Missouri River Basin
Drought Early Warning System

Strategic Plan

The Little Missouri River flows through Theodore Roosevelt National Park in 2008 in North Dakota. NATIONAL PARK SERVICE PHOTO

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Overview

In February 2014 over 70 stakeholders from across the Missouri River Basin (MRB) met in Nebraska City to discuss approaches people and communities could take to better prepare for and anticipate drought. The result of that discussion is the Missouri River Basin Drought Early Warning System (DEWS) Work Plan. The Work Plan is a two-year road map organized under three broad tasks:

- **Task 1 – Drought Early Warning and Risk Management: The MRB States:** Task 1 will focus on improving data and information for drought risk management at the state level. Examples of activities include drought scenario exercises, improving technical capacity of State Drought Task Forces, and working with watershed groups to improve resilience to drought.
- **Task 2 - Drought Early Warning and Risk Management: The MRB Tribes:** This task is a set of activities centered around working with the MRB Tribes to improve drought data and information and effectively communicating that information to tribal governments.
- **Task 3 – Across Basin Activities:** Task 3 focuses on improvements in drought monitoring and forecasts, such as improving soil moisture and snow monitoring as described in the 2014 Water Resources and Reform Development Act, improving the monthly Midwest/Great Plains Early Warning Webinars, improving Missouri Basin quarterly and extremes summaries, and improving partnerships with U.S. Department of Agriculture, DOI Climate Science Center & Landscape Conservation Cooperatives, and the U.S. Army Corps of Engineers.

The MRB DEWS is being developed as part of the National Integrated Drought Information System (NIDIS) and its Congressional mandate (P.L. 109-430 and P.L. 113-86) to improve drought early warning across the United States. NIDIS is working toward its national goal by establishing a network of regional DEWS, of which the MRB is a component.

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Background

Drought is a common climate event throughout the Missouri River Basin. Significant drought events occurred in the 1930s and 1950s that substantially affected water supplies, crops and livestock, energy, transportation of goods, and the ecosystem. The most recent drought event occurred in 2012, and was unique in that it followed a devastating flood in 2011. Leading up to the drought of 2012, many were expecting a second year of flooding but what followed instead was a devastating drought event. Both the floods of 2011 and then the extreme and rapidly evolving drought in 2012 emphasize the need for an early warning system that not only could improve how we anticipate drought events but could also improve collaboration and coordination of data and monitoring networks for floods in the Missouri Basin. It is in this context that the National Integrated Drought Information System (NIDIS) began developing a Drought Early Warning Information System (DEWS) specifically focused on the Missouri River Basin (MRB).

NIDIS' mandate to develop a DEWS for the MRB originates in 2006 when the U.S. Congress created the NIDIS Program to develop a network of DEWS for the country. NIDIS is working toward this national goal by building on existing monitoring and forecast products and service networks like the U.S. Drought Monitor (USDM) and seasonal outlooks (e.g. the National Weather Service's Climate Prediction Center 90-day seasonal outlook) in a way that provides improved communication and coordination of monitoring, forecasting, and impact assessment efforts at national, watershed, state and local levels.

Purpose of the Work Plan

In February 2014, NIDIS held a meeting in Nebraska City, Nebraska to discuss the current state of drought awareness, planning and capacity across the Missouri River Basin. The workshop was the start of the NIDIS Missouri River Basin (MRB) Drought Early Warning Information System (DEWS). Several gaps and needs along were highlighted for NIDIS and its partners to consider as part of developing a DEWS in the MRB. These included:

- ✦ Improving understanding of impacts and vulnerability to drought;
- ✦ Partnering with states and tribes to create new or improved drought plans;
- ✦ Continuing to support, build out and assess ways to enhance regional monthly drought and flood webinars, quarterly and special topic weather and climate summaries and outlooks and other early warning outreach;
- ✦ Assessing approaches for improved forecasts and long-term monitoring;
- ✦ Initiating a series of regional, sectoral or sub-basin meetings to understand impacts and ways to inform drought risk management.

