by the special master. A simple contract remedy, as the dissent desired, would have been limited to damages, and would only have awarded disgorgement if there had been a deliberate breach of compact.⁴⁸ Justice Kagan, writing for the majority, stated that the Court’s charge was to settle water compact disputes in a way that was “equitable in nature” rather than strictly contractual.⁴⁹ The Court’s role in the litigation was only to declare rights and enforce the compact, but the majority viewed this enforcement role to be under the “shadow” of the Court’s “equitable apportionment power.”⁵⁰ Kagan wrote that this allowed the Court to be creative in the remedies it fashioned.⁵¹ This authority was strengthened because the compact was federal law rather than a simple contract since Congress agreed to the compact.⁵² Finally, in discussing its reasons for not granting an injunction, the majority wrote: “And Nebraska is now on notice that if it relapses, it may again be subject to disgorgement of gains—either in part or in full, as the equities warrant. That, we trust, will adequately guard against Nebraska’s repeating its former practices.”⁵³ This trust, however, was potentially misplaced, given the pressures that climate change impacts will put on the interstate water compacts.

Justice Thomas’s dissent, joined by Justices Scalia and Alito in full, and by Chief Justice Roberts in part, strongly disagreed with the Court’s choice of an equitable remedy, and stated that he viewed the case instead as a “contract dispute.”⁵⁴ Justice Thomas wrote that the remedies should have been determined according to contract principles, or as specified in the settlement agreement.⁵⁵ He concurred with the majority’s conclusion that “Nebraska knowingly, but not deliberately, breached the Republican River Compact,” and argued that “ordinary contract principles” did not allow for disgorgement of Nebraska’s profits, because disgorgement was not available for a “nondeliberate breach of a contract.”⁵⁶ Only a deliberate breach of contract would warrant disgorgement.⁵⁷

46. *Id.* at 1058–59.

47. *Id.* at 1059. Finally, the Court ruled in favor of revising the appendix. *Id.* at 1063.

48. *Id.* at 1067–68 (Thomas, J., concurring in part and dissenting in part).

49. *Id.* at 1051 (quoting *Ohio v. Kentucky*, 410 U.S. 641, 648 (1973)).

50. *Id.* at 1052 (citing *Texas v. New Mexico*, 462 U.S. 554, 567 (1983)).

51. *Id.*

52. *Id.* at 1053 (citing *Cuyler v. Adams*, 449 U.S. 433, 438 (1981)).

53. *Id.* at 1059.

54. *Id.* at 1064 (Thomas, J., concurring in part and dissenting in part).

55. *Id.* (Thomas, J., concurring in part and dissenting in part).

56. *Id.* at 1064–65 (Thomas, J., concurring in part and dissenting in part).

57. *Id.* at 1067 (Thomas, J., concurring in part and dissenting in part).

III. THERE SHOULD BE NO EFFICIENT BREACH IN THE WATER CONTEXT

The future threat of a potentially larger disgorgement award does not do enough to discourage breaches that may be efficient from one party's perspective but are contrary to the compact. To the contrary, only complete disgorgement of profits will fully disincentivize breaches.⁵⁸ An efficient breach occurs when one of the parties to the contract breaches because the profits it gains by doing so are greater than the damages it will have to pay to the other party under the contract.⁵⁹ In other words, a party can net a profit while renegeing on the contract and compensating the other party for its loss.

Yet the efficient breach theory in the water context does not adequately account for distributional impacts. While some scholars argue that water may be priced by the market and flow where it is valued most highly,⁶⁰ this fails to account for the special value of water to communities.⁶¹ First, the theory of efficient breach assumes that the party harmed by the breach receives compensation to be made whole again. In other words, the compensation puts the damaged party back into the position it was in before the contract was breached. However, in the context of water disputes the litigation takes years and the payoff goes to the state rather than to the farmers or other water users who were harmed by reduced water deliveries. For this brief analysis, because the majority of water users in the Republican River basin are agricultural users, I will assume that the communities most impacted are farming and ranching communities. Second, even if this could be corrected and the specific water users harmed by the reduction could be compensated, the farming communities depend on the processing of agricultural products.⁶² This is because simply

58. The Special Master Report explains:

While the benefits of efficiency reinforce the customary reluctance to employ disgorgement as the measure of an award in the typical action for breach of contract, they carry less weight in the context of a contract of this type, where interests of sovereignty, property, and compliance with the law are also at stake. Further, too, an assessment that a river might be pumped dry as long as the down-stream state is compensated for the short-term impact on its gross state product pays too little heed to the public interest in the flow of a major river. Few people in Kansas, for example, would agree to a return to the dust bowl in exchange for relocation to an economically equivalent residence and livelihood elsewhere. Moreover, to the extent that there is a benefit to allowing a role for economic efficiency, it remains open for the states to negotiate and share the efficiency.

Special Master Report *supra* note 29, at 133.

59. See Daniel Friedmann, *The Efficient Breach Fallacy*, 18 J. Legal Studies 1, 2–3 (1989).

60. See e.g., Jonathan H. Adler, *Water Rights, Markets, and Changing Ecological Conditions*, 42 *Envtl. L.* 93, 95 (2012); Jonathan H. Adler, *Water Marketing as an Adaptive Response to the Threat of Climate Change*, 31 *Hamline L. Rev.* 729 (2008); Thomas J. Graff & David Yardas, *Reforming Western Water Policy: Markets and Regulation*, 12 *Nat. Resources & Env't* 165, 166–67 (1998).

61. See e.g., K. Weber, *Effects of Water Transfers on Rural Areas: A Response to Shupe, Weatherford, and Checchio*, 30 *Nat. Resources J.* 13 (1990) (describing the effects of a water transfer market on a rural community); Helen Ingram & Cy Oggins, *Water, the Community, and Markets in the West* 3–4 (W. Water Pol'y Project Discussion Series Paper No. 6, 1990).

62. Steven Shupe et al., *Western Water Rights: The Era of Reallocation*, 29 *Nat. Resources J.* 413, 429 (1989) (“Water right transfers threaten not only county tax bases, but also the overall economic

compensating the farmer for his lack of water destroys the tax base of that community.⁶³ Compensation to the water user does not reimburse the grain silo owner who depends on the farmer's crops or the ranching equipment salesperson who is forced out of business.⁶⁴ In the Republican River Basin, water used in Nebraska is more valuable than water used in Kansas, so "Nebraska can take water that under the Compact should go to Kansas, pay Kansas actual damages, and still come out ahead."⁶⁵ However, this goes against the nature of a water compact.

In addition, the "interests of sovereignty, property, and compliance with the law" undercut the efficiency of an efficient breach.⁶⁶ In a simple two-party contract, efficient breach does not cause the types of externalities that are seen with water compact breaches as described above. Neither the remedy approved by the majority nor the one proposed by the dissent would create an efficient breach or actively discourage future breaches by Nebraska or other upstream compacting states. The Court should instead have crafted a remedy that would have extracted any benefit from a breach rather than merely threatening such a remedy for a future breach. The holding sets a precedent that upstream states get at least one profitable breach before the Court mandates complete disgorgement, but for many farming communities a profitable breach by an upstream state will spell the end.

IV. PREDICTING FUTURE COMPACT BREACHES

Working from the understanding that an efficient breach in the context of water compacts does not leave both parties whole again and in the same position they were in before the compact was breached, and considering that the Court did not fully disincentivize future breaches, it is important to look towards possible future breaches. The predicted effects of climate change include droughts and heat waves,⁶⁷ which will make water compact compliance even less likely. As states see that Nebraska was allowed to "recklessly gamble[]" with Kansas's rights,⁶⁸ other compact breaches will be more likely. As states fail to take the necessary measures to comply with compacts in light

health of rural areas. When productive agricultural acreage in an area is suddenly reduced, severe secondary economic impacts can debilitate the remaining farmers, as well as affect the businesses that supply and depend upon agricultural customers.").

