



2021–2025

# NIDIS TRIBAL DROUGHT ENGAGEMENT STRATEGY

FOR THE MISSOURI RIVER BASIN AND MIDWEST  
DROUGHT EARLY WARNING SYSTEMS (DEWS)



# ACKNOWLEDGEMENTS

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**“We don’t work with strangers.  
We work with relatives.”**

—TRIBAL CITIZEN, OKLAHOMA



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**On the Cover:** lands at sunset near Rapid City, South Dakota. The area known today as Badlands National Park is ancestral land for many indigenous nations. Credit: Virrage Images

## SUGGESTED CITATION

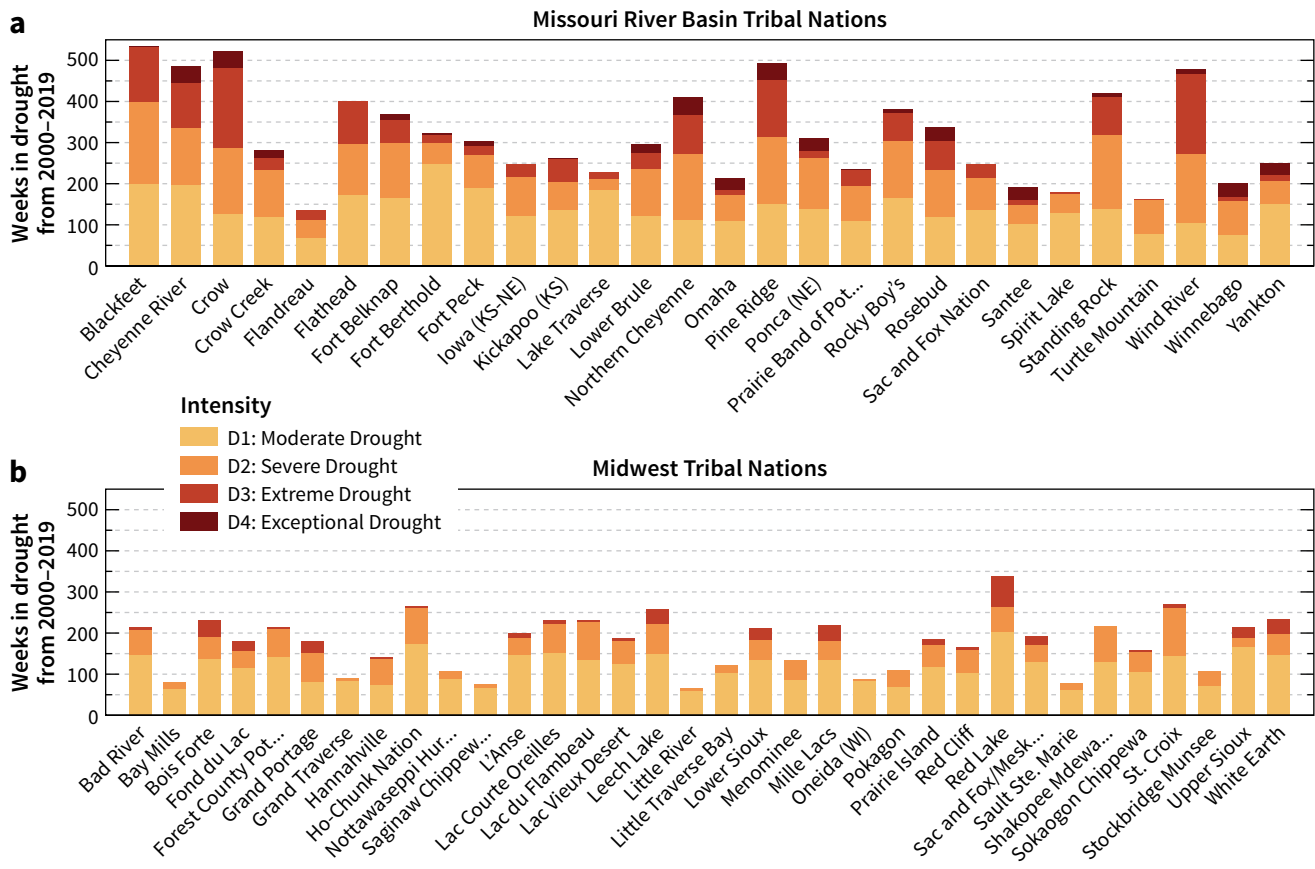
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# INTRODUCTION

Drought has been a constant concern for many regions of the United States, including the Midwest region and in the Missouri River Basin. Both of these areas have experienced increases in average temperatures (1–3°F) over the past few decades, with drought and flooding becoming more frequent and extreme (NCA 2018). Future projections predict that these changes will continue to impact these regions, with temperatures expected to rise by up to 3–5°F by the mid-21st century and up to 8°F by the end of the 21st century (NCA 2018).



North Dakota  
bison herd.  
Credit: Anh Luu



### DROUGHT IMPACTS ON TRIBAL NATIONS

Sixty-two federally recognized tribal nations exist within the Missouri River Basin and Midwest region and all of them have experienced multiple episodes of drought since 2000, according to the *U.S. Drought Monitor*. Figure 1 shows the number of weeks tribal nations within the (a) Missouri River Basin and (b) Midwest have been in drought based on the severity levels of the U.S. Drought Monitor from 2000–2019. On average, tribal nations in the Missouri River Basin were in drought 30% of the time from 2000–2019, and almost all tribal nations have experienced all levels of drought at some point in the 20-year period. While drought has been longer and more severe in the Missouri River Basin, drought has also been an issue for Midwest tribal nations. On average, tribal nations in the Midwest were in drought 17% of the time from 2000–2019. For the methodology behind this historical drought analysis and individual tribal nation drought exposure scores, please see *Appendix A*.

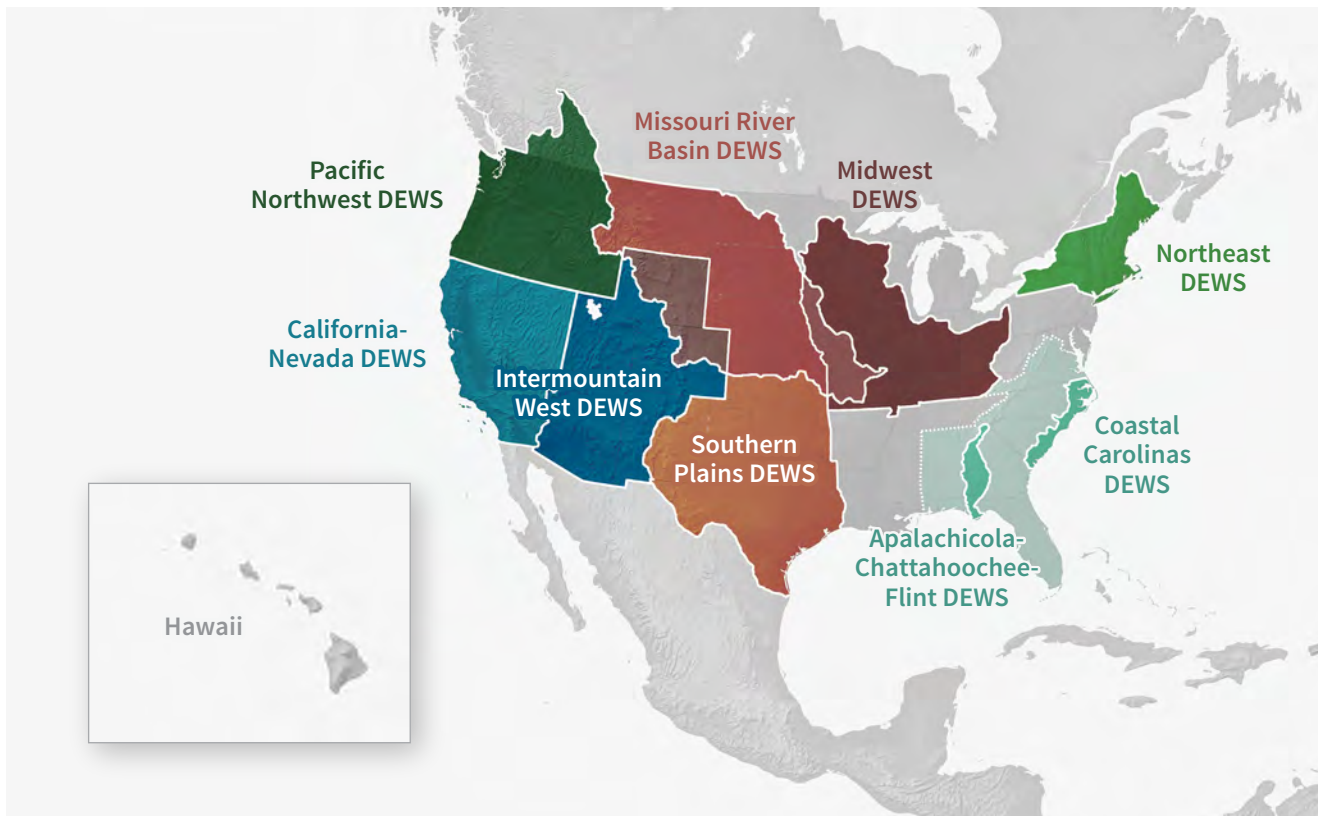
Given the prevalence and reoccurrence of drought, information providers should engage with tribal nations and make drought monitoring and forecasting tools available for drought preparedness and response.

### NIDIS AND TRIBAL ENGAGEMENT

The National Oceanic and Atmospheric Administration’s (NOAA) National Integrated Drought Information System (NIDIS) program was established by Congress in 2006 (*Public Law 109-430*) and reauthorized in 2014 and 2019. NIDIS has an interagency mandate to coordinate and integrate drought research, building upon existing federal, tribal, state, and local partnerships in support of creating a national drought early warning information system.

