Activity 1.1

Improving Collection & Reporting of Drought Impacts

Description

Although methods to collect and document drought impacts do exist (e.g., Drought Impact Reporter, CoCoRaHS condition reporting), impacts continue to be underreported.

Midwest DEWS stakeholders identified that an activity to develop a drought impact survey template to collect impacts from stakeholders would help partners obtain this information, as well as standardize the impact collection and data. This template would be utilized by state agencies like natural resources, public health, emergency management, etc.,across the Midwest to send to stakeholders throughout the state to collect drought impact information.

In addition, the Midwest DEWS will establish a working group to develop a strategy for other activities the Midwest DEWS could do to improve the collection and reporting of drought impacts.

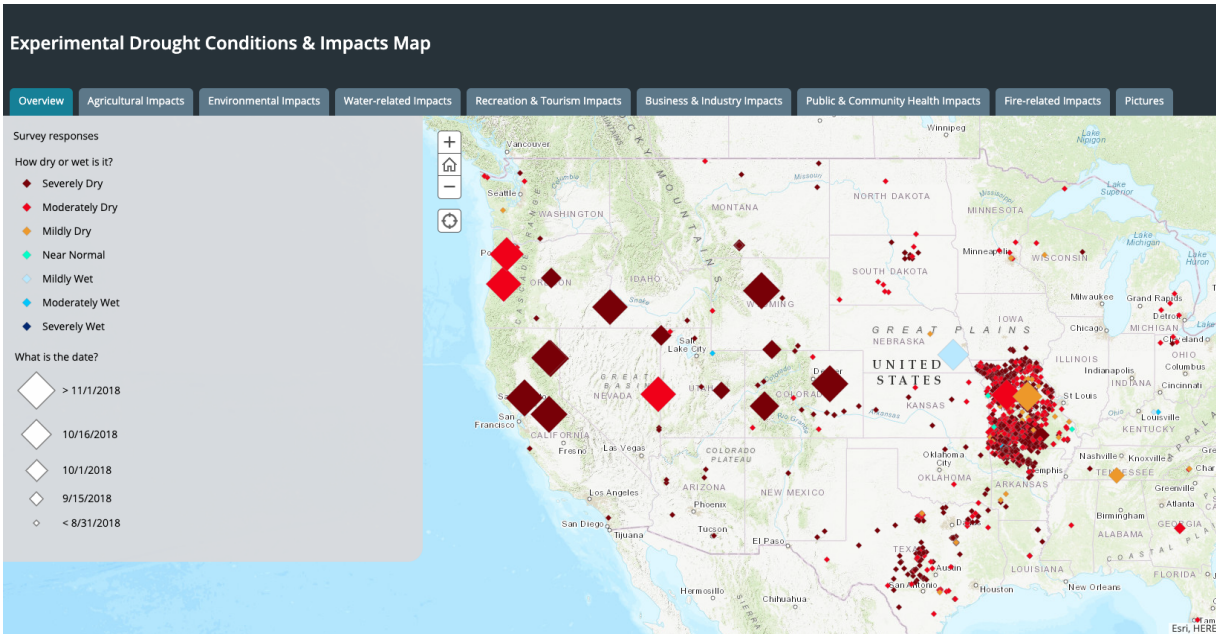
Outcome 1: Develop and beta test the drought impact survey template in coordination with state agencies and the NDMC.
Status: In Progress

Outcome 2: A comprehensive strategy from a Midwest DEWS working group on other actions to take for improving the collection and reporting of drought impacts, and how this information aligns and/or is integrated into the Drought Impact Reporter.
Status: Not yet started

Progress

Summer 2018 brought an unexpected flash drought to the state of Missouri and some surrounding areas. The Missouri State Climatologist, NDMC and NIDIS worked together to create a Missouri-specific Drought Impact Reporter survey to collect impacts throughout the state. This test was very successful, with over 100 impact reports submitted per week during the peak of the drought (see graphic). NDMC has also been doing a lot of work on this topic, and Kelly Smith will provide an update of their work and current thoughts later today.

Activity 1.1: This map shows the number of reports received in summer 2018 in Missouri compared to the rest of the country (which had many areas in drought).



Activity 1.1: Scan this QR code to visit the Drought Impact Reporter survey!

Activity 1.2

Correlate and Validate Regional Sector Drought Impacts to USDM Classification System

Description

Midwest DEWS stakeholders expressed that having more drought impact information by USDM classification level (i.e., D1, D2, D3, and D4) and by sector (e.g., agriculture, navigation, water supply, public health) would be very useful in planning for drought in the Midwest. In coordination with NIDIS and the Midwest DEWS stakeholders, the NDMC will take the lead on conducting this research for two states in the Midwest DEWS region over the next two years. NIDIS and its partners will share the initial research with key stakeholders in each state and gather feedback on how well the research represents drought impacts in their state. As needed, additional resources and data will be incorporated to make this a robust process and final product.

Outcome 1: NDMC, in consultation with NIDIS, will perform the correlation and validation research and analysis for two Midwest DEWS states.
Status: Complete

Outcome 2: NIDIS will gather feedback on the initial state-specific drought information from key stakeholders in each state and perform additional analysis as needed.
Status: Not yet started

Outcome 3: NIDIS will share the final information through state networks and integrate this information into Drought.gov to inform response and mitigation actions in the region.
Status: Not yet started

Progress

The NDMC completed tables for every Midwest state that correlates the various levels of drought to impacts typically experienced in that level. This information was gathered from an analysis using the Drought Impact Reporter and CoCoRaHS condition monitoring reports.

There is still a desire to dive a bit deeper into the state tables to validate and augment with additional drought impact data sources.

How well does this table characterize drought impacts in your state? Think an impact is missing? Please fill out this survey to help improve the table: https://ssp.qualtrics.com/jfe/form/SV_6xtFpyDfAbPyZDL

Activity 1.2: The Minnesota Drought Impact table is shown below. These tables exist for each state in the Midwest on their website (scan QR code to see)!

Minnesota

Category	Impact
D0	Soil moisture is low; pasture and row crops are stressed
	Fire danger increases
	Weather is good for construction projects
	Lake and river levels decline; water temperatures rise
D1	Winter snow events are canceled
	River and lake levels are lower than normal
D2	Ground is hard; seed corn is short; feed is expensive; crop yields are low
	Fire danger is high; burn permits are required
	Landscaping is stressed; leaves change colors early
	Bears search for food; trout runs are hampered; fish kills occur
	River flow is very low; snowpack is significantly lower; well levels decrease
D3	Corn is harvested early; emergency haying and grazing are authorized
	Wildfires are widespread
	Surface waters are near record lows

Activity 1.3

Develop Midwest-Specific Repository of Drought Management Actions

Description

Drought management actions include response, mitigation, recovery and adaptation. Midwest DEWS stakeholders have said that a more comprehensive database with drought management action examples utilized in the Midwest region would be beneficial in planning for drought. NIDIS will coordinate the development of a spreadsheet list of drought management actions currently implemented in each Midwest state. The spreadsheet will include fields for each drought management action type (e.g., response, mitigation, recovery, or adaptation), as well as identifiers for the state and sector. The spreadsheet will be designed to easily transfer to an online, queryable database in the future. Once the list is finalized, it will be made available to the Midwest DEWS stakeholders to inform drought planning in the future.

Outcome 1: NIDIS will lead the development of a spreadsheet list of drought management examples in the Midwest.
Status: In Progress

Outcome 2: NIDIS, NDMC, and its partners will identify the best strategy to provide this information to the Midwest DEWS network (e.g., online database, PDF from Drought.gov).
Status: In Progress

Progress

NIDIS is partnering with the National Drought Mitigation Center for this activity, and the work began on September 1, 2019. This project will look at the following questions:

1) What drought mitigation actions are being implemented or proposed at the state and county levels in the Midwest DEWS region?

2) At the state level in the Midwest, what are the similarities and differences between drought mitigation measures being implemented via drought, water, and hazard mitigation plans?

3) What are the similarities and differences between drought mitigation actions in state- and county-level plans in the Midwest DEWS?

Activity 1.3: Methodology

Research Questions

1) What drought mitigation actions are being implemented or proposed at the state and county levels in the Midwest DEWS region?

2) At the state level in the Midwest, what are the similarities and differences between drought mitigation measures being implemented via drought, water, and hazard mitigation plans?

3) What are the similarities and differences between drought mitigation actions in state- and county-level plans in the Midwest DEWS?