63. *Id.* at 428–30.

64. See Anastasia Champ, *Surface Water Shortage, Farmers Looking for Answers*, NBC NEB. (Feb. 8, 2016), <http://www.nbcneb.com/content/news/-Surface-water-shortage-farmers-looking-for-answers-368123841.html> ("From here to Alma, anybody involved in it, all these little towns, there's a lot of [grain] elevators—they need the business, the bushels. Furniture stores, insurance agencies, just any door in a town in some certain way—our school district—they can be affected with the money we're generating with the water for the bushels of grain,' [a resident] added. 'The biggest user of our tax money is our school districts.'").

65. *Kansas v. Nebraska*, 135 S. Ct. 1047, 1057 (2015).

66. Special Master Report, *supra* note 29, at 133.

67. Melillo et. al., *supra* note 1, at 38–40

68. *Kansas v. Nebraska*, 135 S. Ct. at 1056.

of climate change, this will likely lead to more disputes and litigation. If the Court had mandated complete disgorgement of Nebraska's profits, other states would have been incentivized to comply with interstate water compacts.

While the drought that gave rise to the compact breach in *Kansas v. Nebraska* has not been directly linked to climate change, it is an example of the type of event predicted by climate change models. The state described the drought years between 2002 and 2006 that led to Nebraska's compact breach in 2006 as reducing its "yearly allotments to historically low levels."⁶⁹ By looking at the compacts and the predicted climate change impacts in the different regions, it is possible to predict vulnerabilities and future compact breaches. As an example of both the impacts of recent drought and the importance of considering the impact of climate change on interstate water compacts now, the Nebraska drought discussed above has already been surpassed by the 2012–13 drought, when more than 70 percent of the state was in exceptional drought for thirty-eight weeks.⁷⁰ In comparison, only 44 percent of the state was in exceptional drought even during the worst week of the 2002–06 drought.⁷¹ The 2012 calendar year was "the driest and hottest year for [Nebraska] based on the climatological record going back to 1895."⁷² While some scientists hesitate to link specific weather events to climate change, they predict more severe droughts and heat waves in the years to come.⁷³ Climate change is expected to exacerbate water shortages in Nebraska as "increases in extreme heat" lead to increases in surface water losses and the number of consecutive dry days.⁷⁴ Scientists predict that "temperatures during the summer by mid-century would, on average, be comparable to those experienced during the summer of 2012."⁷⁵ Even if this particular drought is not directly attributable to climate change it is predicted to be the new normal by 2050.⁷⁶ As the already arid West becomes drier, states will find it increasingly difficult to comply with interstate water compacts.

69. *Id.* at 1054.

70. *Tabular Data Archive*, U.S. DROUGHT MONITOR, <http://droughtmonitor.unl.edu/MapsAndData/DataTables.aspx?state,NE> (last updated Apr. 19, 2016).

71. For the week of August 6, 2002. *Id.* The U.S. Drought Monitor defines "exceptional drought" as "[e]xceptional and widespread crop/pasture losses [and] [s]hortages of water in reservoirs, streams, and wells creating water emergencies." *Drought Severity Classification*, U.S. DROUGHT MONITOR, <http://droughtmonitor.unl.edu/aboutus/classificationscheme.aspx> (last visited Apr. 26, 2016).

72. DEBORAH J. BATHKE ET AL., UNIV. OF NEB., UNDERSTANDING AND ASSESSING CLIMATE CHANGE: IMPLICATIONS FOR NEBRASKA 33 (2014), <http://snr.unl.edu/download/research/projects/climateimpacts/2014ClimateChange.pdf>.

73. EPA, Understanding the Link Between Climate Change and Extreme Weather (2016), <http://www3.epa.gov/climatechange/science/extreme-weather.html#ref1>.

74. See U.S. GLOBAL CHANGE RESEARCH PROGRAM, REGIONAL CLIMATE IMPACTS: GREAT PLAINS, GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES 444–45 (2014), http://nca2014.globalchange.gov/system/files_force/downloads/low/NCA3_Climate_Change_Impacts_in_the_United%20States_LowRes.pdf?download=1. The exact locations of this drying within the Great Plains, however, are uncertain. *Id.* at 445.

75. BATHKE ET AL., *supra* note 72, at 32.

76. *Id.* at 34.

I will build on a framework developed by Professor Noah Hall of Wayne State University Law School and published in his 2010 article, *Interstate Water Compacts and Climate Change Adaptation*,⁷⁷ to consider the likelihood that Nebraska will breach the Republican River Compact again. The framework uses two sets of criteria to analyze both predicted climate change impacts in a compact water basin and the interstate water compact's adaptability to climate change.⁷⁸ I have also chosen to use this framework to examine the Rio Grande Compact, because there is ongoing litigation between Texas and New Mexico over the scope of the compact.⁷⁹ The outcome of this litigation will affect the adaptability of the Rio Grande Compact in the future.

A. *Introduction to the Climate Change Impacts Framework*

Professor Noah Hall of Wayne State University Law School provides a framework for considering the predicted climate change impacts in a given compact basin and the water compact's ability to adapt to climate change impacts.⁸⁰ Professor Hall has written extensively on interstate water compacts and climate change,⁸¹ and I appreciated his framework's considerations of climate change predictions and compact adaptability. I have added the point values for each question to allow for a rough quantitative evaluation. A low score corresponds to fewer climate change impacts predicted and to greater adaptability of the compact to these impacts. Alternatively, if the impact of climate change on a compact basin has a high score, the basin is very susceptible to climate change. A compact with a high score is inflexible and therefore inadequate to adapt to the changing climate generally. A compact with a high score in a basin with a high score has a high probability of being breached by an upstream state.

77. Hall, *supra* note 5, at 259.

78. *Id.*

79. Texas v. New Mexico, 134 S. Ct. 1050 (2014).

80. Hall, *supra* note 5, at 261–65.

81. See e.g., Noah Hall & Robert Adams, *Framing Water Policy in a Carbon Affected and Carbon Constrained Environment*, 50 Nat. Resources J. 3 (2010); Noah Hall & Bret B. Stuntz, *Climate Change and Great Lakes Waters Resources: Avoiding Future Conflicts with Conservation*, 31 Hamline L. Rev. 641 (2008); Noah Hall et al., *Climate Change and Freshwater Resources* 22 Nat. Resources & Env't 30 (2008).

