

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

A Case Study on Indigenous Sovereignty, Water Rights, and Climate Change Adaptation

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Photo: Angela Burgess, USFWS (public license)

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**

Anna Lenaker

February 2026

“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.”

About this work



42 conversations

I learned from Eastern Shoshone and Northern Arapaho Tribal members, Tribal water staff, BIA and USFWS staff, state agencies, legal experts, and researchers.



Two visits to the Reservation

March 2023 & August 2023 to listen and learn on the ground.



Paired with research & synthesis

Historical analysis, case law, academic literature, Senate testimony, and Tribal and agency planning documents.

A note on voices

Any quotes that are shared reflect the views of the individuals who shared them, not the positions of Tribal governments.

My goal was to listen, to learn, and to share what I learned with gratitude to everyone who welcomed me.

Interviewees

Lynnette GreyBull

Jason Baldes

Dick Baldes

Jason Robison

Anne MacKinnon

Cody Knutson

Mitch Cottenoir

Corrie Knapp

Wes Martel

Tyler Beeton

Tarissa Spoonhunter

Imtiaz Rangwala

Crystal Stiles

Jennifer Wellman

Gary Collins

Lokilo St. Clair

Caterine Vandemoer

Dave Skates

Ben Ridgley

Melvin Arthur

Veronica Howard

Pat Hnilicka

Mike Mazur

Orville St. Clair

Leslie Shakespeare

Jim Gappa

Geoff O’Gara

Scott Christensen

Kenneth Ferris

Clinton Glick

Sierra Harris

Rachael Budowle

Kelsey Beck

Jason Mead

Teresa Cohn

Travis Teegarden

Colleen Friday

Kurt Imhoff

Dena Egenhoff

Howard Brown

Herb Welsh

Cy Lee

42 interviewed

March–October 2023

Including Northern Arapaho and Eastern Shoshone Tribal members; current and former Tribal Water Engineers; the BIA Superintendent and other BIA staff; current and former U.S. Fish and Wildlife Service staff; legal experts on the Big Horn Adjudication; researchers behind the drought and agricultural resource management plans; Wyoming Water Development Commission staff; Wind River Water Resources Control Board members; former Inter-Tribal Council members; Greater Yellowstone Coalition staff; and local community members.

IN MEMORY OF

Gary Collins

Northern Arapaho

- Chairman of the Northern Arapaho Tribal Council, 1986–1988
- First Arapaho Tribal Liaison to the Wyoming Governor
- Tribal Water Engineer for eight years
- Former Member, Wind River Water Resources Control Board

A holder of much wisdom and knowledge about Tribal water rights and management, Gary will be missed dearly



Today's conversation

01

Why Wind River?

*An instructive case study
& ongoing injustice*

02

The past

A shrunken Reservation
and a 37-year water
rights adjudication

03

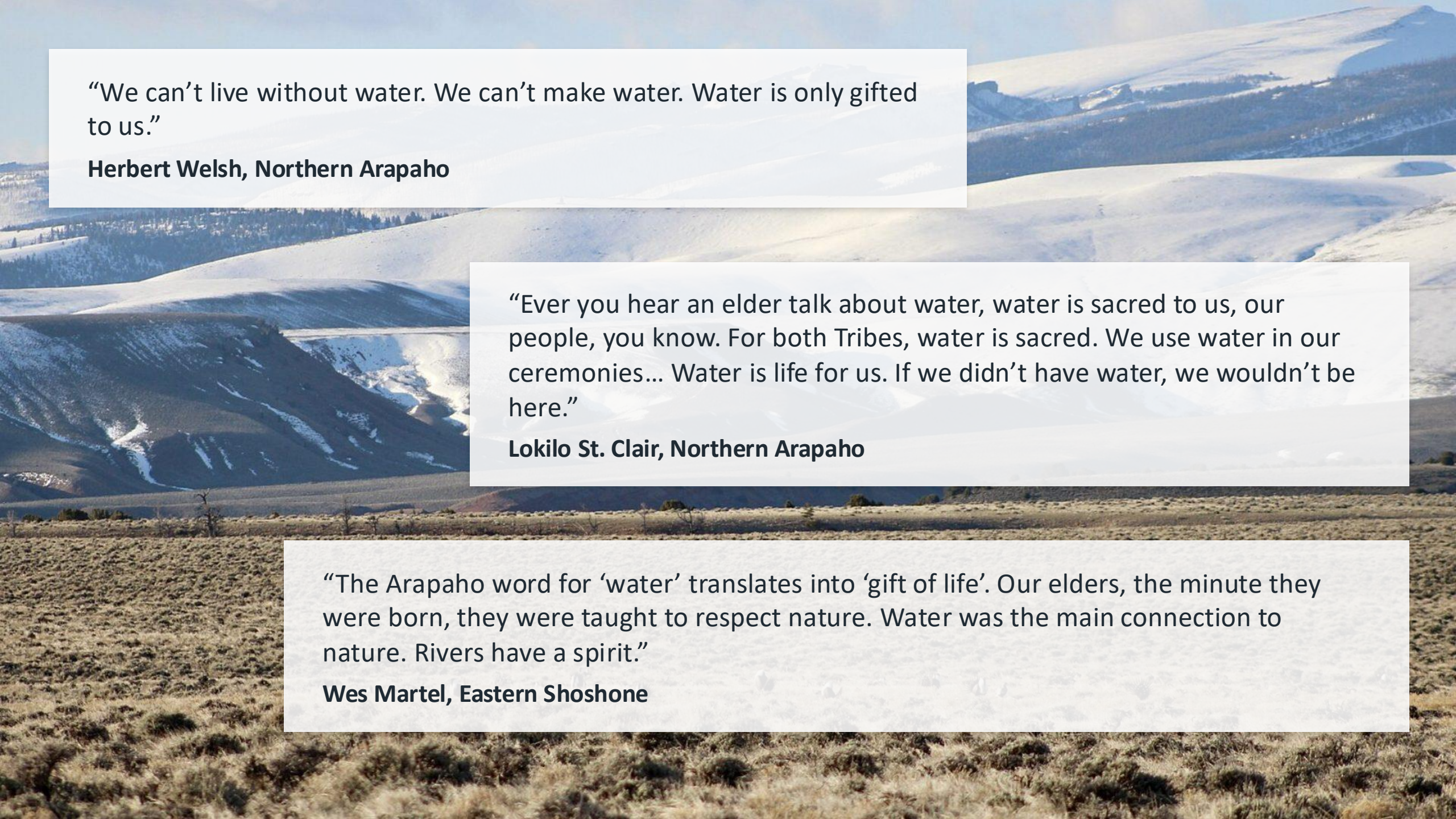
The present

A dilapidated irrigation
system, chronic
disinvestment, a
changing climate, and
broken promises

04

The future

Tribal-led solutions to
support thriving
communities for seven
generations to come



“We can’t live without water. We can’t make water. Water is only gifted to us.”