A drought early warning system (DEWS) utilizes new and existing networks of federal, tribal, state, local, and academic partners to make climate and drought science accessible and useful for decision makers; and to improve the capacity of stakeholders to monitor, forecast,

**▲ Figure 1: The number of weeks tribal nations within the (a) Missouri River Basin and (b) Midwest have been in drought based on the severity levels of the U.S. Drought Monitor from 2000–2019. The total number of weeks is 1,044. Credit: NOAA NIDIS, Fiona Martin**



▲ **Figure 2:** Map of regional Drought Early Warning Systems (DEWS). NIDIS will be launching a new Southeast DEWS (dotted outline) in 2020. Credit: NOAA NIDIS, Fiona Martin

plan for, and cope with the impacts of drought. Currently, there are nine regional drought early warning systems. NIDIS will continue to develop regional DEWS in watersheds and regions across the country (Figure 2).

Within each DEWS, NIDIS works with partners to guide activities that strengthen drought preparedness and early warning systems. Past and current work with tribal nations led to the recognition that a more focused approach to support tribal communities was needed, leading to the development of this *NIDIS Tribal Drought Engagement Strategy*. The priorities identified in this strategy are meant to complement the work occurring throughout the Missouri River Basin and Midwest DEWS.

Table 1 summarizes some of the past work that NIDIS has supported over the last five years in partnership with tribal nations. This table is not exhaustive, and provides examples of the types of activities that have occurred.

► **Table 1:** (next page) summarizes some of the past work that NIDIS has supported over the last five years in partnership with tribal nations.

### GOALS OF THE NIDIS TRIBAL DROUGHT ENGAGEMENT STRATEGY

Indigenous experiences and perspectives of drought vary greatly across the two regions. By integrating these diverse perspectives into our work, we will be able to foster a culturally appropriate engagement practice and work with tribal nations as equal partners in responding to drought.

In order to ensure the inclusion of indigenous perspectives in the implementation of the DEWS, NIDIS launched a Tribal Drought Engagement initiative in January 2019 in collaboration with the Masters of the Environment Program at University of Colorado-Boulder. The project aimed to strengthen relationships with tribal resource managers across the Missouri River Basin and Midwest DEWS regions in order to effectively deliver timely and relevant drought information (*more on the project in Appendix B*). These tribal resources managers are elected or duly appointed officials of tribal governments or authorized intertribal organizations,

**TABLE 1**

<b>Drought Observations and Monitoring</b>
<p>Monthly water supply and climate summaries for the Wind River Indian Reservation were developed and serve as models for other tribal nations across the United States [HPRCC, North Central Climate Adaptation Science Center (CASC), NDMC, NIDIS ].</p>
<p>The HPRCC is currently working with Tribal Nations to develop Decision Dashboards that provide pertinent information on past, present, and future environmental conditions [HPRCC, Great Plains Tribal Water Alliance (GPTWA), NOAA, NIDIS, North Central CASC, Bureau of Indian Affairs (BIA), NDMC, University of Nebraska-Lincoln, South Dakota State University, Colorado State University, Louis Berger]. Examples: <i>Rosebud Sioux Decision Dashboard</i> and <i>Wind River Decision Dashboard</i>.</p>
<b>Drought Planning and Preparedness</b>
<p>NOAA and other partners (NDMC, HPRCC, North Central CASC) have supported tribal nations of the Missouri River Basin over the last five years in successful proposals to receive BIA Tribal Resilience Grants to do drought vulnerability assessments, drought planning, and training on accessing drought tools and information.</p> <ul style="list-style-type: none"> <li>• The Great Plains Tribal Water Alliance, has successfully competed for a series of Tribal Resilience Grants for drought vulnerability assessments and drought planning with the Rosebud, Oglala, Standing Rock, and Flandreau Santee Sioux Tribes.</li> <li>• Led by Sac and Fox Nation of Missouri in Kansas and Nebraska, the four Tribal Nations of northeastern Kansas/southeastern Nebraska received funding for a drought adaptation planning project.</li> <li>• The Eastern Shoshone and Northern Arapaho Tribes of the Wind River Indian Reservation received multiple Tribal Resilience Grants to fund a vulnerability assessment focused on the impacts of drought, to develop a drought plan, and for the development of decision tools to support drought preparedness.</li> <li>• The Flandreau Santee Sioux Tribe received a grant to bring together the tribes of North and South Dakota for a Tribal Adaptation Planning Training and Workshop.</li> </ul>
<b>Drought Communication and Outreach</b>
<p>A monthly climate summary and outlook webinar series for the North Central U.S. has been delivered since 2012. These resources are critical to providing partners, including tribal nations, with the latest climate and drought conditions. Webinar frequency increased during the 2017 Missouri River Basin drought with additional webinars for tribal nations.</p>
<p>The HPRCC has produced quarterly drought and climate two-page summaries focused on the Missouri Basin states since 2011.</p>
<p>Drought Impact Briefs were issued for the lower Missouri River Basin during 2018 drought conditions.</p>
<p>Several workshops were held to understand and synthesize tribal drought impacts, vulnerabilities, critical needs, and priorities.</p> <ul style="list-style-type: none"> <li>• Climate Change, Drought and Early Warning on Western Native Lands (2009)</li> <li>• Drought Preparedness for Tribes in the Four Corners (2010)</li> <li>• Tribal Climate Change Adaptation Planning and Intergovernmental Coordination (2010)</li> <li>• Kansas Tribes Meet on Extreme Events, Drought Resiliency (2014)</li> <li>• Extreme Events and Drought Resiliency (2014)</li> </ul>
<b>Interdisciplinary Research and Applications</b>
<p>2017 Northern Plains Drought Assessment was completed in partnership with tribal nations in the Upper Missouri River Basin.</p> <ul style="list-style-type: none"> <li>• <i>Flash Drought: Lessons learned from the 2017 Drought Across the U.S. Northern Plains and Canadian Prairies</i> report released</li> <li>• <i>The Causes, Predictability, and Historical Context of the 2017 U.S. Northern Great Plains Drought</i> report released</li> <li>• Hoell, A., et al. 2020. <i>Lessons Learned from the 2017 Flash Drought Across the U.S. Northern Great Plains and Canadian Prairies</i>. <i>Bull. Amer. Meteor. Soc.</i> 1-46.</li> </ul>

responsible for managing natural resources on the Reservation (e.g., Fish and Wildlife, Water etc.).

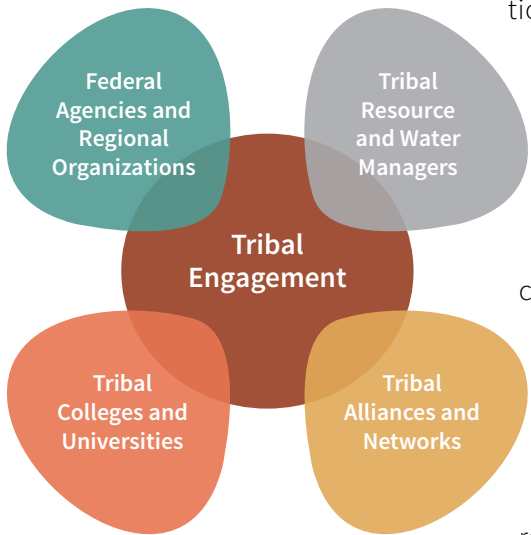
The *NIDIS Tribal Drought Engagement Strategy* was developed following this project, which included a year of consultations with tribal resource managers across the Missouri River Basin and Midwest Regions.

These consultations helped identify critical engagement gaps and the actions that could be taken to address them. The engagement in these two DEWS will inform consultations with tribal nations as a foundation for scaling the Strategy to other regions.

Working through tribal alliances and networks is also very important. Each tribe is unique, and it takes time to build trust and relationships. For a small program like NIDIS, working through existing alliances and networks can result in reaching more communities with pertinent products and information.

NIDIS would also like to engage with the Tribal Colleges and Universities (TCU). NOAA has a longstanding partnership with these entities to support tribal members in entering the science and technology fields. NIDIS has the opportunity to build on this, especially in the area of increasing the monitoring and observation capabilities on tribal lands. Engagement with these key categories of partners will strengthen DEWS implementation and ensure the inclusion of indigenous perspectives into all aspects of NIDIS' work.

Finally, this Strategy aims to complement NOAA's agency-wide *Tribal Relations Strategy*, which is intended to provide guidance to NOAA line offices to support a more consistent, effective, and proactive approach to conducting government-to-government consultations with federally-recognized tribes under *Executive Order 13175* and the Department of Commerce's Tribal Consultation Policy (NOAA 2013). □



▲ **Figure 3:** Employing Multiple Knowledge Systems. Credit: NOAA NIDIS, Fiona Martin

Two types of information are encompassed in the Strategy. The first are a set of *Guiding Principles of Engagement* that capture important approaches that NIDIS wants to embody in partnerships with tribal nations.

Following these principles are *Key Outcomes and Activities* that are organized around the five components of a DEWS (interdisciplinary research and applications; predictions and forecasting; observations and monitoring; planning and preparedness; and communications and outreach). The Strategy also provides a framework for integrating indigenous perspectives into the DEWS. Ultimately, implementation of the Strategy will lead to improved drought monitoring, forecasting, and resilience for tribal nations.

Tribal natural resource managers have been and will remain focal points of contacts for NIDIS, but expanded engagement with the other tribal partners is a key priority moving forward (*Figure 3*). NIDIS works closely with other federal agencies and regional





# GUIDING PRINCIPLES OF ENGAGEMENT

It is important to NIDIS to develop trust and a shared vision for improving drought preparedness in our partnerships with tribal nations. The following Principles of Engagement were developed following robust dialogue with more than 22 tribal natural resource managers and leaders across the Midwest and Missouri River Basin regions. Although tribal members all had different stories to tell, their key recommendations followed similar themes. These themes, reflected as Key Principles, are listed below.