PARTNERSHIPS

The process for building the Missouri River Basin DEWS is a reflection of the knowledge and experience of a dedicated group of people and organizations. These include:

Western Governors Association

Western States Water Council

Missouri River Basin Interagency Roundtable

Missouri River Association of States and Tribes

American Association of State Climatologists

High Plains Regional Climate Center

North-Central Climate Science Center

USDA Northern Plains Regional Climate Hub

Western Water Assessment (a NOAA Regional Integrated Sciences and Assessments Program)

LIST OF ACRONYMS

AASC: American Association of State Climatologists

BIA: Bureau of Indian Affairs

BOR: Bureau of Reclamation

CoCoRaHS: Community Collaborative Rain, Hail, and Snow Network

DEWS: Drought Early Warning Information System

EPA: Environmental Protection Agency

FEMA: Federal Emergency Management Agency

HPRCC: High Plains Regional Climate Center

MRB: Missouri River Basin

NCEI: National Centers for Environmental Information

NDMC: National Drought Mitigation Center

NDRP: National Drought Resilience Partnership

NEMA: Nebraska Emergency Management Agency

NGO: Non-Governmental Organization

NIDIS: National Integrated Drought Information System

NOAA: National Oceanic & Atmospheric Administration

NWS: National Weather Service

SDSU: South Dakota State University

USACE: U.S. Army Corps of Engineers

USDA: U.S. Department of Agriculture

USDM: U.S. Drought Monitor

USGS: U.S. Geological Survey

WRIR: Wind River Indian Reservation

WRRDA: Water Resources Reform and Development Act

The Missouri River in 2006 near Ft. Yates, North Dakota. US ARMY CORPS OF ENGINEERS PHOTO

Work Plan Development

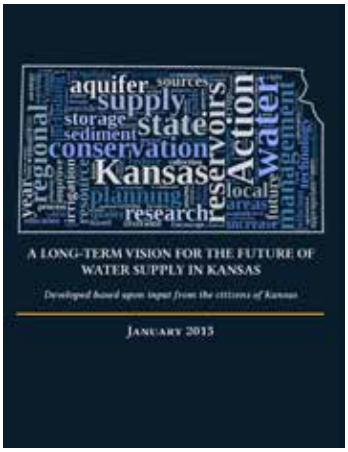
The purpose of this document is to create a two-year work plan that will address the needs identified at the Nebraska City meeting and other pertinent feedback gathered at NIDIS sponsored events. Some of the activities identified, such as the monthly regional Drought and Flood webinars, were developed prior to the MRB Pilot, while other activities like NIDIS partnering with states and tribes are relatively new and are emerging areas that could have implications for other NIDIS DEWS. The work plan is divided into three main tasks, which involve improving drought early warning and risk management for states and tribes, as well as activities that cut across the entire MRB. The themes are further broken out by how they fit into the NIDIS working groups (i.e. education and outreach, research, monitoring and prediction). This will allow assessment of how the three broad themes (i.e. states, tribes, and across Basin activities) are consistent with NIDIS' overall strategy for improving drought early warning and enhancing communities' abilities to cope with drought.

THE WORK PLAN

Task 1: Drought Early Warning and Risk Management: The Missouri River Basin States

The first task of the MRB Work Plan focuses on improving data and information for drought risk management at the state level.

Subtask 1.1 – Drought Simulations with Vulnerable Communities in Kansas



Drought and its associated impacts are common in Kansas. There are many historical and ongoing events that have serious implications for the state, its communities and economy. The resulting impacts are complex and far-reaching, from both a surface and groundwater context. The Kansas Water Office, NIDIS/NOAA, NOAA/National Centers for Environmental Information (NCEI), the National Drought Mitigation Center and other state and regional partners are interested in aiding communities to become more aware of and resilient to such events. In the recently completed report "A Long-term Vision for the Future of Water Supply in Kansas" (h), under the section "Themes and Strategies to Achieve the Vision," the purpose for these specific services is defined:

> *Conduct drought simulation exercises to educate the public and identify gaps in conservation efforts Incorporate drought simulation efforts into state hazard planning and seek funding and support for efforts from partners such as the U.S. Department of Homeland Security (DHS), National Integrated Drought Information System (NIDIS) and National Oceanic and Atmospheric Administration (NOAA)*

One mechanism to better understand resilience and vulnerabilities to drought includes testing existing information and tools through simulations in different communities. Simulation exercises allow the affected communities to work through various drought scenarios and across time scales. There are numerous examples and techniques to conduct such simulations depending on the needs of the communities involved. When the scenarios/simulations are complete the focus areas will have a better grasp of their particular vulnerabilities and mechanisms to prepare to minimize some of the impacts.