Herbert Welsh, Northern Arapaho

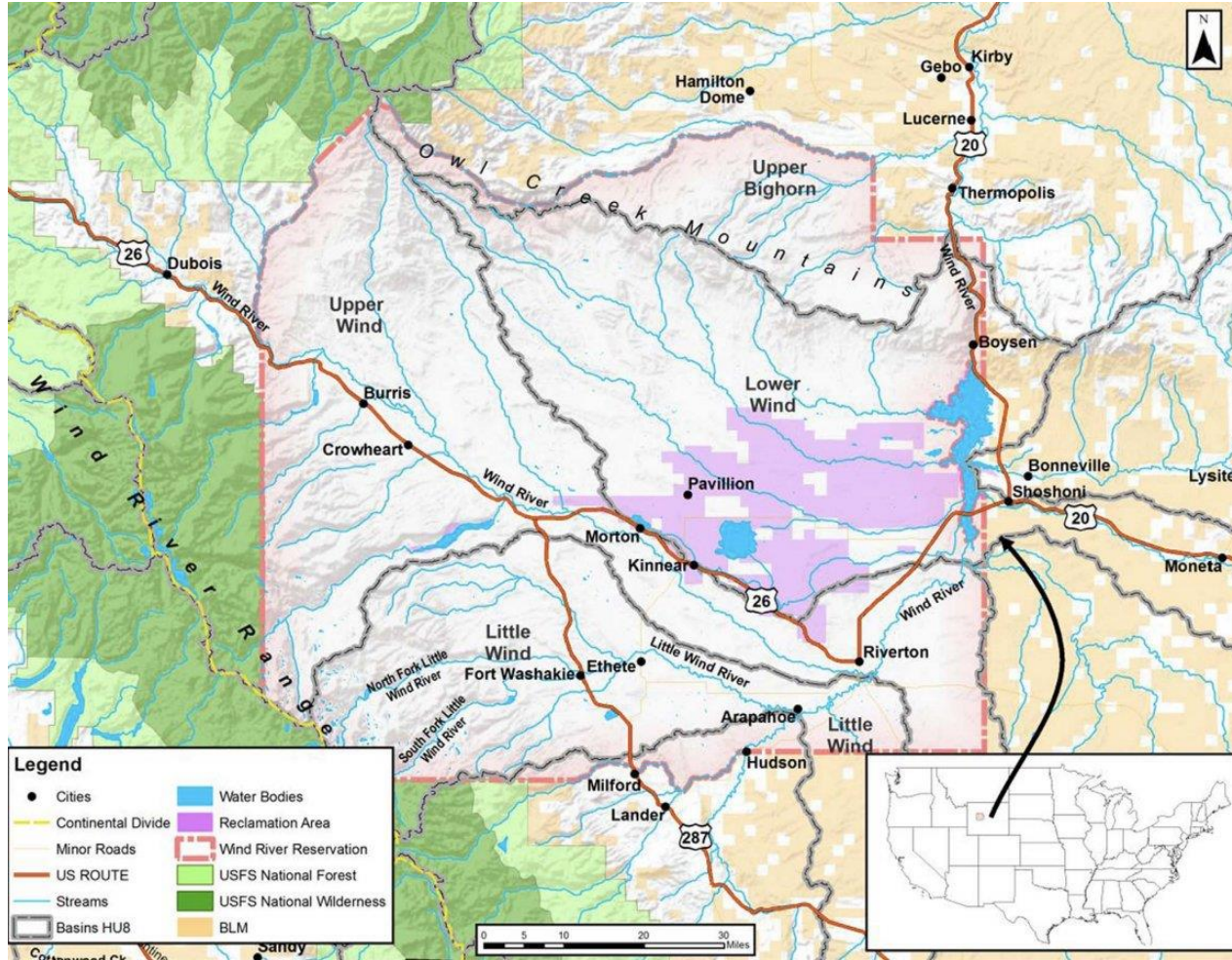
“Ever you hear an elder talk about water, water is sacred to us, our people, you know. For both Tribes, water is sacred. We use water in our ceremonies... Water is life for us. If we didn’t have water, we wouldn’t be here.”

Lokilo St. Clair, Northern Arapaho

“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

The Wind River Indian Reservation at a glance



Map: McNeeley et al. (2018), *Climate Risk Management* 19

~2.2M

acres, about the size of
Yellowstone National Park

25,000+

people live within Reservation
boundaries (2020 census)

~3,900

enrolled Eastern Shoshone
members (BIA)

~8,600

enrolled Northern Arapaho
members (BIA)

Two sovereigns, one Reservation. Headwaters of the Wind River Range flow into the Bighorn, then the Yellowstone, Missouri, and Mississippi, all the way to the Gulf of Mexico.

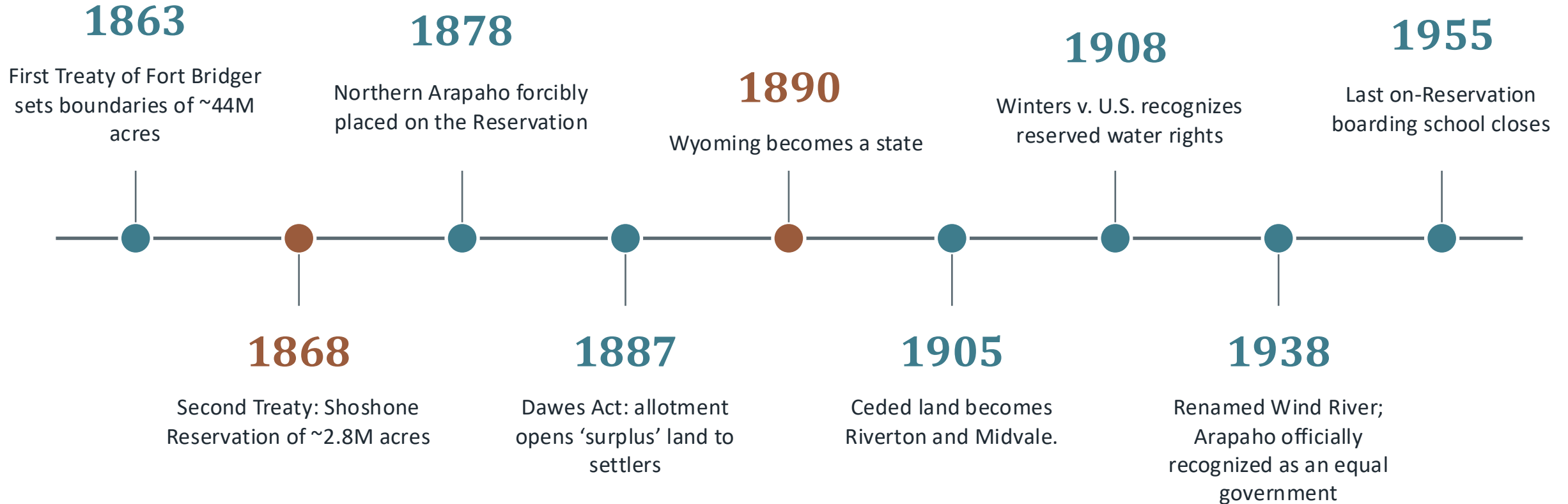


PART 1

The past: history and legal context

A shrunken Reservation and a 37-year water rights adjudication

Timeline



Tribal reserved water rights 101



Federal reserved rights (*Winters Doctrine*)

- Recognized in *Winters v. United States* (1908)
- Water needed to fulfill the purpose(s) of the Reservation
- Priority at least as senior as the Reservation's founding
- Fixed once quantified; not lost through non-use



State prior appropriation

- 'First in time, first in right' governs most western water
- 'Use it or lose it' can discourage efficiency
- Wyoming strongly prioritizes agriculture and other consumptive uses

The catch: under interpretations of the McCarran Amendment (1952), Tribal rights can be adjudicated in state court.