TABLE 1: CLIMATE CHANGE SEVERITY

Climate Change Factors Affecting the Compact Basin	
Factor	Answer
<i>Total water supply relative to water demand:</i> ⁸² How are water demand and supply currently balanced, and is greater demand predicted in the future?	a) Supply is greater than demand and predicted to stay greater than demand, or supply is balanced now and into the future: 0 c) Supply balanced now, greater demand in future: 1 d) Demand is greater than supply now and predicted to increase: 2
<i>Groundwater depletion:</i> ⁸³ Does the amount of groundwater withdrawals already exceed recharge?	a) Yes: 1 b) No: 0
<i>Expected impact on water supply from climate change:</i> ⁸⁴ What are the current predictions for climate change in the region?	a) Less water expected: 1 b) More water expected: 0
<i>Instream use factors:</i> ⁸⁵ Does the watershed need to maintain a certain level of flow for navigation, endangered species, or other instream uses?	a) No: 0 b) Yes: 1
Severity of Climate Change on Compact Basin	
Score	Severity of climate change impacts
Points 0-1	Moderate
Points 2-3	Severe
Points 4-5	Extremely severe

82. Hall, *supra* note 5, at 261.83. *Id.* at 262.84. *Id.*85. *Id.* at 263.

I will use the four factors above to rate the severity of climate change impacts predicted in the two compact basins.⁸⁶ Total water supply relative to water demand asks how water demand and supply are currently balanced, and whether greater demand is predicted in the future. The greater the demand currently and into the future, the greater the severity of climate change impacts on the basin. Groundwater depletion asks if the amount of groundwater withdrawals already exceeds recharge. When an aquifer is overdrafted, the water level drops, leading to increased pumping costs and causing irrigators to switch to surface water.⁸⁷ This in turn increases the severity of climate change impacts. The framework also examines the current predictions for climate change impacts on water supply in the region. Finally, the framework asks if the watershed needs to maintain a certain level of flow for navigation, endangered species, or other instream uses. When there are substantial instream uses that require certain flows of water (such as for endangered species or navigation), water diversions become more difficult, and water-management options may be limited.⁸⁸

TABLE 2: COMPACT ADAPTABILITY

Factors Affecting Interstate Water-Compact Adaptability	
Factor	Answer
<i>Geographic and hydrologic scope:</i> ⁸⁹ How extensive is the compact? Does it just manage certain tributaries, and/or does it include groundwater?	a) Manages river, tributaries, and groundwater: 0 b) Manages the river and tributaries but not groundwater: 1 c) Only manages the river itself: 2
<i>Flexibility of allocation:</i> ⁹⁰ Are allocation amounts fixed, or based on a percentage of streamflow?	a) Percentage: 0 b) Fixed: 1
<i>Water conservation:</i> ⁹¹ Does the compact require conservation measures?	a) Yes: 0 b) No: 1

86. Hall, *supra* note 5, at 261–63. For simplicity’s sake, I have omitted four other factors used by Professor Hall: natural variability, dryness ratio, infrastructure for storing and delivering water supplies, and water use flexibility. *See id.*

87. U.S. GEOLOGICAL SURVEY, GROUNDWATER DEPLETION, http://water.usgs.gov/edu/gw_depletion.html (last updated Feb. 23, 2016).

88. Hall, *supra* note 5, at 263.

89. *Id.* at 263.

90. *Id.* at 264.

91. *Id.*

<i>Ecosystem protection:</i> ⁹² Does the compact incorporate aquatic ecosystem protection?	a) Yes: 0 b) No: 1
<i>Watershed governance institutions:</i> ⁹³ Does the compact create a governing body? Is this governing body functioning, and what authority does it have? Are states on their own to enforce the compacts?	a) Governing body exists and is able to enforce the terms of the compact, currently in use: 0 b) Governing body exists, but is not strong and/or does not currently function: 1 c) States are on their own to enforce the terms of the compact: 2
<i>State governance:</i> ⁹⁴ How do state governments “ensure that their water users are abiding by compact water-allocation rules?” ⁹⁵	a) States have laws in place to ensure that their water users abide by the compact: 0 b) States do not have laws in place: 1
<i>Past disputes:</i> What have been the outcomes of past compact disputes? Was a settlement agreement reached?	a) There have been no disputes: 0 b) There has been litigation before the Supreme Court: 1
Adaptability of the Interstate Water Compact	
Score	Compact adaptability to meet climate change risks
Points 0–2	Adequate
Points 3–5	Somewhat adequate
Points 6–9	Inadequate

I will use the previous seven factors to assess an interstate water compact’s adaptability to climate change impacts.⁹⁶ A compact that is more adaptable to climate change, and corresponding state laws that encourage compact compliance, will decrease the likelihood of unintentional breach. For example, a compact that divides the interstate waters into fixed amounts will be

92. *Id.*

93. *Id.* at 265.

94. I have added these next two factors.

95. Edella Schlager & Tanya Heikkila, *Left High and Dry? Climate Change, Common-Pool Resource Theory, and the Adaptability of Western Water Compacts*, 71 PUB. ADMIN. REV. 461, 469–70 (2011).

96. See Hall, *supra* note 5, at 263–65. For simplicity’s sake, I have omitted three other factors used by Professor Hall: data collection and reporting; restrictions on transbasin diversions; and duration, revision, and rescission.

more likely to be breached because the burden from a drought will fall entirely on the upstream state. As noted above, the fact that droughts are more likely to occur as a result of climate change further increases the likelihood of a future breach. The first factor simply asks what the compact covers geographically and hydrologically. The least adaptable compacts will exclude groundwater. Groundwater withdrawals can affect surface water flow, and if the compact does not consider groundwater withdrawals it is likely to end up with missing water. Next, the framework asks if the allocation amounts are fixed or proportionate. An inflexible compact will have fixed amounts, which makes it difficult to adapt to drought years as the upstream states have to drastically reduce their consumption to meet water-delivery obligations to downstream states. Third, the framework asks if the compact requires conservation and/or efficiency. Mandating conservation or efficiency can reduce total water and energy demands and “risk from climate change impacts on water resources.”⁹⁷ Fourth, ecosystem protections incorporated into a compact can increase its adaptability to climate change impacts. Ecosystem management prevents species from becoming endangered, and falling under the protection of the Endangered Species Act.⁹⁸ The fifth criterion asks what governance institutions are created by the compact. If the compact has no internal governance structures, it will be less adaptable to change, as all disputes will need to be litigated at the Supreme Court.

I added the final two factors to the framework, which relate less to the compact itself and more to the states that are party to it. The sixth factor asks what governance structures states have in place to ensure compact compliance.⁹⁹ States with stronger laws to enforce the compacts are less likely to breach. Even though compacts themselves are federal law, the fact that states have backstop laws in place means that they have actively planned for compliance, and are more likely to do so. This factor is broken down by the states, but the ultimate score for this section is determined by the state with the weakest laws. Finally, I ask whether there have been past disputes. Existence of past disputes means that the compact has been breached in the past and is therefore more likely to be breached in the future.

B. Republican River Compact

The Republican River Basin is facing severe climate change impacts, and the compact and state governance are only somewhat adequate to respond to these impacts. Scientists predict droughts, heat waves, and longer dry periods for the basin in the next fifty to one hundred years.¹⁰⁰ The compact in general, and the state laws of Nebraska specifically, are only somewhat adequate to adapt to climate change impacts. The Republican River itself originates in the

97. Hall, *supra* note 5, at 264.

98. *Id.* at 264 (“In some interstate water basins[] enforcement of the Endangered Species Act has drastically reduced the supply of water available for consumptive uses.”).

99. Schlager & Heikkila, *supra* note 95.

100. Melillo et. al., *supra* note 1, at 38–40.

high plains of northeastern Colorado¹⁰¹ and flows through southwestern Nebraska and northwestern Kansas.¹⁰² The watershed covers 25,018 square miles, and is home to 92,498 people.¹⁰³ Colorado,¹⁰⁴ Kansas, and Nebraska agreed to the compact in 1942, and Congress ratified it in the same year.¹⁰⁵ The compact allocates the water in the river and its tributaries according to the “average virgin water supply” available, and counts only water that originates in the basin.¹⁰⁶ Since the 2003 litigation, the scope of the compact has also included groundwater.¹⁰⁷

1. *Climate Change Impacts*

Score: Four out of five points, Severe

The Republican River Basin faces severe climate change impacts, with a score of four out of five. Generally, if stream flows decrease, water users turn to groundwater pumping.¹⁰⁸ However, given that the aquifer is already overdrafted, and that costs of pumping will rise, the water users in the basin will likely not have this option. The basin is very vulnerable to climate change impacts. This subpart will analyze each of the four factors in turn.