This activity seeks to identify two specific communities or watersheds to run the drought simulations: one in western Kansas within the Ogallala aquifer and another in eastern Kansas with more reliance on surface waters (rivers and reservoirs). State and local community members with water management responsibilities and interests will be identified for the simulation focus groups. The latest drought trends and outlooks will be provided across time scales. A potential third group for drought scenario planning is the Governor's Drought Task Force who have been identified as potential participants.

1.1 Deliverable:

1.1a Conduct drought scenario/simulation workshops with state of Kansas. These workshops would primarily focus on exchanging perspectives, and assessing triggers, data gaps and coordination needs within as well as among watersheds. NDMC, BOR, USACE and the U.S. Department of Homeland Security. [10/2015 – 09/2016]

Subtask 1.2 – South Dakota Drought Plan Revision

The state of South Dakota is currently in the process of rewriting its state drought plan through a contract with AMEC. Information on initial impacts and vulnerability has been gathered from various government sources and through South Dakota state agencies. The vulnerability assessment has been completed and members of the task force are currently reviewing it. The full drought plan, which incorporates the vulnerability assessment, is scheduled to be completed in early 2016.

NIDIS' role in South Dakota's Drought Plan process is to encourage local and tribal entities (i.e. Great Plains Tribal

Water Alliance) to develop plans that can linked to or be reinforced by the state plan. NIDIS will use state drought plan as an opportunity to work with the state and the South Dakota tribes on ways data/information could be leveraged to improve drought early warning and planning for tribes in South Dakota.

1.2 Deliverable:

1.2a Work with a tribal liaison on the South Dakota Drought Task Force to develop an engagement strategy to socialize the South Dakota the state drought plan with the South Dakota Tribes and help initiate local tribal drought plans. Develop a document describing linkages between SD drought plan and SD tribes' drought planning activities [10/2015 – 09/2017]

A spring creek near near Belgrade, Montana, feeds the headwaters of the Missouri.

Subtask 1.3 – Montana Demonstration Project

The Montana Demonstration Project is part of a larger effort by the National Drought Resilience Partnership (NDRP: https://www.drought.gov/drought/what-nidis/national-drought-resilience-partnership) to improve overall drought resilience for the U.S. The Montana Demonstration Project is partly focused on the headwaters of the MRB (upstream of Fort Peck Reservoir), which is the primary reason it is included in this work plan. The activities that are included here are a result of workshops held in Bozeman, MT (03/2015) and Dillon, MT (09/2015). The workshops included participants from seven sub-watersheds of the Upper Missouri Basin: the Beaverhead, Ruby, Big Hole, Upper Gallatin, Lower Gallatin, Madison, and Jefferson River watersheds.

Several themes emerged from these meetings, including: 1) What are the gaps in drought related monitoring, and forecasting in the watersheds, recognizing all of the work already underway; 2) How to leverage, integrate, and build on existing successful efforts such as watershed restoration plans (WRPs) many of the watersheds have already developed; 3) Developing and enhancing collaboration with active NGO partners, state agencies, universities, and private citizen interests. NIDIS will collaborate with the Montana Department of Natural Resources and Conservation, NDMC, EPA, and the MT State Climate office to complete this task.

1.3 Deliverables:

1.3a NDMC, NIDIS, and Montana Department of Natural Resources and Conservation with the Big Sky Watershed Corps (BSWC) members and watershed coordinators will conduct a drought planning course for the MRB Headwaters. The course will be conducted approximately monthly and will cover the drought planning process from beginning the process of planning to developing mitigation and response options. [02/2016 – 05/2016]

1.3b Develop a drought monitoring plan that meets local and regional scale needs and identifies data gaps related to soil moisture, streamflow and precipitation monitoring among other things (e.g., remote sensing applications) in the Missouri River Basin Headwaters region. [01/2016 – 01/2017]

Subtask 1.4 – Identify states in the MRB that have incorporated drought into their multi-hazard mitigation plan

Identifying which states in the MRB have incorporated drought plans into their multi-hazard mitigation plan is a first step in working with states to improve drought risk management as called for at the MRB kick-off meeting.

