

The Past, Present, and Future of Water on the Wind River Indian Reservation¹:

**A Case Study and Research Report on Indigenous Sovereignty,
Tribal Water Rights and Governance, and Climate Change Adaptation**



**Informed and Guided by In-Depth Discussions with Eastern Shoshone
and Northern Arapaho Tribal Members**

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¹ Photo courtesy of Angela Burgess, USFWS, public license [here](#)

Executive Summary

This paper is intended to serve as a case study and policy research report that explores the complex history, current challenges, and future possibilities surrounding Tribal water governance on the Wind River Indian Reservation (WRIR) in Wyoming, home to the Eastern Shoshone and Northern Arapaho Tribes. Drawing on historical analysis, case law, existing academic research, and interviews with Tribal members, legal experts, water managers, and federal and state agency staff, among others, the paper provides a contextualized narrative of water on the Reservation. This focus on water provides a lens for discussing historical and contemporary injustices against the Eastern Shoshone and Northern Arapaho peoples, Indigenous sovereignty, and Tribal communities' economic development.

The paper is structured around three interwoven themes:

1. The legal and political struggles for Tribal (water) sovereignty on the Wind River Indian Reservation;
2. The impacts of chronic federal underinvestment in irrigation infrastructure serving the Northern Arapaho and Eastern Shoshone; and
3. The current and projected impacts of climate change on water availability across the Reservation.

Central to the discussion is the decades-long Big Horn Adjudication, a legal battle that quantified Tribal water rights but imposed significant limitations on how those rights could be exercised. Thus, despite possessing senior water rights, the Tribes face barriers to utilizing these rights both legal in nature and structural, namely, the Wind River Irrigation Project intended by the U.S. government to be the cornerstone of the Tribes' economies is severely dilapidated. This dilapidation is a result of historic and ongoing federal underfunding of the irrigation project. Moreover, the paper outlines how the local water cycle is being disrupted by glacial melt, reduced snowpack, earlier snowmelt, and drought, highlighting the urgent need for climate adaptation strategies and water storage solutions. Despite these challenges, the paper highlights promising Tribal-led initiatives to exercise their sovereignty; modernize their irrigation infrastructure and make use of their water in the ways they see fit; and prepare for a drier, more uncertain future. This case study relates to broader challenges that Indigenous peoples face in the American West as they seek to exercise their sovereignty and their water rights, particularly in contexts with limited water resources and many competing water uses and water users.

Ultimately, the paper calls for greater federal investment in Native communities, enhanced Tribal control over their water and land, and a recognition of and respect for Indigenous values and knowledge systems. The paper serves as witness to the resilience of the Eastern Shoshone and Northern Arapaho peoples and their visions for seven generations to come.

This case study and report is intended to inform policymakers, researchers, and other interested parties about the systemic barriers Indigenous communities face in exercising sovereignty over their natural resources.

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1. Introduction

I first visited the Wind River Indian Reservation that is home to the Northern Arapaho and Eastern Shoshone Tribes in March 2023 when there was a thick layer of snow on the ground. At the time, I was a graduate student at the Yale School of the Environment and was taking a field course on the Greater Yellowstone Ecosystem. I had recently read the 2021 Greater Yellowstone Climate Assessment and was thinking of doing my project for the course on water, specifically how it is changing and expected to continue changing in the region with global temperature rise. Our Tribal liaison for the day, Lynnette GreyBull² (Húŋkpapha Lakota from the Standing Rock Sioux Tribe and Northern Arapaho) mentioned it would be a useful thing for us students to support Tribal goals, specifically when it came to utilizing their water. I took her up on this offer and began learning more.

I read up on the history of the Wind River Reservation; the multi-decade adjudication of Tribal water rights; and the Wind River irrigation project that serves primarily Native farmers and ranchers and the Midvale Irrigation project that serves primarily non-Natives who live on lands that have been ceded from the Reservation. I reached out to researchers who had been involved in drought management planning for the Tribes and lawyers who had watched the *Big Horn Adjudication* cases unfold that quantified the Tribes' present and future water rights. I returned to the Reservation in August 2023 to interview members of both the Northern Arapaho and Eastern Shoshone Tribes, including those employed by the Office of the Tribal Water Engineer and who serve on the Wind River Water Resources Control Board. I also interviewed a variety of different stakeholders on the ground who either had roles that supported the Tribes explicitly or roles that by necessity intersected with Tribal water management goals, including staff at the U.S. Fish and Wildlife Service, the Bureau of Indian Affairs, the Wyoming Water Development Commission, and the Greater Yellowstone Coalition, some of whom had Tribal affiliation.

My goal was to listen, to learn, and to then share what I had learned with others. I was fortunate enough to spend time with Tribal members who had spent decades advocating for their water rights and sovereignty. I was deeply humbled by the warm welcome I received and the openness of conversations. What follows is a summary of what I have learned about the history of water and its management on the Wind River Reservation, as well as the hopes that Eastern Shoshone and Northern Arapaho Tribal members have for the future of water on their land. In many ways this is also a story about the history and future of water in the West, and the challenges that many other Native Americans face when it comes to protecting and utilizing their natural resources. This is a story about resilient Indigenous communities, of progress that has been made against great odds, and about future possibilities.

There are three primary and intertwined strands to the story that we will transition between: 1) A story about climate change and a changing water cycle; 2) a story about Indigenous sovereignty

² In Lynnette GreyBull's words, she wanted to share her heritage: My family, the Grey Bulls - Hunkpapa Lakota, are deeply intertwined with the buffalo and the buffalo way of life. Our name originates from a Lakota Warrior who killed an albino buffalo in Greybull, Wyoming. With roots in both the Standing Rock Sioux Tribe and the Northern Arapaho Tribe of the Wind River Reservation, I have a profound connection to this region. As northern plains tribes embrace Indigenous reclamation through the return of the buffalo, we witness a resurgence of justice for Indigenous people. Just as we lived and suffered alongside the buffalo, we now celebrate their return, symbolizing our enduring resilience and unity.

over natural resources and Tribal water rights; and 3) a story about historical federal underinvestment in the Bureau of Indian Affairs and irrigation infrastructure that serves Indigenous people. To contextualize all this, it is also important to understand a bit about the history of the Wind River Reservation and the culture of the Northern Arapaho and Eastern Shoshone peoples. As I learned in my conversations, it is important to think of water in connection with all else and it is important to think of values and differences in values.

Please note that all quotes and expressed opinions only represent the views of individuals and not of Tribal governments.

2. History and Background on the Wind River Reservation

A. Brief Introduction to the Northern Arapaho and Eastern Shoshone Tribes' History on the Wind River Reservation

The Shoshone people had lived in the area for thousands of years when their leader, Chief Washakie, signed the First Treaty of Fort Bridger in 1863. The Treaty established general geographic boundaries for a Reservation 44 million acres in size.³⁴ The Reservation was then relocated to a new area and reduced to approximately 2.8 million acres when it was formalized as the 'Shoshone Indian Reservation' through the Second Treaty of Fort Bridger Treaty in 1868.⁵

The Northern Arapaho were forcibly placed on the Reservation in 1878, supposedly temporarily. However, the U.S. government never provided them a Reservation of their own. In 1938, the Reservation was renamed the 'Wind River Indian Reservation' when the Northern Arapaho Tribe was recognized by the court as having an equal interest in the Reservation and as an equal government alongside the Eastern Shoshone Tribe.

“We were driven from our homelands in Colorado by the discovery of gold...And supposedly they [the U.S. government] were going to move us. I think back into Colorado, where they were going supposedly to set aside some land for the Arapaho Tribe to have our own Reservation. That never happened. So we've been here ever since, and they put us in with our ancestral enemies: the Shoshone people.”

Herbert Welsh, Northern Arapaho

“They put us on this Reservation. Two Tribes that were notorious enemies...They're mortal enemies. They'll probably wipe each other out. But it didn't happen. Instead, we worked together.”

Ben Ridgley, Northern Arapaho

The Eastern Shoshone and Northern Arapaho Tribes have the rare experience of living on the same Reservation. They have the challenge of co-ownership and therefore co-governing of their natural resources, among other things, that's compounded by the weight of historical tension between the two groups.

³ *Treaty with the East Shoshoni*, 1863, <https://jacksonholehistory.org/wp-content/uploads/1863-treaty.pdf>.

⁴ *Wind River Interpretive Plan* (Wyoming State Historic Preservation Office, 2014), <https://wyoshpo.wyo.gov/index.php/programs/planning-historic-contexts/interpretive-plans>, 3.

⁵ *Ibid.*

“You know, we’re very unique. Two separate governments, one Reservation, no constitution.”
Wes Martel, Eastern Shoshone

“We’re two Tribes, two sovereigns on one Reservation, which is hell. Because everything is owned, resource-wise, 50%-50%, undivided. So it’s like a divorce from hell.”
Gary Collins, Northern Arapaho

One cannot understand life on the Reservation today and the challenges surrounding Tribal sovereignty and economic development laid out in this paper without understanding the history and impact of boarding schools. Through boarding schools, the U.S. government attempted to forcefully ‘civilize’ and Christianize Native Americans. Many Native children died in these schools.⁶

The Carlisle Indian School operated from 1879-1913 and was the first such school to be established. 189 children died in attendance. Hundreds of schools were modeled after Carlisle.⁷ There were boarding schools on the Wind River Reservation, one of which, the ‘Government Boarding School,’ did not close until 1955.⁹ The trauma of these boarding schools has inevitably been passed from the generation who experienced them to the next.

I first met Herbert Welsh in a supermarket parking lot in Fort Washakie. I jumped into his truck to go for a drive: we were headed to Washakie Reservoir. On the winding dirt road, we passed by antelope. Light raindrops splattered the windshield. I hung onto every word Herb said. Sitting in front of the Reservoir, I heard the histories of several generations of Northern Arapaho. I heard about the interconnectedness of life and the sacredness of water to the Northern Arapaho people. I learned of the lasting impacts of boarding schools, of the relentless efforts of colonizers to Christianize and make farmers of the Indigenous peoples. In Herb’s words:

“My grandfather was one of the very first students sent to Carlisle Indian School...The quickest way to subjugate and to neutralize a people is to take their children away from them, and when you take the children away from the people and the people’s will to live dies quickly...So a lot of our Indian children were sent off to boarding school; my parents went to boarding schools. They were taken at the age of six. They weren’t allowed to come home until they were adults. So that’s an evil past that haunts us...Now, the guy who ran the Carlisle Schools his name was Pratt and he was a Methodist minister. And his ideology is a well-known phrase now: ‘Kill the Indian, save the man.’ That was the doctrine at the time...But at the core of it, the central goal of the government was to take the land from the Indian, subjugate him, make him an individual and not a Tribal

⁶ Ibid, 38.

⁷ Carlisle Indian School Digital Resource Center, <https://carlisleindian.dickinson.edu/>.

⁸ Dana Hedgpeth and Sari Horwitz, “More than 900 Native American Children Died at U.S. Boarding Schools,” Washington Post, July 30, 2024, <https://www.washingtonpost.com/investigations/2024/07/30/indian-boarding-schools-native-americans/>.

⁹ Geoffrey O’Gara, “From Wind River to Carlisle: Indian Boarding Schools in Wyoming and the Nation,” in *WyoHistory.Org*, May 28, 2019, <https://www.wyohistory.org/encyclopedia/wind-river-carlisle-indian-boarding-schools-wyoming-and-nation>.

member and take away his heritage, take away his language, take away his identity, and make him an individual with one skill and that's farming.”

The topic of boarding schools came up often in my conversations with Tribal members. Here are a couple more quotes:

“When they signed Treaties they were trying to protect their way of life. Ever since those treaties were signed the Christian colonizers have been trying to eliminate that way of life.”
Wes Martel, Eastern Shoshone

“The injustices of the boarding schools will probably never be answered because of the implications.”
Mel Arthur, Eastern Shoshone

B. Land and Water

A common thread in my conversations was that members of both Tribes marveled at the beauty of the Wind River basin and mountains. Today, the size of the Wind River Reservation is approximately 2.2 million acres according to non-Tribal entities — same as Yellowstone National Park just a couple hours away (Figure 1). The Reservation is home to approximately 3,900 Eastern Shoshone and 8,600 Northern Arapaho enrolled Tribal members, according to the Bureau of Indian Affairs.¹⁰ More than 25,000 people, however, live within the boundaries of the Reservation per the 2020 census and these include people who identify with one or more of the Tribes but are not enrolled, in addition to non-Natives, many of whom are farmers and ranchers on lands that originally attracted white homesteaders.¹¹¹²

¹⁰ “Wind River Agency,” U.S. Department of the Interior | Indian Affairs, <https://www.bia.gov/regional-offices/rocky-mountain/wind-river-agency>.

¹¹ “Wind River Reservation CCD, Fremont County, Wyoming,” United States Census Bureau, https://data.census.gov/profile/Wind_River_Reservation_CCD,_Fremont_County,_Wyoming?g=060XX00US5601393742.

¹² Note: Historically, the Tribes have conducted three Wind River Indian Needs Determination Surveys, with the last one being in 2010, to better count the Tribal population and statistics such as the unemployment rate. This was done as it was believed the census undercounted their populations.