Total water supply relative to water demand: Two out of two points

Water users in the basin are in a challenging position where demand exceeds supply, a situation that will only be exacerbated by climate change. Water in the Republican River Basin is already fully appropriated, with demand exceeding supply in all but the wettest years.¹⁰⁹ Agriculture in both Kansas and Nebraska relies on the steady flow of water from the river.¹¹⁰ Greater demand is predicted in the future than the current supply will be able to meet.¹¹¹ And while “[c]onservation has been implemented in some areas throughout the

101. *Basin History Home*, Republican River Basin Water and Drought Portal, http://www.rrbdp.org/basin_home.html (last visited Apr. 26, 2016).

102. *Welcome to the Republican River Basin Water and Drought Portal*, Republican River Basin Water & Drought Portal (last visited Apr. 26, 2016), <http://www.rrbdp.org/index.html>.

103. *Basin History Home*, *supra* note 101.

104. Colorado was not discussed in the *Kansas v. Nebraska* case because it was not alleged to have breached the Republican River Compact. However, it is a party to this compact.

105. Republican River Compact, COLO. REV. STAT. § 37-67-101 (2016).

106. Hall, *supra* note 5, at 303.

107. Special Master Report, *supra* note 29, at 7–8.

108. Associated Press, *Vast Areas of California Are Sinking as Groundwater Is Pumped in Drought*, *The Guardian*, (Aug. 19, 2015), <http://www.theguardian.com/us-news/2015/aug/19/california-sinking-groundwater-pumped-drought>.

109. Lori Potter, *DNR Director Denies Request to Look at Republican River Basin Again*, KEARNY HUB (Apr. 14, 2009), http://www.kearneyhub.com/news/local/article_5a1e9e16-60ba-59e1-80aa-c046a1e8fb81.html.

110. *Water Development*, REPUBLICAN RIVER BASIN WATER & DROUGHT PORTAL, http://www.rrbdp.org/basin_water.html (last visited Apr. 27, 2016).

111. *Id.*

region . . . a tradeoff is that this leads to reduced return flows for downstream users.”¹¹²

Groundwater depletion: One out of one point

The Republican River Basin overlies the High Plains Ogallala Aquifer.¹¹³ Groundwater-withdrawal amounts exceed recharge, meaning that the Ogallala aquifer is overdrafted.¹¹⁴ Groundwater in this aquifer, one of the largest in the world, is predicted to decline continually.¹¹⁵ As groundwater levels decline, the cost of pumping rises. It requires more energy to draw water up to the surface, and some wells need to be drilled deeper to chase the receding water table.¹¹⁶ This can also lead to land subsidence and infrastructure damage.¹¹⁷ As these costs increase, farmers will likely turn back to surface water and pump more from the Republican River.

Expected impact of climate change on water supplies: One out of one point

Under both high- and low-emissions scenarios predicting climate change impacts, the region is expected to have more high-temperature days, which “will have many negative consequences, including increases in surface water losses.”¹¹⁸ Climate change is expected to increase the number of consecutive dry days,¹¹⁹ with “negative impacts on crop and animal production.”¹²⁰ Additionally, scientists predict that “temperatures during the summer by mid-century would, on average, be comparable to those experienced during the summer of 2012,” which was the hottest ever recorded.¹²¹ These factors indicate that climate change impacts in the Basin will likely decrease the amount of surface water available.

Instream use factors: Zero out of one point

Neither the compact nor federal environmental laws require the watershed to maintain a certain level of flow for navigation, endangered species, or other instream uses. When there are substantial instream uses that require certain flows of water (such as for endangered species or navigation), water diversions

112. DENNIS OJIMA ET AL., NAT’L CLIMATE ASSESSMENT, GREAT PLAINS REGIONAL CLIMATE ASSESSMENT TECHNICAL REPORT 76 (2012), http://downloads.globalchange.gov/nca/technical_inputs/Great_Plains_technical_input.pdf.

113. REPUBLICAN RIVER COMPACT ADMINISTRATION, GROUND WATER MODEL (2003), http://water.state.co.us/DWRIPub/Documents/trca_model.pdf.

114. ALEXANDRA S. RICHEY ET AL., WATER RESOURCES RESEARCH, QUANTIFYING RENEWABLE GROUNDWATER STRESS WITH GRACE 5227 tbl. 3 (2015) (finding a negative mean annual recharge in the Ogallala Aquifer, number seventeen in the study).

115. OJIMA, *supra* note 112, at 66.

116. U.S. GEOLOGICAL SURVEY, *supra* note 87.

117. *Id.*

118. U.S. GLOBAL CHANGE RESEARCH PROGRAM, *supra* note 74, at 443–44.

119. *Id.* at 445.

120. Melillo et. al., *supra* note 1, at 155.

121. Deborah J. Bathke et al., *supra* note 72, at 32.

become more difficult and water management options may be limited.¹²² Because the Republican River does not have any mandated instream uses, it is less vulnerable to climate change impacts for this factor.

2. *Compact Adaptability*

Score: Three and one-half out of nine, Somewhat Adequate

The Republican River Compact receives a score of three and one-half, making it somewhat adequate to adapt to climate change impacts. The compact manages both surface water and groundwater, and allocates water based on the amount available, rather than a fixed amount. Further, Colorado and Nebraska have laws in place to ensure compact compliance, and the Republican River Compact Administration provides notice to irrigators of expected allocation amounts. All of these factors make it more likely that the states will be able to comply with the compact in the future. However, the compact does not require conservation or ecosystem protection, and it has been involved in two disputes before the Supreme Court in the past fifteen years. The Compact “does not offer enough proactive management to avoid future conflicts and uncertainties.”¹²³

Geographic and hydrologic scope: Zero out of two points

The compact originally included only “virgin water supply”—water that originates in the basin before it is depleted by human use¹²⁴—and did not clearly include groundwater. This changed with the settlement agreement in 2002.¹²⁵ The 1999 complaint filed by Kansas argued that “Nebraska’s increased pumping of groundwater, resulting from that State’s construction of thousands of wells hydraulically connected to the Republican River and its tributaries,” was governed by and in violation of the compact.¹²⁶ Nebraska argued “that groundwater pumping fell outside the Compact’s scope even if that activity diminished stream flow in the area.”¹²⁷ The Court agreed with Kansas, and thus in the settlement agreement groundwater consumption was measured to the extent it depleted surface stream flow.¹²⁸ To comply with this finding, the settlement agreement created the Republican River Compact Administration (RRCA) Groundwater Model to determine “stream flow depletions caused by

122. Hall, *supra* note 5, at 263.

123. *Id.* at 304.

124. Republican River Compact, COLO. REV. STAT. § 37-67-101 art. II (2016).

125. Special Master Report, *supra* note 29, at 7–8.

126. *Kansas v. Nebraska*, 135 S. Ct. 1042, 1049 (2015) (quoting Motion for Leave to File Bill of Complaint, Bill of Complaint, and Brief in Support of Motion for Leave to File Bill of Complaint, *Kansas v. Nebraska*, 135 S. Ct. 1042 (2015) (No. 126), 1998 WL 35862312 at *2, *5 (“The essence of the claim is that postcompact groundwater development in Nebraska has deprived, and threatens to increasingly deprive, Kansas of its allocated share of water under the Republican River Compact.”)).