1.4 Deliverables:

1.4a NDMC will conduct a survey on the number of states in the MRB that have incorporated drought plans into their multi-hazard mitigation plan. [10/2015 – 09/2016]

1.4b NDMC will identify and update drought planning contacts in the states. [10/2015 – 12/2015]

Subtask 1.5 – Nebraska Emergency Management Agency

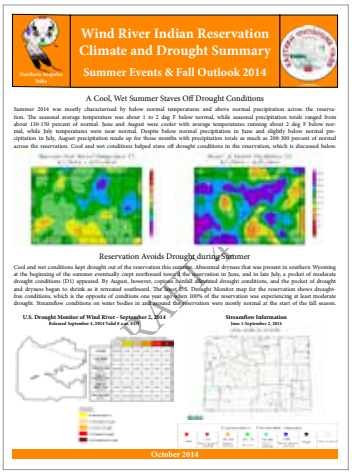
The Nebraska Emergency Management Agency (NEMA) plans to formally integrate a strong drought component into their state multi-hazard mitigation plan. The NDMC met with NEMA in January 2015 to discuss steps forward. To date, Nebraska's drought plan has mostly focused on agriculture in the state. This new approach would incorporate multiple sectors and do so from an emergency management perspective.

1.5 Deliverable:

1.5a NDMC (Mike Hayes/Kelly Smith as POC) will assist NEMA with updating their state hazard plan to incorporate drought. [01/2016 – 09/2017]

Task 2 – Drought Early Warning and Risk Management: The Missouri River Basin Tribes

While drought events adversely affect all of the MRB, impacts related to drought are often magnified in Indian Country. At the NIDIS Kick-off meeting in Nebraska City, it was decided NIDIS needed to have an explicit engagement strategy for the MRB Tribes (Table. 1) working with them as sovereign nations to improve drought early warning and overall resilience to drought.


Wind River Indian Reservation
Climate and Drought Summary
Summer Events & Fall Outlook 2014

A Cool, Wet Summer Staves Off Drought Conditions

Reservation Avoids Drought during Summer

October 2014

Subtask 2.1 – Wind River Indian Reservation

This task will involve two coordinated activities:

1) The creation of a drought/climate summary, that can eventually lead to a vehicle improving technical capacity and collection of impact information for the U.S. Drought Monitor; and

2) The development of a Wind River Indian Reservation (WRIR) Drought Management Plan.

The drought/climate summary is already in progress and being led by the High Plains Regional Climate Center (HPRCC) and NDMC. The WRIR Drought Management Plan is just beginning and will be part of the Wind River Indian Reservation's Vulnerability to the Impacts of Drought and the Development of Decision Tools to Support Drought Preparedness project, funded by the North-Central Climate Science Center (USGS). The purpose of this project is to conduct an assessment of key climatological and social-ecological vulnerabilities, risks, and response capacities of the WRIR to inform the development of a drought management plan. NIDIS' role will be to facilitate the development of the plan using vulnerability assessment work as an organizing activity.

2.1 Deliverables:

2.1a HPRCC and NDMC in collaboration with the North Central Climate Science Center (NCCSC) and Wind River Water Engineer's Office, develop a periodic Drought/Climate Summary template: http://revampclimate.colostate.edu/sites/default/files/projects/Climate-Drought%20Summary%20Mar%2015%20Final.pdf [COMPLETED]

2.1b Ensure (through travel support for NDMC) The Wind River Indian Reservation's Vulnerability to the Impacts of Drought and the Development of Decision Tools to Support Drought Preparedness project will result in a WRIR Drought Management Plan [10/2015 – 06/2017]

Subtask 2.2 –Tribes of South Dakota Drought Vulnerability Assessment

Working closely with the Great Plains Tribal Chairman's Association and their Great Plains Tribal Water Alliance,