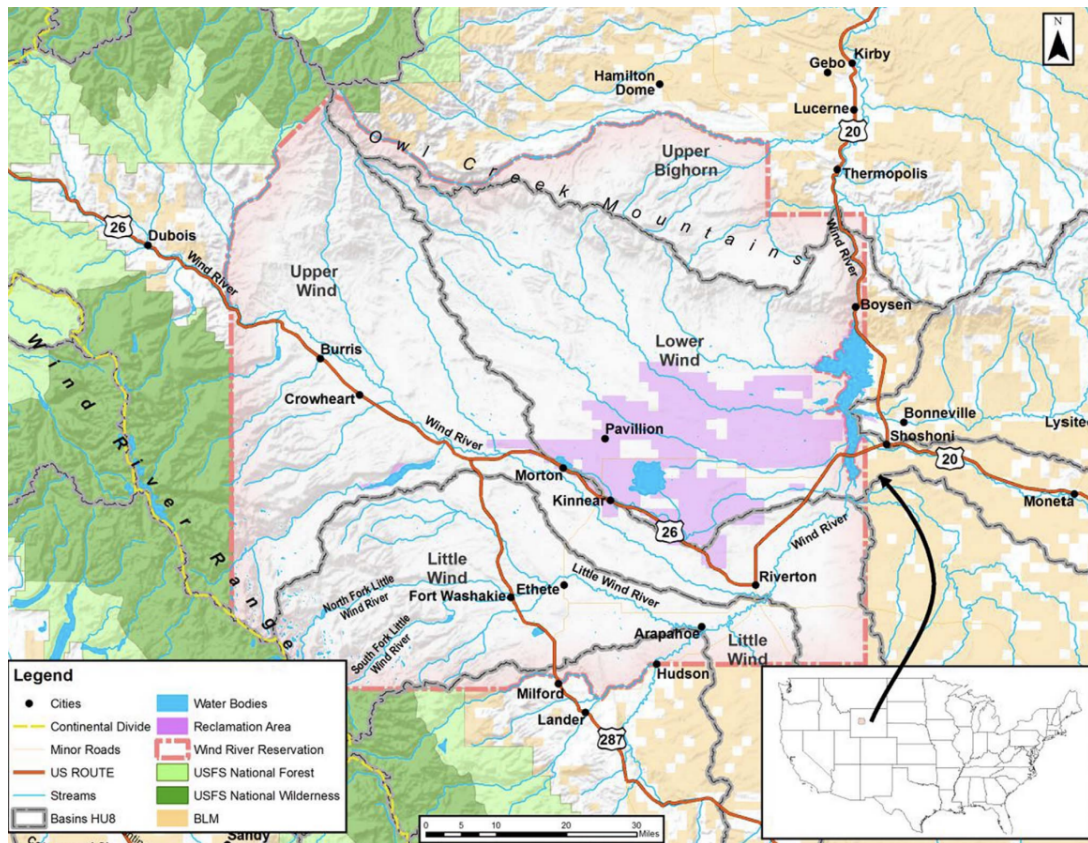


Figure 1: Map showing Wind River Reservation and Surrounding Area¹³

The Reservation is considered ‘diminished’ meaning that it has been reduced in size through a series of land purchase agreements post-treaty, which included the Brunot Agreement in 1872, the First McLaughlin Agreement in 1897, and the Second McLaughlin Agreement in 1905. It was under this last agreement — the biggest of the three — that the Northern Arapaho and Eastern Shoshone were pressured to cede 1.5 million acres that were then opened to settlement in what became the city of Riverton and the Midvale Irrigation District.¹⁴¹⁵¹⁶ For a long time, there was dispute over the jurisdictional status of Riverton. However, the question of whether the land ceded in 1905 was considered as being within the boundaries of the Reservation was settled by the Tenth Circuit Court in 2018, who ruled that the land belongs to the state and the U.S. Supreme Court denied a petition for review.¹⁷ (The legal boundary officially recognized by the

¹³ Borrowed: Shannon M. McNeeley et al., “Anatomy of an Interrupted Irrigation Season: Micro-Drought at the Wind River Indian Reservation,” *Climate Risk Management* 19 (2018): 61–82, <https://doi.org/10.1016/j.crm.2017.09.004>.

¹⁴ *Wind River Interpretive Plan*, 17.

¹⁵ *Agricultural Resource Management Plan*, June 13, 2018, <https://wrr.wyisc.org/agricultural-resource-management-plan/>, 15.

¹⁶ “The Tribes Sell Off More Land: The 1905 Agreement,” in *WyoHistory.Org*, December 10, 2018, <https://www.wyohistory.org/encyclopedia/tribes-sell-more-land-1905-agreement>.

¹⁷ Gina Dickerson, “Supreme Court Resolves Wind River Reservation Boundary Case,” *Welborn Sullivan Meck and Tooley, P.C.*, July 2, 2018, <https://www.wsmtlaw.com/blog/supreme-court-resolves-wind-river-reservation-boundary-case.html>.

state of Wyoming can be viewed in ArcGIS [here](#).) The Riverton dispute is but one instance of a larger, ongoing effort by the Tribes to return lands that were once part of the Reservation (or, from many Tribal members' point of view, they want the land that *is* theirs be recognized as theirs by non-Native governments) so there may be continuity not only of land but of Tribal sovereignty and control. In the last 70 years there have been some successes and, presently, the Tribes hope to obtain approximately 60,000 acres of land called "Muddy Ridge" north of Riverton, where they have had existing mineral rights but no surface rights.¹⁸¹⁹

In addition to its reduction in size, another important feature about the Reservation is its diversity of land-ownership types, which include Tribal land that is held in trust for the Tribes as a whole by the U.S. government (~75%), Tribal-allotted land that is held in trust for individuals and families within a Tribe (~5%), and fee simple land that is privately owned typically by non-Natives (~20%).²⁰ This detail can be seen in Figure 2. Tribal-allotted land is a legacy of the federal government trying to force Native Americans to break away from communal living and pursue 'private' ownership through the Dawes Act of 1887. The Act also had the effect of opening up what was deemed as "surplus" Reservation land to settlement by non-Native homesteaders — a trend which continued when the Tribes were pressured to cede the land that became Riverton and the Midvale Irrigation District in 1905.²¹²² Land was marketed to non-Native homesteaders as being well-suited for farming, as can be seen in the newspaper clipping from 1918 below (Figure 3).

¹⁸ Wes Martel, "Repatriating 'Muddy Ridge' on the Wind River Indian Reservation," Greater Yellowstone Coalition (blog), January 27, 2023, <https://greateryellowstone.org/blog/2023/muddy-ridge>.

¹⁹ Clair McFarland, "Wyoming Tribes May Be On Path To Get 60,000 Acres Of Federal Land," *Cowboy State Daily*, April 19, 2024, <https://cowboystatedaily.com/2024/04/18/wyoming-tribes-may-be-on-path-to-get-60-000-acres-of-federal-land/>.

²⁰ *Agricultural Resource Management Plan*, 36.

²¹ *Ibid*, 15.

²² Teresa Cavazos Cohn et al., "Seems like I Hardly See Them around Anymore: Historical Geographies of Riparian Change along the Wind River," *Water History* 8, no. 4 (December 5, 2016): 405–29, <https://doi.org/10.1007/s12685-016-0187-5>, 422.

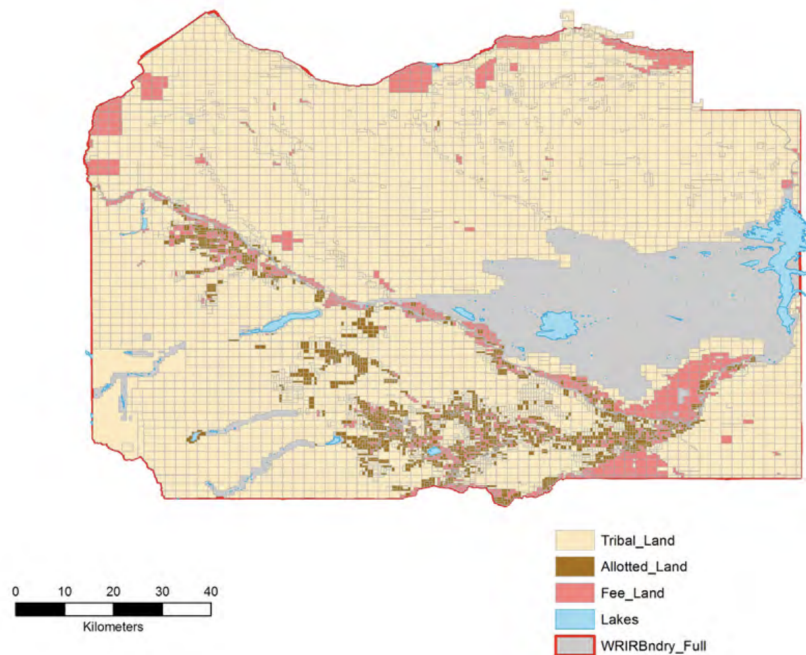


Figure 2: Land Ownership by Type on the Wind River Reservation²³

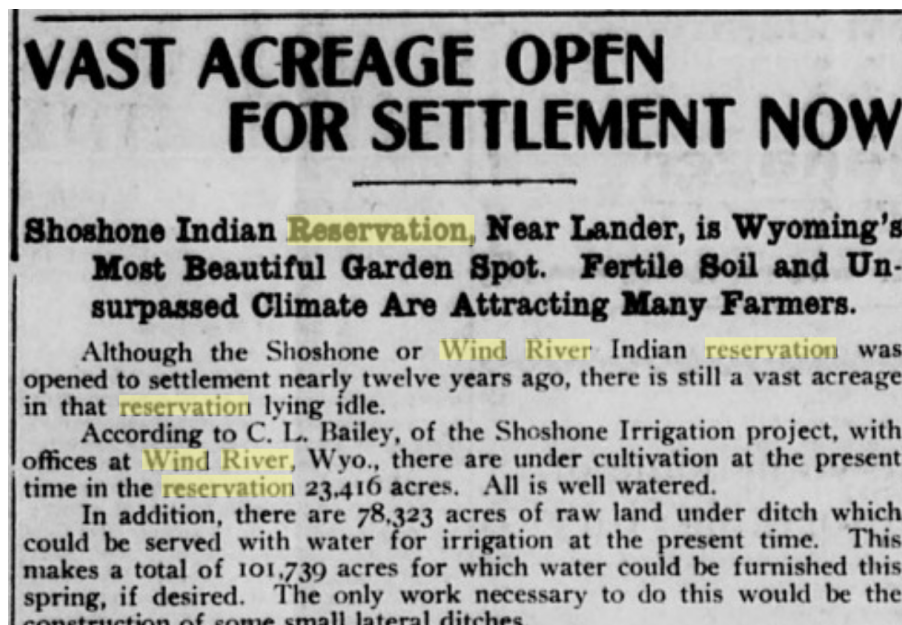


Figure 3: Example of Advertising Opened Land for Non-Native Settlement in the March 1918 Issue of the Wyoming State Journal²⁴

²³ Borrowed: *Agricultural Resource Management Plan*

²⁴ "Vast Acreage Open for Settlement Now," *The Wyoming State Journal (Lander)*, March 29, 1918, Volume 35, Number 25 edition, <https://wyomingnewspapers.org/?a=d&d=WYSJR19180329-01.1.17&e=-1866---2017--en-20--1--img-txIN%7ctxCO%7ctxTA-wind+river+reservation-----0-Fremont----1>.

A couple important points: First, fee simple lands are privately-owned and therefore not always under direct Tribal governance.²⁵ Second, with Tribal-allotted land there's an issue with land-owners not identifying who inherits their land before they die and ownership gets divided up among all living heirs. There now exists instances in which there are hundreds of owners for a given allotment, making any kind of land-use decisions challenging.²⁶ This diversity of land-ownership types and the different boundaries of governance and responsibilities make Tribal management of natural resources difficult.

In addition to understanding how the boundaries of the Reservation have changed and how the land has been defined over time, it is useful to understand how water flows through the landscape. The Wind River, otherwise known as the Big Wind, and the Little Wind River are the main rivers meandering through the Reservation. (There is a very useful [ArcGIS map](#) for the Wind River Reservation — I recommend turning on the layer titled “National Hydrography Dataset” to view the finer details of the streams, rivers, lakes, ponds, and reservoirs within the Reservation boundary). The Reservation exists at the headwaters that come down from the Wind River Range in the southwest. The Wind and Little Wind Rivers unite with the Popo Agie River in the southeast corner of the Reservation before becoming the Bighorn River after exiting Wind River Canyon at the northern boundary of the Reservation in Thermopolis (Figure 1). The Bighorn then flows into Yellowstone.²⁷ The Yellowstone becomes the Missouri River, the Missouri flows to the Mississippi River and, eventually, to the Gulf of Mexico (Figure 4).