The Big Horn Adjudication: Tribal water right quantified

1977

Adjudication begins, sparked by Tribal objections to groundwater drilling in Riverton

1988

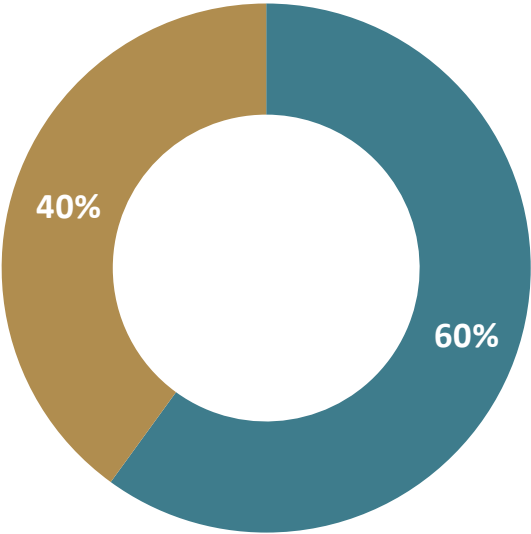
Big Horn I: Wyoming Supreme Court quantifies the right using ‘practicably irrigable acreage’ (107,976 acres)

1989

U.S. Supreme Court affirms in a 4–4 split after Justice O’Connor recuses

2014

Adjudication ends after 37 years and six cases



■ Historic use ■ Futures

499,862 acre-feet

Total reserved right: ~60% historic use, ~40% ‘futures’

Source: Robison (2015), Wyoming Law Review 15(2)

Senior rights on paper, barriers in practice

ON PAPER

1868

Tribal priority date, from the Second Treaty of Fort Bridger

1890

the year Wyoming became a state, 22 years later

499,862 acre-feet

reserved water right quantified in the Big Horn Adjudication

^A paper right to ~40% of the water flowing through the Reservation

IN PRACTICE

~100,000

of 250,000 acre-feet of historic irrigation water the Tribes can effectively use (2011 testimony)

~200,000

acre-feet of 'futures' water that remains a paper right

< 2%

of the storage capacity non-Tribal users have in the basin

The Tribes build their own water framework



April 1990

Instream flow permit

252 cfs minimum on the Wind River, the first instream flow designation on Tribal lands. Fisheries rebounded.



March 1991

Wind River Water Code

15 beneficial uses with equal weight, including cultural, religious, and instream flow. Consumptive uses are not superior.

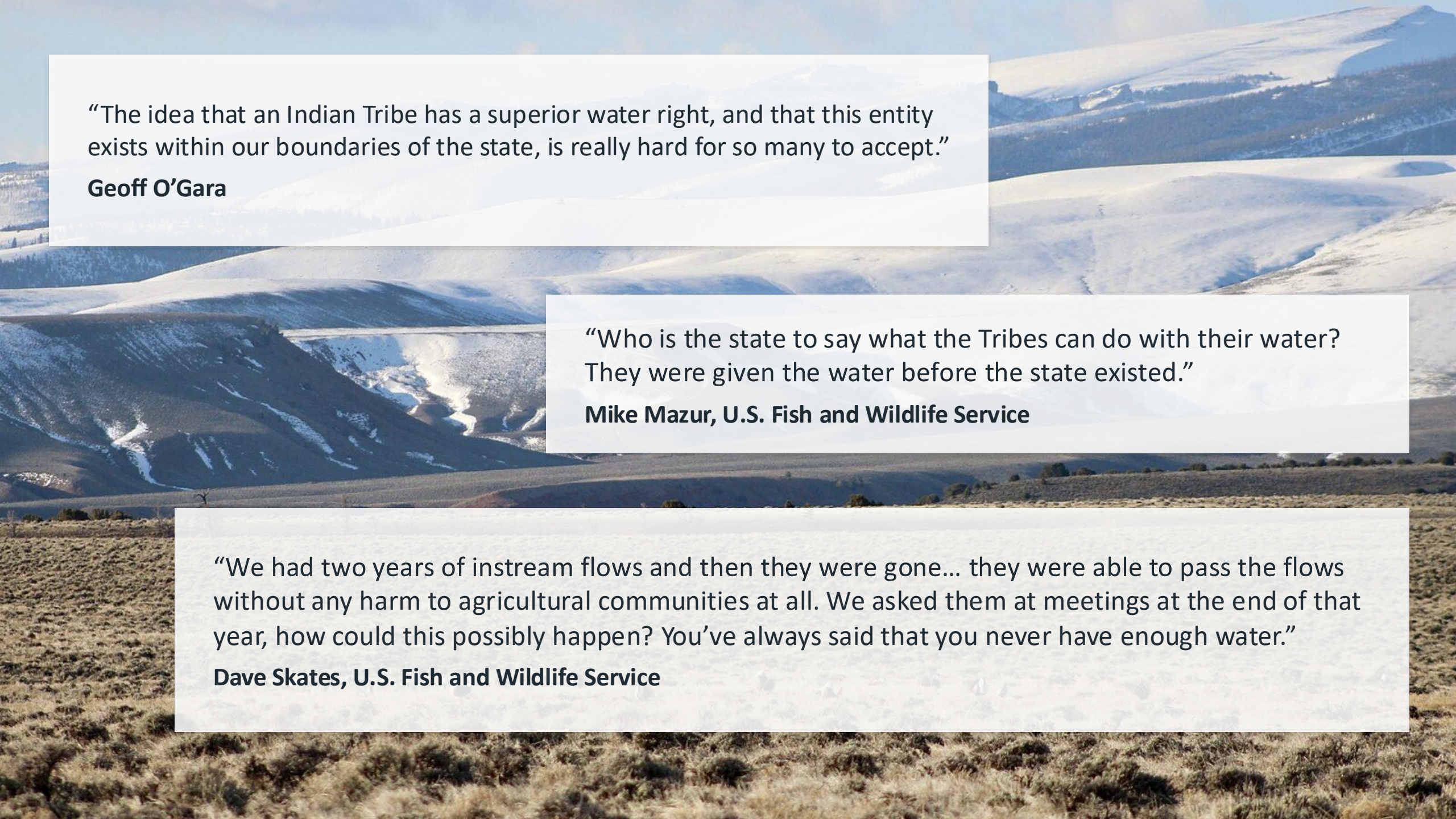


Joint governance

New institutions

Office of the Tribal Water Engineer and the Wind River Water Resources Control Board, with six members from each Tribe.

Lesson for other Tribes: Have a water code in place before undergoing any process to quantify your reserved water right. Otherwise, “you’re playing somebody else’s game.” – Wes Martel, Eastern Shoshone



“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

“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

“We had two years of instream flows and then they were gone... 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

Big Horn III and beyond: A right restricted



Instream flow denied (1992)

A split Wyoming Supreme Court held the Tribes must first put water to agricultural use before changing it to instream flow, which state law makes structurally impossible.