State Plans

Identify drought mitigation actions in state plans for 9 Midwest states (Illinois, Indiana, Iowa, Kentucky, Ohio, Michigan, Minnesota, Missouri, and Wisconsin) - **by looking at state drought, water, and hazard mitigation plans.** Actions will be coded by sector and type of plan.

County Plans

Identify drought mitigation actions included in local plans, **specifically county hazard mitigation plans**.

Sample of county plans in Minnesota, Illinois, and Ohio will be targeted to represent northern, central, and watern states in the Midwest DEWS.

Deliverables

- List of drought mitigation actions incorporated in the Midwest DEWS into state-level drought, water, and hazard mitigation plans.
- This information will be shared with the Midwest DEWS network, and made available on Drought.gov and other websites.

How Can You Be Involved?

This project will engage **state-level drought, water, and hazard planners** via webinar meetings at the beginning, middle and end of the project.

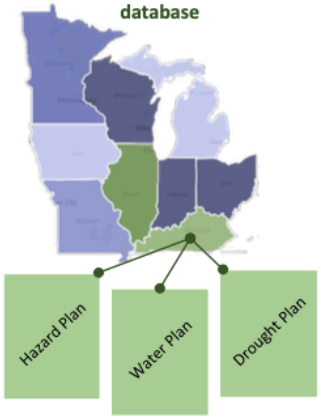
If you are a state-level planner, let Cody know if you are interested in joining!

Drought Mitigation Research in the Midwest

Assessing drought mitigation actions included in state hazard mitigation, water, and drought plans

1

Gather state plans from NDMC database



2

Find, code, and, categorize actions

Sectors:

- Farming
- Livestock Production
- Water Supply & Quality
- Recreation/Tourism
- Fire
- Plants & Wildlife
- Society & Public Health

3

Analyze actions within the database

Research Questions:

What drought management actions are being implemented or proposed at the state level in the Midwest DEWS region?	What are similarities and differences between actions implemented via drought, water and hazard mitigation plans?

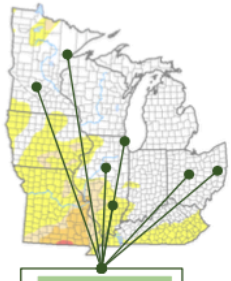
Example spreadsheet:

State	Plan Type	Year	Sector	Subsector	Drought Mitigation Action Text	Section/Page/Figure	Responsible Party	Time (past, current, future)
Kentucky	Drought	2008	Water Supply and Quality	Water Conservation	Take a leadership role by implementing water conservation efforts at state facilities.	Page 31	Kentucky Drought Mitigation Team	Current

Drought Mitigation Research in the Midwest

Assessing if county hazard mitigation plans include drought mitigation actions in MN, IL, and OH

1 Develop strategy and collect random county sample



County Hazard Mitigation Plan

2 Search for county plans

Ramsey County Minnesota Hazard Mitigation Plan

3 Find, code, and, categorize actions

Mitigation actions?

- 142 sample (yes/no) analysis
- Work with state planners to identify 30 good case studies for analysis of mitigation actions

4 Analyze actions within the database

Research Questions:

Are drought management actions being implemented or proposed at the county level in the Midwest DEWS region?

What are similarities and differences between drought mitigation actions in state and county plans?

Stratified Sampling Strategy:

1. Calculate the minimum sample size (95% confidence level) for Minnesota, Ohio, and Illinois
2. Calculate the minimum sample size for large counties in these states
3. Calculate the sample size for the small counties in these states
4. Randomly select minimum size of large and small counties

State	Large	Small	Total
MN	10	36	46
OH	20	26	46
IL	15	35	50
Total	45	97	142

Source: Rea, L. M., & Parker, R. A. (2014). Designing and conducting survey research: A comprehensive guide. John Wiley & Sons.

Activity 2.2

Enhance and Promote Web Service Interface for Sub-Daily Climate Data

Description

The Midwestern Regional Climate Center provides a suite of products and information based on sub-daily climate observations (i.e., temperature, precipitation, dew point, wind speed/direction, pressure, etc.) and derived parameters (i.e., relative humidity, wind chill, heat index). Utilizing this database, several hourly observed data tools have been developed and accessible through MRCC's Application Tools Environment (cli-MATE).

Additional tools planned in the near future include: climatologies for derived parameters (heat index and dew point temperature) and access to allowable, non-federal data (e.g., mesonet data).

Users can also access the data via web service calls, through an application programming interface (API).

Outcome 1: MRCC will add more tools, data reduction routines, and data to the sub-daily web services interface.
Status: Done

Outcome 2: MRCC and NIDIS will promote this online data resource through the Midwest DEWS network, and MRCC will work with the NIDIS Comms Team to integrate the new data resource onto drought.gov.
Status: In Progress

Progress

The MRCC has added several new tools, data reduction routines and data to their sub-daily web services interface. The data and tools can either be found through cli-MATE (https://mrcc.illinois.edu/CLIMATE/) or their Climate Data Access Portal (Cli-DAP) (https://mrcc.illinois.edu/data_serv/cli-dap.jsp), which provides sub-daily data for climate networks across the U.S.

Information on what is available is provided on the supplemental sheets for this activity.

Activity 2.2:

Sub-Daily Data Access through Web Services

What exactly is data access through web services?

Web services provide the ability to access data via the web. For climate data users, this provides a **simple way to build their own web tools** as well as **easily access large amounts of data.**

MRCC
Midwestern Regional Climate Center

Okay, you have me interested. Now how can I do this?

You can do this through MRCC's Climate Data Access Portal - or Cli-DAP!

Cli-DAP web services allows users to gain access to a sub-daily database created in partnership between the Western and Midwestern Regional Climate Centers. The web services currently allows users to retrieve ASOS/AWOS and CRN station metadata as well as the raw data in its initial time step.

Users can also obtain calculations derived from the raw data, such as means, maximums, and minimums at hourly, daily, monthly, or yearly time steps.

For more information, visit here: https://mrcc.illinois.edu/data_serv/cli-dap.jsp or scan the QR code below:

Activity 2.2:

Sub-Daily Tools through cli-MATE

How do I access cli-MATE?

https://mrcc.illinois.edu/CLIMATE/

You need to register, but it is free!

What sub-daily data is available through cli-MATE?

- Temperature
- Relative humidity
- Dew point temperature
- Precipitation
- Wind speed, direction, gust
- Cloud height
- Atmospheric pressure
- Sea level pressure
- Altimeter
- Visibility
- Derived data
  - Wind chill temperature
  - Heat index

What tools can I use to access this data?

- Sub-daily data lister
- Threshold search
- Metar - raw or decoded
- Daily summaries
- Multi-station daily summaries
- Wind rose
- Frequency distribution

Example Output (*threshold search results - number of times from 2010 to 2019 that the heat index in Indianapolis was greater than 105°F*):

Threshold Search
INDIANAPOLIS INTL AP (IN)
18097
Lat/Lon/Elev: 39.7317/-86.2789/790
Years: 2010 to 2019
Limited to: 04/01 - 10/31 and 00:00 - 24:00
Criterion: Heat Index (F) greater than 105.0
Mode: Chronological list of hours meeting criteria
64 out of 51,358 hours missing (0.1%)

Date	Time	Heat Index (F)
2010-07-24	15:54	105.9
2010-08-03	14:54	107.5
2010-08-03	15:54	106.1
2010-08-03	16:54	107.5
2010-08-03	17:54	107.5
2010-08-03	18:54	107.3
2010-08-04	09:54	106.1
2010-08-04	10:54	106.1
2010-08-04	13:54	107.1
2010-08-04	14:54	110.8
2010-08-04	15:54	109.7

Activity 2.3

Foster Development of the Regional Mesonet Program

Description

Since 2012, the MRCC has helped organize workshops that convene mesonet programs across the Midwest to discuss issues and opportunities for collaboration. As a result of these workshops, the MRCC helped establish the Midwest Mesonet Consortium (MMC), which is a working group comprised of mesonet leaders throughout the region.

The MMC leads the Regional Mesonet Program (RMP), and provides guidance on RMP workshops, strategic planning, and provides leadership across this mesonet community. One effort of the RMP is to provide online operational product maps from various mesonet groups around the region, which are updated daily.

In this activity, the MRCC will develop and promote regional maps of evapotranspiration data. In addition, NIDIS will work with the MRCC, MMC, and NDMC to survey the RMP users and the Midwest DEWS network on the products developed by the RMP. The survey will ask users how they use these products and mesonet data, if they find the RMP products useful, what other regional information from mesonets would be useful, and other questions to assess the products and needs of the stakeholders.