127. *Id.* at 1050.

128. *Id.*

[w]ell pumping.”¹²⁹ This Groundwater Model was updated in the most recent dispute to more accurately account for water imported by Nebraska and to make sure this imported water would not count toward Nebraska’s consumption of compact water.¹³⁰ Thus, the compact now governs both groundwater and surface water use.

Flexibility of allocation: Zero out of one point

Both the compact and the 2002 settlement agreement allocate water proportionately between the three states so that in times of drought all states reduce their use. The compact allocates a percentage of streamflow to the states, rather than a fixed amount, so that in times of drought the amount each state receives is reduced proportionally.¹³¹ The settlement agreement based this reduction on either a two- or five-year average.¹³² The text of the compact allows proportional recalculation of annual amounts of virgin water supply when the supply varies by more than ten percent from the original compact amounts.¹³³ In years with normal precipitation, water allocation is based on a five-year running average.¹³⁴ In water-short years, the water allocation is based on a two-year average.¹³⁵ This shorter average makes compact compliance more difficult, given that allocation amounts are calculated at the end of each year. Accordingly, the states need to plan ahead based on projected allocations. However, Nebraska and Colorado, as upstream states, can generally determine whether or not they are on track to reach compliance.¹³⁶

The 2002 settlement agreement requires Nebraska, in years projected to be water-short, to “advise the other States and the United States no later than April 30 of measures Nebraska plans to take for that year, and the anticipated water yield from those measures.”¹³⁷ This “compliance check” likely influenced the Court when it wrote: “Nebraska cannot take refuge in the timing of the RRCA’s calculations. By the time the compliance check of 2006 loomed, Nebraska knew that it had exceeded its allotment (by an ever greater margin) in

129. Final Settlement Stipulation IV.C., *Kansas v. Nebraska and Colorado*, (Dec. 15, 2002) (No. 126).

130. *Kansas v. Nebraska*, 135 S. Ct. at 1060.

131. Republican River Compact, COLO. REV. STAT. § 37-67-101 art. III (2016).

132. Final Settlement Stipulation V.B., *Kansas v. Nebraska and Colorado*, (Dec. 15, 2002) (No. 126).

133. § 37-67-101 art. III. The compact originally allocated 54,100 acre-feet of water to Colorado (11 percent), 234,500 acre-feet of water to Nebraska (49 percent), and 190,300 acre-feet of water to Kansas (40 percent). So the compact began with fixed proportions but allowed the allocated amounts to be varied if the water supply changed. *But see* Schlager & Heikkila, *supra* note 95, at 464 tbl. 2 (2011) (characterizing the Republican River Compact as fixed).

134. Final Settlement Stipulation IV.D, *Kansas v. Nebraska and Colorado*, (Dec. 15, 2002) (No. 126).

135. *Id.* at V.B.2.e.i.

136. *Id.* at V.B.2.d.

137. *Id.*

each of the three previous years.”¹³⁸ Thus, the compact and other governing documents require proportional allocation and mandate that the states plan for reduced consumption in drought years. This proportional allocation allows better adaptability to climate change.¹³⁹

Water conservation: One out of one point

The Compact does not require conservation measures.¹⁴⁰ The settlement agreement provides for a joint study on soil and water conservation, but does not require any of the study’s future findings to be adopted to promote water conservation.¹⁴¹ Mandating conservation can reduce total water and energy demands and “risk from climate change impacts on water resources.”¹⁴² Because the compact fails to require conservation measures, it is less adaptable to climate change impacts.

Ecosystem protection: One out of one point

Aquatic ecosystem protection is not incorporated into either the compact or the settlement agreement.¹⁴³ Adaptable compacts mandate ecosystem protection because such protection “prevents species from becoming endangered.”¹⁴⁴ This in turn avoids federally mandated streamflows to protect species under the Endangered Species Act.¹⁴⁵ By not mandating ecosystem protection, the Republican River Compact leaves open the possibility of the federal hammer dropping and further limiting water uses in the face of climate change.¹⁴⁶

Watershed governance institutions: Zero out of two points

The compact created the Republican River Compact Administration (RRCA), and gave the Administration the ability to “adopt rules and regulations.”¹⁴⁷ The RRCA consists of one member each from Colorado,

138. *Kansas v. Nebraska*, 135 S. Ct. at 1055.

139. Hall, *supra* note 5, at 264.

140. *Id.* at 304.

141. Final Settlement Stipulation VI.B.3., *Kansas v. Nebraska and Colorado*, (Dec. 15, 2002) (No. 126).

142. Hall, *supra* note 5, at 264.

143. *Id.* at 304.

144. *Id.* at 264.

145. *Id.*

146. *Id.*

147. Republican River Compact, COLO. REV. STAT. § 37-67-101 art. IX (2016) (“It shall be the duty of the three states to administer this compact through the official in each state who is now or may hereafter be charged with the duty of administering the public water supplies, and to collect and correlate through such officials the data necessary for the proper administration of the provisions of this compact. Such officials may, by unanimous action, adopt rules and regulations consistent with the provisions of this compact.”).

Kansas and Nebraska.¹⁴⁸ Any disputes over allocation must first go through the RRCA.¹⁴⁹ The RRCA currently provides notice to irrigators of expected annual allocations.¹⁵⁰ For example, the three states used the RRCA to reach an agreement to “provide timely notice and access to water for the 2016 irrigation season.”¹⁵¹ On a hopeful note, the Colorado member stated: “This agreement exemplifies the success that can be achieved through collaboration and cooperation of the RRCA and the water users in the basin.”¹⁵² The fact that the RRCA is currently functioning and has the ability to adopt rules and regulations¹⁵³ means that the compact will be able to more easily adapt to climate change.¹⁵⁴

State governance: One-half point out of one point (against Nebraska)

Both upstream state governments have laws in place to “ensure that their water users are abiding by compact water-allocation rules.”¹⁵⁵ In Colorado, the “conservation” of the Republican River and underlying portion of the Ogallala Aquifer is recognized as “vital” to the development and welfare of the area and its population.¹⁵⁶ Thus, the state created the Republican River Water Conservation District to oversee “the conservation, use, and development of the water resources” governed by the compact¹⁵⁷ “through voluntary participation.”¹⁵⁸ Colorado also grants the state engineer the power to make and enforce regulations to “enable the state of Colorado to meet its compact commitments.”¹⁵⁹ Where the compact does not establish standards for administration specifically within Colorado, the state engineer has the power to promulgate regulations to cut back diversions in order to comply with the compact.¹⁶⁰ Should the state engineer take no action despite knowing that Colorado will breach a compact if she fails to cut back diversions, the

148. *What is the RRCA?*, Republican River Compact Admin., <http://www.republicanrivercompact.org/about.html> (last visited Apr. 27, 2016).

149. Press Release, Kan. Dep’t of Agric., Kansas reaches agreements on Republican River Compact disputes (Oct. 24, 2014), <http://agriculture.ks.gov/AllNewsItems/2014/10/24/kansas-reaches-agreements-on-republican-river-compact-disputes>.

150. Press Release, Kan. Dep’t of Agric., Kansas: Colorado, Kansas & Nebraska Water Agreement Further Helps Water Users (Aug. 27, 2015), <http://www.nasda.org/News/statePR/37322.aspx>.

151. *Id.*

152. *Colorado, Kansas & Nebraska Water Agreement Further Helps Water Users*, KAN. DEP’T AGRIC., <https://agriculture.ks.gov/AllNewsItems/2015/08/27/colorado-kansas-nebraska-water-agreement-further-helps-water-users> (last visited May 7, 2016).