No reserved groundwater right

The adjudication found no reserved right to groundwater, a key source of drinking water.



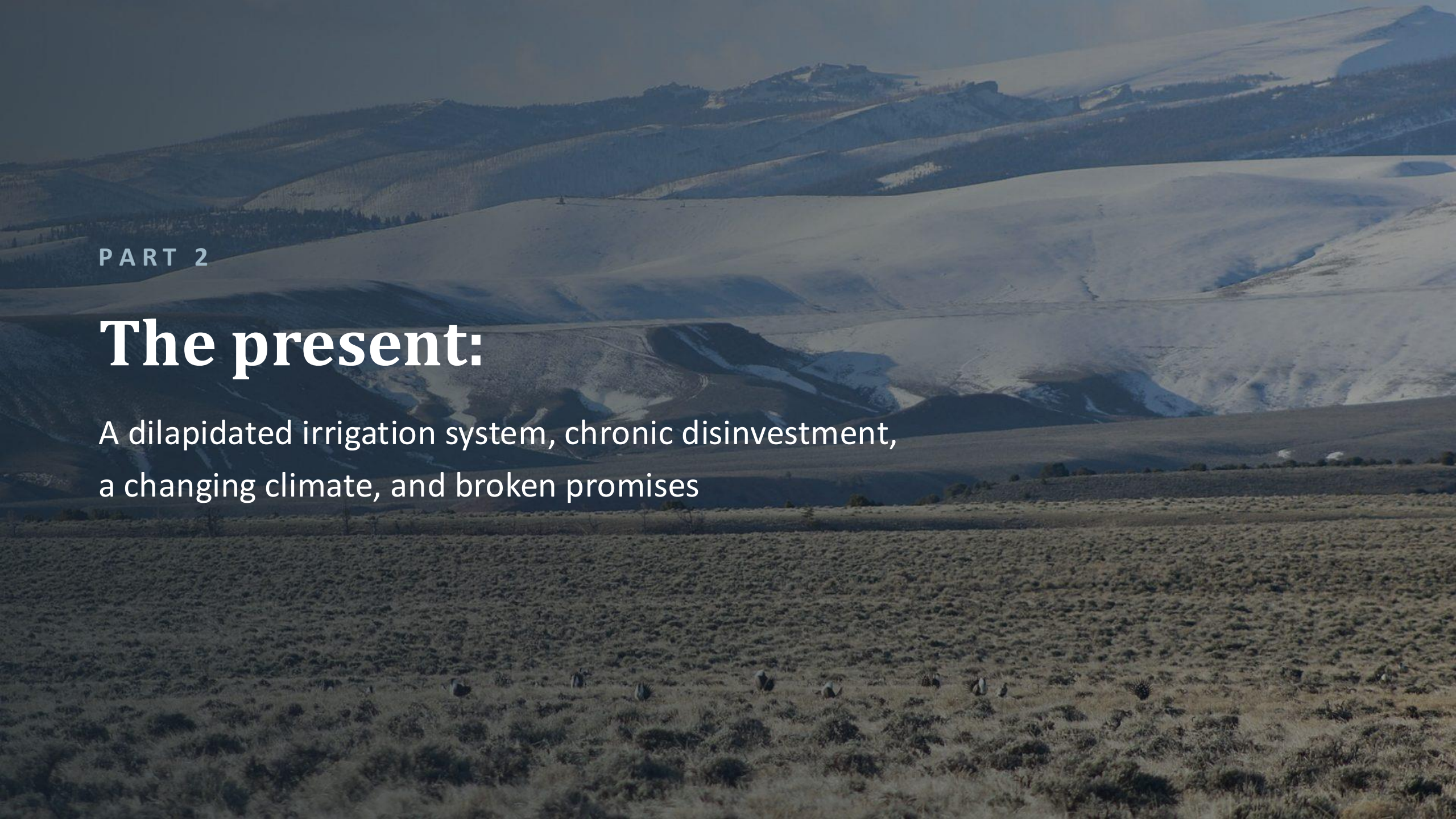
No off-Reservation marketing

No legal foundation to lease or market Tribal water beyond Reservation boundaries.

**Only 12 court
adjudications out of 56
Indian water rights
quantifications**

The courts construed the Reservation's purpose as agriculture, so the Tribes' ~200,000 acre-feet of futures water remains a 'paper' right.

Sources: Robison (2015); Sanchez, Edwards & Leonard (2020), Environmental Research Letters 15(9)

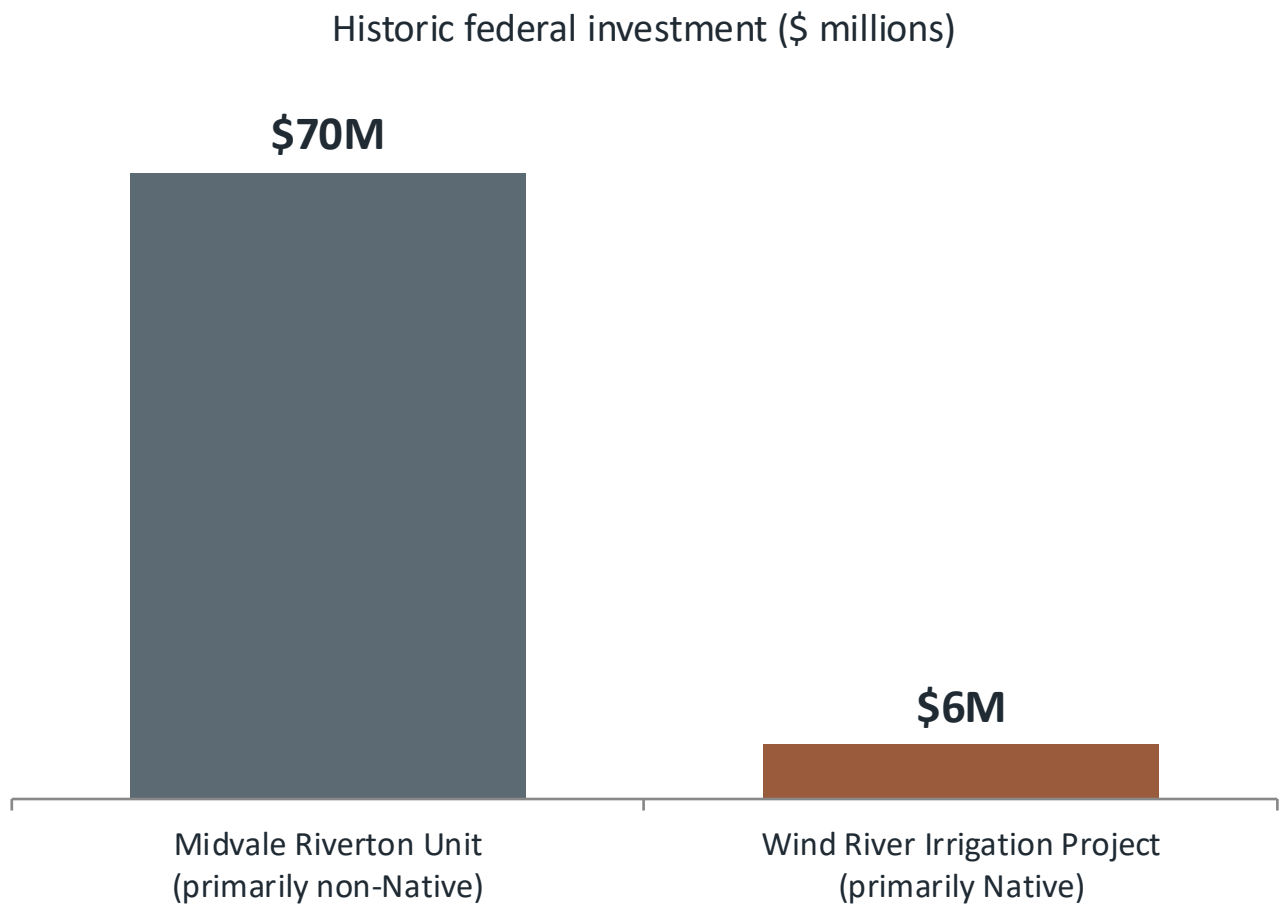
A wide-angle landscape photograph showing rolling hills. The foreground is covered in dry, brownish-yellow grass with small, dark shrubs. In the middle ground, there are several hills with patches of white snow or frost, particularly on the upper slopes and in the valleys. The background shows more distant, hazy hills under a clear sky. The overall tone is somewhat desaturated, giving it a somber or historical feel.