TRIBES LOCATED IN THE MISSOURI RIVER BASIN

Blackfeet Nation
Cheyenne River Sioux Tribe
Chippewa-Cree Indians of the Rocky Boy's Reservation
Crow Nation
Crow Creek Sioux Tribe
Eastern Shoshone Tribe of the Wind River Reservation
Flandreau Santee Sioux Tribe
Fort Belknap Indian Community
Fort Peck Assiniboine and Sioux Tribe
Iowa Tribe of Kansas and Nebraska
Kickapoo Tribe in Kansas
Lower Brule Sioux Tribe
Northern Arapaho Tribe
Northern Cheyenne Tribe
Oglala Sioux Tribe of the Pine Ridge Reservation
Omaha Tribe
Ponca Tribe of Nebraska
Potawatomi Tribe
Prairie Band of Potawatomi of Kansas
Rosebud Sioux Tribe
Sac and Fox Nation of Missouri in Kansas
Santee Sioux Nation
Sisseton Wahpeton Oyate of the Lake Traverse Reservation
Spirit Lake Sioux Nation
Standing Rock Sioux Tribe
Three Affiliated Tribes
Winnebago Tribe of Nebraska
Yankton Sioux Tribe

NIDIS will support a proposal through the BIA to better identify South Dakota Tribes' vulnerability to drought. NIDIS will support the engagement process by providing the resources necessary to write the proposal, which includes potential tribal council and Tribal Water Alliance meetings. NIDIS will also lend expertise and knowledge base to fulfill the proposal's success.

2.2 Deliverable:

2.2a Develop a process for conducting vulnerability assessment working with the South Dakota tribes as a test case. [10/2015 – 09/2017].

Task 3 – Across-Basin Activities

Subtask 3.1 – Midwest/Great Plains Early Warning Webinars (monthly)

Regular coordination of federal entities and outlooks/webinars in the MRB will be led by the South Dakota (SD) State Climate Office and NOAA's NCEI Regional Climate Services Director for the Central Region. The regional outlooks/webinars in the Missouri River were originally created as a response to the Missouri River Flood in 2011. The webinars, however, changed scope and regional emphasis (expanding to the Great Plains and Midwest) following the record 2012 Drought. The SD State Climate Office, along with the NDMC, state climatologists and others will continue holding the monthly webinars. The SD State Climate Office will coordinate the webinars and serve as the point of contact for information being collected from the region.

In coordination with the NIDIS working ups (e.g. Monitoring and Forecasting and Engaging Preparedness Community) and partners, regional climatologists and extension staff and media we will expand the reach of the webinars. Using local partner email lists and social media, extension and other state email lists and media contacts we will increase the awareness of the webinars. The goal is to increase awareness, attendance, and relevance of the monthly outlooks/webinars.

In 2014 NIDIS, NCEI, NDMC and the South Dakota State University published a NOAA report on the impact of the webinars. A new evaluation of the webinars is needed, however, given the change in scope (i.e. covering drought and other climate phenomena) and since they have been operational for a longer period of time. A follow-up survey will be conducted of attendees to better track effectiveness of the webinars. We will reach out to attendees to gather more specific information about specific decisions, their benefits and dollars saved made based on the decisions.

3.1 Deliverables:

3.1a Continue monthly climate outlooks (register for the webinars at: http://mrcc.isws.illinois.edu/multimedia/webinars.jsp) the 3rd Thursday of the month. When unique conditions develop, however, separate, more focused webinars may be introduced based on need and severity of the climate extreme covered. [Ongoing]

3.1b Assess survey of webinar participants, organizations represented, information from the webinars used to make decisions, (e.g. recorded webinars), perceptions of the webinars etc. and complete an in-depth evaluation of webinars and how this early warning information and process creates value across MRB. [01/2016 – 09/2016]

3.1c Using previous survey as an initial starting point, target groups like USDA

Extension, Farm Service Agency, NRCS, and the media to increase awareness of the webinars. [10/2015 – 12/2015]

3.1d Draft publication of regional webinars for peer reviewed journal (in progress). [10/2015 – 06/2016]

Subtask 3.2 – Regional Monitoring

Regional monitoring collaboration in the last 2-3 years has increased conversations among state networks in the region looking for potential collaboration efforts. Specific work on regional soil moisture and snow monitoring produced a document on how to improve soil moisture and snow monitoring. This was included in the 2014 Water Resources and Reform Development Act (WRRDA) bill, which is currently authorized, but not funded. Recent regional efforts include network collaboration, soil moisture monitoring expansion and product development – more related to automated and ongoing observations. Additional state efforts have included citizen science through CoCoRaHS (www.cocorahs.org).