## PRINCIPLE 1: RESPECTING TRIBAL SOVEREIGNTY

### i) Acknowledging and Respecting Tribal Sovereignty

The first key principle, and perhaps the most important, involves the respect and acknowledgement of tribal sovereignty and indigenous peoples' right to self-determination. This sovereignty includes lawmaking and enforcement, regulating trade and property, and forming alliances with other nations through treaties and other agreements (NOAA 2013). This sovereignty also means that tribal nations are nations in their own right. As such, tribal representatives should be engaged with on a government-to-government basis.

Additionally, it is vital that the boundaries of these sovereign nations are represented on drought maps and other communication materials, as would be the case for other nations. A key complaint voiced by tribal resource managers is that there is limited reservation-specific monitoring and forecasting data available for use by tribal nations. In many cases, tribal resource managers have to

### Federal Trust Responsibility

*Executive Order 13175* of November 6, 2000 directs all federal agencies to develop an “accountable process” for ensuring meaningful and timely input by tribal officials in the development of legislation and regulatory policies that have tribal implications (*Federal Register 2000*). This includes all regulations, proposed legislation, and other policies, states, reports, or actions that have substantial and direct effects on tribal nations.

Presidential Memorandum E9-27142 of November 5, 2009 reaffirms this policy and requires federal agencies to have an even higher degree of accountability to this legislation (*Federal Register, 2009*).

Sunrise over Theodore Roosevelt National Park, North Dakota. Credit: Zak Zeinert

rely on county-level data which is not always reliable or reflective of drought conditions on the reservations. This remains a key constraint in terms of drought monitoring and planning.

### **Putting it into Practice #1: Recognition of Tribal Sovereignty and Federal Trust Responsibility**

All NIDIS strategies, documents, and other communication materials that pertain to tribal nations should contain an acknowledgement of tribal sovereignty and federal tribal trust responsibility.

### **ii) Fulfilling Federal Trust Responsibility**

The Federal Trust Responsibility is an important legal principle that instructs the Federal Government to consult with tribal nations regarding decisions that affect their future [*American Indians/Alaska Natives (AI/AN) Fact Sheet 2014*]. When the trust responsibility is acknowledged and upheld by the Federal Government, a true government-to-government relationship and tribal sovereignty can exist and thrive (*GovInfo 2012*). Ensuring that the Federal Trust Responsibility is upheld within NIDIS' tribal engagement is key to expanding partnerships with tribal nations.

► **A young Sioux participates in the 49th annual United Tribes Pow Wow in Bismarck, North Dakota. September 2018. Credit: Pierre Jean Durieu**



## **PRINCIPLE 2: ENSURING TRUST AND RECIPROCITY**

### **i) Establishing Trust**

Establishing the trust and respect of tribal resource managers and leaders is the cornerstone of this Strategy. Most tribal resource managers engaged in this project stated that effective engagement first requires recognition of the historical trauma and trust issues indigenous persons face when working with the Federal Government. NIDIS engagement with tribal nations seeks to be sensitive to and respectful of this historical context.

Rebuilding trust requires that we approach tribal citizens with an authentic and respectful manner. This includes learning from tribal members about their resilience in past droughts, adaptation strategies, and respecting and elevating Traditional Ecological Knowledge (TEK). TEK consists of the body of knowledge, beliefs, traditions, practices, institutions, and worldviews developed and sustained by indigenous communities in interaction with their biophysical environment (*Toledo 2002, Berkes 2004*). This is not to

### **Putting it into Practice #2: Fulfilling Federal Trust Responsibility**

Consultation with tribal nations requires a genuine, respectful, government-to-government partnership. Native American tribal partnerships are a necessary and core aspect of NIDIS. This can be put into practice by including tribal nations in the development and implementation of applied research priorities, tools and services, and by working with tribal nations to clarify procedures and responsibilities within the partnerships.

appropriate the knowledge, but to acknowledge the deep understanding and connection with the natural world and integrate this knowledge to fully reflect their contribution to the DEWS.

This effort to genuinely understand and appreciate indigenous values and the appropriate use of language can help establish a positive paradigm shift by moving away from a “top-down” style of engagement, to one which is more culturally respectful and relevant. This approach is an important step in establishing authentic and lasting partnerships with tribal communities.

### **Putting it into Practice #3: Initiating the Conversation with Authenticity and Empathy**

Respectful engagement with tribal members includes an upfront discussion of what information the nontribal partner is hoping to gather, how this information will be used, and why it will be useful, particularly for the tribal nation. The transparency and respect garnered in this initial exchange will ultimately help foster trust. Once information has been collected, documents and other materials should be shared with the tribal nation for input and permission received before publicly sharing any information.

### **Putting it into Practice #4: Respecting Time Demands**

Similar to many natural resource managers, tribal resource managers are overstretched and often only have the capacity to deal with the emergent issues of the day, with limited time and resources to dedicate to non-urgent issues. In addition, many agencies and institutions are approaching tribal nations for various reasons, which may put additional stress on resources and time. Coordination among agencies to work together and avoid duplicative requests would help reduce this stress.

### **ii) Ensuring Reciprocity**

The notion of reciprocity is central to Native American society and culture. It is the basis for indigenous peoples’ interaction with both humans and the environment. Reciprocity is a native social norm that encourages a positive action to be rewarded with another positive action, motivating kind, respectful, and generous behavior.

### **Putting it into Practice #5: Ensuring Reciprocity**

In the case of federal-tribal engagement, reciprocity means that tribal engagement projects are designed in a way that the primary beneficiary is tribal citizens, and that any information collected must be openly shared with tribal members. Engaging with tribal nations and understanding their needs throughout the life of a project ensures that outcomes are agreed upon and mutually beneficial.

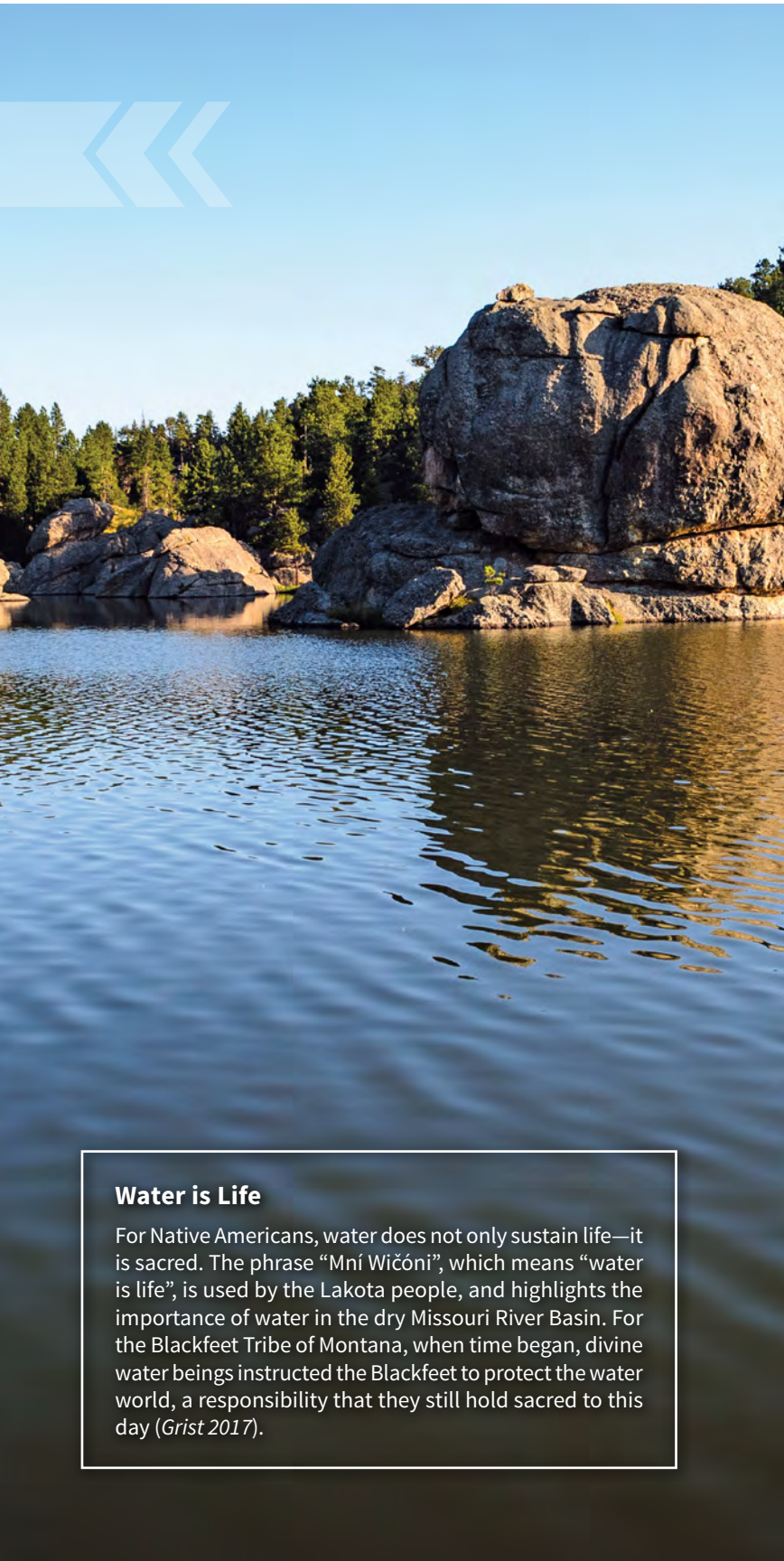


◀ Wild horse in Theodore Roosevelt National Park, North Dakota. Credit: Zak Zeinert

## **PRINCIPLE 3: ENSURING DEWS ARE CULTURALLY APPROPRIATE AND USEFUL FOR TRIBAL NATIONS**

### **i) Encourage the integration of Native American knowledge and values into NIDIS drought programs.**

Native Americans consider all beings (including plants, animals and water) in the natural environment to be relatives, elders, and teachers. Further, they believe that these



### Water is Life

For Native Americans, water does not only sustain life—it is sacred. The phrase “Mní Wičóŋi”, which means “water is life”, is used by the Lakota people, and highlights the importance of water in the dry Missouri River Basin. For the Blackfeet Tribe of Montana, when time began, divine water beings instructed the Blackfeet to protect the water world, a responsibility that they still hold sacred to this day (*Grist 2017*).