Outcome 1: MRCC will develop and promote regional evapotranspiration maps.
Status: Done

Outcome 2: NIDIS and partners will survey RMP users and the Midwest DEWS network to gather feedback on the RMP products.
Status: Not yet started

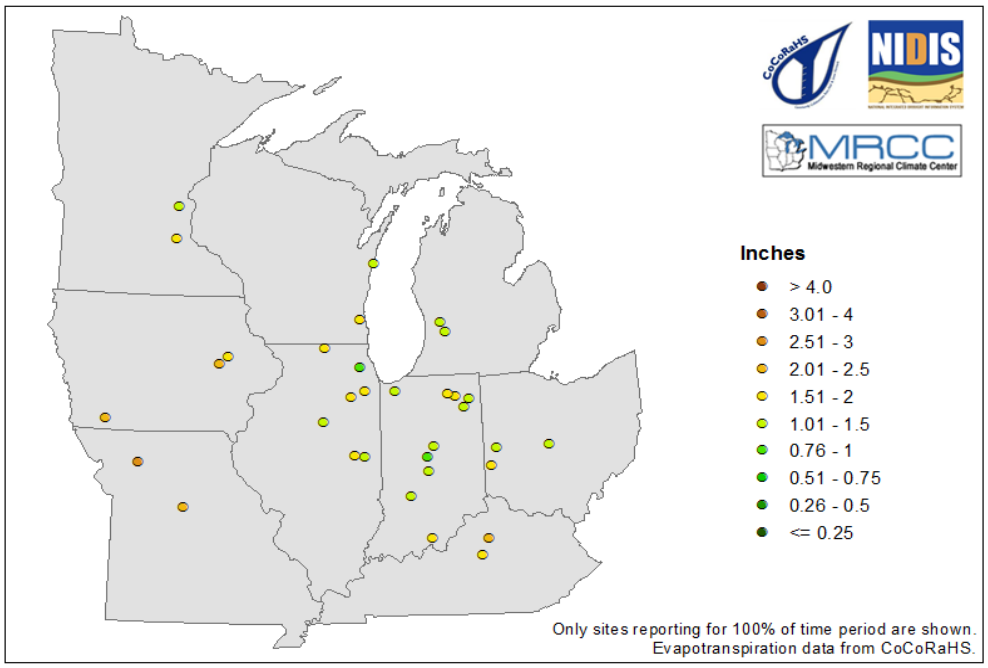
Progress

Regional and national evapotranspiration and water balance maps are available on the MRCC website: https://mrcc.illinois.edu/cliwatch/drought/drought.jsp#et. Time frames available are 1-day, 7-day, 14-day, 30-day, and 60-day maps.

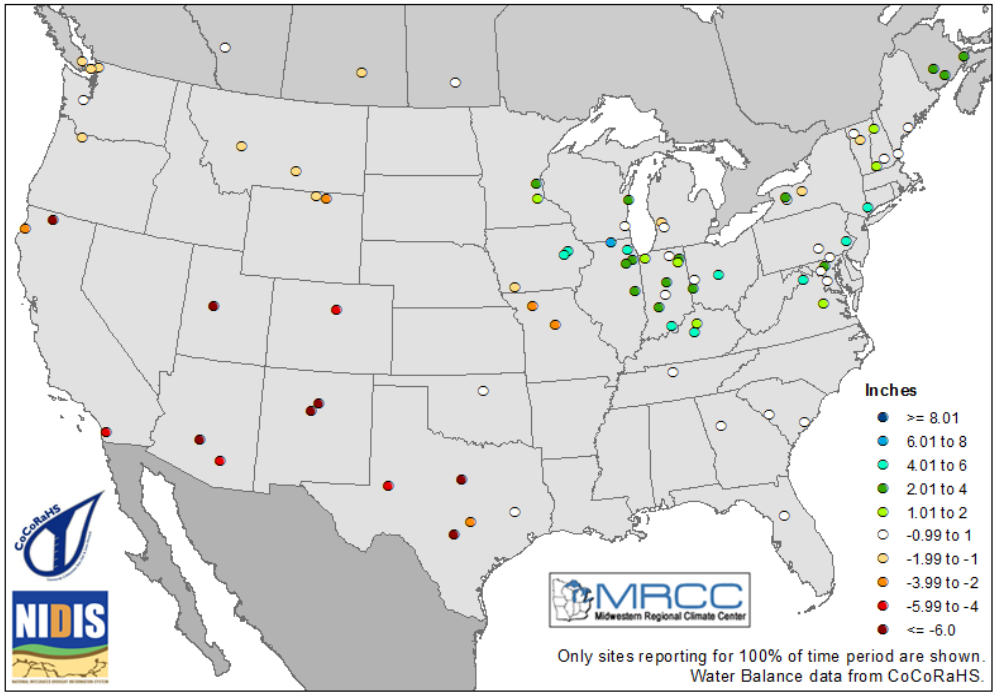
The Regional Mesonet Program - which is a collaboration of multiple states and mesonet groups (products created and hosted by the MRCC) - has the following maps available: 24-hour and 7-day soil temperature (2-inch and 4-inch) maps, and 24-hour and 7-day potential evapotranspiration maps. These products are accessible here: https://mrcc.illinois.edu/RMP/index.html.

Activity 2.3: Regional Evapotranspiration and Water Balance Maps

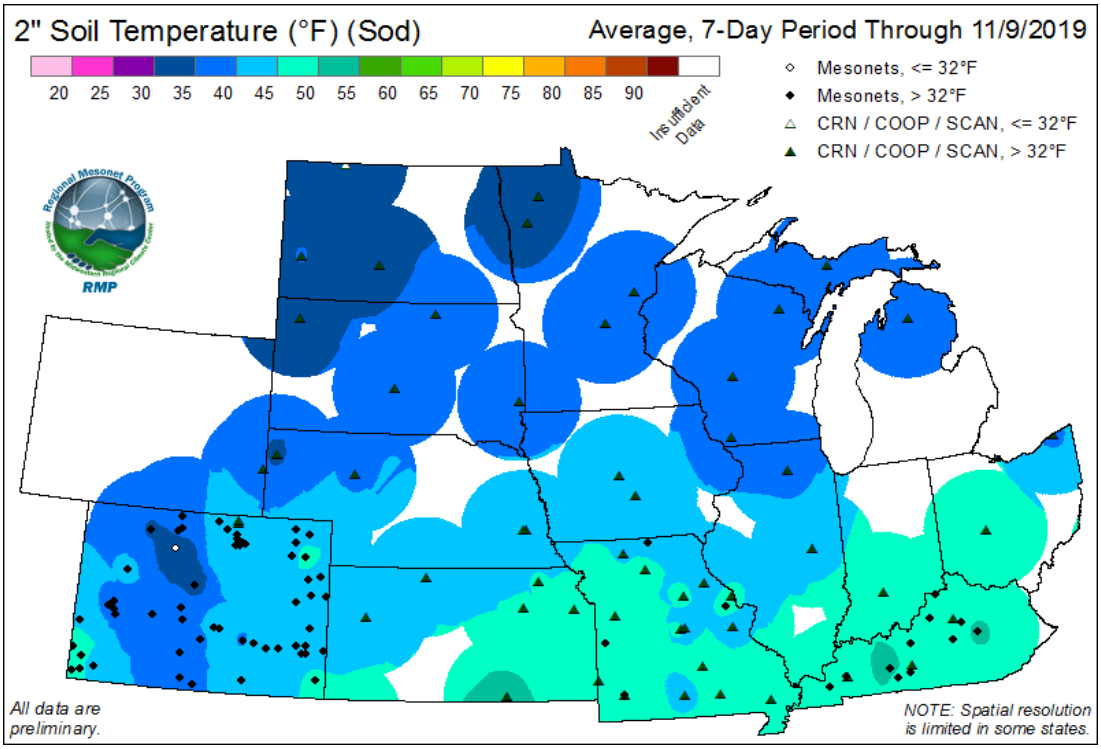
Evapotranspiration for 14-day Period: 7/18/2018 - 8/1/2018