The goal is to improve spatial and temporal density of monitoring using automated and manual efforts. In addition to in-situ monitoring, additional help coordinating regional drought reporting and monitoring is necessary. Piecemeal efforts with different federal, state and tribal organizations are always evolving. NIDIS' role is to support such activities through enhancing proposals to fund such networks, supporting database efforts and increasing public access to such data via the Drought Portal.

3.2 Deliverables:

3.2a In coordination with the HPRCC and NCEI, conduct a regional tribal meeting to describe different types of monitoring (in situ and satellite) available for application on on tribal lands and to identify additional monitoring capabilities for tribes in coordination with tribal colleges. [01/2016 – 12/2016]

3.2b Improve coordination and sharing of data through collaboration with state and federal networks (e.g. range monitoring using NRCS data). Outcome would be additional monitoring locations and more regionally based products. [10/2015 – 09/2017]

3.2c Monitor movement on WRRDA bill and encourage additional action on regional soil moisture and snowpack monitoring. [ONGOING]

3.2d Increase funding from in-state or local entities for the SD Mesonet (http://climate.sdstate.edu/awdn/current/realtime.asp), which would in-turn provide additional Missouri River information including soil moisture monitoring. [10/2015 – 09/2017]

3.2e Expand the amount of interaction and reporting on drought issues in the basin by increasing the number of people and sectors represented who report to the USDM particularly in WY/MT and possibly ND. [10/2015 – 09/2017]

3.2f Develop a template for weekly impact reporting during extreme situations (drought and flood) for individual states to use for local reporting – similar to quarterly regional outlook 2-pagers. [01/2016 – 09/2017]

Subtask 3.3 –USDA Northern Plains Climate Hub

The Northern Plains USDA Climate Hub, based out of Colorado State University USDA Forest Service and USDA Agricultural Research Service, was created in 2013. The leadership of the hub has indicated a strong interest in partnering and developing outreach capabilities for the agriculture sector in the region.

As a result of a USDA Climate Hub Planning meeting with the USDA Extension system in each of the six states (MT, WY, CO, NE, SD, ND), several efforts are under way across Extension to increase climate education capabilities tied to local changes and impacts. A total of 14 potential areas of emphasis were identified at the meeting, with water and drought impacts a specific area of emphasis. Cooperation between the South Dakota State Climate Office, SDSU Extension and the climate hub will expand over the coming years, helping to coordinate regional extension education opportunities and regional collaboration on extension drought/climate efforts.

REFERENCES

1. An Interpretation of the Origins of the 2012 Central Great Plains Drought: http://www.drought.gov/media/pgfiles/2012-Drought-Interpretation-final.web-041013_V4.0.pdf

2. Climate Assessment Report: Understanding and Explaining Climate Extremes in the Missouri River Basin Associated with the 2011 Flooding: http://www.drought.gov/media/pgfiles/mrb-assessmentReport-022514-1.pdf

3. From Too Much to Too Little: How the Central U.S. Drought of 2012 Evolved out of One of the Most Devastating Floods on Record in 2011: https://www.drought.gov/media/pgfiles/CentralUSDroughtAssessment2012.pdf

4. Great Plains and Midwest Webinars: http://www.drought.gov/drought/regional-programs/mrb/reports-assessments-and-outlooks

5. Missouri River Basin Drought Early Warning System Kickoff Meeting Feb 26-27, 2014 2-pager: http://www.drought.gov/media/eventfiles/MRB%20Feb%202-14%20wkshop%202-pager.pdf

6. Missouri River Basin Drought Early Warning System Tribal Engagement Workshop Sep 17-18, 2014 2-pager: http://www.drought.gov/media/pgfiles/MRB/MRB-Tribal-Sept-2014-2-pager-FINAL-v2.pdf

7. Missouri River Basin Drought Early Warning System Kansas Tribal Engagement Workshop Nov 21, 2014 1 pager: http://www.drought.gov/media/pgfiles/MRB/Kansas%20Tribes%20NIDIS%20Meeting%20-%20Nov%202014%20-%20Final.pdf

8. Missouri River Quarterly Climate Impacts & Outlooks: http://www.drought.gov/drought/regional-programs/mrb/reports-assessments-and-outlooks

9. Seasonal Precipitation Forecast over the Missouri River Basin: http://www.esrl.noaa.gov/psd/csi/factsheets/images/mrb-fcst-skill-assessment-report.pdf