**“We don’t live in a world full of resources, we live in a world full of relatives. We feel like drought monitoring systems are primarily geared towards the economic needs of non-native farmers.”**

—TRIBAL RESOURCE MANAGER  
MISSOURI RIVER BASIN DEWS

beings can teach valuable lessons, which have been passed down for generations and have ensured the survival of indigenous people (*GLIFWC 2018*).

Tribal environmental perspectives focus on observation, deliberation, and adaptation to the environment, instead of trying to change it. This holistic, interconnected view of the environment translates into integrated natural resources management in tribal communities. For example, natural resource managers may also actively engage in water management and agricultural activities, particularly during a drought crisis.

### Putting it into Practice #6: Successfully Integrating TEK and Indigenous Ways of Knowing

- Asking permission before using or interpreting traditional knowledge and give credit where it is due. This is to ensure that this knowledge is protected and utilized correctly.
- Acknowledging the role and value of diverse knowledge.
- Asking culturally relevant and respectful questions.
- Ensuring the collection of TEK is carried out ethically and is not shared for profit.

Sylvan Lake, SD. Credit: Zack Frank

**ii) Respecting traditional drought resilience strategies**

For thousands of years, Native Americans have possessed a deep knowledge of water and drought and have developed their own methods of dealing with limited water supply, in harmony with the natural environment. For example, in the Pacific Northwest, tribal citizens make use of the dams created by beavers to improve water storage in streams and rivers during the drier months. Indigenous peoples also sow drought-resilient plants and use traditional techniques to prevent drought-related fire (Fond du Lac Band 2019).

Tribal nations have a wealth of knowledge to share with nontribal partners that can help support and strengthen all drought mitigation strategies.

**iii) Ensure the use of appropriate language**

Language plays an integral role in sustaining indigenous culture and ways of knowing. Understanding the appropriate language is a critical tool for strengthening relationships with tribal communities. Not all tribal citizens will have a knowledge of technical western science terminology and their application in relation to drought. In addition, technical terms

are not always easily translated into indigenous languages. Any drought concepts should be explained in plain language to increase shared understanding. In addition, there are several words and phrases which many tribal members may find offensive; these are listed below and should be avoided (Table 2). □

▼ More than 900 dancers and musicians gather to celebrate native american culture at the United Tribes Pow Wow. Bismark, ND, September 2018. Credit: Pierre Jean Durieu



**“All the information we need on drought is out there, it’s just too complex with too many conflicting indicators.”**

—TRIBAL RESOURCE MANAGER  
MISSOURI RIVER BASIN DEWS

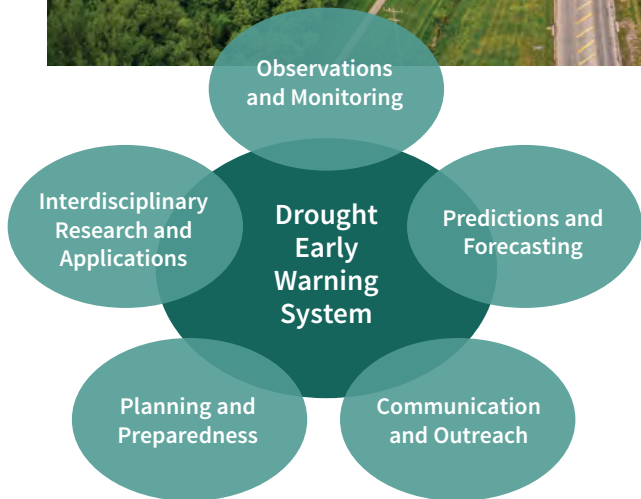
**TABLE 2**

To Avoid	Preferred Term
<b>Stakeholders:</b> implies that Native Americans only hold limited stakes in a project or issue	<b>Rights holders or tribal citizens:</b> terms that are a more accurate portrayal of Native Americans in relation to their sovereignty and the rights they hold as citizens
<b>Indian:</b> is a term that can have negative connotations due to its colonial origins	<b>Indigenous persons or Native Americans:</b> the original or earliest known inhabitants of this land, in contrast to those that have settled, occupied or colonized the area more recently
<b>Vulnerability:</b> this term infers weakness and should be avoided	<b>Resilience:</b> a more accurate depiction of the strength exhibited by tribal nations throughout history
<b>Tribe:</b> a term that is often used for shorthand in referring to indigenous communities	<b>Tribal nation:</b> the preferred term that acknowledges sovereignty

◀ **Table 2: Appropriate terminology for use during all forms of tribal communication based on input from tribal members at workshops, meetings, and in conversations that informed this engagement strategy.**



Winnebago tribe in Nebraska. Credit: Jacob Boomsma



## KEY OUTCOMES AND ACTIVITIES

The Key Outcomes and Activities are potential tribal engagement activities for NIDIS to implement in 2021 and beyond, organized around the five components of a DEWS (Figure 4). It is not a prescribed list; rather, it is a flexible menu of options that NIDIS and partners can use to strengthen engagement with tribal communities.

▲ **Figure 4: The components of a Drought Early Warning System (DEWS). An early warning system is the provision of timely and effective information that allows individuals exposed to a hazard to take action to avoid or reduce their risk.** Credit: NOAA NIDIS, Fiona Martin

This Strategy is considered a living document and through meetings and further consultation with our tribal partners, priority activities will be selected, actions can be added, and the plan may be adjusted to address emerging issues as needed. After five years, an evaluation should be undertaken to determine progress and a more robust process should be considered to update the priorities and activities. Activities that include an asterisk (\*) next to them denote those that came up

in conversations repeatedly and should be considered for early implementation.

Finally, this Strategy was developed in collaboration with many tribal natural resource managers and networks, federal agencies, and regional organizations. Through continued coordination, we can work together to meet many of the needs voiced during this process.

## INTERDISCIPLINARY RESEARCH AND APPLICATIONS

**In order to better predict, understand, and respond to drought, the characteristics and impacts of drought must first be properly understood. In the case of many tribal nations, this knowledge exists, but has not yet been documented. Integrating the results of drought research into tribal decision-making is needed.**

A key concern raised by tribal resource managers is that there is too much information out there, indicators of drought are often complex, and they don't always represent the conditions on the ground. In this regard, NIDIS and partners have an opportunity to improve understanding of drought indicators, their appropriate uses, and strengths and weaknesses. This will help tribal resource managers select the best indicators for their location.

### OUTCOME 1.1

**Tribal Nations have an improved understanding and application of drought indicators and drought early warning on the reservations.**

**Activity 1.1a:** Work with tribal resource managers to improve awareness of key drought indicators, their benefits, reliability, and how to use them.

**Activity 1.1b:** NIDIS, tribal resource managers, and tribal colleges and universities (TCUs) partner to carry out drought-impact mapping exercises. This information is then digitally mapped by TCU students using geographic information system (GIS) technology.

### OUTCOME 1.2

**Drought research and knowledge is documented by tribal nations and used to strengthen drought early warning and response.**

**Activity 1.2a:** NIDIS and partners will work with tribal resource managers and other partners

to document the most prominent drought impacts and communicate them to drive mitigation actions in the tribal community.

**Activity 1.2b:** NIDIS and partners will ensure that these documented impacts are included in relevant external communication materials for tribal citizens (including the *U.S. Drought Portal*, etc.)

### OUTCOME 1.3

**Reservation-specific drought mitigation actions are better understood and resilience is improved.**

#### Activity 1.3a\*:

Through meetings, workshops, and leveraging other NIDIS drought mitigation research, tribal resource managers gain a better understanding of the causes of drought and the most cost-effective mitigation actions. Secondary impacts will also be addressed (e.g., wildfires, soil degradation, etc.).

### OUTCOME 1.4

**NIDIS has an improved understanding of tribal drought risk.**

**Activity 1.4a:** NIDIS works with tribal partners to compile additional data to strengthen the existing tribal Drought Exposure Analysis and improve our collective understanding of drought resilience on tribal lands (e.g., expanding the analysis to include drought incidence over the past 40 years and to include household water supply access).

**Activity 1.4b\*:** NIDIS and partners use this information when developing drought-resilience resources in a way that maximizes impact for tribal nations who are the most exposed to drought.



▲ Corn leaves rolling and drying in drought conditions. Credit: The Natures



▲ **Figure 5:** Front page of one of the *Tribal Drought Snapshots* created in 2019. Credit: NOAA NIDIS

## PREDICTION AND FORECASTING

While many of the improvements in forecasting can and should take place at the federal level, tribal nations also play a vital role in ensuring effective utilization of this information for drought preparedness and mitigation activities. However, staffing constraints and competing priorities often mean that tribal nations face challenges in applying predictions and forecasts for drought in a timely manner.

### OUTCOME 2.1

Tribal citizens have an improved understanding of short and medium-term forecasts and outlooks, allowing tribal resource managers to easily locate the data and information which is relevant to them.

**Activity 2.1a:** NIDIS and partners will improve their communication of existing forecasting by making it more relevant to tribal audiences and improving the communication of uncertainties.

**Activity 2.1b\*:** The NIDIS website is updated and simplified. The new Tribal Drought pages on the US Drought Portal will include reservation-specific drought data where possible, and this information is effectively shared with tribal partners.

**Activity 2.1c\*:** NIDIS and partners work with tribal resource managers to translate the probabilities of future drought events into messages relevant to tribes to inform long-term planning.