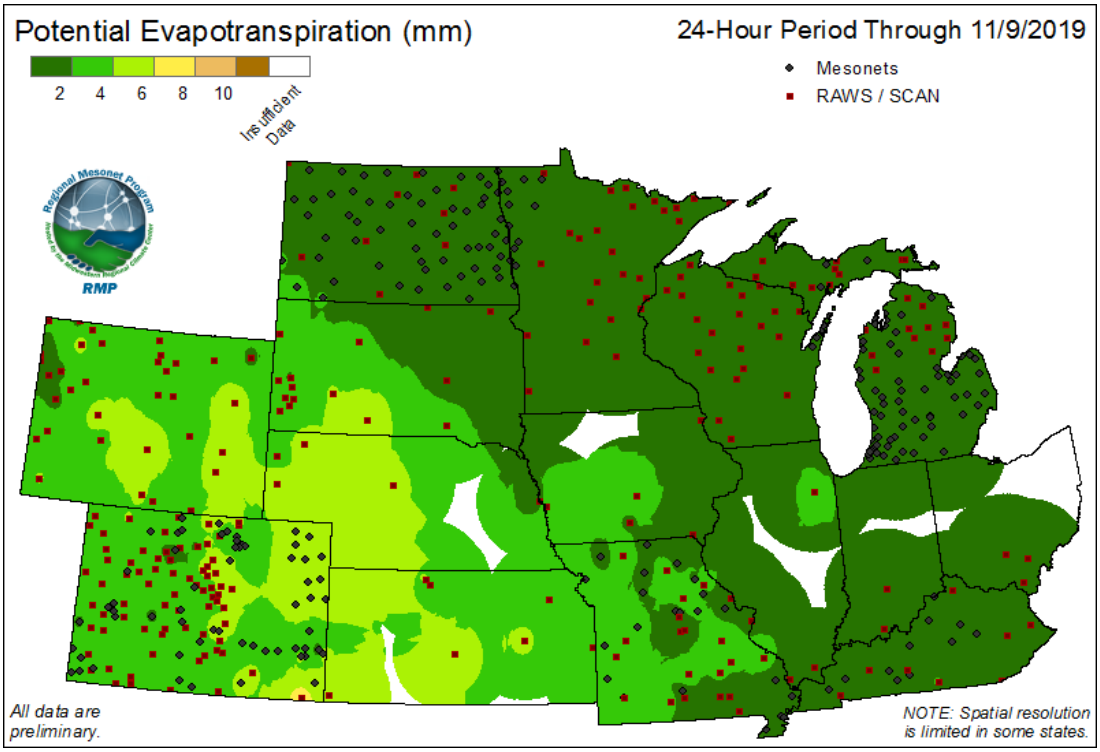


Water Balance for 30-day Period: 6/4/2018 - 7/4/2018



Activity 2.3: Regional Mesonet Program Maps





Activity 2.4

Advancing Drought Early Warning and Preparedness in Kentucky

Description

The Kentucky Climate Center (KCC) will advance drought early warning and preparedness in Kentucky by enhancing the in situ environmental monitoring infrastructure of the Kentucky Mesonet with additional soil moisture sensors, and by developing an interactive data visualization and analysis dashboard. The Kentucky Mesonet is a network of automated weather and climate monitoring stations developed by the Kentucky Climate Center at Western Kentucky University to service diverse needs in communities across Kentucky. It currently has 69 stations, including 23 that monitor soil moisture and seven with cameras to visually capture landscape conditions.

Integral to advancing drought monitoring in Kentucky will be developing an interactive data visualization and analysis dashboard that integrates and facilitates analysis of both environmental input data (e.g., precipitation, soil moisture, streamflow, reservoir level data, potential evapotranspiration) and environmental impact data (e.g., landscape images or crop and livestock reports).

Outcome 1: Expand soil moisture measurements of the Kentucky Mesonet.
Status: In Progress

Outcome 2: Develop an interactive data dashboard to display Kentucky Mesonet data and environmental impact data.
Status: In Progress

Progress

This project with the Kentucky Climate Center kicked off in summer 2018, and continues through summer 2020. The KCC hosted a kick-off meeting in September 2018 with Kentucky stakeholders to start scoping needs for the interactive data dashboard and other drought information.

The interactive data dashboard is currently in development, and the soil moisture sensors have been purchased and will be installed in early 2020.

Activity 3.1: Establish Midwest DEWS Communications Working Group

Description

NIDIS and the MRCC will establish a Midwest DEWS Communication Working Group, which will include representatives from multiple states, sectors, and government/tribal/private/academic entities, focusing on those with communication and/or outreach experience like communication coordinators or Land Grant Extension specialists.

The goal of this working group will be to determine and establish new modes of communication to the broader Midwest DEWS network, which might include an electronic newsletter, an email listserv, communication platform for internal group communication, regional water summary updates (modeled after the Iowa Water Summary), and social media. To decide what new modes of communication will be developed, the MRCC will host a Midwest DEWS Communication Working Group meeting in summer 2018 to discuss options and implementation plans.

Outcome 1: Identify the Midwest DEWS Communication Working Group.
Status: Done

Outcome 2: Host a Midwest DEWS Communication Working Group meeting, in collaboration with the MRCC.
Status: Done

Outcome 3: Develop and sustain a new mode(s) of communication, based on the findings from the Communication Working Group workshop.
Status: In Progress

Progress

The first Midwest DEWS Communication Working Group meeting took place in May 2018 in Champaign, Illinois. Many ideas were gathered for improving internal DEWS and external DEWS communication. **The top recommendations from the Comms WG for external communication included developing a news media strategy and increasing social media presence through partnerships. The top recommendations for improving internal communication included having regular face-to-face Midwest DEWS meetings, as well as some sort of web-based message board.** Progress on these recommendations include: beginning efforts to form a team to develop the news media strategy, developing a social media listserv to share drought-related

posts on social media, and hosting the 2019 annual meeting. In addition, monthly emails are now sent out by the Midwest DEWS coordinator to the entire Midwest DEWS network.

Activity 3.1: Social Media Listserv

At the May 2018 Communications Workshop, we discussed how to better utilize social media in the Midwest DEWS for outreach to the general public and some particular target audiences like broadcast meteorologists and producers.

The decision was made that it does not make sense to start a new Midwest DEWS specific account on Twitter or other social media platforms, but **rather to utilize our existing networks and followings on social media to increase the reach of Midwest drought-specific posts**.

Many attendees at the workshop said that if they were aware of when posts were coming out, they would be happy to retweet them. But right now, they just are not aware for the most part when these are happening.

In order to coordinate this effort through retweeting of NIDIS (and each other's) drought posts, **the Midwest DEWS established a Social Media Listserv to communicate when posts are available for retweeting.**

If you (or your program's social media POC) would like to be added to the Midwest DEWS Social Media Listserv, please send Molly (molly.woloszyn@noaa.gov) an email to let her know!

Activity 3.1: Summary of Recommendations from the May 2018 Midwest DEWS Communications Workshop

Internal Communication

Refers to how the network of the Midwest DEWS can correspond to one another

External Communication

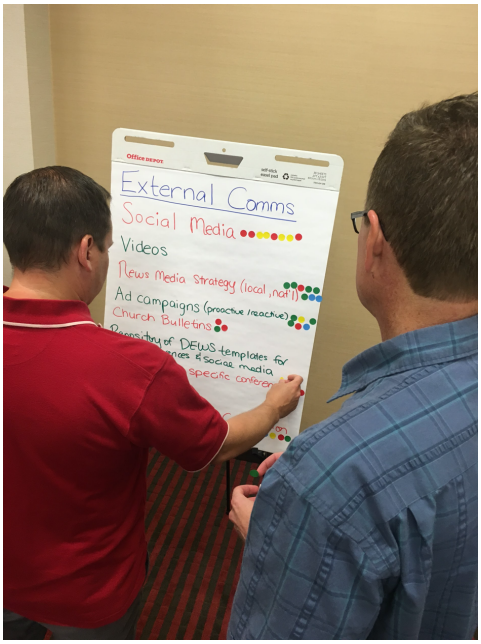
Refers to the communication from the Midwest DEWS to stakeholders across the region.

Methods & Outcomes

The Comms WG brainstormed ideas for internal and external communication. Then, they voted on what they felt would be the most effective, and the totals are below:

External communication ideas:

- **News media strategy (14)**
- **Social media (11)**
- Attend sector-specific conferences (9)
- Ad campaigns (6)
- Weather-Ready Nation collaboration (4)
- Church bulletins (3)
- Videos (0)
- Brochures (0)



Internal communication ideas:

- **Face-to-face DEWS meetings (19)**
- **Message board (11)**
- DEWS newsletter (4)
- Regional discussions via conference calls (4)
- Intranet platform (4)
- DEWS webinars (3)
- Email listserv (3)
- Live online chat forum (like NWS Chat) (0)

We discussed the four that received the highest votes (**ideas in bold**) in more detail during small breakout groups. For each of these ideas, the small breakout groups discussed topics like the goals of the communication, the audience, steps for implementation, the lead team, and evaluation metrics of success. This feedback is being used to move the top ideas forward to improve communication within and from the Midwest DEWS.