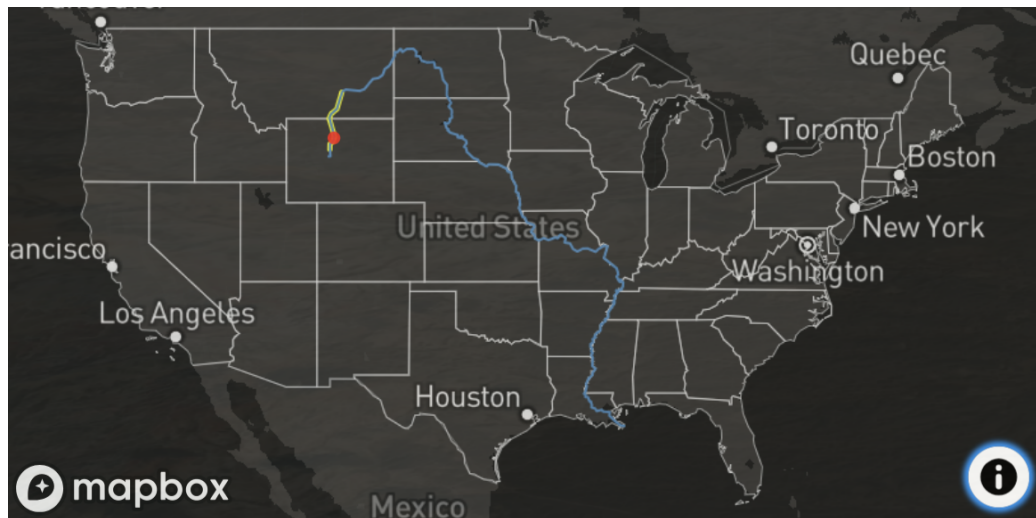


Figure 4: Flow of water from Wind River to the Gulf of Mexico²⁸

²⁵ Ginger B. Paige, William J. Gribb, and Roger H. Coupal, “Agriculture Resource Management Planning on the Wind River Indian Reservation: An Integrative Approach,” *Journal of Geoscience and Environment Protection* 7, no. 12 (December 2019): 206–21, <https://doi.org/10.4236/gep.2019.712015>.

²⁶ Shannon M. McNeeley, “Sustainable Climate Change Adaptation in Indian Country,” *Weather, Climate, and Society* 9, no. 3 (July 1, 2017): 393–404, <https://doi.org/10.1175/wcas-d-16-0121.1>.

²⁷ Cohn, “Seems like I Hardly See Them Around Anymore”.

²⁸ Sam Learner, “Downstream Path from Fort Washakie, Wyoming,” River Runner, <https://river-runner.samlearner.com/?lng=-108.88429&lat=42.986346>.

Relative to the Indigenous peoples who called the area home, the state of Wyoming is a relatively new entity. Wyoming became a state in 1890, twenty-two years after the Treaty of Fort Bridger was signed by the Eastern Shoshone people. On the state seal of Wyoming is a figure of a woman with an 'equal rights' banner (as they were the first state to grant equal political and civil rights to women), accompanied by a cowboy and a miner with banners that refer to four major industries in the state: 'oil', 'mines', 'livestock', and 'grain'.²⁹ The state seal represents values that have to do with resource extraction and with making use of the land for agricultural purposes.

In Shoshone, the word for 'water' is *Baa*. In Arapaho, it is *Nec*. During my interviews, I asked Tribal members about their relationship to water and what it meant to them and their community. Here are some of the responses I received:

"The Arapaho word for 'water' translates into 'gift of life'. Our elders, the minute they were born, they were taught to respect nature. Water was the main connection to nature. Rivers have a spirit."

Wes Martel, Eastern Shoshone

"We can't live without water. We can't make water. Water is only gifted to us."

Herbert Welsh, Northern Arapaho

"It's easy for us as Native people to have that connection and be born with that and non-Natives, just because of the way they're socialized, don't know their own connection with water even though it's there."

Mel Arthur, Eastern Shoshone

"Ever you hear an elder talk about water, water is sacred to us, our people, you know. For both Tribes, water is sacred. We use water in our ceremonies... Water is life for us. If we didn't have water, we wouldn't be here."

Lokilo St. Clair, Northern Arapaho

"Within our tribe, water means a lot. Because water is life, essentially. Water gives us so much. And it also is very powerful. Water can change anything if there's enough of it, you know, including landscapes."

Colleen Friday, Northern Arapaho

There was a sense of deep gratitude and respect for water in all my conversations with Tribal members. I present some of these quotes with the hope that they lay a useful foundation for reflecting on what different values and relationships to water exist in some of the historical and contemporary challenges that we're about to explore.

²⁹ "Great Seal," Wyoming Secretary of State, <https://sos.wyo.gov/Services/GreatSeal.aspx>.

3. Climate Change on the Reservation

Water on the Wind River Reservation is changing in response to our warming world.

The freezing level has shifted upwards by 500 feet, meaning snow formation is restricted on average to higher elevation as the region has warmed by approximately 2 degrees Fahrenheit since the mid-20th century.³⁰ This has led to a reduction in snowpack. Since 2000, there has been a reduction in annual runoff and runoff has been occurring earlier than usual — between two and four weeks ahead of historic timing. Glaciers in the Wind River mountains are retreating due to warming.³¹ And there has been a reduction in precipitation in recent decades.³²

Water availability on the Reservation is largely dependent on runoff from snowmelt, supplemented by glacial melt in the Wind River mountain range. Snow accumulation typically begins in October and concludes in mid-April before entirely melting by late June. Early melt, or below expected snowpack, has a significant negative impact on water availability on the Reservation, impacting the agricultural growing season.³³ This is because the water moves through the system before all of the plants and people are ready to use it.³⁴ Glaciers are an important source of late-season melt water, so their retreat compounds concern about reduced water supply during the summer.

As the planet continues to warm, it is expected that things will continue to change, affecting annual precipitation rates, including what portion of precipitation occurs as snowfall, the timing of precipitation, and when runoff occurs.³⁵ In the past two decades, west central Wyoming has experienced severe droughts, including in the early 2000s and in 2012-2013.³⁶ Though drought, or lower-than-normal water availability, is a normal part of life in the west and a given amount of natural variability is expected, conditions are changing and the past, in this instance, is no longer a good guide for the future. With so much uncertainty when it comes to the timing and volume of future water availability, it is essential to build resiliency and plan for the unexpected.

Moreover, the Tribes also experienced a ‘micro-drought’ in 2015, where, even during a wet year, certain areas on the Reservation — in this case, the Little Wind Basin — experienced water shortages.³⁷ In their paper on the phenomena, a ‘micro-drought’ is defined by McNeeley and

³⁰ Cody Knutson and Shannon McNeeley, rep., *DOI North Central Climate Adaptation Science Center Final Report*, 2018, 8

³¹ Benjamin Storrow, “The Rocky Mountains’ Largest Glaciers Are Melting with Little Fanfare,” *Scientific American*, September 13, 2017, <https://www.scientificamerican.com/article/the-rocky-mountains-largest-glaciers-are-melting-with-little-fanfare/>.

³² Shannon McNeeley et al., rep., *Wind River Reservation Drought Management Plan* (Fort Collins, Colorado: Natural Resource Ecology Laboratory, Colorado State University, 2020), 3.

³³ *Ibid*, 17

³⁴ Shannon M. McNeeley, Tyler A. Beeton, and Dennis S. Ojima, “Drought Risk and Adaptation in the Interior United States: Understanding the Importance of Local Context for Resource Management in Times of Drought,” *Weather, Climate, and Society* 8, no. 2 (February 2016): 147–61, <https://doi.org/10.1175/wcas-d-15-0042.1>, 8.

³⁵ *Wind River Reservation Drought Management Plan*, 4.

³⁶ “Anatomy of an Interrupted Irrigation Season,” 61.

³⁷ *Ibid*, 62.

team as “droughts that are highly localized, short in duration, and develop due to the unique social and environmental features of local systems.”³⁸ So, what was happening in the Little Wind Basin to cause a water shortage in 2015? Conditions were such that runoff occurred early in the season and, when high precipitation also occurred shortly thereafter, there was not enough storage in the low-capacity Washakie Reservoir that served said segment of the Reservation to hold the water for distribution throughout the irrigation season. Instead, water had to be released from the reservoir downstream before it could be used by irrigators. The irrigation season for this part of the Reservation ended a month early, which had negative impacts on producers whose livelihoods depend on the reliability of the water resource.³⁹ Yet, other parts of the Reservation that received water from multiple sources did not experience such shortages. For example, folks in the Upper Wind basin in the Crowheart area were able to utilize stored water in Dinwoody Lake in addition to runoff from Dinwoody Glacier, an exceptionally large glacier in the Wind River Range, late into the irrigation season.⁴⁰ This example brings to the forefront the ways in which infrastructure, management, and the availability of plural or ‘back-up’ water resources play key roles in determining resilience to changing climatic conditions.

In 2020, a drought management plan was published for the Reservation. This was a product of years of research into drought and shifting climatic conditions in the area that had been contributed to by researchers at Colorado State; the North Central Climate Adaptation Science Center; the High Plains Regional Climate Center; the National Drought Mitigation Center at the University of Nebraska, Lincoln; University of Wyoming; and NOAA; among others. This work was done with Tribal support and in partnership with the Office of the Tribal Water Engineer and the Wind River Water Resources Control Board.⁴¹ Along the way, government agencies and university partners had helped the Tribes develop a system for monitoring and declaring drought, assessed the Reservation’s vulnerabilities to climatic changes, and identified feasible adaptation strategies in spite of barriers.⁴²

In order for the Tribes to adapt to a changing climate, they need to be able to make decisions about their natural resources. This means they need to be able to exercise their sovereignty and self-determination.⁴³ Beyond this, Tribal water managers will need access to climate information to monitor and understand changes that are happening on the landscape and to inform their decision-making.⁴⁴ Additionally, one of the central themes of my conversations has been the need for more water storage on the Reservation. If the Tribes have places to store water, they can supplement deficient supplies as needed by releasing what they need to into the river. Another benefit of the control that comes with water storage is it would allow the Tribes to implement a reliable instream flow for ecological and other purposes.

Overall, the Tribes have little storage available to them on the Reservation. They are mostly relying on “run of the river and natural hydrology,” says Travis Teegarden, Chief of the Branch

³⁸ Ibid, 63.

³⁹ Ibid, 74.

⁴⁰ Ibid, 76.

⁴¹ *Wind River Reservation Drought Management Plan*.

⁴² “Anatomy of an Interrupted Irrigation Season,” 77.

⁴³ “Sustainable Climate Change Adaptation in Indian Country.”

⁴⁴ “Anatomy of an Interrupted Irrigation Season,” 78.

of Irrigation and Power at the BIA's Office of Trust Services. Washakie Reservoir has the greatest capacity at 7,940 acre-feet, followed by Ray Lake, and Dinwoody Lake. In total, the Tribes manage under 20,000 acre-feet of stored water in BIA facilities. In contrast, the Bureau of Reclamation manages over 1,000,000 acre-feet of stored water in the Wind River basin that primarily serves non-Tribal agricultural producers.⁴⁵ In other words, the Tribes have less than 2% of the storage that non-Tribal members in the area have to serve their needs (Figure 5).

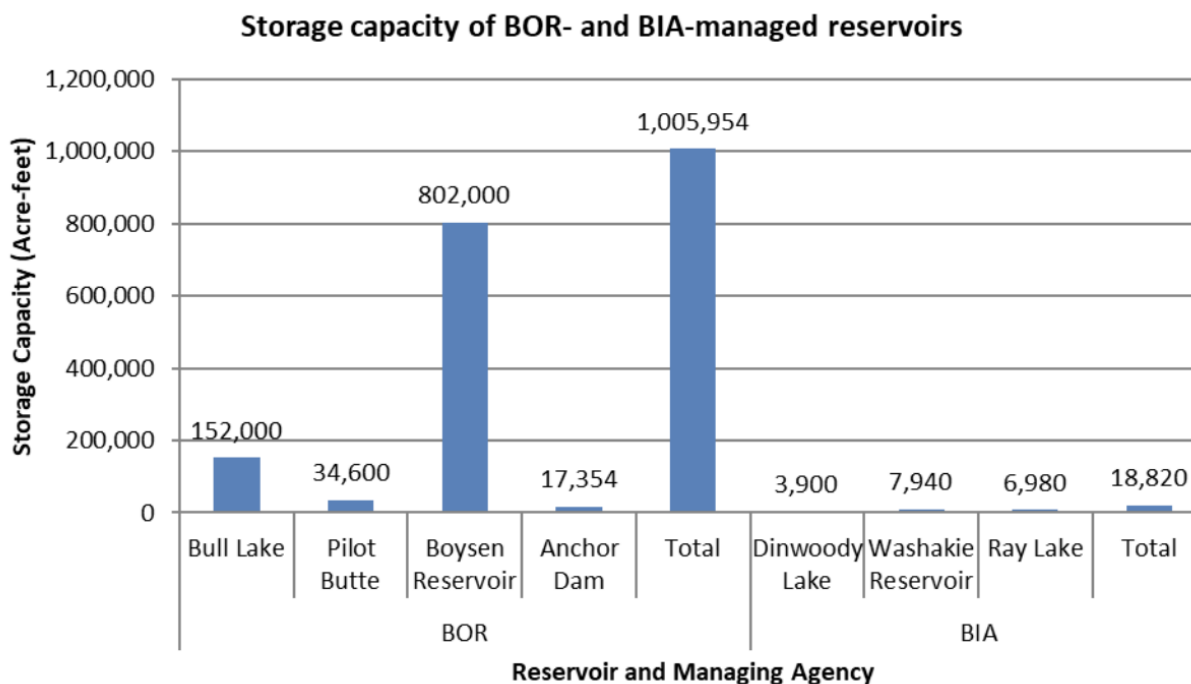


Figure 5: Storage Capacity in Acre-Feet of Reservoirs Managed by Bureau of Reclamation (BOR) versus Bureau of Indian Affairs (BIA)⁴⁶

At an even more fundamental level, it is no surprise that lack of water storage is an issue on the Reservation for Tribal irrigators. As Anne MacKinnon writes about the never-completed Wind River Irrigation Project: “The design required water storage to make water available throughout the irrigation season. Barely 20 percent of the storage capacity once planned existed in 2018.”⁴⁷

4. The Fight for Tribal Water and Sovereignty

Native American Reservations have a federal reserved water right whenever water is necessary to fulfill the purpose(s) for which the reservation was created. In these cases, this federal reserved water right is a right to water that accompanies the land set aside for the Reservation with a priority date that is at least as senior as the date when the Reservation was established, if

⁴⁵ *Wind River Reservation Drought Management Plan*, 8.