**Activity 2.1d:** NIDIS works with partners (e.g., NDMC, HPRCC) to include the National Weather Service in tribal workshops and trainings, in order to provide forecasting guidance and answer questions.

### OUTCOME 2.2

Tribal nations have an improved understanding of long-term drought predictions and scenarios, allowing tribal resource managers to implement long-term drought resilience planning.

**Activity 2.2a:** Ensure long-term drought prediction information (e.g., data from the *National Climate Assessment*, *Climate Explorer* tool, and *Climate Resilience Toolkit*) are shared with tribal citizens, both in-person and through online resources.

**Activity 2.2b\*:** Continue to develop reservation-specific drought snapshots with tribal nations. Tribal Drought Snapshots were developed with 20 tribes across the two regions during the 2019 NIDIS Tribal Engagement Project. These snapshots were created for the tribes, and included drought trends and impacts, key drought indicators, outlook information, and key partners and future engagement opportunities for the tribes (Figure 5).





◀ A mesonet station installed above Cooney Reservoir in Stillwater County, Montana. Credit: Kevin Hyde

## OBSERVATIONS AND MONITORING

One of the major gaps identified during consultations with tribal resource managers is the lack of reservation-specific drought observation data. Many tribal nations rely on regional data, which is often collected more than a hundred miles away and is not always relevant to the reservation. More localized weather stations, stream gauges, and soil moisture measurements will be vital to ensure reliable observation and monitoring of drought on reservations. The effective maintenance of stations and gauges will be important in order to ensure long-term sustainability of the network and data.

### OUTCOME 3.1

Tribal resource managers play a leading role in strengthening existing monitoring networks and drought planning across the Missouri River Basin and Midwest.

**Activity 3.1a\*:** NIDIS and regional partners (e.g., Regional Climate Centers, NDMC, etc.) work with tribal resource managers to determine the most relevant drought indicators/

indices for each region. Such indicators could include TEK, if determined appropriate by tribal partners.

**Activity 3.1b\*:** NIDIS and partners will ensure that the indices selected by tribal nations are included in regional monitoring tools and platforms including Tribal Decision Dashboards such as the *Wind River Decision Dashboard* and the *Rosebud Sioux Tribe Decision Dashboard*, and the *US Drought Portal*.

**Activity 3.1c:** NIDIS and partners (e.g., HPRCC and NDMC) facilitate and support tribal nations to provide input into the *United States Drought Monitor* (USDM), a weekly product showing parts of the U.S. that are in drought. This could include establishing citizen monitoring and partnerships with the TCUs to engage tribal youth in data and drought impact collection.

### OUTCOME 3.2

Tribal nations receive regional observation and monitoring data in a timely manner, allowing them to respond to the expected impacts accordingly.

**Activity 3.2a\*:** Tribal resource managers are added to the appropriate DEWS mailing lists

► Lana Recountre helps take care of plants growing at South Dakota's Sisseton Wahpeton Oyate tribe headquarters. Tribal members can pick up plants for free. Credit: Kayla Gahagan, YES! Magazine

and provided with timely regional drought alerts through the *US Drought Portal*.

**Activity 3.2b\*:** NIDIS and partners will work with tribal resource managers to integrate tribal information and impacts into the monthly *North Central U.S. Climate and Drought* webinars. This includes ensuring tribal partners are included on email planning lists and cultivating their active involvement in webinar planning. As tribal resource managers join this community, ensure their perspectives are elevated and webinar content is culturally relevant and inclusive of tribal interests.

### OUTCOME 3.3

NIDIS works with tribal resource managers to map monitoring stations on reservations and provides support on how to address the identified station gaps in the network.

**Activity 3.3a\*:** NIDIS and HPRCC will work with tribal resource managers to document gaps in reservation-level monitoring data, including challenges that arise from long-term maintenance of stations and data processing and dissemination.

**Activity 3.3b\*:** NIDIS, working with partners, assists the tribal resource managers to identify potential funding support to establish new weather stations on their reservations, particularly for those reservations with the least monitoring capacity. This could include leveraging support from other ongoing initiatives (e.g., the *NWS Cooperative Observer Network*, National Coordinated Soil Moisture Monitoring Network, *Community Collaborative Rain Hail and Snow Network* (CoCoRaHS), *Tribal Soil Climate Analysis Network* (Tribal SCAN).

**Activity 3.3c\*:** NIDIS will work to establish partnerships with the TCUs to deploy and maintain weather stations on tribal lands. This can include work to assist tribal communities in using data, data management, and the development of data policies that support their work.



## PLANNING AND PREPAREDNESS

Over the past few years, tribal nations have made significant advances in their drought planning activities. Many tribal nations have now developed drought (or climate change) risk assessments and/or action plans. However, despite this planning, many tribal resource managers have expressed frustration that this has not always translated into action on the ground. A major reason for this has been the lack of adequate funding for implementation of drought resilience activities and the competing priorities of other emergencies such as flooding.

### OUTCOME 4.1

Key tribal drought exposures and resilience across the region are better understood and NIDIS prioritizes engagement with tribal nations accordingly.

**Activity 4.1a\*:** NIDIS facilitates the sharing of successful drought vulnerability assessments, planning and response guidance amongst

tribal nations, with their permission. This guidance will include examples of results from each stage of the planning process.

**Activity 4.1b\*:** NIDIS, in collaboration with partners, provides elevated technical support during periods of drought to impacted tribal nations.

#### OUTCOME 4.2

**Drought mitigation and adaptation actions and approaches are better understood and implemented by tribal resource managers across the two regions.**

**Activity 4.2a:** NIDIS and partners work with tribal resource managers to explore more relevant, bottom-up planning options for drought, creating relevant, more flexible planning tools for the tribal nations. This could include developing online resources such as flow diagrams or decision trees to help guide communities in planning for and responding to drought.

**Activity 4.2b:** NIDIS and partners work with tribal resource managers to jointly document drought resilience case studies, using online platforms and networks to share these experiences (with their permission) with other tribal nations in the region.

**Activity 4.2c:** NIDIS facilitates and finances state-to-state tribal exchange opportunities across the two regions, providing opportunities for tribal nations to share their experience (with their permission) and expertise in drought planning with other tribal nations.

#### OUTCOME 4.3

**NIDIS provides technical support for tribal nations with significant drought exposure and financial need.**

**Activity 4.3a:** NIDIS works with tribal nations to review drought plans and identify key funding opportunities for resilience activities.

**Activity 4.3b\*:** NIDIS and partners provide technical support to those tribal nations who

have yet to develop drought vulnerability assessments and action planning.

**Activity 4.3c\*:** NIDIS and partners help identify grant writing resources for tribal nations. One idea could be a partnership between NIDIS and other federal agencies (including BIA) to develop and organize regional grant writing capacity building workshops for tribal nations.

**Activity 4.3e:** NIDIS explores options to provide grants to those tribal nations seeking to build drought early warning and resilience capacity. This could include coordinating with other federal agencies (e.g., Environmental Protection Agency, BIA) to see how grants can be used to improve funding equity.



#### OUTCOME 4.4

**Ecosystem health across the two regions is improved through restoration efforts.**

**Activity 4.4a\*:** NIDIS and partners work with tribal resource managers to develop guidance on the restoration of the water cycle and associated storage, integrating TEK where appropriate. This guidance will be shared via workshops, networks, and online platforms (e.g., the *US Drought Portal*).

**Activity 4.4b:** NIDIS works with partners to share options with tribal resource managers for restoring soil health, based on the work of the Natural Resource Conservation Service

▲ Cattle on Ft. Belknap Range unit. July 2012. Blaine, MT. Credit: USDA NRCS Montana

► A youth gardening project yields giant zucchini on Standing Rock Reservation. Credit: Cheyenne River Youth Project



and others, and shares success stories (e.g., through joint workshops, *US Drought Portal*, learning networks, peer-to-peer exchanges).

## COMMUNICATIONS AND OUTREACH

Since its establishment in 2006, NIDIS has engaged in communication and outreach activities with tribal nations. NIDIS intends to build on and strengthen these partnerships, particularly to ensure that tribal nations are integral partners in the implementation of NIDIS.

Tribal resource managers have expressed that engaging young people on water and climate-related issues is a priority for them. In addition, NIDIS recognizes that tribal resource managers seek materials that are oriented to tribal communities. Communication and outreach materials and efforts are not one-size-fits-all and need to be tailored to address tribal concerns.

### OUTCOME 5.1

An authentic, meaningful government-to-government engagement is achieved when tribal resource managers play a lead role at the decision-making table on all drought-related decisions that affect them.



▲ Two Oglala tribe members drive through Pine Ridge Indian Reservation in South Dakota. Credit: Sopotnicki/shutterstock.com

**Activity 4.4c\*:** NIDIS facilitates a learning network to bring together tribal nations to communicate successes and lessons learned. This would be part of a larger

concept of learning networks across regional DEWS, but would ensure a place for tribal nations to share with one another if they would like to do so.

**Activity 4.4d:** NIDIS and partners will provide technical guidance to tribal nations on how to implement low cost, high-impact ecological system restoration activities, coordinating with other federal agencies (e.g., Federal Emergency Management Agency, EPA and Bureau of Land Management) to build on programs already in place.

**Activity 5.1a\*:** Tribal resource managers are invited to drought-related planning and response meetings and their status as sovereign nations is recognized and respected.

**Activity 5.1b\*:** NIDIS works with tribal resource managers to develop mechanisms to ensure authentic representation within NIDIS and the DEWS, which could include creating additional pathways for incorporating tribal perspectives into the NIDIS consultation process.

**Activity 5.1c\*:** NIDIS ensures tribal representatives are engaged in a process to provide input into the planning and drafting of all key NIDIS strategies and documents which affect tribal nations.

**Activity 5.1d\*:** NIDIS continues to work with tribal members to further strengthen NIDIS outreach and consultation activities.