Activity 3.3

Provide Climate and Drought Outlooks and Webinars

Description

Monthly North Central U.S. Climate Summary and Outlook Webinars

These monthly webinars interpret relatively complex climate information at various scales to a non-technical audience, encouraging discussion and questions from a cross section of governmental, academic, and private attendees. They were initiated in July 2012 and, as of the end of 2017, have received over 5,500 viewers.

Partners: NOAA, NCEI, USDA, NDMC, NIDIS, MRCC, High Plains RCC, state climatologists

Midwest Quarterly Climate Impacts and Outlooks

This quarterly report provides information on recent (last three months) temperature and precipitation anomalies, regional impacts, and a regional climate outlook for the next three months. They are created for decision makers who want to be informed of recent climate trends and impacts in their particular region, thus they are of a non-technical nature.

Partners: NOAA, NCEI, USDA, MRCC, NIDIS, state climatologists, and many other climate services providers

Outcome 1: Midwest Quarterly Climate Impacts and Outlook reports provided in March, June, September and December.

Status: Ongoing

Outcome 2: Climate Summary and Outlook Webinars provided the 3rd Thursday of each month.

Status: Ongoing

Progress

Both of these efforts have been continuing every month and quarter as stated. The monthly webinar archives can be found here: https://mrcc.illinois.edu/multimedia/webinars.jsp. The quarterly reports archive can be found here: https://mrcc.illinois.edu/pubs/pubsMWquarterly.jsp.

Activity 3.3: Monthly North Central U.S. Climate Summary and Outlook Webinars

When: 3rd Thursday of every month from 1-2pm Central

Who: For anyone that wants to keep up-to-date (whether for decision-making and/or general awareness) on climate conditions and associated impacts.

Want to sign up?: Email doug.kluck@noaa.gov

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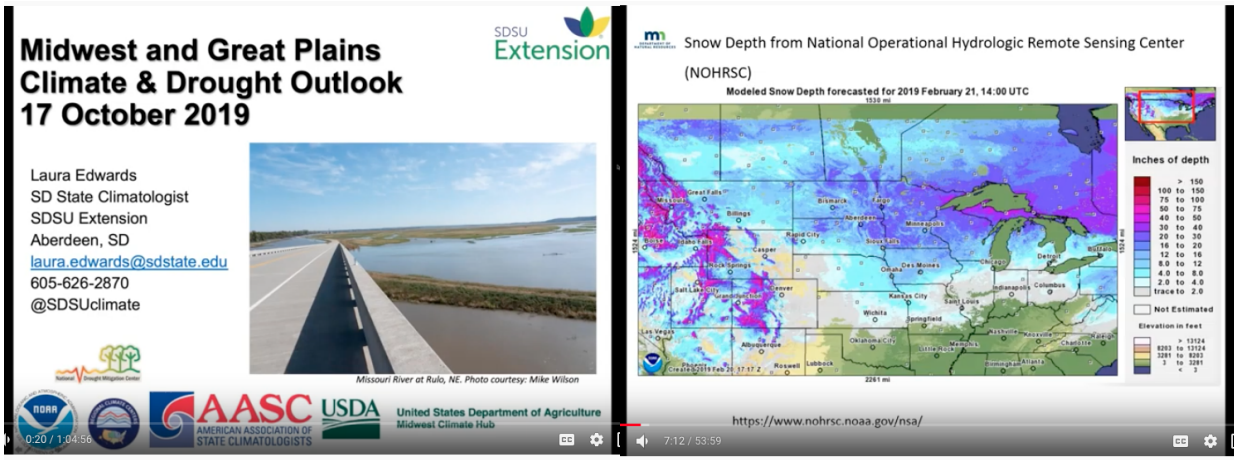
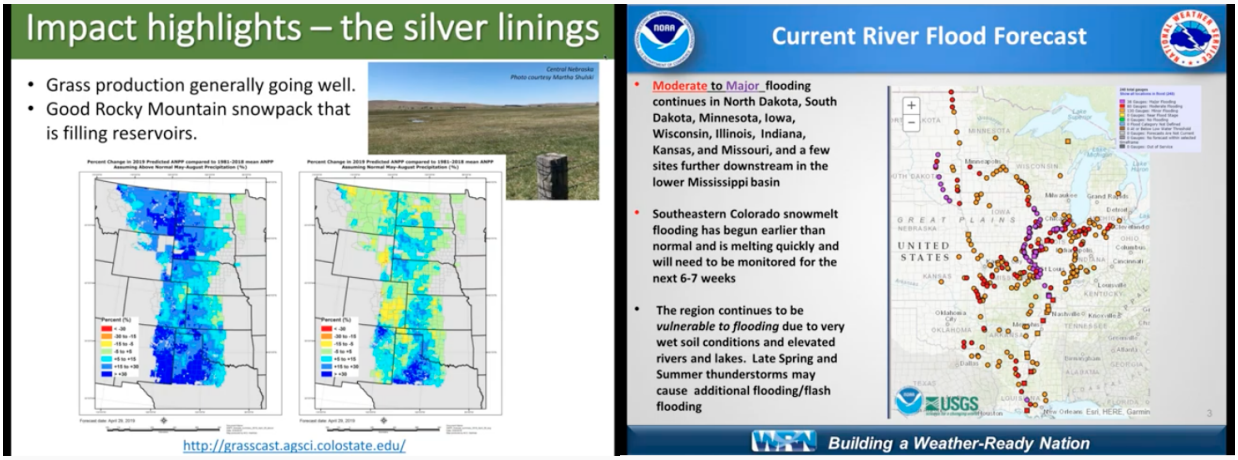
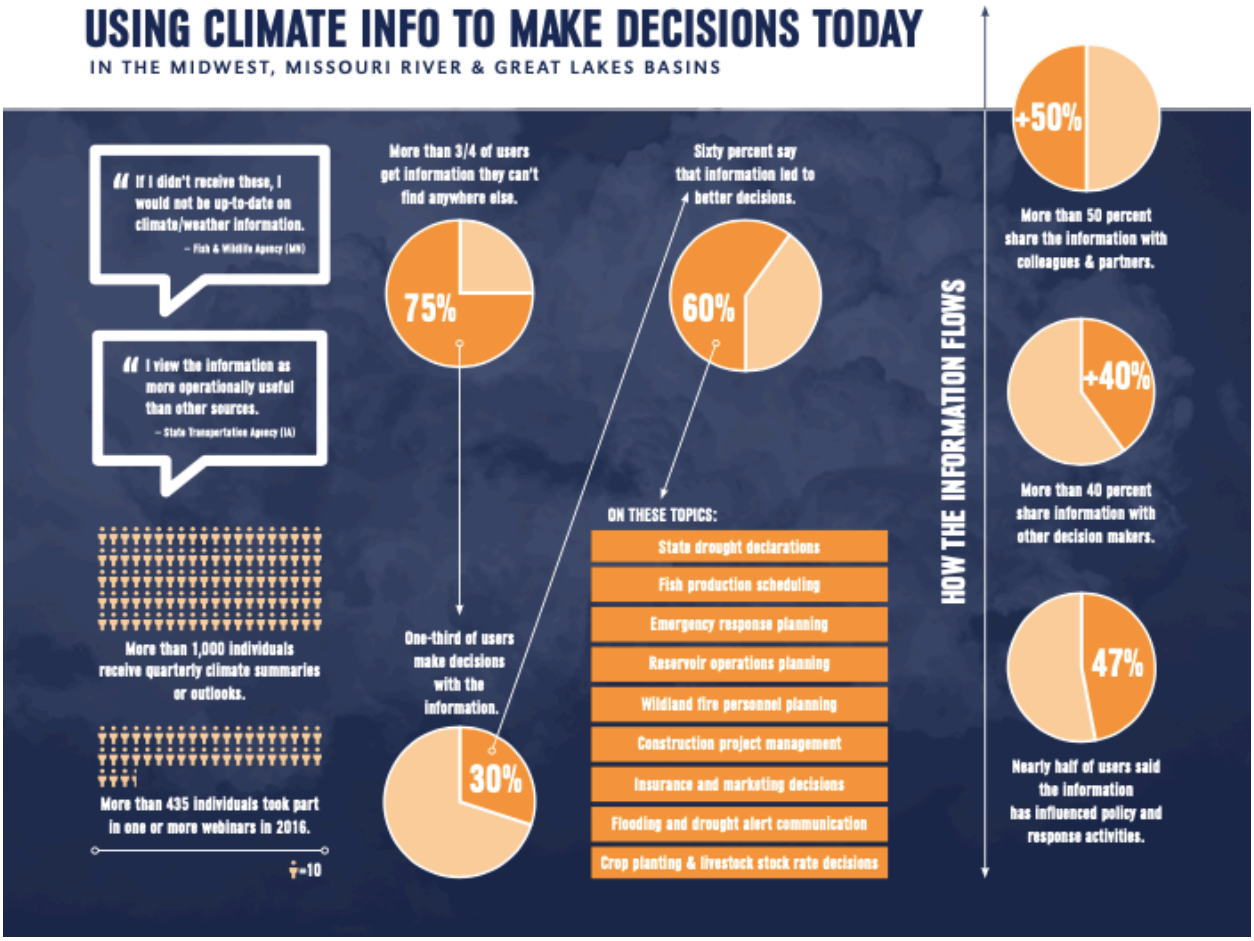
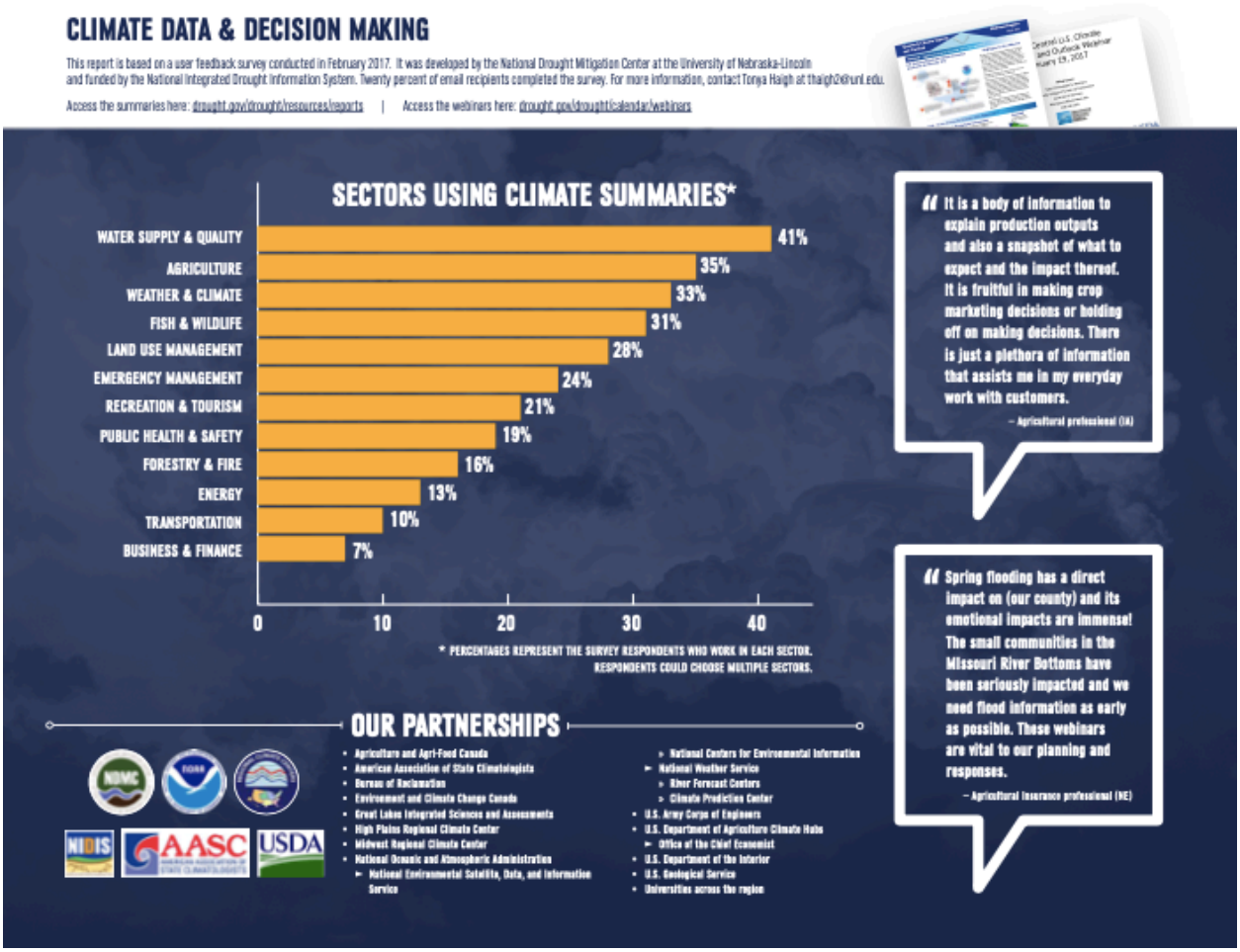
Screenshots from Previous Webinars