153. Republican River Compact, COLO. REV. STAT. § 37-67-101 art. IX (2016).

154. Hall, *supra* note 5, at 265.

155. Schlager & Tanya Heikkila, *supra* note 95, at 469.

156. § 37-50-101.

157. *Id.*

158. *Welcome!*, Republican River Water Conservation Dist., <http://www.republicanriver.com/> (last visited May 7, 2016).

159. § 37-80-104.

160. *Id.*

downstream state could argue that this breach was intentional. Even Justice Thomas acknowledged in his dissent that if there were a deliberate breach, complete disgorgement would be an appropriate remedy.¹⁶¹

Nebraska created the Republican River Basin Water Sustainability Task Force following the settlement agreement “to define water sustainability for the Republican River basin, develop and recommend a plan to help reach water sustainability in the basin, and develop and recommend a plan to help avoid a water-short year in the basin.”¹⁶² The task force defined water sustainability entirely in terms of meeting “socio-economic needs and obligations.”¹⁶³ This definition does not consider environmental concerns, which, as discussed above in Ecosystem Protections, makes it more likely that species will be listed under the Endangered Species Act.¹⁶⁴ Though the task force made broad recommendations, there is little evidence that these were followed in any meaningful way. In 2007 the state passed legislation “establishing a mechanism to accurately forecast the State’s annual allotment of Republican River water.”¹⁶⁵ This law requires the Department of Natural Resources to “forecast on an annual basis the maximum amount of water that may be available from streamflow for beneficial use in the short term and long term in order to comply with” the interstate water compact.¹⁶⁶ If forecasts are accurate, this could greatly help with compact compliance.

Past disputes: One out of one point

As discussed,¹⁶⁷ the Republican River Compact has been the subject of two disputes before the Supreme Court.¹⁶⁸ The first dispute concerned Nebraska’s pumping of groundwater, and was resolved in a settlement agreement creating the Groundwater Accounting Procedures to make groundwater subject to the compact.¹⁶⁹ The second dispute found that Nebraska

161. *Kansas v. Nebraska*, 135 S. Ct. 1042, 1067 (2015) (Thomas, J., concurring in part and dissenting in part).

162. Neb. L.B. 1057 (2015) (codified at NEB. REV. STAT. § 46-2,140) (repealed by Revisor Bill to Repeal the Republican River Basin Water Sustainability Task Force that Terminated June 30, 2012, Neb. L.B. No. 9, § 1, eff. Aug. 30, 2015) (“A BILL FOR AN ACT relating to the Republican River Basin Water Sustainability Task Force; to repeal provisions that terminated on June 30, 2012; to repeal a fund that is no longer needed; and to outright repeal sections 46-2,140 and 46-2,141, Revised Statutes Cumulative Supplement, 2014.”).

163. *Id.*

164. REPUBLICAN RIVER BASIN WATER SUSTAINABILITY TASK FORCE, FINAL REPORT (May 7, 2012), <http://dnr.nebraska.gov/republican-river-basin-water-sustainability-task-force-final-report-may-7-2012>.

165. *Kansas v. Nebraska*, 135 S. Ct. at 1058.

166. NEB. REV. STAT. §§ 46-715(4)(b), (6) (2016).

167. *See supra* Part III.

168. *See Kansas v. Nebraska*, 135 S. Ct. at 1042; *Kansas v. Nebraska*, 538 U.S. 720 (2003).

169. Final Settlement Stipulation IV.C., *Kansas v. Nebraska and Colorado*, (Dec. 15, 2002) (No. 126).

had knowingly exceeded its allocation, but had taken steps to remedy this violation by passing state legislation to ensure future compliance.¹⁷⁰

3. *Likelihood of Breach*

Given the severity of climate change impacts and the inadequacy of the Republican River Compact to adapt to climate change impacts, future breaches are likely. Nebraska is more likely than Colorado to breach the compact because Colorado has stronger laws to ensure compliance. However, due to the 2007 legislation¹⁷¹ in Nebraska creating the “regulatory backstop” that allows the state to “force districts to curtail both surface water use and groundwater pumping,”¹⁷² the probability that it will breach the compact is significantly lower than it was after the 2002 settlement agreement. Further, the Supreme Court has threatened full disgorgement of profits from a third breach. While this possibility is not incorporated into the framework because this is the first time that the Court has threatened complete disgorgement, it is highly relevant to the consideration. Another breach is unlikely in the near term because of the Court’s threat. Regardless, the severity of coming climate change impacts in the region will make a breach increasingly likely for both Colorado and Nebraska, despite the Court’s warning.

C. *Rio Grande Compact*

The Rio Grande Compact is inadequate to adapt to climate change impacts, and the climate change predictions for the basin are severe. It is very likely that there will be future breaches based on this analysis. Compared to the Republican River Basin and Compact, the Rio Grande Compact faces roughly the same severity of climate change impacts, but is less adaptable to these impacts and more likely to experience a breach. Current litigation highlights the vulnerability of the compact, and its lack of groundwater accounting.¹⁷³ The Rio Grande originates in southern Colorado and flows across New Mexico to the Texas-Mexico border.¹⁷⁴ Thirteen million people live¹⁷⁵ in the 182,200 square mile watershed of the river, the majority in New Mexico.¹⁷⁶ In 1938 Colorado, New Mexico, and Texas agreed to the Rio Grande Compact.¹⁷⁷ The compact mandates that certain amounts of water be delivered to the Colorado–New Mexico state line and that certain amounts be delivered to Elephant Butte

170. See *Kansas v. Nebraska*, 135 S. Ct. at 1058–59.

171. § 46-715(6).

172. See *Kansas v. Nebraska*, 135 S. Ct. at 1058.

173. See Motion for Leave to File a Complaint, and Brief in Support of Motion for Leave to File Complaint, *Texas v. New Mexico*, 134 S. Ct. 1050 (Jan. 8, 2013) (No. 220141).

174. *Id.*

175. CTR. FOR WATER POL’Y, UNIV. OF WIS. AT MILWAUKEE, CLIMATE CHANGE IMPACTS ON AGRICULTURE IN THE RIO GRANDE RIVER BASIN 1 (2013), http://uwm.edu/centerforwaterpolicy/wp-content/uploads/sites/170/2013/10/Rio-Grande_Agriculture_Final.pdf.

176. Hall, *supra* note 5, at 304.

177. Rio Grande Compact, COLO. REV. STAT. § 37-66-101 (2016).

Reservoir in New Mexico for distribution downstream in New Mexico and Texas.¹⁷⁸ The amounts of water are “modified based on water runoff measured at four stations in the Rio Grande headwaters.”¹⁷⁹

1. *Climate Change Impacts*

Score: Five out of five points, Severe

The area of the Rio Grande governed by the compact will be severely impacted by climate change. Moreover, it is very vulnerable to these impacts because demand for surface water exceeds supply and groundwater is overdrafted. This means that, when there is as much as one-third less surface water available, there will be major impacts to all activities that rely on water in the Basin.

Total water supply relative to water demand: Two out of two points

Water demand is already greater than current supply in the region covered by the Rio Grande Compact, and is only expected to grow. Agriculture accounts for over 85 percent of surface water withdrawals from the Rio Grande.¹⁸⁰ Water demand is high, and droughts are “already a serious threat to agriculture in the region.”¹⁸¹ The population in the region is also expected to grow, which will increase municipal demand.¹⁸² Because the river is overappropriated from the headwaters in Colorado¹⁸³ and into New Mexico,¹⁸⁴ any sort of climate change impacts that decrease water supply will hit the region very hard.