## OUTCOME 5.2

**Drought response capacity among tribal nations is improved across the two regions.**

**Activity 5.2a\*:** NIDIS has dedicated staff for tribal engagement who will help build and sustain meaningful and reciprocal relationships with tribal nations.

**Activity 5.2b:** Create an online *Tribal Drought Portal*, through the *US Drought Portal*, which includes key learning tools for tribal resource managers, students, and the public. These resources will be regularly updated by NIDIS staff to guide drought planning and mitigation efforts.

**Activity 5.2c:** NIDIS partners with BIA to hold a Tribal Conference in the Upper Missouri River Basin. The conference will include a dedicated Drought Tool and Information Day, guiding tribal resource managers on how to access and utilize existing drought resources.

**Activity 5.2d\*:** Ensure strong tribal participation in Human Health and Drought workshops

to inform the *NIDIS Human Health and Drought Strategy*.

**Activity 5.2e:** Explore the use of drought scenario exercises for tribal nations to inform drought early warning and preparedness in the region.

**Activity 5.2f:** Work with tribal resource managers to integrate drought early warning information into existing tribal communication pathways (e.g., social media, email, text messaging alerts etc.).

**Activity 5.2g\*:** Drought exposure analyses are expanded to all DEWS regions.

## OUTCOME 5.3

**NIDIS ensures that all their communication and interaction with tribal nations is culturally appropriate and respectful.**

**Activity 5.3a:** NIDIS makes a conscious effort to ensure that all relevant communication and outreach materials are culturally relevant and developed in collaboration with tribal partners.

**Activity 5.3b:** NIDIS and partners work with tribal nations in order to better align the language of western drought science with traditional knowledge. This includes the development of culturally-appropriate training materials.

**Activity 5.3c\*:** NIDIS staff and partners are encouraged to take part in Cultural Intelligence training (and certification).

## OUTCOME 5.4

**NIDIS successfully establishes and sustains meaningful relationships with TCUs.**

▼ **Drummers at the 49th annual United Tribes Pow Wow, a large event that attracts more than 900 dancers and musicians. Bismark, North Dakota. Credit: Pierre Jean Durieu/shutterstock.com**



► **Fond du Lac Native American Reservation in Northern Minnesota. Credit: Jacob Boomsma**



**Activity 5.4a:** NIDIS explores opportunities to engage with tribal youth (e.g., comic book development, artwork, storytelling) focused on drought resilience. The outcomes of such efforts could be compiled and shared across tribal nations.

**Activity 5.4b:** NIDIS and partners establish relationships with the next generation of climate leaders at the TCUs, working with them to build capacity and roll out workshops and trainings at their colleges and reservations.

**Activity 5.4c:** In collaboration with tribal leaders, NIDIS develops a series of maps using native languages. These maps will be used to facilitate drought-mapping exercises as part of the proposed climate trainings.

### **OUTCOME 5.5**

**Tribal nations are engaged in drought learning networks, established to increase learning exchange between the two regions and across regions, utilizing the *US Drought Portal* and other resources as appropriate.**

**Activity 5.5a\*:** NIDIS works with tribal resource managers in order to document success stories, innovations, lessons learned, and guidance for other tribal nations in the region. These resources will be compiled and shared

with their permission via the *US Drought Portal* platform.

**Activity 5.5b:** NIDIS works with online platform partners (e.g., ESRI, Storyvine) to create one-minute drought impact videos from reservations across the two regions. These stories will be mapped using GIS technology and be used to support training as well as communication and outreach activities across the regions.

**Activity 5.5c:** NIDIS works with partners (e.g., HPRCC, CASCs) to amplify drought messaging and materials developed from the activities above.

### **OUTCOME 5.6**

**Regional DEWS networks are strengthened as a result of tribal engagement.**

**Activity 5.6a:** NIDIS coordinators encourage tribal resource managers to attend and provide opportunities for them to be active participants in the regional DEWS meetings.

**Activity 5.6b\*:** To foster improved cultural intelligence amongst DEWS partners and collaboration with tribal nations, selected future DEWS meetings will be hosted on the reservations. □

## CONCLUSION

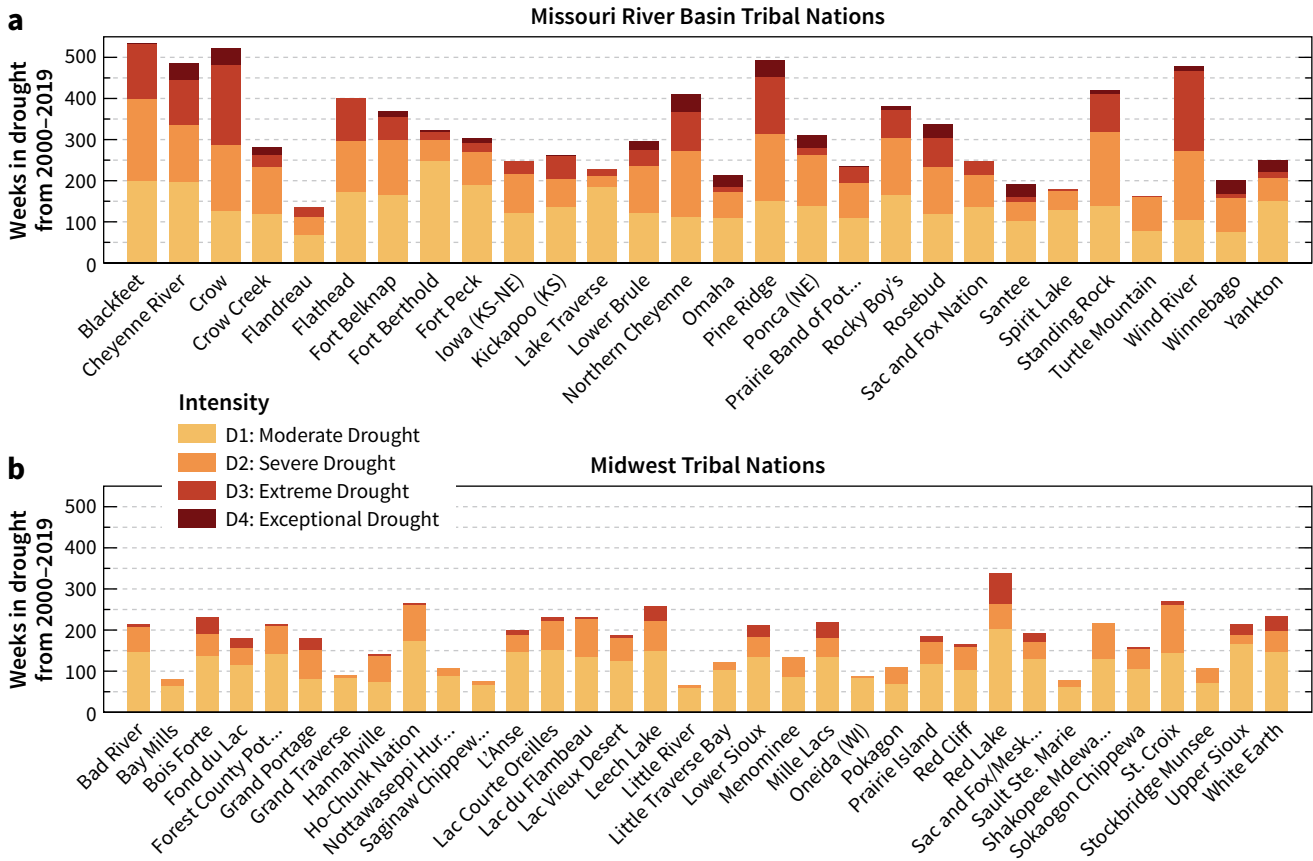
**This NIDIS Tribal Engagement Strategy outlines a series of guiding principles and key outcomes and activities that can be taken in order to engage with tribal nations in an authentic and meaningful manner to strengthen drought resilience.**

While initial work may be project-focused, the hope is that by working together, tribal nations will be fully integrated into all aspects of NIDIS' work, including the regional DEWS.

Building trust, respect, and reciprocity are critical for this integration. We will use this Strategy to foster a culturally-appropriate communication style and work with tribal nations as partners and allies in the fight against drought. We are stronger together. A genuine, authentic collaboration with Tribal Nations is the only way to protect communities against future drought. We look forward to working more closely with tribal citizens to improve monitoring, planning and our understanding of drought. □



Bison in Custer State Park, South Dakota. Credit: Tom Reichner



**▲ Figure A.1:** The number of weeks tribal nations within the (a) Missouri River Basin and (b) Midwest have been in drought based on the severity levels of the U.S. Drought Monitor from 2000–2019. The total number of weeks was 1,044. Credit: NOAA NIDIS, Fiona Martin