PART 2

The present:

A dilapidated irrigation system, chronic disinvestment,
a changing climate, and broken promises

Broken promises: unequal federal investment



Built 1905–1926, never completed

The Wind River Irrigation Project serves about three-fourths of its anticipated acres.



Built with Indian appropriations

Funds appropriated for Native projects helped build Diversion Dam and the canal serving settlers on ceded land.



Fees shifted onto users

BIA reclassified project lands as self-supporting, cutting maintenance funds and raising user fees.

Sources: Wes Martel, 2011 Senate testimony; O’Gara (2002); MacKinnon (2021)

A severely dilapidated irrigation system & a broken federal trust responsibility system

~90%

of the system dilapidated, per the Acting Tribal Water Engineer's estimate

~28%

of diverted water actually reaches the farm (Dave Skates, USFWS)

From the federal government's POV, the irrigation system was supposed to be the centerpiece of the Reservation's economy...

\$30–35M

to address deferred maintenance; up to \$90M for full rehabilitation

\$10M/yr

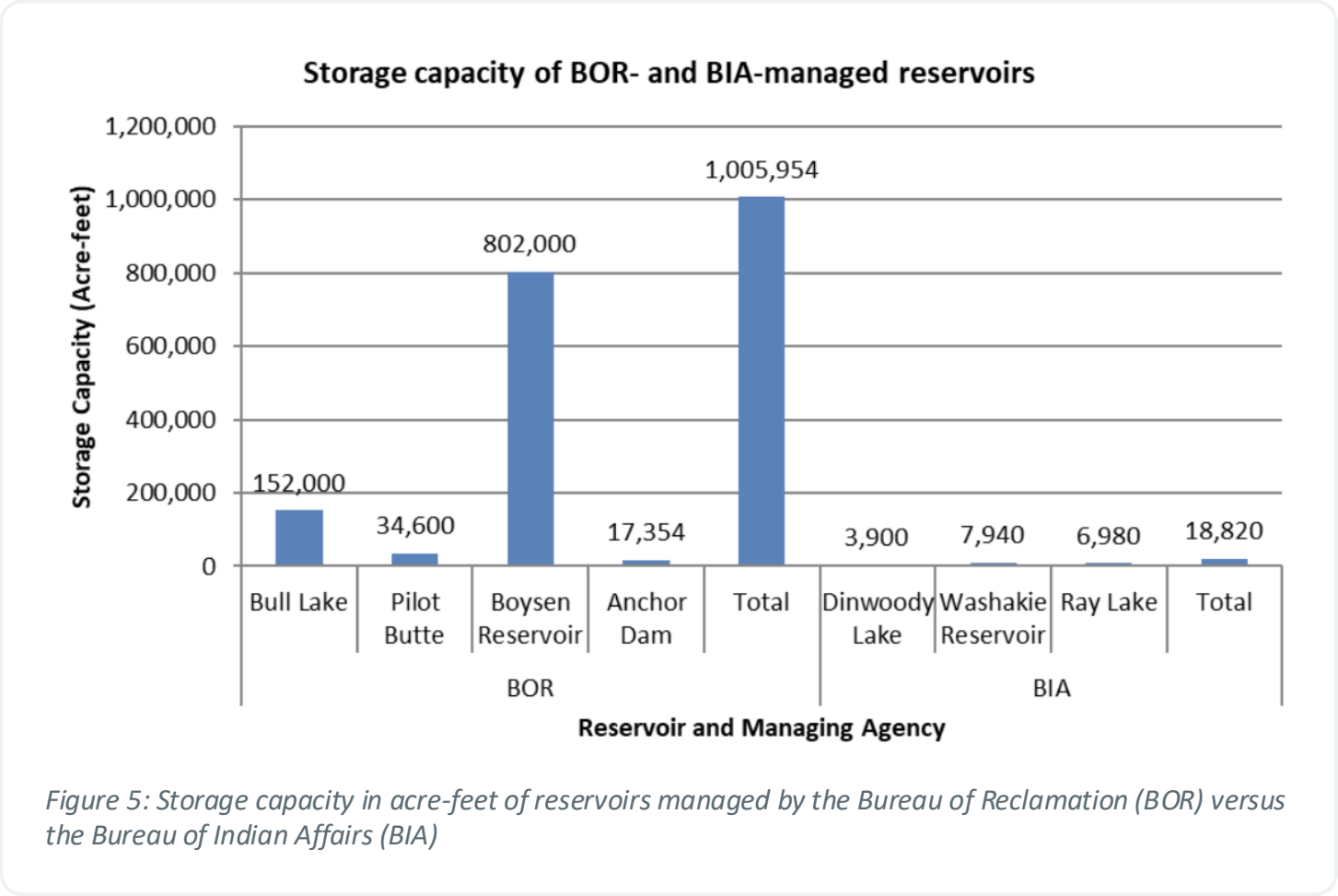
WIIN Act funding since 2018, shared across all BIA irrigation projects

62 of 160

BIA irrigation projects were operable nationally by 2000

Sources: interviews (2023); Cottenoir (2013); Agricultural Resource Management Plan (2018); WIIN Act (2016); Henson (2008)

Little room to store water



Source: Wind River Reservation Drought Management Plan (2020)

< 2%

Tribal storage compared with Bureau of Reclamation storage that primarily serves non-Tribal producers

~20%

of the Wind River Irrigation Project's originally planned storage existed in 2018 (MacKinnon)

A changing climate reshapes water availability



~2°F warmer
since the mid-20th century



Freezing level up ~500 ft
snow forms only at higher
elevations



Runoff 2–4 weeks earlier



Glaciers retreating
losing a key source of late-
season water



**Less snowpack and
precipitation**
in recent decades



Severe droughts
early 2000s and 2012–2013

Snowmelt drives the system

Snow accumulates October to mid-April and melts by late June. Early melt sends water through before plants and people are ready to use it. And there's not enough places to store it.