Groundwater depletion: One out of one point

Groundwater basins underlying the Rio Grande River are “severely depleted.”¹⁸⁵ Groundwater development in the Upper Rio Grande Basin

178. Resolution Adopted by Rio Grande Compact Commission at the Annual Meeting Held at El Paso, Texas, February 22–24, 1948, Changing Gaging Stations and Measurements of Deliveries by New Mexico Resolution (1948), wrrri.nmsu.edu/wrdis/compacts/Rio-Grande-Compact.pdf (“[B]ecause of change of physical conditions, reliable records of the amount of water passing San Marcial are no longer obtainable at the stream gaging station at San Marcial and that the same should be abandoned for Compact purposes.”).

179. Hall, *supra* note 5, at 305.

180. CTR. FOR WATER POL’Y, *supra* note 175, at 1.

181. *Id.*

182. *Id.*

183. *Rio Grande River Basin*, COLORADO’S WATER PLAN, <https://www.colorado.gov/pacific/cowaterplan/rio-grande-river-basin> (last visited Apr. 27, 2016) (“Water in the Rio Grande Basin is currently over appropriated (and has been since the 1890s).”).

184. Bureau of Reclamation, West-Wide Climate Risk ASSESSMENT: UPPER RIO GRANDE IMPACT ASSESSMENT, at S-vi (2013), <http://www.usbr.gov/watersmart/wcra/docs/urgia/URGIAMainReport.pdf>.

185. Hall, *supra* note 5, at 306.

governed by the compact¹⁸⁶ has “exploded” over the past seventy-five years.¹⁸⁷ For example, groundwater use near Albuquerque has caused groundwater levels to decline by 160 feet. Though a small amount given the depth of the aquifer, it represents the extraction of the highest quality water.¹⁸⁸ Groundwater use is predicted to increase, which in turn will lead to greater losses from the Rio Grande and its tributaries into the groundwater basin.¹⁸⁹

Expected impact on water supplies from climate change: One out of one point

Climate change impacts on the Upper Rio Grande Basin are expected to “significantly decrease available water supplies.”¹⁹⁰ Between 1971 and 2011, temperatures in the basin rose at double the rate of the global temperature.¹⁹¹ Climate models predict that average temperatures in the basin “may rise by an additional 4 to 6 °F by the end of the twenty-first century.”¹⁹² While the models do not “consistently” project any specific changes in amount of precipitation in the basin, they do predict changes in “magnitude, timing, and variability.”¹⁹³ These changes, combined with increases in evaporation due to higher temperatures, will likely “cause significant changes in the available water supply and demand.”¹⁹⁴ Current projections indicate that water supply in the Rio Grande will decrease by about a third.¹⁹⁵

Instream use factors: One out of one point

Federally listed species in the Rio Grande Basin include the endangered Rio Grande silvery minnow, the endangered southwestern willow flycatcher,¹⁹⁶ and the threatened Pecos sunflower.¹⁹⁷ These species require certain flows of water that the states and federal government purchase from willing water-rights holders.¹⁹⁸ This instream use can limit water-management options by requiring

186. The Compact allocates the waters of the Rio Grande from the headwaters in Colorado to a delivery at Elephant Butte Reservoir. The Upper Rio Grande Basin “encompasses the headwaters of the Rio Grande in Colorado to the Caballo Reservoir in south central New Mexico” just south of the Elephant Butte Reservoir. Bureau of Reclamation, *supra* note 184, at 9.

187. *Id.* at 17.

188. *Id.*

189. *Id.* at S-vi.

190. *Id.* at 40.

191. *Id.* at S-iii. (“Over the period 1971 through 2011, average temperatures in the Upper Rio Grande Basin rose at a rate of just under 0.7 degrees Fahrenheit (°F) per decade, a rate approximately double the global rate of temperature rise.”).

192. *Id.*

193. *Id.*

194. *Id.*

195. *Id.* at S-iv.

196. *Middle Rio Grande Endangered Species Collaborative Program*, U.S. FISH & WILDLIFE SERV., http://www.fws.gov/southwest/es/NewMexico/MRGESP_home.cfm (last updated Mar. 22, 2012).

197. Bureau of Reclamation, *supra* note 184, at 10.

198. *Middle Rio Grande Endangered Species Collaborative Program*, *supra* note 196.

certain flows of water in the river.¹⁹⁹ Further, climate change is predicted to reduce the amount of water available, which will “make environmental flows in the river more difficult to maintain, and reduce the shallow groundwater available to riparian vegetation.”²⁰⁰

2. *Compact Adaptability*

Score: Six out of nine, Inadequate

The Rio Grande Compact is inadequate to adapt to climate change. While it allocates water proportionally, and while Colorado regulates groundwater along with the river and its tributaries, all other factors indicate that it is an inflexible compact that is ill suited to adapt to changing conditions.

Geographic and hydrologic scope: One out of two points (against New Mexico)

The compact itself only manages surface water.²⁰¹ However, Colorado chooses to regulate groundwater to comply with the compact.²⁰² New Mexico does not include groundwater in its accounting, and Texas is now suing over this issue.²⁰³ This litigation will be discussed further below. Even though Colorado regulates groundwater for compact compliance, New Mexico’s lack of regulation merits this score for the compact in general. Further, Colorado is not obligated under the compact to manage groundwater. While it is unlikely to stop managing groundwater, it could do so in theory.

Flexibility of allocation: Zero out of one point

Allocation amounts of water in the compact are based on an annual percentage of streamflow, meaning that states share the burdens and benefits of dry and wet years proportionately.²⁰⁴ While the compact mandates that certain amounts of water be delivered to the Colorado–New Mexico state line,²⁰⁵ and that certain amounts be delivered to Elephant Butte Reservoir in New Mexico,²⁰⁶ the amounts of water are “modified based on water runoff measured

199. Hall, *supra* note 5, at 263.

200. Bureau of Reclamation, *supra* note 184, at S-v.

201. Rio Grande Compact, COLO. REV. STAT. § 37-66-101 (2016).

202. *Rio Grande Basin Roundtable*, COLO. WATER CONSERVATION BD., <http://cwcb.state.co.us/water-management/basin-roundtables/Pages/RioGrandeBasinRoundtable.aspx>; *Rio Grande Basin Groundwater*, COLO. WATER CONSERVATION BD., <http://cwcb.state.co.us/water-management/basin-roundtables/Documents/RioGrande/RioGrandeBasinGroundwater.pdf>.

203. See Motion for Leave to File a Complaint, and Brief in Support of Motion for Leave to File Complaint, *Texas v. New Mexico*, 134 S. Ct. 1050 (Jan. 8, 2013) (No. 220141).

204. § 37-66-101 art. III.

205. *Id.*

206. Resolution Adopted by Rio Grande Compact Commission, *supra* note 178 (“[B]ecause of change of physical conditions, reliable records of the amount of water passing San Marcial are no longer obtainable at the stream gaging station at San Marcial and that the same should be abandoned for Compact purposes.”).

at four stations in the Rio Grande headwaters.”²⁰⁷ The compact allows Colorado and New Mexico to choose to hold water in reservoirs in a system of debits and credits.²⁰⁸ Because the allocation of water is not fixed, Colorado, New Mexico, and Texas share the burden in drought years as consumption for each state is reduced proportionally. This makes compact compliance more likely, because upstream states do not bear the burden disproportionately. That is, in dry years, they are required to deliver proportionately less water.