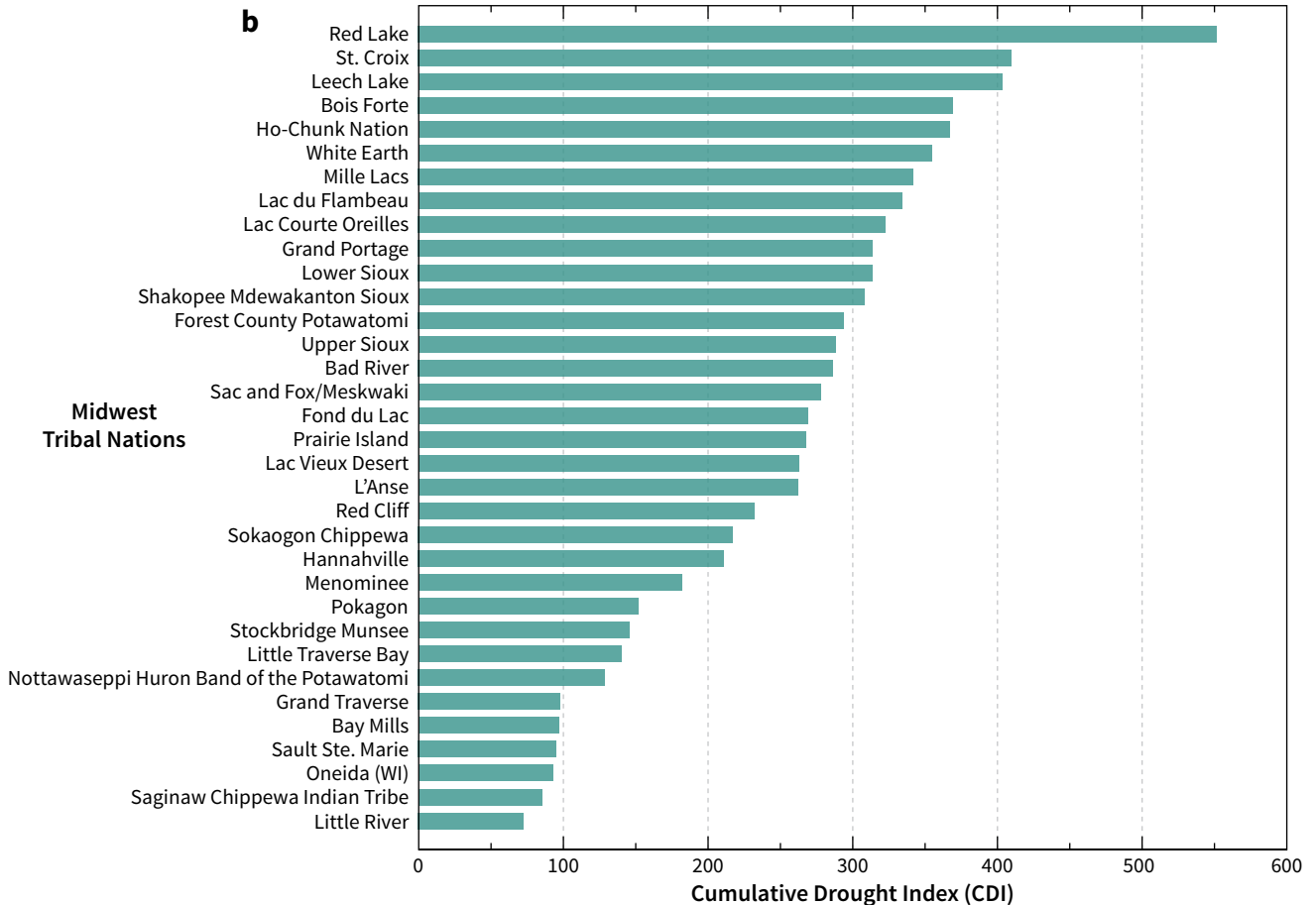
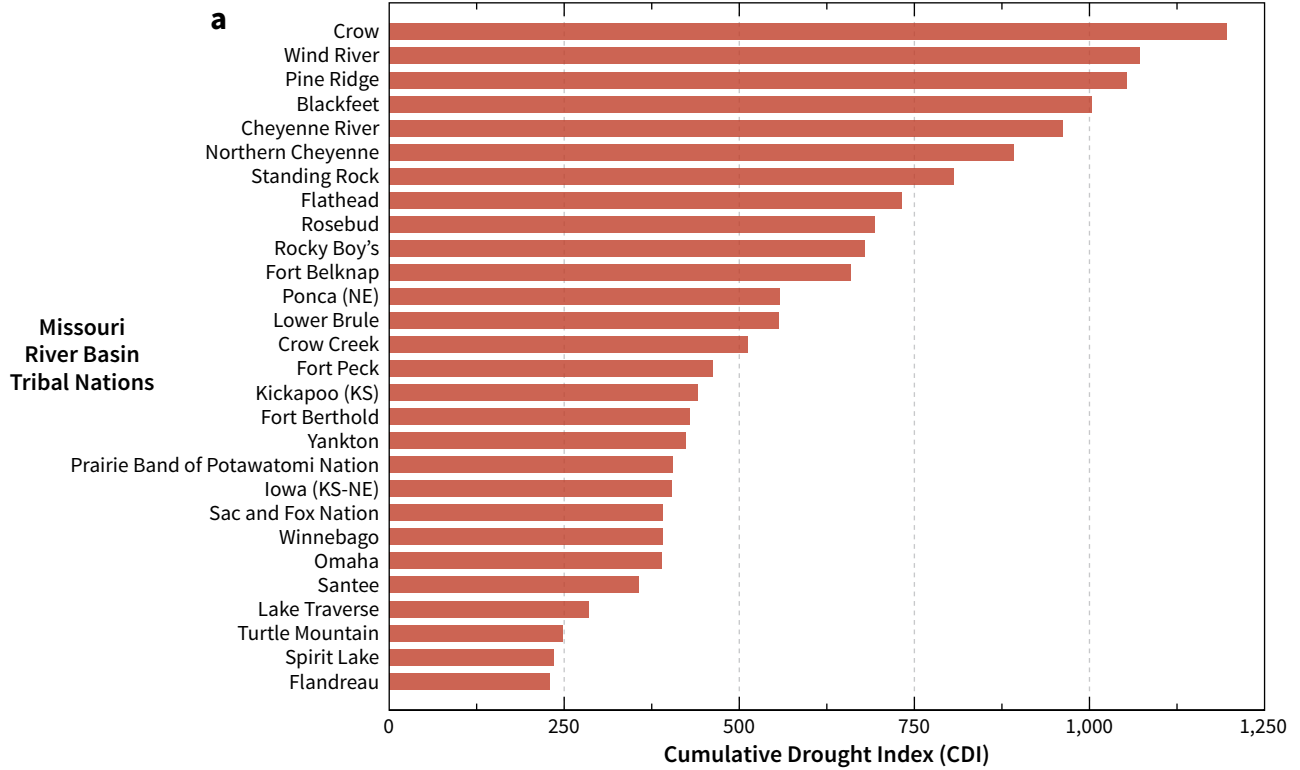
## APPENDIX A: HISTORICAL DROUGHT EXPOSURE ANALYSIS

A historical Drought Exposure Analysis was conducted for all 62 tribal nations in the Missouri River Basin and Midwest. This analysis shows the frequency and severity of drought conditions from 2000 through 2019 according to the U.S. Drought Monitor (USDM). The basis for the analysis was calculating the total number of weeks spent in each level of drought on the USDM (Figure A.1). The USDM drought levels are moderate drought (D1), severe drought (D2), extreme drought (D3), and exceptional drought (D4). Since D0 is considered abnormally dry and not drought, the weeks spent at this level are not considered in the number of weeks spent in drought. The analysis also calculated the total percentage of time spent at any drought level by adding up the number of weeks in D1–D4 drought and dividing by the total number of weeks, which was 1,044 weeks.

Finally, a Cumulative Drought Index (CDI) was also calculated for each reservation (Figure A.2). To calculate the CDI, for each week and for each reservation, a score was given based on the level of drought. A score of “0” was given if that reservation either had no drought or if they were in D0 (abnormally dry). A score of “1” was given if that reservation was in moderate drought (D1), “2” for severe drought (D2), “3” for extreme drought (D3), and finally “4” for exceptional drought (D4). The CDI was calculated for each reservation by simply adding all of these weekly scores from 2000–2019. By scoring and calculating the CDI this way, it takes into account not only the frequency of drought but also the severity of drought. The higher the CDI, the more frequent and/or severe drought has been for the reservation (and vice versa). The specific numbers, percentages, and index totals for all 62 reservations is shown in Table A.1. □

**► Figure A.2:** (next page) The Cumulative Drought Index (CDI) for all (a) Missouri River Basin tribes and (b) Midwest tribes based on the U.S. Drought Monitor data from 2000–2019 (methodology in Appendix A). Credit: NOAA NIDIS, Fiona Martin





▼ **Table A.1: For all 62 reservations in the Midwest and Missouri River Basin, this table shows the number of weeks spent in each level of drought according to the U.S. Drought Monitor (orange); the total percentage of time at any level of drought (green); and the Cumulative Drought Index score (tan).**