***“The past is no longer a
good guide for the future.”***

Sources: Knutson & McNeeley (2018), NC CASC Final Report; Wind River Reservation Drought Management Plan (2020)

2015: a micro-drought in a wet year

Micro-droughts are highly localized, short, and driven by the unique social and environmental features of local systems.



Little Wind basin

- Early runoff, then heavy precipitation
- Low-capacity Washakie Reservoir couldn't hold it
- Water released downstream before irrigators could use it
- **Irrigation season ended a month early**

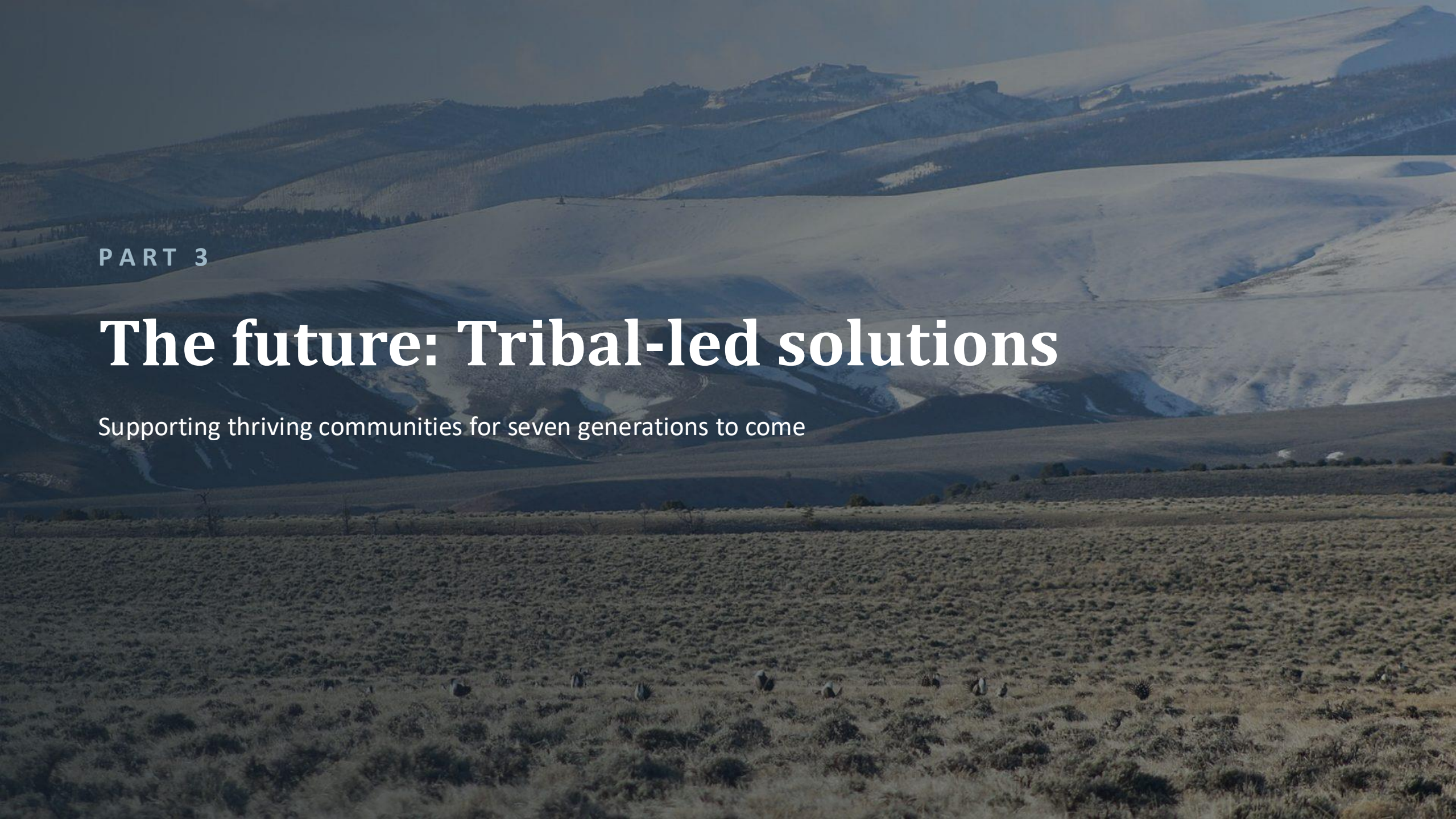


Upper Wind basin (Crowheart)

- Stored water in Dinwoody Lake
- Late-season melt from Dinwoody Glacier
- Multiple 'backup' sources available
- **Irrigation continued late into the season**

Lesson: infrastructure, management, and backup water sources determine resilience to a changing climate.

Source: McNeeley et al. (2018), "Anatomy of an Interrupted Irrigation Season," Climate Risk Management 19



PART 3

The future: Tribal-led solutions

Supporting thriving communities for seven generations to come

Taking back management of the irrigation system



Self-determination contracting

Through Public Law 638, the Tribes now manage most of the system's seven units



Hands-on rehabilitation

Crews cleared 20+ years of debris and up to four feet of silt from canals and laterals, with visible results.



Infrastructure aligned with values

Fish ladders and screens installed across the project; a 25 cfs instream flow maintained on the Little Wind.



Leveraging partners

Several million dollars in grants by combining Wyoming Water Development Commission funds with federal matches.

The core challenge is capacity. With capacity, you can pursue funding. Building it without funding at the start is the hard part.

Adapting to a drier, less predictable future



Storage on Tribal terms

- Tribes have organized their own analysis for developing water storage on their land
- Preference for off-channel storage: “We’ll never put anything on the mainstem.” (Wes Martel)

Needs: Funding that doesn’t limit sovereignty



Climate information for decisions

- 2020 Drought Management Plan: the Tribal Water Engineer declares normal, surplus, or drought conditions
- Climate dashboard (High Plains Regional Climate Center) with SNOTEL and reservoir data

Needs: more stream gauges, more SNOTEL sites, and staff time to use the tools

Activating the ‘futures’ right: the ARMP

2018 Agricultural Resource Management Plan

“A viable, self-directed and sustainable agricultural economy that enhances the education, health, natural resources, traditions and culture of our native people.”

Plan vision, approved by the Inter-Tribal Council



Increase storage

for the benefit of agriculture, fish, and wildlife, and to build resilience for changes in the timing of runoff



Master plan for irrigation rehab

and identify funding for storage projects



Develop futures lands

turning paper water into usable water



Diversify crops and livestock

economically viable and environmentally sustainable

Open question: shift historic use to instream flow while futures water meets agricultural needs?