⁴⁶ Borrowed: *Wind River Reservation Drought Management Plan*.

⁴⁷ Anne MacKinnon, *Public Waters: Lessons from Wyoming for the American West* (Albuquerque: University of New Mexico Press, 2021), 231.

not time immemorial.⁴⁸ This right was first recognized by the Supreme Court in *Winters v. United States* (1908).⁴⁹ With a priority date of 1868, the Eastern Shoshone and Northern Arapaho have a senior water right, given the state of Wyoming wasn't founded until 1890. It is typically the case that Tribes have the most senior water rights on rivers in the western United States. And unlike the water law doctrine of prior appropriation that controls surface water and groundwater use in most of the western United States, Indian reserved water rights, once quantified, are fixed.⁵⁰ (As a side note, Tribes can also hold appropriative rights through the state in addition to their reserved rights as part of their water rights portfolio.) The prior appropriation doctrine that dictates much of water use in the west, excluding Tribal water use, can disincentivize efficiency, insofar as if rights holders do not use their full allotment, the excess can be taken by the state with no reward to the original irrigator who managed to use less water.⁵¹

“Most irrigators are not very good and waste a lot of water. But state water law allows that.”
Dick Baldes, Eastern Shoshone

What began as a lawsuit initiated by the Tribes objecting to groundwater-drilling in Riverton, turned into a decades-long legal battle to adjudicate water rights on the Reservation. In 1977 the meticulous process of taking inventory of water rights — federal reserved, federal reserved rights held by Tribes, and appropriative rights — and quantifying them began, including determining the amount of water that the Tribes were entitled to in the river.⁵² The idea was that, administratively, it made sense to consider all water rights at once, in order to take a whole systems view to determine how things need to be carved up. This played out in the courts as the *Big Horn Adjudication*. Notably, it was a state court that was set to determine the Tribes' water rights, supported by the U.S. Supreme Court's interpretation of the McCarran Amendment (1952) in a 1976 case regarding the Colorado River.⁵³

The *Big Horn Adjudication* infamously lasted thirty-seven years, involving lower state courts, the Wyoming Supreme Court, and the U.S. Supreme Court.⁵⁴ Extending across six separate cases, it is *Big Horn I* and *Big Horn III* that are most relevant for this discussion.

In *Big Horn I*, the Wyoming Supreme Court quantified the Tribes' reserved water right based on the practicably irrigable acreage (PIA) standard that had been developed previously in *Arizona v. California* (1963). The PIA standard seeks to quantify the amount of water you would need to irrigate land that is capable of irrigation, including land that is presently irrigated and land that

⁴⁸ “Federal Reserved Rights,” Water Education Foundation, <https://www.watereducation.org/aquapedia/federal-reserved-rights>.

⁴⁹ *Winters v. United States*, 207 U.S. 564 (1908)

⁵⁰ Jason A. Robison, “Wyoming's Big Horn General Stream Adjudication,” *Wyoming Law Review* 15, no. 2 (2015): 243–312, <https://doi.org/10.59643/1942-9916.1342>, 257-258.

⁵¹ Madilynne Clark, “Use It or Lose It – a Counterproductive Aspect of Washington's Water Law That Hurts Conservation Efforts,” *Washington Policy Center*, March 23, 2017, <https://www.washingtonpolicy.org/publications/detail/use-it-or-lose-it-a-counterproductive-aspect-of-washingtons-water-law-that-hurts-conservation-efforts>.

⁵² Robison, “Wyoming's Big Horn General Stream Adjudication,” 267.

⁵³ Jay Stein, *The McCarran Amendment and the Administration of Tribal Reserved Water Rights*, 1997, 9–15, <https://opensiuc.lib.siu.edu/cgi/viewcontent.cgi?article=1284&context=jcwre>, 11.

⁵⁴ Robison, “Wyoming's Big Horn General Stream Adjudication,” 266.

might be irrigated in the future. Based on this, the court estimated that the Tribes have 107,976 acres of PIA. This translates to 499,862 acre-feet reserved water right, of which approximately 60% is historic and 40% is futures.⁵⁵ After the Wyoming Supreme Court decision, *Big Horn I* progressed to the United States Supreme Court where, after Justice O'Connor recused herself, a split court affirmed the Wyoming Supreme Court's decision in 1989.⁵⁶

I was fortunate to be able to arrange a meeting with Northern Arapaho Tribal members Gary Collins and Howard Brown to learn about the history of the *Big Horn Adjudication*. Gary Collins is currently the Arapaho Tribal Liaison to the State of Wyoming. Previously, he served as Tribal Water Engineer for eight years and has been instrumental in facilitating dialogue and joint action across stakeholders to support Tribal water management. Howard Brown, like Gary, possesses an encyclopedic knowledge of the topics we discussed. For nearly two decades, Howard worked for the joint-Tribal Department of Transportation, most recently as Associate Director. As of 2025, Howard is a member of the Wind River Water Resources Control Board. For three hours, I listened, transfixed, as they shared in great detail the circumstances surrounding the adjudication of Tribal water rights and their hopes for the future. They, like many others I talked to, were trying to plan seven generations into the future and a big part of that plan was making good use of the Tribes' water right.

"We got 500,000 acre feet, which pretty much stunned the state of Wyoming. They thought that we would only be allowed the 250,000 plus or minus acre feet that we already use... So that meant we had to come back home and decide what to do with our water rights that we have now had codified in the U.S. Supreme Court. Well, that is why we created the water code."

Gary Collins, Northern Arapaho

With their water right newly quantified, the Northern Arapaho and Eastern Shoshone set about developing and adopting a legal water code that could provide a system for managing and protecting their water resources in the present and for "generations to come."⁵⁷ The water code adopted in March 1991 identified 15 beneficial uses (in water law, the use of water that has *value*) of their water, including "agricultural use," "cultural use," "religious use," "industrial use," and, importantly, "instream flow use, including instream flow for fisheries, wildlife, and pollution control, aesthetic and cultural purposes."⁵⁸ The water code is based on plural values that recognize the cultural, spiritual, economic, and practical uses of water, and prescribes all 15 beneficial uses of water equal weight. As Howard Brown and Gary Collins have emphasized in our conversations together, water is life. It is sacred. More than 70% of the Earth's surface is covered in water. Our bodies are ~60% water. In the Tribal water code, consumptive uses are not superior to non-consumptive uses.⁵⁹ This contrasts with the state of Wyoming that strongly

⁵⁵ Ibid, 282-283.

⁵⁶ Ibid, 288.

⁵⁷ "LAW AND ORDER CODE OF THE SHOSHONE AND ARAPAHO TRIBES OF THE WIND RIVER RESERVATION: WIND RIVER WATER CODE" (Eastern Shoshone and Northern Arapaho, March 18, 1991).

⁵⁸ Ibid.

⁵⁹ "Wind River Reservation Tribes Work with Research Coalition to Enhance Drought and Climate Resilience," National Drought Mitigation Center: University of Nebraska, July 24, 2015, <https://drought.unl.edu/Publications/News.aspx?id=204>.

prioritizes agricultural use and other consumptive uses of water, with less concern for environmental flows or nonconsumptive uses.

Notably, the water code was approved by the Eastern Shoshone and Northern Arapaho general councils within one week of each other in what was a significant collaborative, political step for the two Tribes. The water code established the Office of the Tribal Water Engineer and the Wind River Water Resources Control Board. The Board is composed of six members from each Tribe and oversees water resource management and actions under the Code.⁶⁰ The Tribal Water Engineer (TWE) is responsible to the Board and the TWE and their staff carry out all water resource management activities dictated by the Code.⁶¹

One difficulty for the Tribes is that, while their water code governs their communities, other entities are not required to abide by it.

“Our water code doesn't have any effect on the non-Indian community, because they don't put a value on culture.”
Gary Collins, Northern Arapaho

“The Tribes are able to pass their own laws.. and the water code is under that. And so the BIA's stance and I guess the federal government's stance is, well, we will recognize and honor those codes to the extent that they don't conflict with any federal regulations.”
Superintendent Leslie Shakespeare

In April 1990 the Tribes issued an instream flow permit that set a minimum requirement of 252 cubic feet per second for how much water had to flow through the Wind River at all times. One of the reasons for doing this was the Tribes wanted to try to restore and enhance fisheries that had been damaged by agricultural diversions that, at times, left little water left in certain stretches of the river.⁶² These impacts have historically been acute downstream of Diversion Dam, a major dam on the main stem of the Big Wind River that diverts water to the majority non-Native Riverton area.⁶³⁶⁴ This was the first ever instream flow designation on Tribal lands and, as retired U.S. Fish and Wildlife Service employee Dave Skates put it during our conversation at the Gannett Grill in Lander, Wyoming, “a very big deal.”

At this point, the dewatering below Diversion Dam and its associated ecological impacts had been well-established for decades. A 1980 report by U.S. Fish and Wildlife Service made recommendations for instream flows along all major sections of the rivers and streams on the Reservation for the purpose of establishing baselines to protect fishery resources.⁶⁵

⁶⁰ Wind River Water Code.

⁶¹ Ibid.

⁶² Robison, “Wyoming's Big Horn General Stream Adjudication,” 289.

⁶³ Shannon M. McNeeley et al., “Cottonwoods, Water, and People - Integrating Analysis of Tree Rings with Observations of Elders from the Eastern Shoshone and Northern Arapaho Tribes of the Wind River Reservation, Wyoming,” Open-File Report USGS, 2020, <https://doi.org/10.3133/ofr20201072>.

⁶⁴ *Tribal Waters* (Patagonia, 2022), <https://www.patagonia.com/stories/tribal-waters/video-122646.html>.

⁶⁵ David A. Vogel, rep., *Instream Flow Recommendations for Fishery Resources in the Major Rivers and Streams on the Wind River Indian Reservation, Wyoming* (Lander, Wyoming: U.S. Fish and Wildlife, 1980).

Referring to the stretch of the Big Wind between Diversion Dam and the Little Wind, the report stated:

“At the present time, this portion of the Wind River is heavily impacted by man. Severe dewatering often occurs in the summer months, high siltation occurs during the flushing of sediment behind Diversion Dam in the fall...Because of these reasons, the brown and rainbow trout populations are depressed.”⁶⁶

“The years they [the Tribes] had instream flow, we had rebound in the fishery,” says Mike Mazur, a fish biologist at the U.S. Fish and Wildlife Service office in Lander, Wyoming for the past thirteen years. The instream flows were a success for the Tribes for a brief period. Then, water levels dropped because of agricultural diversions by users with state law-based rights. The Tribes issued a complaint to the State Engineer asking that their instream flow be respected as they were the senior rights holder on the river. This was the beginning of *Big Horn III*.⁶⁷

“The idea that an Indian Tribe has a superior water right, and that this entity exists within our boundaries of the state, is really hard for so many to accept.”

Geoff O’Gara

In *Big Horn III*, the Wyoming Supreme Court ruled in a split decision in 1992 that the Tribes were not permitted to dedicate a portion of their reserved water right to instream flow.⁶⁸ It had been interpreted by the court throughout the adjudication process, though there was always dissent, that the purpose of the Reservation was for agriculture and that, therefore, the beneficial use of the Tribes’ reserved right was for agriculture (meaning crops or livestock production).⁶⁹ Three justices expressed the view that water would first have to be put to agricultural use before a change application could be submitted to the State Engineer to shift the use to instream flows.⁷⁰ This recommendation, though, is structurally impossible and was recognized as so by the justices, as the state limits who can hold an instream flow right to the state itself.⁷¹ In sum, the majority of the court ruled against the Tribes using their water as they see fit for the development of their communities.⁷²

In an interview for a 1999 documentary about water rights and water management on the Wind River Reservation titled *Wind River*, Wyoming Supreme Court Justice Thomas’ commentary on the adjudication process to date provided real insight into some of the callous perspectives that informed justices’ rulings:

“It seems highly unlikely that anybody is going to build dams and irrigation projects to irrigate what sort of are sagebrush flats at the moment. It just doesn’t make sense. What we have is a situation in which the Tribes have the right to a tremendous amount of water that they have no way to utilize. Here we have Indigenous Tribes that basically have all

⁶⁶ Ibid, page 29.