There is an opportunity to increase interaction among states gathering drought information and delivering information via Extension to engaged stakeholder groups. The SD State Climate Office is connected to several of these through the North Central Regional Extension and Experiment Station Directors, the USDA Regional Committee NC-1179 and through individual state climatologists. NOAA's NCEI, NIDIS and HPRCC along with representatives of the American Association of State Climatologists (AASC) held two meetings in partnership with the USDA AG Hub in March 2016. They were conducted in Casper, WY and Brookings, SD. These meetings were with producers and other key USDA agencies to provide information on current drought information, provide some best practices by successful producers, and build requirements on tools that may or may not already exist that could be adjusted to help specific types of agriculture.

3.3 Deliverables:

3.3a Leverage NIDIS' work with climate extension specialist (e.g. South Dakota State University Extension) by competing for a small Request for Proposals for USDA Extension related programming via the Northern Plains Regional Climate Hub. [01/2016 – 09/2017]

3.3b Conduct a needs survey of regional USDA Extension climate programming and efforts. [01/2016 – 09/2016]

3.3c Develop a NIDIS Climate Hub collaboration document and planning efforts. [10/2015 – 06/2016]

3.3d Utilize Drought on the Ranch (http://drought.unl.edu/ranchplan/Overview.aspx)materials for rangeland management decisions and assess ways to support regionalization of the rangeland productivity drought tool similar to the one produced by NRCS in South Dakota. [01/2016 – 12/2016]

3.3e Identify additional funding for testing Drought Ready Communities (http://drought.unl.edu/Planning/PlanningProcesses/DroughtReadyCommunities.aspx) in selected locations in the Basin. [ONGOING]

Subtask 3.4 – US Army Corps of Engineers: Working with USACE Outlooks and Monitoring Interaction

This task focuses on working with the USACE to assess impacts of drought and flood conditions and in coordination with NWS the lead forecast for the monthly management calls during the spring runoff season. The SD State Climate Office will continue as the lead coordinator of outlook information for the USACE throughout the basin. The goal is to continue operation in the current mode of delivery of outlook information coordinated with the NWS and Missouri Basin River Forecast Center and search for additional research dollars on early warning triggers for USACE decisions on Missouri River water management (i.e. rapid shifts to either significant dry or wet periods).

3.4 Deliverables:

3.4a With the AASC, NWS and NCEI, continue participating in USACE spring water management outlooks and fall public meeting. [ONGOING]

3.4b A report describing the approach USACE is using to better

utilize NOAA outlooks for USACE operations in the Missouri River Basin. [07/2016 – 6/2017]

Subtask 3.5 –Identify federal funding streams and ways to leverage them for supporting drought planning

Several federal programs, such as FEMA's Pre-Disaster Mitigation program and Bureau of Reclamation's Drought Response Program can be better utilized to support drought planning across the MRB. NIDIS and its partners will identify ways or approaches these programs can be used as part of work to identify the status of state and tribal drought planning efforts.

3.5 Deliverable:

3.5a Develop policy paper in collaboration with the Federal Emergency Management Agency, the Bureau of Reclamation, and the Bureau of Indian Affairs, highlighting existing federal programs and how they could be used to support drought planning at the state, county, municipal, and tribal level. [10/2015 – 12/2015]

Schedule of the MRB Workplan deliverables. Blue bars indicate ongoing activities and have no end date

White River, Lyman County, South Dakota.

MRB Work Plan tasks separated by the NIDIS Working Groups

To assess the consistency of the MRB Work Plan with NIDIS' overall strategic approach, the themes have been organized in relation to the NIDIS working groups (i.e. education and outreach, research, monitoring and prediction).

	Engaging Preparedness Communities	Public Awareness and Education	Integrated Monitoring and Forecasting	Interdisciplinary Research and Applications	U.S. Drought Portal
Task 1					
Subtask 1.1	X				
Subtask 1.2	X				
Subtask 1.3	X	X	X		
Subtask 1.4	X				
Subtask 1.5	X				
Task 2					
Subtask 2.1	X	X	X		X
Subtask 2.2	X		X		
Task 3					
Subtask 3.1	X		X		X
Subtask 3.2			X	X	
Subtask 3.3			X	X	
Subtask 3.4	X		X		
Subtask 3.5	X	X			