Water conservation: One out of one point

The compact requires neither conservation nor efficiency measures.²⁰⁹ Mandating conservation can reduce total water and energy demands and thus reduce “risk from climate change impacts.”²¹⁰ Because this compact fails to require conservation measures, it is less adaptable to climate change impacts.

Ecosystem protection: One out of one point

The compact does not incorporate aquatic-ecosystem protection.²¹¹ It does note that, should the “character or quality” of the water at each delivery point change, the states can seek redress in the Supreme Court.²¹² Such redress could lead to a healthier upstream ecosystem, if certain water-quality measures were required at delivery points. However, because this provision has not already been argued before the Supreme Court, and given the lengthy litigation process, it is an inefficient and ineffective way to protect the aquatic and riparian ecosystem. Because the compact does not mandate any ecosystem protections, the states run the risk of having more species become threatened or endangered, and thus subject to protections under the Endangered Species Act.

Watershed governance institutions: One out of two points

The compact requires administration by “one representative from each state, to be known as the Rio Grande compact commission.”²¹³ The state engineers of Colorado and New Mexico are the “ex officio” commissioners, and the governor of Texas appoints that state’s representative.²¹⁴ Additionally, the federal government supplies a fourth representative to “act as chairman of the commission without vote.”²¹⁵ However, this commission lacks any real

207. Hall, *supra* note 5, at 304.

208. Rio Grande Compact, COLO. REV. STAT. § 37-66-101 art. VI.

209. Hall, *supra* note 5, at 305.

210. *Id.* at 264.

211. *Id.* at 306.

212. § 37-66-101 art. XI.

213. § 37-66-101 art. XII.

214. *Id.*

215. *Id.*

power, given that the compact does not give any legal significance to any findings by the Commission about compact interpretation.²¹⁶

State governance: One out of one point (against New Mexico)

Colorado has the strongest laws ensuring compact compliance. The state engineer has the power to make and enforce regulations to “enable the state of Colorado to meet its compact commitments.”²¹⁷ When the compact does not establish standards for administration specifically within Colorado, the state engineer may use “priority administration to assure its obligations are met under the Rio Grande Compact.”²¹⁸ This statute was used to uphold the state engineer’s decision to regulate surface water and groundwater to meet Rio Grande Compact obligations.²¹⁹

New Mexico does not have “a formal process” for ensuring compliance with the Rio Grande Compact.²²⁰ In the future, New Mexico must take management actions to comply with the compact in the face of climate change or risk breaching it.²²¹ The Supreme Court’s decision in *Kansas v. Nebraska* will not disincentivize New Mexico from breaching, because as long as the state does not intentionally breach, the Court will require complete disgorgement of profits.

History of disputes: One out of one point

A special master is currently hearing a dispute over the compact between Texas and New Mexico. Texas contends that New Mexico’s groundwater pumping has depleted the flows of the Rio Grande to which Texas is entitled.²²² In broad terms, Texas argues that while New Mexico has been delivering the correct amount of water to the Elephant Butte Reservoir, groundwater wells drilled in New Mexico between the reservoir and the New Mexico–Texas border are depleting Texas’s allocation.²²³ New Mexico contends that the compact does not cover groundwater pumping below the reservoir, and that its

216. *Id.* (“The findings of the Commission shall not be conclusive in any court or tribunal which may be called upon to interpret or enforce this compact.”).

217. § 37-80-104.

218. Bureau of Reclamation, *supra* note 184, at 62. *See also* Colo. Rev. Stat. § 37-80-104 (2011) (“[T]he state engineer shall make such regulations as will be legal and equitable to regulate distribution among the appropriators within Colorado obligated to curtail diversions to meet compact commitments, so as to restore lawful use conditions as they were before the effective date of the compact insofar as possible.”).

219. *See In re Rules & Regulations Governing Water Rights*, 583 P.2d 910 (Colo. 1978).

220. Bureau of Reclamation, *supra* note 184, at 62.

221. *Id.* at 74.

222. *See Texas vs. New Mexico: The Water War*, U.S. WATER ALLIANCE (Feb. 8, 2013), <http://uswateralliance.org/2013/02/08/texas-vs-new-mexico-the-water-war/>.

223. *See* Motion for Leave to File a Complaint, and Brief in Support of Motion for Leave to File Complaint at 2–3, *Texas v. New Mexico*, 134 S. Ct. 1050 (Jan. 8, 2013) (No. 220141).

obligation ends with the delivery of the correct amount of water to Elephant Butte.²²⁴ The outcome of this dispute could bring groundwater officially into the compact or it could lead to further instability in water supplies.

3. *Likelihood of Breach*

The upstream state likeliest to breach the compact in the future is New Mexico rather than Colorado, mainly due to Colorado's strong state laws and New Mexico's lack thereof. In the current litigation, if the Court finds that New Mexico has violated the compact, the Court has the opportunity to disincentivize future breaches by requiring the state to completely disgorge any profits. Should the Court not find a breach, or should it find a breach but fail to extract all profits from the breach, New Mexico will likely breach the compact again in the future. This may be economically efficient for the state, but it would have larger ramifications for farmers and ranchers in Texas that payment of damages would not address.

The climate change impacts facing the Rio Grande Basin are severe, and the Compact is inadequate to adapt to the changing conditions predicted by scientists. Colorado has state laws in place that empower the state engineer to effectively manage water appropriations, while New Mexico does not. Demand is also predicted to increase more in New Mexico than in Colorado, which will make compact compliance even harder for New Mexico.

TABLE 3: SUMMARY OF FINDINGS

Summary of Findings		
Compact	Climate Change Severity	Adaptability of the Compact to Climate Change
Republican River	4: Severe	3.5: Somewhat adequate
Rio Grande	5: Severe	6: Inadequate

CONCLUSION

With severe climate change impacts affecting the Great Plains and the Southwest, water resources will become scarcer, and compact compliance will become increasingly difficult. If states are allowed to profit from “consciously disregarding”²²⁵ their overuse of water, then in this future of scarcity there is

224. New Mexico's Brief in Opposition to Texas' Motion for Leave to File Complaint, *Texas v. New Mexico*, 134 S. Ct. 1050 (Mar. 11, 2013) (No. 220141), 2013 WL 6917385 (“New Mexico's Compact delivery obligation is to Elephant Butte Reservoir and not to the New Mexico–Texas state line.”).

225. *Kansas v. Nebraska*, 135 S. Ct. 1042, 1056 (2015).

likely to be more “reckless[] gamb[ing]”²²⁶ with downstream states’ water rights. While these compact breaches may be economically efficient, this view fails to accurately account for the impacts on the communities depending on water deliveries.

The western United States has adopted interstate water compacts to allocate water, and if the Court wants to ensure compliance, the remedy must be complete disgorgement of any profit gained by breaching a compact. But because the Court has effectively taken the heavy penalty of complete disgorgement off the table through its ruling in *Kansas v. Nebraska*, it is important to understand the specific climate change impacts threatening the river basins and how adaptable the interstate water compacts are to these impacts. While both the Republican River and Rio Grande face severe climate change impacts, because of the remedial steps taken by Nebraska after its breaches, the Republican River Compact is now somewhat adequate and future breaches are less likely. On the other hand, the Rio Grande Compact is inadequate, and breaches are likely to occur in the future.

The member states of the twenty-five other interstate water compacts should view *Kansas v. Nebraska* as a warning. However, because Nebraska was allowed to profit from its breach, states will not be incentivized to actively update their state laws to ensure compliance with their compacts in the face of climate change. A hot, dry future is in store for the western United States, and interstate water compact breaches will increase in frequency and severity.

226. *Id.*