Food sovereignty: the return of the buffalo



Wind River Tribal Buffalo Initiative, March 2023

2023

first Sundance harvest from the Tribes' own herds and lands in 138 years

95 + 86

Shoshone and Arapaho buffalo (March 2024)

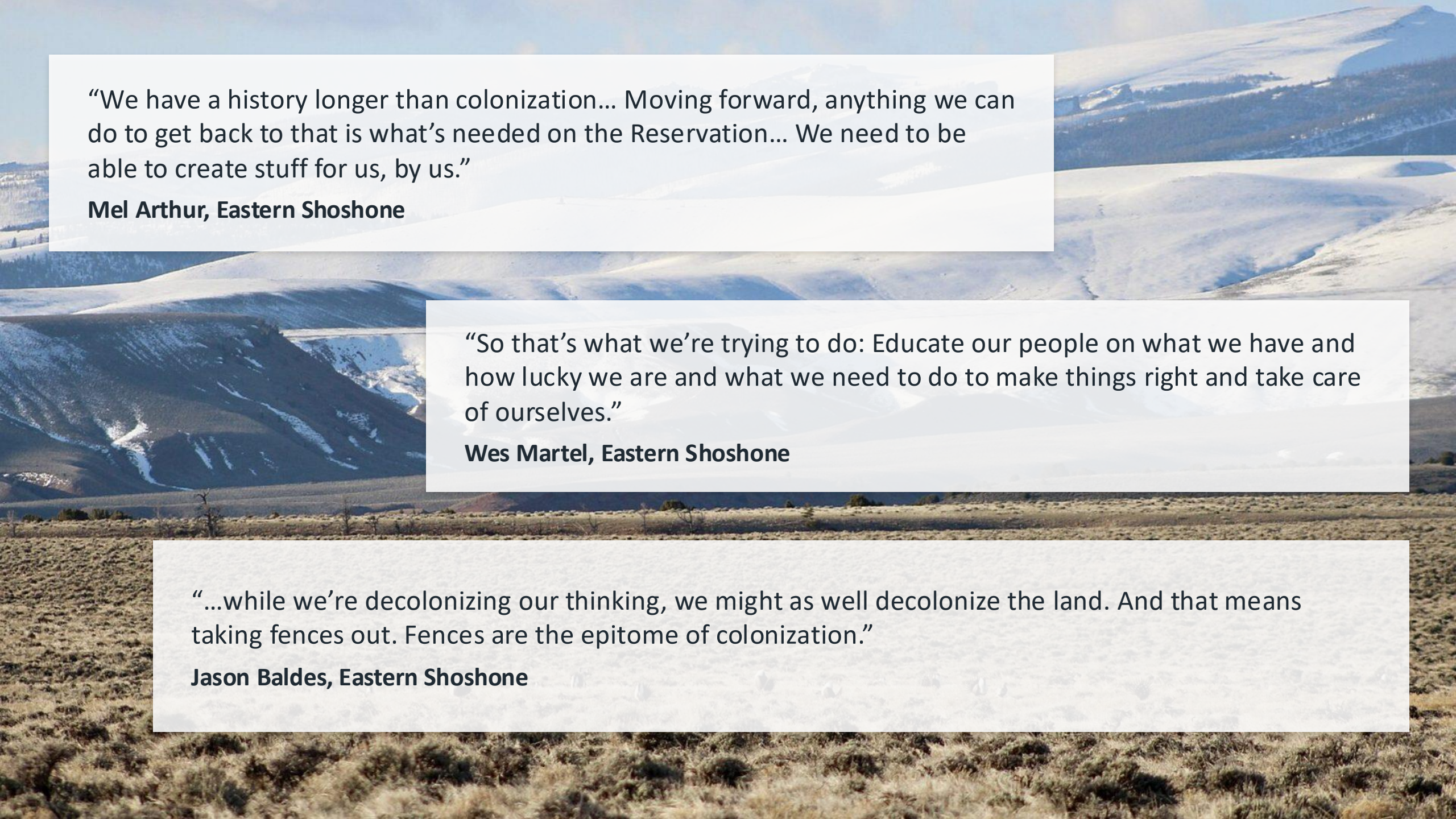
50–60M

buffalo once roamed North America, reduced to a few hundred

Ecosystem engineers: wallows collect water and disperse seeds, hooves aerate soil, and shed winter coats become nesting material for birds.

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

Jason Baldes, Eastern Shoshone



“We have a history longer than colonization... 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

“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.”

Wes Martel, Eastern Shoshone

“...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

What's needed now



Respect sovereignty and Indigenous knowledge

Support Tribal control over water and land, center Indigenous science and values in partnerships, and invest in education for Tribal youth.



Plan for change on both sides

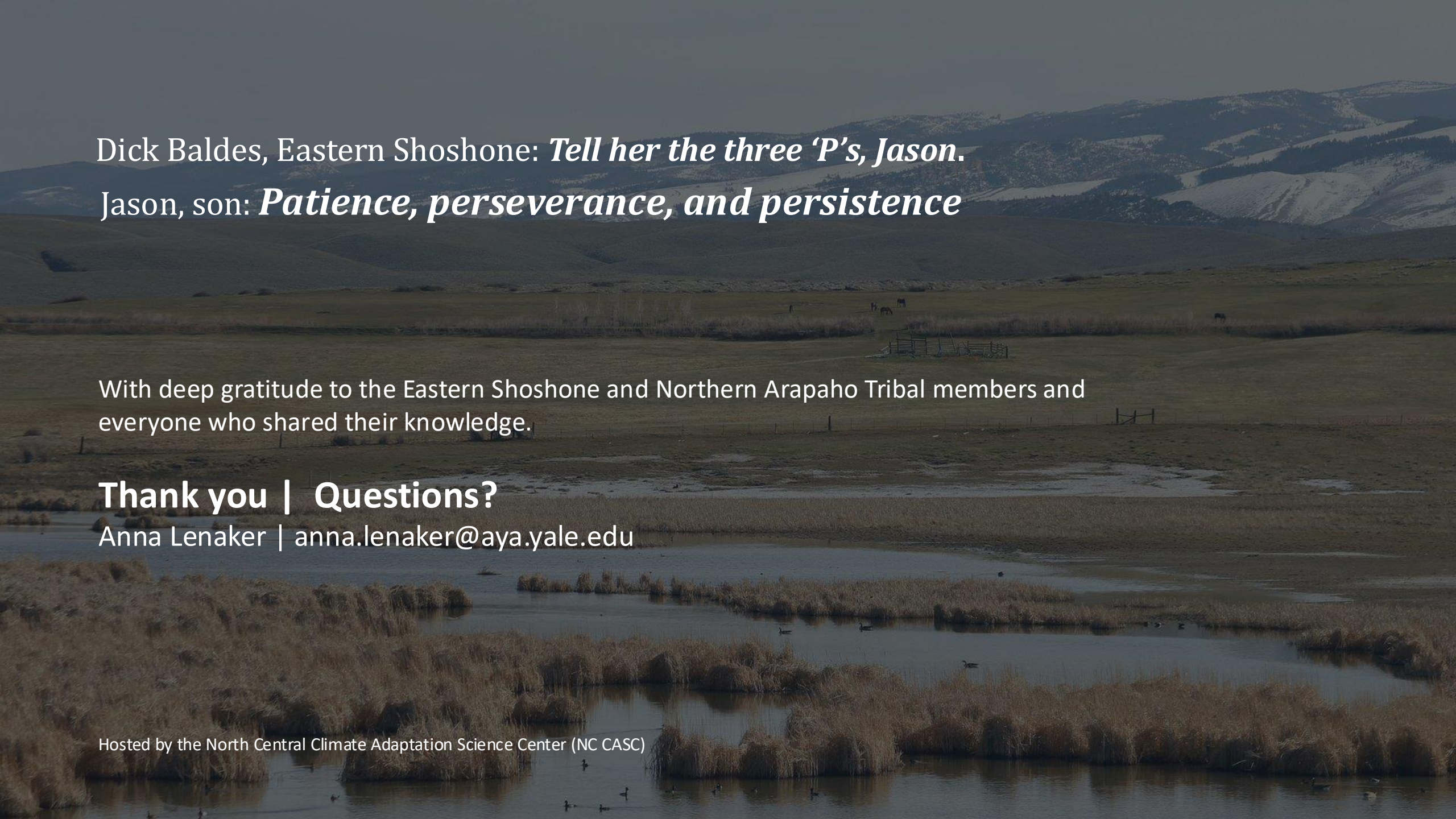
Storage and efficiency alone won't be enough. As the Tribes use their paper right, Native and non-Native water users will need to adapt demand and diversify their economies.