USING CLIMATE INFO TO MAKE DECISIONS TODAY
IN THE MIDWEST, MISSOURI RIVER & GREAT LAKES BASINS
"If I didn't receive these, I would not be up-to-date on climate/weather information."
– Fish & Wildlife Agency (MN)
"I view the information as more operationally useful than other sources."
– State Transportation Agency (IA)
More than 1,000 individuals receive quarterly climate summaries or outlooks.
More than 435 individuals took part in one or more webinars in 2016.
1=10
More than 3/4 of users get information they can't find anywhere else.
75%
One-third of users make decisions with the information.
30%
Sixty percent say that information led to better decisions.
60%
ON THESE TOPICS:
State drought declarations
Fish production scheduling
Emergency response planning
Reservoir operations planning
Wildland fire personnel planning
Construction project management
Insurance and marketing decisions
Flooding and drought alert communication
Crop planting & livestock stock rate decisions
HOW THE INFORMATION FLOWS
+50%
More than 50 percent share the information with colleagues & partners.
+40%
More than 40 percent share information with other decision makers.
47%
Nearly half of users said the information has influenced policy and response activities.



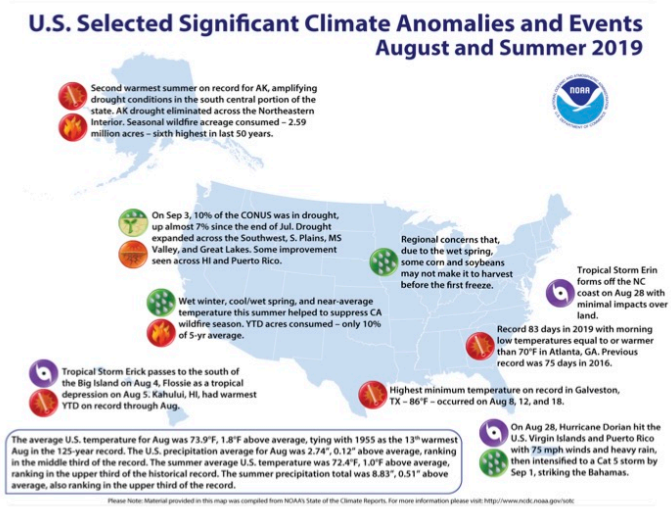
This PDF is also available here:
https://mrcc.illinois.edu/pubs/docs/ClimateSummarySurvey.pdf

Quarterly Climate Impacts and Outlook

Midwest Region

September 2019

National – *Significant Events for June–August 2019*



Significant events from June through August 2019 across the United States.

Highlights for the Midwest

Flooding on the Mississippi River continued well into the summer and there was renewed flooding on the Missouri River in early June. Flash flooding struck the St. Louis area on July 22, August 12, and 26.

The 12-month precipitation for August 2018 to July 2019 set a new all-time record for the Midwest.

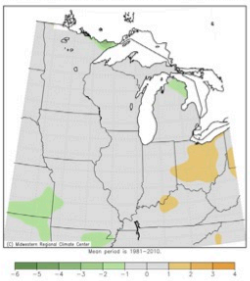
In mid-August, drought developed in the Midwest for the first time in 2019. It developed from Iowa to Indiana with areas also in Kentucky and Michigan.

Severe weather affected the region, including a damaging hail event in the Minneapolis area on August 5.

A heat wave in mid-July brought heat indices well above 100°F to a large swath including most of the Midwest.