⁶⁷ Robison, “Wyoming’s Big Horn General Stream Adjudication,” 289.

⁶⁸ Ibid, 293.

⁶⁹ *Agricultural Resource Management Plan*, 28.

⁷⁰ Robison, “Wyoming’s Big Horn General Stream Adjudication,” 290-291.

⁷¹ In re General Adjudication of All Rights to Use Water in Big Horn River System, Justia (Supreme Court of Wyoming 1992).

⁷² “Sustainable Climate Change Adaptation in Indian Country,” 398.

of what we now call the United States of America and 200 years later they don't have very much of it. And, of course the other side of that coin is, well, that's what happens to you when you lose."⁷³

Two other outcomes to mention from the *Big Horn Adjudication*: 1) It was ruled that the Tribes had no reserved right to groundwater, an important source of domestic water use including drinking water⁷⁴, and 2) No legal foundation to market their water beyond Reservation boundaries, for example through leasing.⁷⁶ While the Tribes received a sizeable portion of the water in the river in theory, in practice it is hard for them to use it for the purposes they desire — for the purposes that align with their values (eg, instream flows to protect fisheries) and for the purposes that allow them to develop their economy in the ways that they see fit. Notably, while the PIA standard to quantify water rights as established in *Arizona v. California* is determined based on agricultural need, the court did not restrict the usage of the water to agricultural irrigation in that case.⁷⁷ However, the use of water by the Eastern Shoshone and Northern Arapaho came to be restricted in the *Big Horn Adjudication*.

While it has been difficult for the Tribes to utilize their water, it has not been impossible. The Tribes have been hard at work determining how to move forward within these constraints. For example, the Tribal Water Engineer is able to maintain an instream flow of 25 cubic feet per second (CFS) on the Little Wind River which primarily serves Native water users. The State Engineer typically allows the Tribal Water Engineer to manage water in accordance with the Tribal Water Code on the Little Wind. However, the instream flow is not enforced by the state and would, therefore, not be ensured during a drought year.⁷⁸

For the Tribes to utilize their approximately 200,000 acre feet of futures water, which at present is a 'paper' right and not currently benefiting them, they have to work within the constraints imposed by the adjudication that construed the purpose of life on the Reservation as 'agriculture.'

"Who is the state to say what the Tribes can do with their water? They were given the water before the state existed."

Mike Mazur, U.S. Fish and Wildlife Service

Dick Baldes (Eastern Shoshone) and Dave Skates spent their careers working together at the U.S. Fish and Wildlife Service office in Lander, Wyoming. Both are passionate advocates for instream flow and the ecological well-being of the Wind River. Dick was such a relentless advocate for biodiversity conservation and Tribal water rights that during his life-long career at U.S. Fish and Wildlife Service he had been suspended and ultimately forced to retire early for

⁷³ *Wind River* (High Plains Films, 1999), https://www.highplainsfilms.org/films/wind_river.

⁷⁴ *Agricultural Resource Management Plan*, 27.

⁷⁵ **Note:** In the most significant case to date on the topic of groundwater and reserved rights, the Ninth Circuit court ruled in 2017 that the reserved rights doctrine in fact extends to groundwater in a win for the Agua Caliente Band of Cahuilla Indians.

⁷⁶ Robison, "Wyoming's Big Horn General Stream Adjudication," 281-282.

⁷⁷ *Ibid*, 290, speaking about *Arizona vs. California* (1979)

⁷⁸ *Wind River Reservation Drought Management Plan*, 8, 12.

ruffling too many feathers in what had become a hyper-politicized environment around water use and conservation efforts on the Reservation.⁷⁹

Both Dick and Dave shared their disappointment over the outcome of *Big Horn III* and the common perception in the non-Native agricultural community of instream flow as competing with essential water for irrigation:

“We had two years of instream flows and then they were gone. And during that time of instream flow, we had a relatively drought year. You know, it was 80-some percent of normal, not the best of years. But they were able to pass the flows without any harm to agricultural communities at all. We asked them at meetings at the end of that year, how could this possibly happen? You’ve always said that you never have enough water.”

Dave Skates, U.S. Fish and Wildlife Service

“What the state engineer was saying, that if the Tribes continued to have an instream flow, that it was going to hurt the irrigators, non-Indian irrigators? That was crap. That's wrong because the two years that the Tribes had in-stream flows, those irrigation projects, the non-Indian irrigation projects, the Bureau of Reclamation’s Midvale and Le Claire Irrigation Districts had bumper crops by their own media releases.”

Dick Baldes, Eastern Shoshone, U.S. Fish and Wildlife Service

Today, the fisheries in the Big Wind continue to be threatened by agricultural diversions which, under the control of the State Engineer, involve no protected instream flow requirement. Given this, certain stretches of the river below Diversion Dam can run dry to the detriment of these ecosystems and their inhabitants:

“...the fisheries have hung on for a long time after being dewatered and mistreated...they’re to the point now where that fishery, and we don’t survey it anymore because we don’t have the manpower to survey it, but when I see it and I talk to people, and it’s still declining, there’s hardly any fish left and it’s to the point where...it’s almost a dead river.”

Mike Mazur, U.S. Fish and Wildlife Service

The *Big Horn Adjudication* has become a poster child for the risks Native American Tribes face when their water rights are adjudicated in state courts and certainly is one reason why other Tribes have pursued negotiated settlements instead. The underlying concern with such an adjudication process being: Can a state court be unbiased when the outcome of the water rights accounting process directly impacts the interests of powerful stakeholders holding appropriative rights in the state and state judges are popularly elected? As Lawrence MacDonnell put it in a Wyoming Law Review article for a special symposium celebrating the end of the *Big Horn Adjudication*:

“While the courts endeavor to consistently apply federal law, they are inevitably affected by their position as state courts. They are subject to state political influences. They are

⁷⁹ Conversation with Dick Baldes in July 2023.

often sensitive to the potential adverse effects of newly decreed senior reserved water rights on junior water users with rights established under state law.”⁸⁰

A paper published in 2020 by Sanchez et al found that only 56 of 226 federally recognized Native Reservations in the western United States have quantified their water rights, either by adjudicating them in the courts or through negotiated settlements with relevant stakeholders.⁸¹ Notably, only twelve of the 56 have been through court adjudications, including the Wind River Reservation.⁸²

Nearly every person I talked to during my August visit, asked me if I had had the chance yet to speak with Wes Martel (Eastern Shoshone). I was fortunate to meet Wes for breakfast one morning at The Middle Fork in Lander and immediately understood why it had been vital for me to chat with him. Wes has worn many hats over the years: he was on the Eastern Shoshone Business Council for two decades; he had been a part of developing the Wind River Water Code and currently serves on the Wind River Water Resources Control Board; and had become a Tribal water rights expert over the years. Wes struck me as a visionary, deeply committed to the well-being and sovereignty of the Wind River Reservation Tribal communities and Indigenous peoples in general.

A lot had been learned throughout the *Big Horn Adjudication*. One thing Wes emphasized was that should a Tribe seek to quantify their water rights in court or pursue a negotiated settlement, it’s important to have a water code or Tribal water law in place from the outset. This enables a Tribe and their legal counsel to negotiate on the Tribe’s terms and within a framework of their own values. Otherwise, says Wes, “you’re playing somebody else’s game.”

5. Federal Underinvestment in the Wind River Irrigation Project

The Wind River Irrigation Project was constructed between 1905 and 1926 and never completed — it serves about three-fourths of anticipated acres.⁸³ Notably, the majority of irrigation on the Reservation is done by non-Natives, as 64% of irrigated cropland is on fee simple land typically owned by non-Natives.⁸⁴ To understand why there is not as much irrigation being done by Tribal members, we must understand the historical roots of the Wind River Irrigation Project’s challenges.

⁸⁰ Lawrence J. MacDonnell, “General Stream Adjudications, the McCarran Amendment, and Reserved Water Rights,” *Wyoming Law Review* 15, no. 2 (2015): 313–45, <https://doi.org/10.59643/1942-9916.1343>, 342.

⁸¹ Leslie Sanchez, Eric C Edwards, and Bryan Leonard, “The Economics of Indigenous Water Claim Settlements in the American West,” *Environmental Research Letters* 15, no. 9 (August 21, 2020): 094027, <https://doi.org/10.1088/1748-9326/ab94ea>.

⁸² Ibid.

⁸³ Senator Barrasso in “Senate Hearing 112-170: THE WIND RIVER IRRIGATION PROJECT--ISSUES ARISING FROM AND CONTRIBUTING TO DEFERRED MAINTENANCE AND OTHER PROJECT MANAGEMENT PROBLEMS,” April 20, 2011, <https://www.govinfo.gov/content/pkg/CHRG-112shrg70860/html/CHRG-112shrg70860.htm>.

⁸⁴ *Agricultural Resource Management Plan*, 22 (see Table V).

I met with the Acting Tribal Water Engineer Lokilo St. Clair (Northern Arapaho) and Irrigation Supervisor Kenneth Ferris (Eastern Shoshone) at their office in Fort Washakie. Both incredibly humble, they shared some of their successes and discussed the challenges they faced when it came to managing water in an irrigation system that had been neglected by the BIA for decades.

The irrigation system is, in theory, ‘revenue-generating’, meaning it is supposed to cover its costs through the assessment of operations and maintenance fees, or O&M fees, from users. However, O&M fees are nowhere near enough to maintain the system and over the decades the system has grown increasingly dilapidated, with Lokilo estimating it at around 90% dilapidated.⁸⁵⁸⁶

In his 2011 testimony in front of the Committee on Indian Affairs to discuss the issues with the Wind River Irrigation Project, the Tribal Water Engineer at the time, Mitch Cottenoir (Eastern Shoshone), shared:

“Like I said, the BIA through their O&M fees, there just isn't the funds available for this kind of rehabilitation. So some kind of earmarking or federal funding needs to be secured to continue the rehabilitation process.”

When it comes to the irrigation project, the BIA is tasked with overseeing and maintaining the project, in line with their trust responsibility to assist the Tribes with preserving and maintaining their natural resources.

It has been estimated that total rehabilitation/replacement of the system would cost up to \$90 million, while simply addressing deferred maintenance would cost between \$30-35 million.⁸⁷⁸⁸ Given how inefficient the system is, it makes it less profitable for Native families to be in the agriculture business, leading to more idle land.⁸⁹ But the irrigation system is supposed to, in the U.S. government’s view, be the centerpiece of the Reservation’s economy. So, how did it fall into disrepair and how does this impact Tribal members?

This failing system imposes a significant burden on low-income Tribal members, many of whom are stuck with O&M fees long after they have let their land go idle. In her testimony before the Committee on Indian Affairs, Sandra C’Bearing, co-chair of the Wind River Water Resources Control Board and a Northern Arapaho Tribal member, noted that “the Tribes can only effectively use about 100,000 acre feet of the 250,000 acre feet of historical irrigation water” because of the state of the system, among other things.⁹⁰

“The amount of water that gets from the diversion point to the landscape: about 28% gets to the farm.”
Dave Skates, U.S. Fish and Wildlife Service

⁸⁵ Ibid.

⁸⁶ Conversation with Acting Tribal Water Engineer Lokilo St. Clair.

⁸⁷ Mitch Cottenoir, rep., *Wind River Irrigation Rehab Update* (The Office of the Tribal Water Engineer, 2013).

⁸⁸ “Drought Risk and Adaptation in the Interior United States,” 14.

⁸⁹ Gary Collins testimony in “Senate Hearing 112-170: THE WIND RIVER IRRIGATION PROJECT”.

⁹⁰ Sandra C’Bearing testimony in “Senate Hearing 112-170: THE WIND RIVER IRRIGATION PROJECT”.

Within the BIA structure, the only solution that is often put forward is to raise O&M rates, but this would be done on a population that is already struggling to afford current rates. The system is supposed to operate like a “non-profit private utility”⁹¹ but this has not been the reality for decades and deferred maintenance has accumulated as a result.

It was not always the case that the Wind River Irrigation Project was fully reliant on O&M fees. It used to be partially subsidized. As Sandra C’Bearing has testified:

“The BIA reclassified major portions of the Wind River Irrigation Project land from class six to class one lands⁹², meaning an upgrade from lands that could not support themselves to lands that could. And this resulted in a loss of significant funds for maintenance activities and raised the individuals operation and maintenance fees.”⁹³

I was allowed to visit the local BIA office to meet with BIA Superintendent for the Wind River Reservation Leslie Shakespeare, an Eastern Shoshone Tribal member and the first Tribal member from the Reservation to serve in the position. I wanted to understand why things have gotten as bad as they have. One point Superintendent Shakespeare emphasized was lack of funding: “Budgets are cut from year to year or increase minimally from a different cut depending on administrations or what’s going on in the economy.”