Fund the trust responsibility, including the BIA

Move critical trust funding from discretionary to non-discretionary, and address decades of accumulated backlog.

"The federal obligation to Native Americans is a matter of both moral and legal imperative." – U.S. Commission on Civil Rights, 2003



Dick Baldes, Eastern Shoshone: *Tell her the three 'P's, Jason.*
Jason, son: *Patience, perseverance, and persistence*

With deep gratitude to the Eastern Shoshone and Northern Arapaho Tribal members and everyone who shared their knowledge.

Thank you | Questions?

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Hosted by the North Central Climate Adaptation Science Center (NC CASC)

SAVE THE DATE

Annual Wind River Water Forum

April 22–24 (tentative) · On or near the Wind River Reservation

Tribal water managers, community members, local organizations, and scholars gather for in-depth conversations on water management issues facing the Eastern Shoshone and Northern Arapaho Tribes, and Tribal Nations across the United States.



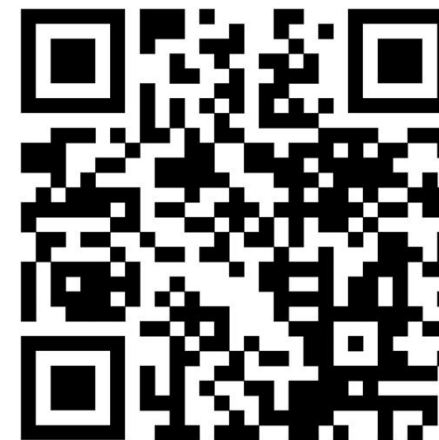
Learn about water-related challenges and water history on the Reservation



Discuss pathways forward that address today's challenges and build thriving communities for generations to come



Get in the field for an optional water infrastructure tour



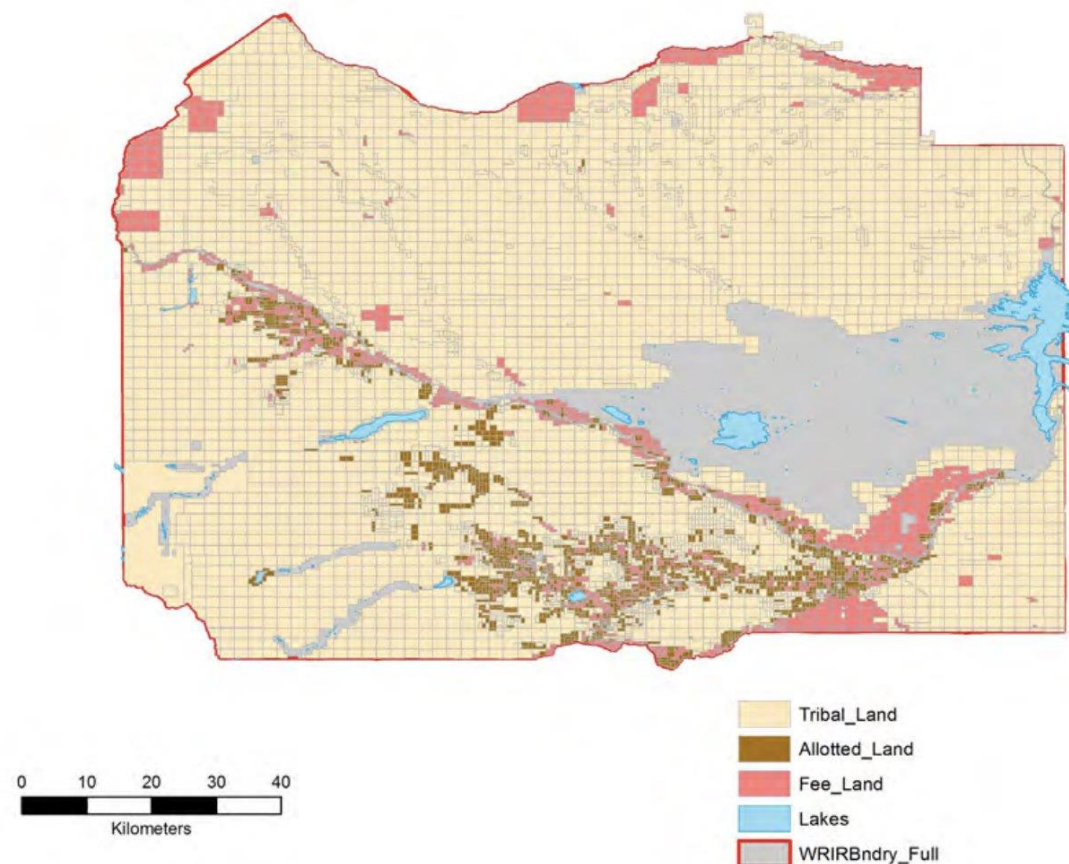
Scan to Stay in Touch

Receive announcements
about the Forum,
including how to register

Jointly sponsored by the University of Wyoming and the Getches-Wilkinson Center at the University of Colorado Boulder

Appendix/other slides

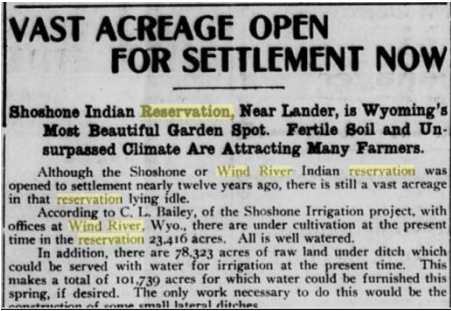
A diminished, fragmented landscape



Map: Wind River Agricultural Resource Management Plan (2018)



Fractionated allotments: without designated heirs, ownership splits among all living descendants, leaving some allotments with hundreds of owners.



Wyoming State Journal, March 1918: land on the Reservation advertised to non-Native settlers as 'Wyoming's Most Beautiful Garden Spot.'

Historical context shapes the present



Boarding schools

Carlisle Indian School (1879–1913) became the model for hundreds of schools that tried to forcibly ‘civilize’ Native children. 189 children died at Carlisle alone.



Close to home, not long ago

The ‘Government Boarding School’ on the Wind River Reservation did not close until 1955.



Farming as policy

Federal policy aimed to turn Tribal members into individual farmers, and an irrigation project became the intended economic cornerstone.

*“It’s historical context
that actually determines
the future.”*

Cy Lee, Northern Arapaho