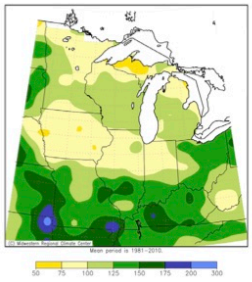
Regional – *Climate Overview for June–August 2019*

Summer Temperature
Departure from Normal



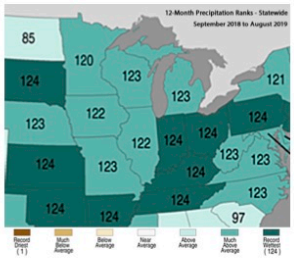
The Midwest had close-to-normal temperatures for the summer across the entire region. A few small areas were as much as 1°F below normal and most of Ohio was just 1°F above normal. There was a warm stretch from late June through the middle of July but it was averaged out by cooler weather in the remaining weeks of the summer.

Summer Precipitation
% of Normal



Summer precipitation was near normal in the upper two-thirds of the region and above normal in the southern third. Nearly all of Minnesota, Wisconsin, Michigan, Iowa, and the northern halves of Illinois and Indiana were between 75% of normal to 125% of normal. Missouri, Kentucky, Ohio, and southern parts of Illinois and Indiana had totals that fell in the 125% of normal to 175% of normal range. Kentucky had its sixth wettest summer on record.

12-month precipitation rankings



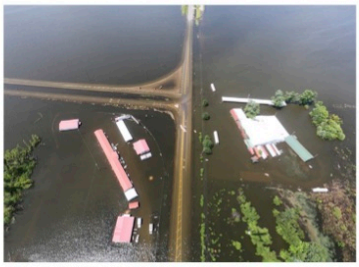
The Midwest set many records for 12-month precipitation this summer. The 12-month period ending in July set the all-time record, regardless of the time of year, with a total of 47.95 inches for the region. In the figure above, 12-month totals for each state are ranked from 1 to 124 (124 being record wet) for the period ending in August. Indiana, Ohio, and Kentucky all set new records. Missouri, Wisconsin, and Michigan ranked second wettest, Iowa and Illinois ranked third and Minnesota was fifth.

Contact: Doug Kluck (doug.kluck@noaa.gov

Regional Impacts – *June–August 2019*

Major Flooding

Major flooding on the Mississippi River continued well into the summer months. The Quad Cities on the Iowa–Illinois border set records for both flood stage and duration of flooding. The river crest continued south with areas along the Missouri–Illinois border affected into August. South of St. Louis, some bridges across the river were not reopened until late July. Barge traffic on the river was also affected by the high water. There were numerous failures of levees including one that allowed barges to wash out into farm fields. Renewed flooding of the Missouri River in early June closed major roads in western Iowa including Interstate 29 and Iowa Highway 2. Stretches of Highway 2 were washed away in the flood waters. Flash flooding in Joplin, Missouri, killed a boy on August 24.



Flooding on Illinois Highway 3 in late June in southern Illinois. (Illinois DOT)

Heat Wave

Mid-July temperatures and heat indices soared, bringing dangerous conditions across the Midwest. Temperatures reached well into the 90s with high humidity driving heat indices well over 100°F. The southern two-thirds of the region was in an excessive heat watch. The heat index in Minneapolis reached 115°F on July 19.

Iowa Highway 2 washed away in early June Missouri River flooding. (Iowa DOT)

Agriculture

Midwest crops were well behind normal development, and in some cases they were record late. Despite near-normal conditions in the summer months, the extreme delays in planting due to wet spring conditions means that crops could be suceptible to early freezes or possibly even normal freezes. The crops will likely also have issues drying in the field.

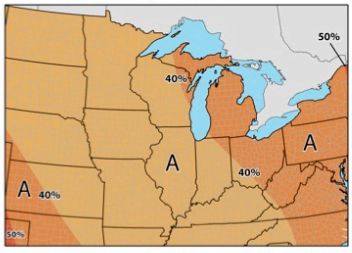
Regional Outlook – *October–December 2019*

Temperature outlooks for the late fall into early winter, October through December, call for an increased chance of temperatures being above normal. This increased chance includes the entire Midwest region with the highest chances of above-normal temperatures in the northeastern third stretching from Upper Michigan to Ohio.

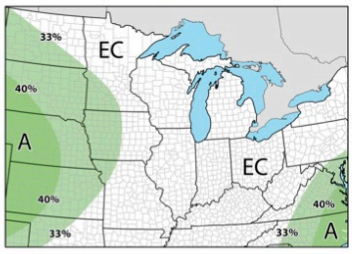
Precipitation outlooks call for most of the Midwest to have equal chances of precipitation being above, below, or near normal for the October through December period. There is an area with an increased chance of above-normal precipitation that includes southwestern Minnesota, western Iowa, and northwestern Missouri.

Fall harvest will be impacted by how the weather develops locally. Drier conditions could enhance drought in areas that have been dry in late summer but could also help allow field work. Warmer-than-normal conditions might extend the growing season with the warmth helping corn reach maturity and lowering grain moisture levels.

Temperature



Precipitation



A = Above normal N = Normal
B = Below normal EC = Equal chances

Midwest Region Partners

- Midwestern Regional Climate Center
- American Association of State Climatologists
- National Oceanic and Atmospheric Administration
- NWS Climate Prediction Center
- National Centers for Environmental Information
- National Weather Service Central Region
- North Central River Forecast Center
- Ohio River Forecast Center
- National Drought Mitigation Center
- National Integrated Drought Information System
- USDA Midwest Climate Hub

Contact: Doug Kluck (doug.kluck@noaa.gov)

Activity 3.4

Response Activities During Drought Events

Description

During times of drought and other drought-related climate events (e.g., high precipitation events that lessen the impacts of drought), increased drought and climate communication and outreach to stakeholders is necessary.

If needed, NIDIS and its partners will implement additional communication strategies and activities to address stakeholder needs and concerns. Such strategies may include special webinars, presentations, listserv emails, hosting *Managing Drought Risk on the Ranch* workshops, new information on the U.S. Drought Portal and social media.

Outcome 1: Additional drought information, data, resources, and outreach efforts will be provided by NIDIS and its partners during times of drought to the Midwest DEWS stakeholders.
Status: Ongoing

Progress

During the 2018 drought in Missouri, Iowa, and Kansas, NIDIS and partners released 4 Drought Status Updates to the Midwest DEWS and Missouri River Basin DEWS listserv, and other stakeholders, to share the most recent information, impacts, and outlook for the drought. The Drought Status Updates were shared on Drought.gov and through the Midwest DEWS social media listserv.

In addition, the Midwest DEWS coordinator had frequent contact with state partners (e.g., agencies, state climatologists), and federal partners (e.g., USDA, NWS) during the drought to assess data and information needs for drought response.

Links to Summer 2018 Drought Status Updates:

- July 19, 2018
- August 23, 2018
- October 11, 2018

Activity 3.5

Develop Regional Drought Condition Notification System

Description

Workshop participants at the Fall 2016 Regional Assessment Workshops identified that developing a drought notification system, where stakeholders could sign up to directly receive drought and other climate information, would be an effective way to increase drought early warning across the region. The user could customize information preferences (e.g., "when local precipitation has been less than 25% of normal over the last two weeks") and platform (e.g., text message, email).

The MRCC will lead the development of such notification system in partnership with NIDIS and key stakeholders who have expressed interest in this system (e.g., state climatologists in Missouri, Illinois, and Ohio), and NIDIS will lead efforts with the MRCC to beta test it through the Midwest DEWS network.

Outcome 1: MRCC will develop the prototype for the user-customized drought notification system, and work with NIDIS to beta test it through the Midwest DEWS network.
Status: Done

Outcome 2: Integrate the final user-customized drought notification system into the Midwest DEWS.
Status: In Progress

Progress

The MRCC completed the beta version of the Flash Drought Risk Tool in 2019. The concept behind the tool is that a user can sign-up to receive email notifications when their location is at risk for the development of flash drought conditions.

The Indiana State Climate Office at Purdue University will continue the development of this tool, which will include user-testing. Expected completion date for the next version of the tool is fall 2020.

Activity 3.5: Flash Drought Risk Tool - Beta Version

How does it work?

- Register for up to 3 locations.
- Receive email notifications when those locations meet the criteria to be at risk for flash drought development.
- You can choose the frequency of emails - 1) when status changes 2) daily while at risk or 3) every day.