Historically, federal investment in the Wind River Irrigation Project has totaled approximately \$6 million, while investment in the Midvale Irrigation District’s Riverton Unit, which includes the Diversion Dam, has totaled more than \$70 million.⁹⁴ It’s the largest federal agricultural subsidy in Wyoming constructed on land ceded from the Wind River Reservation to serve non-Native irrigators.⁹⁶ Farmers here have not had to repay any of these historic construction fees; they are solely responsible for O&M fees.

Many Tribal members I spoke to mentioned that Diversion Dam and the Wyoming Canal utilized money appropriated by Congress for Native American projects to foot the hefty bill in the early 1900s when it was constructed. Anne MacKinnon, a journalist trained in water law, wrote in her latest book on the history of water and water law in Wyoming:

“Wyoming congressman Mondell had meanwhile grown adept at tapping annual federal ‘Indian appropriations’ bills for money to pay for irrigation infrastructure for white settlers on the ceded portion of the Wind River Reservation. Construction got underway with those funds.”⁹⁷

⁹¹ John Anevski, BIA, testimony in “Senate Hearing 112-170: THE WIND RIVER IRRIGATION PROJECT”.

⁹² The US Bureau of Reclamation Land Classification System, <https://www.fao.org/3/X5648E/x5648e0c.htm>.

⁹³ Sandra C’Bearing testimony in “Senate Hearing 112-170: THE WIND RIVER IRRIGATION PROJECT”.

⁹⁴ Wes Martel testimony in “Senate Hearing 112-170: THE WIND RIVER IRRIGATION PROJECT”.

⁹⁵ Geoffrey O’Gara, *What You See in Clear Water: Life on the Wind River Reservation* (New York: Vintage Books, 2002), 37.

⁹⁶ Ibid.

⁹⁷ MacKinnon, *Public Waters*, 89.

⁹⁸ Note: Anne MacKinnon’s source is Mondell’s unpublished “Autobiography,” vol 3, 657-63.

The inequalities could not be more apparent between these two irrigation projects and the Native and non-Native communities. What can justify the Wind River Irrigation Project not receiving the same level of investment as the Riverton unit?

In more recent history, there have been bills that strive to address deferred maintenance and repair costs in BIA-operated irrigation projects. The bills have had mixed success. In 2015, Wyoming Senator John Barrasso introduced the Irrigation Rehabilitation and Renovation for Indian Tribal Governments and Their Economies Act, or IRRIGATE Act, to Congress, which proposed \$35 million a year for twenty years in federal funding for the replacement and/or maintenance of BIA-managed irrigation projects in the western United States that had fallen into disrepair.⁹⁹ The bill, however, did not progress.

In 2016, however, the Water Infrastructure Improvements for the Nation Act, or WIIN Act, was passed. This bill provided funds to address deferred maintenance on BIA-owned irrigation projects, including the Wind River Irrigation Project, with one criteria for funding allocation being priority for “projects serving more than 1 Indian tribe within an Indian reservation.”¹⁰⁰ \$10 million has been appropriated each year since 2018 to be spread across BIA projects. The passage in 2018 of America’s Water Infrastructure Act further extended funding for maintenance and repair of BIA-owned irrigation projects through 2028.¹⁰¹ This funding, of course, is nowhere near sufficient: setting aside ambitions to complete and rehabilitate the entire Wind River Irrigation Project, deferred maintenance on the Project alone would require 3 years of appropriated federal funding that’s supposed to be spread across all BIA-owned irrigation projects.

6. Overcoming Historical Underinvestment in the Wind River Irrigation Project

The Wind River Irrigation system is divided into seven units. In recent years, the Tribes have taken over the management of the majority of these from the BIA through the Public Law 638 Contracting process, whereby Tribes are permitted to take over management responsibilities from the BIA in certain instances with approval.¹⁰² The couple units not controlled by the Tribes are managed by water user associations, groups of water users who perform the needed operation and maintenance on the system. The BIA still collects O&M payments from water users, and then gives most of this money to the Office of the Tribal Water Engineer or to the water user associations to take care of their respective units on the irrigation system.

Taking over the system is a daunting task for what is a very understaffed, under-resourced Office of the Tribal Water Engineer, but the Tribes have chosen to do so when faced with the reality of a BIA that is not likely to increase their funding anytime soon:

⁹⁹ “IRRIGATE Act,” bill (2015), <https://www.congress.gov/bill/114th-congress/senate-bill/438/titles?s=1&r=41#:~:text=A%20bill%20to%20provide%20for,of%20certain%20Indian%20irrigation%20projects>.

¹⁰⁰ “Water Infrastructure Improvements for the Nation Act or the WIIN Act,” bill (2016), <https://www.congress.gov/bill/114th-congress/senate-bill/612>, Section 3226.A 6-8.

¹⁰¹ “Barrasso Secures Key Wyoming Projects in Bipartisan Water Infrastructure Bill,” *John Barrasso*, October 10, 2018, <https://www.barrasso.senate.gov/newsroom-news-releases-barrasso-secures-key-wyoming-projects-in-bipartisan-water-infrastructure-bill/>.

¹⁰² “Sustainable Climate Change Adaptation in Indian Country,” 400

“They're making efforts to make sure that they are the ones who are managing the water. And I think in the past there was always hesitancy to do that because they knew the deferred maintenance on it [the irrigation project]...the government is limited just on the funds that they receive to do that. Whereas the Tribes, they can partner with the state. They can partner with these other entities and leverage federal funds with state funds with Tribal funds to fund a structure, to replace a structure or to do additional maintenance on stuff that would not have normally got done. So there's more avenues for the Tribes to be able to address some of those deficiencies than just waiting for the government to all of a sudden have a big budget and say, “Here you go, fix it.”

Superintendent Leslie Shakespeare, Eastern Shoshone

While much of the irrigation system's inefficiency stems from the infrastructure, some inefficiency can be mitigated with better on-the-ground management. Since taking over management of more of the system, Irrigation Supervisor at the Office of the Tribal Water Engineer, Kenneth Ferris, has been hard at work with his team removing debris, including plants and sedimentation from canals and laterals (smaller ditches that tend to accumulate sediment as they have less flow) that have built up over the past 20+ years. With up to four feet of silt build-up in some ditches, this was no small effort, but it has delivered improvements in the system. “Now, three years down, we've seen a lot of it help,” says Kenneth.

The Tribal Water Engineer's office has been instrumental in shaping an irrigation system that better operates according to their values.¹⁰³ In terms of protecting the ecological health of the river and its inhabitants, the Tribes have installed fish ladders and screens throughout the irrigation project to help facilitate effective fish migration. Historically, there has been a fish ladder at Diversion Dam, but it is ineffective and fish are largely blocked from moving upstream.¹⁰⁴

Over recent decades, the Tribes have been successful in securing several million grant dollars to rehabilitate certain segments of the irrigation system, through state funding from the Wyoming Water Development Commission and matching federal funds.¹⁰⁵ Notably, it is through the Tribes' own self-advocacy that progress has been made when BIA funds have been scant. While the progress has been meaningful, funding remains a significant challenge. Beyond this, the biggest challenge for the Office of the Tribal Water Engineer is capacity. In a way, funding is just a function of capacity. If you have capacity, you can pursue funding. Building capacity, especially without funding at the start, is the core of the challenge. In the case of the Office of the Tribal Water Engineer, Lokilo expressed as much: he wants to have someone on his team who can help out with grant applications.

¹⁰³ “Drought Risk and Adaptation in the Interior United States,” 11.

¹⁰⁴ Lauren Kaljur, “Wyoming Wind River Tribes Want Water on Their Territory to Run Strong, but They Don't Control It,” News 21, September 26, 2017, <https://troubledwater.news21.com/blog/2017/09/26/wyoming-wind-river-tribes-want-water-territory-run-strong-dont-control/>.

¹⁰⁵ Mitch Cottenor testimony in “Senate Hearing 112-170: THE WIND RIVER IRRIGATION PROJECT”.

7. Climate Change Adaptation on the Reservation

In order to adapt to changing climatic conditions, the Northern Arapaho and Eastern Shoshone need to be able to make informed decisions about their natural resources. This means they need 1) The ability to exercise their sovereignty and make decisions for their communities, 2) Information about changing climatic conditions, and 3) Resources to act, with one pressing need being additional water storage on the Reservation.

For approximately the last decade, there has been a series of feasibility studies progressing their way through the Wyoming Water Development Commission (WWDC) to try and identify potential storage sites on the Big Wind and Little Wind Rivers. So far, sites have been narrowed substantially. The timeline for completing said studies and building new infrastructure is estimated to be in the region of 15-20 years should the projects be successful in receiving funding and buy-in.¹⁰⁶

I spoke to Jason Mead, Director of WWDC, to hear about how these studies were progressing and all the considerations at play. Director Mead saw irrigation inefficiency as the problem when it came to water supply issues and mentioned a need for the irrigation system to be rehabilitated.¹⁰⁷ The irrigation system, of course, does need to be rehabilitated, but the water supply issue is also reflective of changes in the timing of runoff and the distribution of water on the landscape. So, storage is still essential for controlling *when* water moves through the system. An improved irrigation system would distribute water more effectively and efficiently, also saving water.

A reservoir on the Little Wind would serve the Tribes alone and could theoretically find federal dollars because of this¹⁰⁸, while a reservoir on the Big Wind would serve the Tribes and non-Tribal irrigators which could mean state funding. A project on the Big Wind is complicated by the politics of who manages it and who benefits. Moreover, when it comes to the project design and its associated environmental impact, it is likely that there would be divergent views on what infrastructure parties are willing to accept.

For example, Wes Martel shared: “We’ll never put anything on the mainstem.” This refers to the idea that Wes and other Tribal members would be opposed to a dam on the Big Wind, such as Diversion Dam. Rather, the preference would be for something off of the main channel that limits its negative environmental impacts and is less likely to be impacting a culturally significant site along the river.¹⁰⁹

I also spoke with Clinton Glick, an Eastern Shoshone Tribal member who previously served as Chairman of the Wyoming Water Development Commission Board. Clinton shared that some of the hesitancy on the ground around a storage project on the Big Wind is certainly rooted in a

¹⁰⁶ “Anatomy of an Interrupted Irrigation Season,” 78.

¹⁰⁷ Katie Roenigk, “Extensions Approved for Two Water Storage Studies in Wind River Basin,” May 16, 2022, <https://county10.com/extensions-approved-for-two-water-storage-studies-in-wind-river-basin/>.

¹⁰⁸ Anne MacKinnon conversation in April 2023.

¹⁰⁹ Mackinnon, *Public Waters*, 233.

concern about the Tribes utilizing more of their reserved water right and how that is going to impact those with more junior rights.

Given the politics surrounding the storage issue and the potential threats state-funded storage poses to their sovereignty given additional state involvement, the Tribes are conducting their own investigations into potential water storage sites.

“So right now we are doing our own water storage study. I think we’ve narrowed it down to three...What we’ve been mainly doing is we’ve been trying to do our own...We’ve been trying to figure out where we want to put our own.”

Acting Tribal Water Engineer Lokilo St. Clair, Northern Arapaho

“We don’t have the money. We’re seeking investors to be able to start building these reservoirs that are needed.”

Howard Brown, Northern Arapaho

One concern with utilizing state funding via WWDC is that any storage built comes with a priority date equivalent to the year of the project’s completion:

“But one of the things with the Wyoming Water Development Commission, there was one other stipulation that if we fund your storage, like if we build it this year, it's going to have a priority date of 2023 and not 1868...We can go out and find private funding for water, because water is going to be pretty valuable.”

Wes Martel, Eastern Shoshone

State involvement is not a major concern for all Tribal members. Clinton Glick believes state funding that pays up to half will make the projects possible. Moreover, Clinton questions whether the priority date of new storage matters, believing that when water exits the reservoir it becomes a flow that the Tribes can utilize with their 1868 priority date.¹¹⁰

Though the pathway forward is uncertain, the goal is clear: additional storage, in some fashion, is a priority. The challenge for the Tribes will be securing funding and autonomy to manage it in the way they see fit.

Researchers at the High Plains Regional Climate Center developed a climate information dashboard to support Tribal decision-making around droughts. [This](#) dashboard provides a useful overview of conditions on the Reservation to be utilized by the Tribal Water Engineer alongside SNOTEL data (high elevation hydroclimatic data) and reservoir data to make critical water management decisions.¹¹¹ Based on these sources, the TWE can declare if water conditions are normal, surplus, or drought — and, if there are drought conditions, follow the prescribed plan outlined by the drought management plan.¹¹²

¹¹⁰ Conversation with Clinton Glick in June 2023.

¹¹¹ *Wind River Reservation Drought Management Plan*, 19.

¹¹² *Ibid*, 19.