**TABLE A.1**

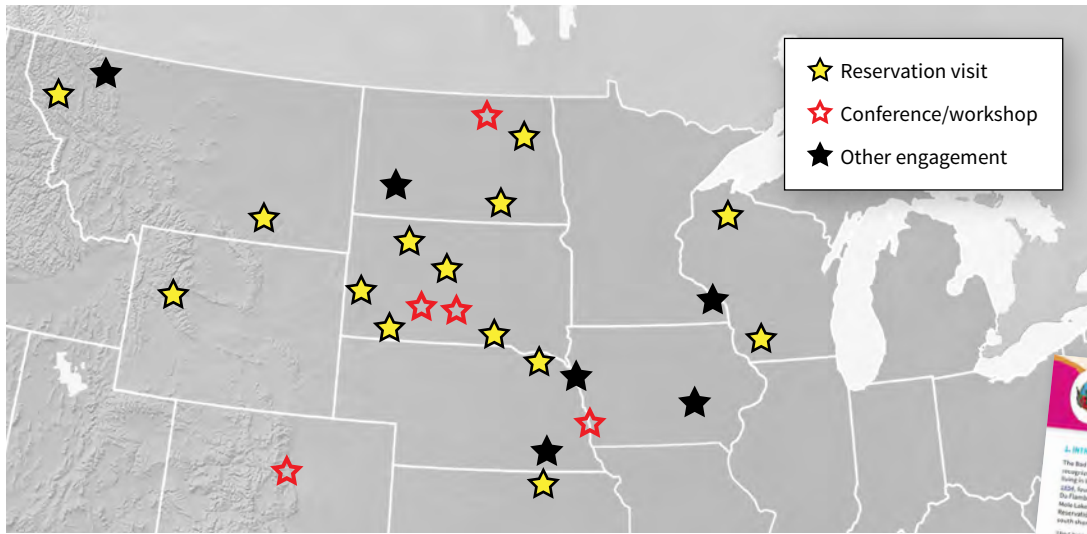
Name	Region	Number of Weeks in				Percent Time at any Drought Level	Cumulative Drought Index
		Moderate Drought (D1)	Severe Drought (D2)	Extreme Drought (D3)	Exceptional Drought (D4)		
Bad River Reservation	Midwest	145	62	6	0	20.40%	287
Bay Mills Indian Community	Midwest	63	17	0	0	7.66%	97
Blackfeet Reservation	MRB	196	200	133	2	50.86%	1,003
Bois Forte Reservation	Midwest	135	56	41	0	22.22%	370
Cheyenne River Reservation	MRB	192	140	110	40	46.17%	962
Crow Reservation	MRB	124	157	198	41	49.81%	1196
Crow Creek Reservation	MRB	117	112	30	20	26.72%	511
Flandreau Reservation	MRB	64	43	26	0	12.74%	228
Flathead Reservation	MRB	169	124	105	0	38.12%	732
Fond du Lac Reservation	Midwest	113	42	24	0	17.15%	269
Forest County Potawatomi Community	Midwest	139	70	5	0	20.50%	294
Fort Belknap Reservation	MRB	162	134	55	16	35.15%	659
Fort Berthold Reservation	MRB	244	51	21	5	30.75%	429
Fort Peck Reservation	MRB	185	80	23	12	28.74%	462
Grand Portage Reservation	Midwest	81	70	31	0	17.43%	314
Grand Traverse Reservation	Midwest	82	8	0	0	8.62%	98
Hannahville Indian Community	Midwest	74	61	5	0	13.41%	211
Ho-Chunk Nation	Midwest	172	87	7	0	25.48%	367
Nottawaseppi Huron Band of the Potawatomi Reservation	Midwest	87	21	0	0	10.34%	129
Saginaw Chippewa Nation	Midwest	65	10	0	0	7.18%	85
Kickapoo Nation	MRB	133	68	56	1	24.71%	441

TABLE A.1 (continued)

Name	Region	Number of Weeks in				Percent Time at any Drought Level	Cumulative Drought Index
		Moderate Drought (D1)	Severe Drought (D2)	Extreme Drought (D3)	Exceptional Drought (D4)		
L'Anse Reservation	Midwest	146	43	10	0	19.06%	262
Lac Courte Oreilles Reservation	Midwest	152	69	11	0	22.22%	323
Lac du Flambeau Reservation	Midwest	132	95	4	0	22.13%	334
Lac Vieux Desert Reservation	Midwest	124	56	9	0	18.10%	263
Lake Traverse Reservation	MRB	181	28	16	0	21.55%	285
Leech Lake Reservation	Midwest	149	73	36	0	24.71%	403
Little River Reservation	Midwest	58	7	0	0	6.23%	72
Little Traverse Bay Reservation	Midwest	102	19	0	0	11.59%	140
Lower Brule Reservation	MRB	118	114	38	24	28.16%	556
Lower Sioux Reservation	Midwest	132	52	26	0	20.11%	314
Menominee Reservation	Midwest	86	48	0	0	12.84%	182
Mille Lacs Reservation	Midwest	134	47	38	0	20.98%	342
Northern Cheyenne Reservation	MRB	108	161	94	45	39.08%	892
Omaha Reservation	MRB	106	64	10	31	20.21%	388
Oneida Nation	Midwest	83	5	0	0	8.43%	93
Pine Ridge Reservation	MRB	149	160	140	41	46.93%	1053
Pokagon Band of Potawatomi Reservation	Midwest	66	43	0	0	10.44%	152
Ponca Reservation	MRB	135	124	17	31	29.41%	558
Prairie Band of Potawatomi Reservation	MRB	106	84	42	1	22.32%	404
Prairie Island Indian Community	Midwest	117	53	15	0	17.72%	268

TABLE A.1 (continued)

Name	Region	Number of Weeks in				Percent Time at any Drought Level	Cumulative Drought Index
		Moderate Drought (D1)	Severe Drought (D2)	Extreme Drought (D3)	Exceptional Drought (D4)		
Red Cliff Reservation	Midwest	102	56	6	0	15.71%	232
Red Lake Reservation	Midwest	201	63	75	0	32.47%	552
Rocky Boy's Reservation	MRB	163	138	68	9	36.21%	679
Rosebud Reservation	MRB	116	116	68	35	32.09%	692
Sac and Fox of Missouri in Kansas and Nebraska Reservation	MRB	133	78	34	0	23.47%	391
Sac and Fox of the Mississippi in Iowa Nation	Midwest	128	42	22	0	18.39%	278
Santee Reservation	MRB	99	47	13	31	18.20%	356
The Sault Ste. Marie Tribe of Chippewa	Midwest	61	17	0	0	7.47%	95
Shakopee Mdewakanton Sioux Community	Midwest	128	90	0	0	20.88%	308
Sokaogon Chippewa Community (Mole Lake Band)	Midwest	104	49	5	0	15.13%	217
Spirit Lake Reservation	MRB	126	45	6	0	16.95%	234
St. Croix Reservation	Midwest	143	117	11	0	25.96%	410
Standing Rock Reservation	MRB	135	180	93	8	39.85%	806
Stockbridge Munsee	Midwest	72	37	0	0	10.44%	146
Turtle Mountain Reservation	MRB	76	82	2	0	15.33%	246
Upper Sioux Reservation	Midwest	164	23	26	0	20.40%	288
White Earth Reservation	Midwest	146	52	35	0	22.32%	355
Wind River Reservation	MRB	100	169	195	12	45.59%	1071
Winnebago Reservation	MRB	72	84	9	31	18.77%	391
Yankton Reservation	MRB	147	57	13	31	23.75%	424



◀ **Figure B.1:** A map showing the engagement efforts of the CU MENV students in 2019 with tribal nations across the Midwest and Missouri River Basin DEWS. Credit: NOAA NIDIS, Fiona Martin

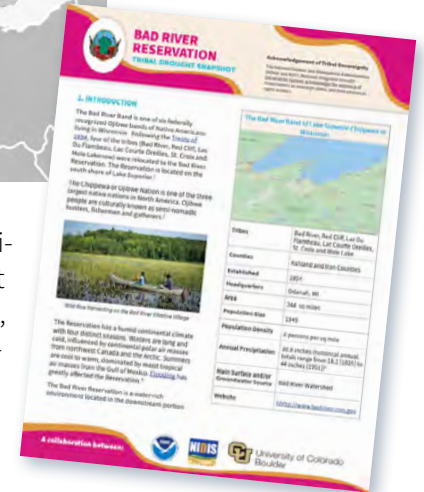
## APPENDIX B: OVERVIEW OF THE 2019 NIDIS TRIBAL ENGAGEMENT PROJECT

In order to ensure the inclusion of indigenous perspectives in the implementation of the DEWS, NIDIS launched a Tribal Drought Engagement Project in January 2019 in collaboration with the Masters of the Environment Program at University of Colorado-Boulder (CU MENV). The project aimed to strengthen relationships with tribal resource managers across the Missouri River Basin and Midwest DEWS regions in order to effectively deliver timely and relevant drought information.

The objectives of this project were to increase engagement through face-to-face contact with tribal resource managers, increase NIDIS' visibility amongst tribes, to map and identify key drought vulnerabilities and capacity gaps, and to ensure that future engagement maximizes positive impact. During the duration of the project, the CU MENV graduate students collected more than 100 key contacts, attended 12 tribal conferences and meetings, visited 15 reservations, and had in-depth conversations with more than 50 tribal resource managers from 20 reservations (*Figure B.1*). This project also collected and analyzed data in order to better understand the drought risk and capacity gaps of tribal nations in the Midwest and Missouri River Basin DEWS. The data collected

include historical U.S. Drought Monitor data for the Historical Drought Exposure Analysis (see Appendix A), and information from the one-on-one interviews regarding past funding received for drought mitigation, completion of drought assessments, and tribal staffing. This data collected helped provide the CU MENV students and NIDIS a clearer picture of not only the historical risk of drought for tribal nations in these two regions, but also capacity, and how that may also play into the ability for tribal nations to mitigate and/or adapt to drought.

Another key component of this project was the development of individualized Tribal Drought Snapshots in collaboration with the tribal resource managers of 20 tribal nations (*Figure B.2*). The finalized Tribal Drought Snapshots were provided back to each tribal nation as a resource that they can use to better understand their drought risk, and resources and information they can use to become better prepared for future droughts. The Tribal Drought Snapshots highlights reservation-specific drought trends and impacts, key capacity needs for drought mitigation and planning, future engagement opportunities, and key resources and contacts. The information collected from the snapshots have also been used to support the redesigned *Drought.gov* page, which will launch in Fall 2020. □



▲ **Figure B.2:** Front page of one of the Tribal Drought Snapshots created in 2019. Credit: NOAA NIDIS

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## ACRONYMS

<b>BIA</b>	Bureau of Indian Affairs
<b>CASC</b>	Climate Adaptation Science Centers
<b>CDI</b>	Cumulative Drought Index
<b>DEWS</b>	Drought Early Warning System
<b>GIS</b>	Geographic Information System
<b>GLIFWC</b>	Great Lakes Indian Fish and Wildlife Commission
<b>GPTWA</b>	Great Plains Tribal Water Alliance
<b>HPRCC</b>	High Plains Regional Climate Center
<b>MRB</b>	Missouri River Basin
<b>NCA</b>	National Climate Assessment
<b>NDMC</b>	National Drought Mitigation Center
<b>NIDIS</b>	National Integrated Drought Information System
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>TEK</b>	Traditional Ecological Knowledge
<b>TCU</b>	Tribal Colleges and Universities
<b>USDM</b>	U.S. Drought Monitor
<b>USFS</b>	U.S. Forest Service



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