While these resources are incredibly helpful, staffing shortages within the Office of the TWE make it difficult to find time to utilize them.

Some resource needs expressed by the Tribes include additional stream gauges. Stream gauges that were funded by USGS during the time of the adjudication have slowly been decommissioned over the years.¹¹³ Though the Tribes still have select stream gauges, it is nowhere near the volume they had at one point, which means they have less information about water throughout certain segments of the system. Given the previous occurrence of ‘micro-drought’ on the Reservation, it’s important to be able to monitor the entirety of the Reservation as there can be pockets of acute shortage not occurring elsewhere. Dr. Imtiaz Rangwala, one of the researchers who has looked into drought on the Reservation, shared during our conversation that the drought management plan recommends additional SNOTEL sites because existing sites near the Reservation do not give a full and accurate sense of what is going on.¹¹⁴¹¹⁵

The difficulties of additional monitoring, though, must be acknowledged: such infrastructure requires upkeep and often the funding secured is not permanent.

8. Challenges and Successes: Exercising Tribal Water Rights and Sovereignty

The Wind River Reservation Inter-Tribal Council, including representation from both Tribal governments, approved the Wind River Agricultural Resource Management Plan (ARMP) in June of 2018. The ARMP is a community-developed plan that identifies shared issues and long-term goals that seek to address them, with an eye towards developing the community’s agricultural resources into the future.¹¹⁶ The agreed-upon vision for the plan is described as the following: “A viable, self-directed and sustainable agricultural economy that enhances the education, health, natural resources, traditions and culture of our native people.”¹¹⁷

“We have a paper water right that in some ways is worthless because we can’t do anything with it. Now, we’re going to have to build into it over time via the water code. And so what the state says, you have to divert the water to an agricultural program before you can do anything else with it. Well, we’re just now starting a program called an Agricultural Resource Management Plan. And in that ARMP is a schedule to start using more of our idle lands as our futures lands for agriculture purposes. And when we do that, you better hold on, because it’s going to be an exciting time.”

Gary Collins, Northern Arapaho

The ARMP proposes the creation of an Office of Agriculture and Natural Resources on the Reservation whose aim will be, among other things, to carry out the 12 goals and their associated objectives and policies.¹¹⁸ To highlight a couple components of the plan: First, when it comes to water-related objectives, the goal stated in the plan is to “manage water availability for

¹¹³ Ibid, 10.

¹¹⁴ Ibid, 29.

¹¹⁵ Conversation with Imtiaz Rangwala.

¹¹⁶ *Agricultural Resource Management Plan*, 1.

¹¹⁷ Ibid, 2.

¹¹⁸ Ibid, 2.

agricultural users that recognizes the Wind River Water Code and can adjust to long and short-term weather and climatic conditions.”¹¹⁹ Some of the objectives include increasing water storage capacity for the benefit of agriculture, fish, and wildlife, and to increase system resiliency and flexibility given changes in run-off patterns. Additionally, the identification of funding for storage projects and the creation of a master plan for rehabilitating the irrigation system are important next steps.¹²⁰ Second, the plan seeks to develop pathways for diversifying the “cropping and livestock enterprises and businesses” on the Reservation, with an eye to developing in ways that are “economically viable and environmentally sustainable”.¹²¹ Third, an objective of the plan is to identify the infrastructure that will be needed to “develop futures lands,” that is, to irrigate new lands that convert what is now a paper water right into something that is usable for the Tribes.¹²²

One big open question and potential possibility is whether the Tribes can strategically utilize the historic water right currently in use for agricultural purposes for non-agricultural purposes such as instream flow and other valued uses of water within their water code while, at the same time, activating their futures right by developing land for agriculture to approximate present-day agricultural water use. This, at minimum, probably means shuffling a lot around spatially on the Reservation and there are bound to be challenges that arise in doing so. However, this is certainly a good line of questioning to pursue and I hope it will become clearer over time whether this is a genuine possibility.

The ARMP represents a significant step towards the Tribes managing their land and resources in alignment with their values, including the water code, and for the benefit of their communities. The plan also governs “the management and administration of Indian agricultural resources and Indian agricultural lands by the Bureau of Indian Affairs.”¹²³ The primary challenges to implementing the plan are funding and capacity — just as is the case with fixing up the Wind River Irrigation Project.

Yet another example of the Tribes exercising their sovereignty is through food sovereignty. A recurring theme in my conversations with folks was the importance of thinking of water in its connections with all else, including land, food, and living beings. Food sovereignty for Indigenous peoples, meaning control over the food system and all of its parts, is deeply intertwined with water and its management as well as access to land.

An important element of food sovereignty for many Indigenous peoples: Tribal buffalo. In Shoshone, the word for ‘buffalo’ is *Boy-szhan*. In Arapaho, it is *Hii3einoon*.

“Way back the buffalo used to take care of us: provide everything. Our food, our shelter, our clothing, our tools—provided everything. They tried to destroy the buffalo to destroy us. Nowadays we can't rely on the buffalo as we did, we rely on the dollar. That's what

¹¹⁹ Ibid, 29.

¹²⁰ Ibid, 30.

¹²¹ Ibid, 33, 41.

¹²² Ibid, 41.

¹²³ “American Indian Agricultural Resource Management Act” bill (1993), <https://www.congress.gov/bill/103rd-congress/house-bill/1425>, Section 101.B-2.

we rely on: the dollar to buy our food, our clothing, our tools, our shelter. And so now this dollar has become the new buffalo.”

Wes Martel, Eastern Shoshone

I first met Jason Baldes (Eastern Shoshone) on my first visit to the Wind River Reservation in March of 2023. I stood in the snow with my classmates in front of a field of buffalo and learned about Jason’s work to manage the restoration and expansion of buffalo on the landscape as Executive Director of the Wind River Tribal Buffalo Initiative.



A photo taken during my March 2023 visit with Jason Baldes and the buffalo

In the 1800s, the buffalo were hunted to near extinction intentionally by colonizers who recognized the buffalo’s central importance to Indigenous livelihoods, including for food, shelter, clothing, tools, and spiritual practice (Figure 6).¹²⁴

¹²⁴ Mike Ives, “Bison Return to Native American Lands, Revitalizing Sacred Rituals,” The New York Times, July 4, 2023, <https://www.nytimes.com/2023/07/04/us/native-american-tribes-bison.html>.

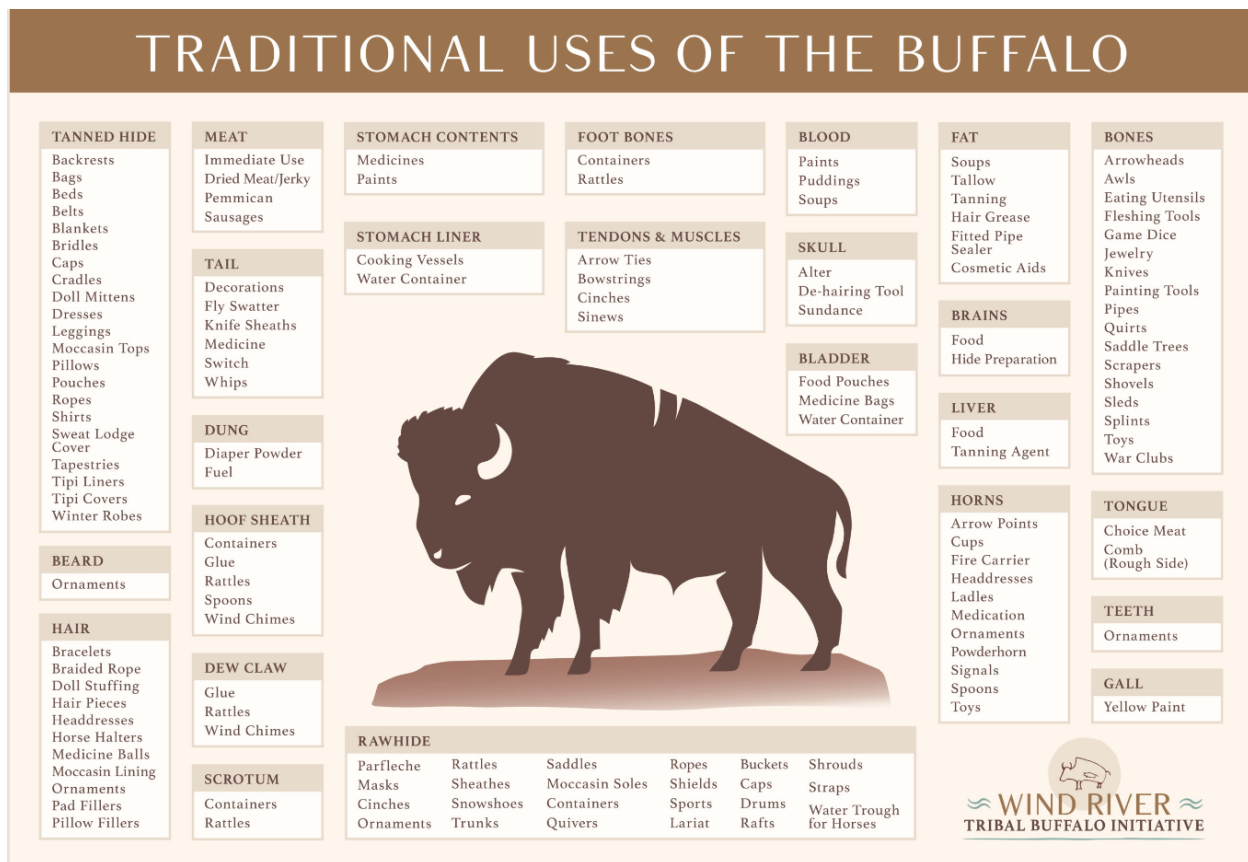


Figure 6: Traditional Uses of the Buffalo¹²⁵

From as many as 50 to 60 million buffalo in North America to a few hundred — that is as close as they came to extinction.¹²⁶

I drove to Jason’s house in the late afternoon in August 2023 for my second visit, eager to meet his father Dick Baldes whom I had read so much about. I had prepared a list of questions, as I did for all my interviews, that I had folded into a tight square and shoved in my pocket. When I arrived, Jason was waiting beside a utility vehicle. Dick arrived next. We got into the utility vehicle along with Jason’s dog, my digital recorder in hand, and drove out towards the buffalo. Some were laying down, others grazing.

We were in their midst — just a few yards away from the nearest buffalo. Dick encouraged me to look into their eyes and I am glad I did. They were a deep, dark brown. We sat in silence watching them. Dick had begun trying to bring the buffalo to the Wind River Reservation in the 1970s and now Jason had been a key part of realizing this dream.¹²⁷ I felt how special it was to be in their company.

¹²⁵ Credit: “All about Buffalo,” Wind River Tribal Buffalo Initiative, <https://windriverbuffalo.org/learn/about-buffalo/>.

¹²⁶ Ives, “Bison Return to Native American Lands”

¹²⁷ Elise Schmelzer, “Wild Bison Return to Wind River Reservation after 131-Year Absence,” *Salina Journal*, November 3, 2016, <https://www.salina.com/story/lifestyle/2016/11/03/wild-bison-return-to-wind/21114112007/>.

Buffalo are ecosystem engineers. They increase biodiversity by creating food, material, and habitat for many other species. For example, the winter coat they shed provides valuable nesting material to birds in the spring. The wallows, or small depressions in the landscape, they create while dust bathing are valuable for dispersing seeds and collecting water on the landscape. Their hooves aerate the soil. Buffalo meat is lower in fat and cholesterol than other meats, promoting better heart health for Indigenous communities who integrate it into their diets.¹²⁸

Through the Wind River Tribal Buffalo Initiative, Jason Baldes and others have worked tirelessly to manage the restoration of the buffalo to the Wind River Reservation, while advocating for the cultural, ecological, and nutritional benefits, among many others.¹²⁹ Part of the effort involves buying up fee lands previously inhabited by non-Natives to establish contiguous ranges of Tribal land for the buffalo to roam. This is but one example of the importance of contiguous land for the Tribes to develop and manage their resources and communities in the way they see fit.

“In order to have food and medicine, you got to have the lands they grow on and access to them.”
Jason Baldes, Eastern Shoshone

“This is the first year we’ve been able to harvest our own animals for our own lands for our Sundances in 138 years. This is the first year: 2023.”

Jason Baldes, Eastern Shoshone

As of March 2024, the Eastern Shoshone Tribe has 95 buffalo and the Arapaho Tribe has 86 buffalo.

The buffalo are slowly coming back elsewhere. Through the Inter-Tribal Buffalo Council, 80 Tribes across 20 different states work to manage more than 20,000 buffalo on Tribal lands “in a manner that promotes cultural enhancement, spiritual revitalization, ecological restoration, and economic development.”¹³⁰ As a Shoshone Tribal member, Jason manages the Shoshone Tribe’s buffalo herd and represents the Tribe on the Council.

It is exciting to see these big steps being taken to exercise sovereignty, including how the economy is developed, how the water right is utilized, and what foods are consumed.

I met Cy Lee (Northern Arapaho) the last morning of my visit. Gary and Howard had helped convene a final conversation at the Holiday Inn over breakfast. Cy emphasized the importance of addressing the fundamental hardships plaguing the community as the prerequisite for further developing the Reservation economy or a long-term plan for water. It is critical to address poverty, mental health issues and addiction, intergenerational trauma and lack of educational

¹²⁸ Caleb Nelson, “Jason Baldes: Buffalo Restoration Key to Wildlife Economy,” Big Horn Radio Network | Wyoming, November 30, 2022, <https://mybighornbasin.com/jason-baldes-says-buffalo-restoration-key-to-wildlife-economy-tribal-health/>.

¹²⁹ “Wind River Indian Reservation,” Wind River Tribal Buffalo Initiative, <https://windriverbuffalo.org/explore/wind-river-reservation/>.

¹³⁰ “About Us,” The InterTribal Buffalo Council, <https://www.itbcbuffalonation.org/about-us>.

opportunity. These are pressing needs, too, and without addressing these, it will be hard to develop the knowledge and capacity in the community to work towards these longer-term natural resource development and management goals.¹³¹ Yet, it is resource development that brings economic opportunity. It is clear that Tribal communities need investment at a greater level than what the federal government has done. Likewise, the entities that support them, such as the BIA and U.S. Fish and Wildlife Service, need to be better funded.

The economic cornerstone that was promised to the Tribes — the irrigation project — never satisfactorily delivered on its promises. In the late 1980s, during the adjudication, unemployment on the Reservation was nearly 80%.¹³² Today, the unemployment rate is not documented on the Reservation.¹³³

“It’s historical context,” Cy Lee wisely said, “that actually determines the future.” The atrocities of the boarding schools, as one example, are not so far in the past. It is easy to imagine how the trauma of historical atrocities continue to impact Native communities in the present day and present barriers to the Tribes as they seek to further develop their economies and flourish in their communities.

The Northern Arapaho and Eastern Shoshone are resilient peoples who are planning for their futures in the wake of historical abuse, forcible relocation, climate change, and disinvestment. They are planning for their futures in spite of the bias of justice systems, economic struggle, and their ongoing experience of racism.

9. Conclusion

The Northern Arapaho and Eastern Shoshone have gone to great lengths to conserve and care for their land and its inhabitants as two governments occupying one reservation. Looking to the future of Tribal water management on the Wind River Reservation and beyond, there are a few things I’d like to highlight from my conversations that emerged as themes.

First, many emphasized the importance of centering and respecting Indigenous science, knowledge, and values, and supporting the education of local Indigenous youths.

Speaking about Tribal conservation successes on the Reservation, Jason Baldes spoke a bit about what Indigenous science and values look like in action:

“I think the importance of the conservation successes like the wilderness,¹³⁴ the game code, protection of wolves and bears, fighting for instream flow, all of that is an ecological connection which is often bridged with Indigenous science. I think everywhere we’re trying to find common ground between how federal agencies and NGOs work with

¹³¹ Summary of conversation with Cy Lee in July 2023.

¹³² MacKinnon, *Public Waters*, 168

¹³³ Taylar Stagner, “National Statistics Say Indigenous Unemployment Is Still High but Lacks Local Data,” *Wyoming Public Radio*, March 7, 2022, <https://www.wyomingpublicmedia.org/open-spaces/2022-03-07/national-statistics-say-indigenous-unemployment-is-still-high-but-lacks-local-data>.

¹³⁴ Note: The Eastern Shoshone and Northern Arapaho have a sizable ‘roadless area’ — a protected wilderness area for animal populations and a place of spiritual and cultural significance for the Tribes.

Tribes to find common ground. So if we want to build our network, collaborate and partner with entities, they have to understand the importance of the Indigenous science part. And that's almost always going to be grounded in ecology. The interconnectedness and the interrelatedness of whether it be water, air or mammals or birds or insects, biodiversity, that that's more important than the monetary gain that we get from exploitation, which is more often grounded in our notion of progress and manifest destiny. So until we can address the history and that worldview that this place is only for extraction or what money can be gained from using it, then we're headed down the wrong path. So if we think more about biology and ecological integrity, the interconnectedness of everything and well, that talks about the importance of wolves and bears, the importance of buffalo, other keystone species, beavers. It's simple, really. You simplify it to get back to what once was and while we're decolonizing our thinking, we might as well decolonize the land. And that means taking fences out. Fences are the epitome of colonization."

Jason Baldes, Eastern Shoshone

Importantly, Jason emphasized that entities seeking to work with the Tribes in support of their goals acknowledge and respect the importance of Indigenous science and its contributions.

Lynnette GreyBull spoke about her desire to see more education around Tribal water for local Indigenous youth, so that knowledge can be passed on that can continue to support Tribal sovereignty and decision-making concerning their natural resources, such as water:

"There's a gap in local education...I would like to see more education around Tribal water...learning about our water, the two major dams on our Reservation. How that water and the snow and the glacier—how all that is impacted by climate change, how it affects wildlife migration, how it affects our streams and our lakes."

Lynnette GreyBull, Northern Arapaho and Hunkpapa Lakota
from the Standing Rock Sioux Tribe

Education is a key pathway for building the Tribes' internal capacity to address the challenges this paper has discussed. Wes Martel described such an education as a vehicle for strengthening Tribal families and communities:

"So that's what we're trying to do: Educate our people on what we have and how lucky we are and what we need to do to make things right and take care of ourselves. That's all we're trying to do: strengthen our families and communities."

Wes Martel, Eastern Shoshone

Second, change is unavoidable. The water supply is changing as a result of climate change and, while certain actions can be taken to maximize efficient use of said water, such as increasing storage and efficiency of water application on crops, this will not be sufficient. The demand side must also be addressed. The Tribes are on a path to make use of their paper water right. This will impact the supply available for others. Adapting to scarcity, both for the Tribes and non-Native farmers, will mean diversifying their economies. Flexibility is a necessity.

According to law professor Jason Robison who has written about the legal narrative surrounding the *Big Horn Adjudication*, one interesting open question is whether there might be an

opportunity in the future for a post-adjudication negotiated settlement. Particularly as the Tribes gear up to make use of their paper water right, there may be incentive for the state to consider a negotiated settlement that agrees to actions that can benefit both parties.

Third, funding is critical and lack of funding is chronic. Speaking to BIA staff, a theme that emerged was how underfunding limited their ability to fulfill the trust responsibility to Tribes. What the trust responsibility entails on paper is different from what is realized in practice in part because of funding limitations. The U.S. Fish and Wildlife Service office in Lander, too, is underfunded and understaffed: just two full-time employees run this office dedicated to supporting Tribal conservation goals, in addition to all other fish and wildlife issues in the region.

The federal government must be held accountable for the fulfillment of their trust responsibility to Tribes. Across the board, the federal government fails to fund Tribal resources — from education, to agriculture, to health care and beyond — at levels comparable to non-Native populations.¹³⁵ Not only must funding be increased, but the backlog of funding needs that have accumulated for decades due to neglect must be addressed.

A 2003 report by the U.S. Commission on Civil Rights captures this well: “The federal obligation to Native Americans is a matter of both moral and legal imperative.”¹³⁶

In 2015, the U.S. Commission on Civil Rights was asked by some members of the House of Representatives to update the report, with an eye towards examining how the federal government had since performed in meeting Native American needs for investment. The short answer from the Executive Summary of the report is as follows:

“Unfortunately, the Commission’s current study reflects that the efforts undertaken by the federal government in the past 15 years have resulted in only minor improvements, at best, for the Native population as a whole. And, in some respects, the U.S. Government has backslid in its treatment of Native Americans...Federal funding for Native American programs across the government remains grossly inadequate to meet the most basic needs the federal government is obligated to provide.”¹³⁷

When it comes to BIA-funded irrigation projects, specifically, construction on these began in the late 1800s. By 2000, only 62 of 160 projects were operable.¹³⁸ Relative to the need that exists, Congress appropriates minimal funding for operation and maintenance costs. What is appropriated is quickly consumed by a few projects in the entire BIA Irrigation project portfolio — there is not enough to go around and there never has been.¹³⁹

¹³⁵ Rep., *A Quiet Crisis: Federal Funding and Unmet Needs In Indian Country* (U.S. Commission on Civil Rights, July 2003), <https://www.usccr.gov/files/pubs/na0703/na0204.pdf>.

¹³⁶ Ibid, 1.

¹³⁷ Rep., *Broken Promises: Continuing Federal Funding Shortfall for Native Americans* (U.S. Commission on Civil Rights, December 2018), <https://www.usccr.gov/reports/2018/broken-promises-continuing-federal-funding-shortfall-native-americans>, 3-4.

¹³⁸ Eric Henson, *The State of the Native Nations: Conditions under U.S. Policies of Self-Determination* (New York: Oxford University Press, 2008), 168.

¹³⁹ Ibid.

The federal government's significant and consistent shortcoming in fulfilling their trust responsibility to Native American Tribes is not news. Per a 2013 report by the Commission on Indian Trust Administration and Reform within the Department of the Interior, there are "two overarching matters that are critical to implementation of the recommendations made in this Report" and one of them is the following: "...Great employees and great ideas are not enough. Many of the problems the Commission learned of were not the result of bad intentions or bad policies. Rather, they were the product of inadequate staffing, which in turn was caused by inadequate funding. The Commission believes that many of the trust functions are so critical that funding should be moved from the discretionary category to nondiscretionary"¹⁴⁰ In other words, funding to support people and actions that fulfill the government's trust responsibility to Tribes should not be negotiable but set in stone.

"The Commission is convinced that sweeping reforms are necessary," reads the Executive Summary of the Commission's nearly 400-page report.¹⁴¹

Let me leave you with some insightful quotes to ponder from some of the individuals I have been lucky to know through this project:

"First step of trying to address any issue is to speak it."

Lynnette GreyBull, Northern Arapaho and Hunkpapa
Lakota from the Standing Rock Sioux Tribe

Dick Baldes, Eastern Shoshone: "Tell her the three 'P's, Jason."

Jason Baldes, Son: "Patience, perseverance, and persistence."

"You take your hate, racism, and fear, and put it into law."

Wes Martel, Eastern Shoshone

"We have a history longer than colonization and through the process of our colonization we've been robbed of our land, history, our cultures, and our traditions. Moving forward, anything we can do to get back to that is what's needed on the Reservation... We need to be able to create stuff for us, by us."

Mel Arthur, Eastern Shoshone

"No one in my view has the right to dry up a river."

Dr. Kate Vandemoer

¹⁴⁰ *Report of the Commission on Indian Trust Administration and Reform* (Department of the Interior, 2013), 4.

¹⁴¹ *Ibid*, 3.

“But it's been really an honor and a privilege working for the Tribes... We work for the federal government for all people, but our role is to assist the Tribes... And we do it because there's a trust responsibility, but we do it because it's the right thing, too.”

Pat Hnilicka, U.S. Fish and Wildlife Service

10. Interviewees

It is with a deep sense of gratitude that I thank all of the individuals who took the time to talk with me and help me learn about these important issues. I thank you for sharing your knowledge and for welcoming me in when I was a stranger. I especially thank the Eastern Shoshone and Northern Arapaho Tribal members who talked with me — I recognize the preciousness of the conversations I held with you and am deeply humbled by your trust. The education and kindness I have received from you is something I will value all my days.

44 individuals were interviewed between March 2023 and October 2023, including Northern Arapaho and Eastern Shoshone Tribal members, current and former Tribal Water Engineers, BIA Superintendent and other BIA staff, current and former staff at U.S. Fish and Wildlife Service, legal experts on the *Big Horn Adjudication*, academics and researchers who worked on either/both the drought management plan or the agricultural resource management plan for the Reservation, staff at the Wyoming Water Development Commission, members of the Wind River Water Resources Control Board, previous members of the Inter-Tribal Council (formerly known as the Joint Business Council), staff at the Greater Yellowstone Coalition, and/or local community members with an interest in these topics.

Lynnette GreyBull	Pat Hnilicka
Jason Baldes	Mike Mazur
Dick Baldes	Orville St. Clair
Jason Robison	Leslie Shakespeare
Anne MacKinnon	Jim Gappa
Cody Knutson	Geoff O’Gara
Mitch Cottenoir	Scott Christensen
Corrie Knapp	Kenneth Ferris
Wes Martel	Clinton Glick
Tyler Beeton	Sierra Harris
Tarissa Spoonhunter	Rachael Budowle
Imtiaz Rangwala	Kelsey Beck
Crystal Stiles	Jason Mead
Jennifer Wellman	Teresa Cohn
Gary Collins	Travis Teegarden
Lokilo St. Clair	Colleen Friday
Caterine Vandemoer	Kurt Imhoff
Dave Skates	Dena Egenhoff
Ben Ridgley	Howard Brown
Melvin Arthur	Herb Welsh
Veronica Howard	Cy Lee

On a personal note, I have learned a great deal from the conversations I was fortunate enough to have with all the folks I interviewed. I have been changed by what I have learned, and forced to reconsider my own values and how I relate to the places I call home. I have reflected a lot on what has been left out of my own education in non-Native U.S. classrooms, which is far too much and this is inexcusable.

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