Current Methodology

- Combines the previous two weeks of precipitation plus the next 6 days of forecasted precipitation.
- If that total is less than the 20th percentile, that location is designated as “at risk” for flash drought development.

Alerts - Example

FLASH DROUGHT RISK NOTIFICATION

Dear Molly Woloszyn,

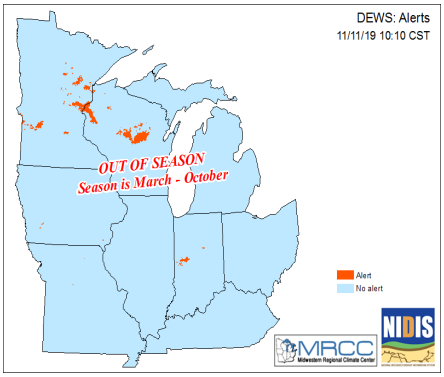
This is an email notifying you that your selected location of "Home" (40.114246, -88.243622) is at an increased risk of flash drought conditions forming over the next six days due to reduced precipitation accumulation.

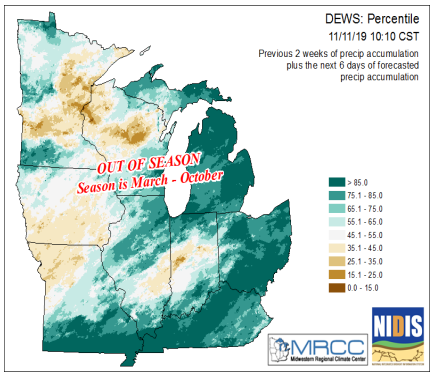
Forecasted Precipitation Departure from Average: -1.13 in.

Forecasted Precipitation Percentile: 23.53 percentile

See the following link for more information:
https://mrcc.illinois.edu/MWDEWS/ALERTS/index.jsp

Maps - Examples





Activity 3.5: Flash Drought Risk Tool - Future Development

The Flash Drought Risk Tool will continue to be developed for the Midwest region at the Indiana State Climate Office at Purdue University with Dr. Beth Hall.

Future Development

- Explore how the onset of flash drought should be defined.
- Add additional variables that should be integrated into the Flash Drought Risk Tool - including but not limited to: potential evapotranspiration, soil conditions, EDDI, Keetch-Byram Drought Index, etc.
- A user group will be identified to assess the online tool and provide feedback.

How can you be involved?

Let your table helper, Beth Hall, know if you are interested in being a part of the user test/feedback group!

Activity 4.2

Increase Collaboration on Drought-Related Activities in the Midwest

Description

Partner agencies and organizations at the federal, tribal, state, and local levels are actively engaged in a variety of drought-related activities. In an effort to improve awareness and collaboration among these stakeholders, and to avoid the duplication of efforts, NIDIS will develop a matrix that utilizes the regional network to document current drought activities and resources in the Midwest.

NIDIS will develop a template matrix and circulate among Midwest DEWS stakeholders to collect information on existing and planned drought-related activities. Information collected will include: project or resource information, lead agency/organization, funding, associated timelines, and primary contact(s). The completed matrix will be converted into an interactive GIS format and made available on drought.gov, so that stakeholders can visually see where the projects are happening throughout the region. This matrix will help identify priorities for the Midwest DEWS region.

Outcome 1: First version of matrix and interactive GIS map completed and posted to the U.S. Drought Portal.
Status: In Progress

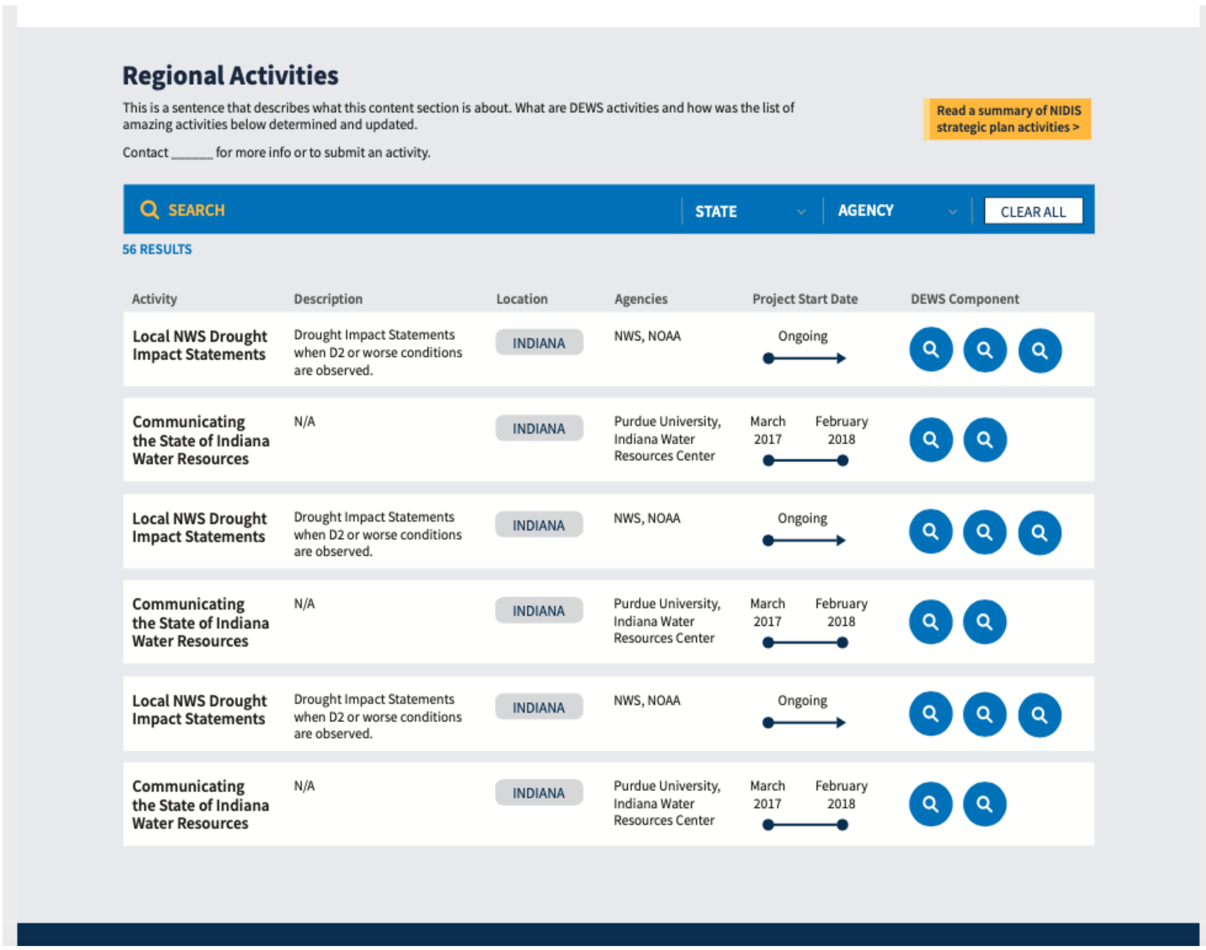
Outcome 2: Review the matrix at least twice a year with input from Midwest DEWS stakeholders and update the GIS map as needed.
Status: Not yet started

Progress

After NIDIS explored the idea of providing this information via Drought.gov, the focus of this activity has shifted slightly. The overall goal of showcasing partners drought-related activities remains the same, but the way in which they will be shown and when this information will be available has changed. **This information will be incorporated into the redesign of Drought.gov, which will be launched in Spring 2020 (anticipated).** Before this time, all NIDIS coordinators will be updating their matrix of partner activities throughout the region.

Activity 4.2: **Drought.gov Redesign Mock-Up**

Interested in seeing how the partner activities will be displayed on the new Drought.gov website when it is relaunched? This “Regional Activities” section will be displayed on the main Midwest DEWS page.



Regional Activities

This is a sentence that describes what this content section is about. What are DEWS activities and how was the list of amazing activities below determined and updated.

Contact ______ for more info or to submit an activity.

Read a summary of NIDIS strategic plan activities >

SEARCH | STATE | AGENCY | CLEAR ALL

56 RESULTS

Activity	Description	Location	Agencies	Project Start Date	DEWS Component
Local NWS Drought Impact Statements	Drought Impact Statements when D2 or worse conditions are observed.	INDIANA	NWS, NOAA	Ongoing	
Communicating the State of Indiana Water Resources	N/A	INDIANA	Purdue University, Indiana Water Resources Center	March 2017 – February 2018	
Local NWS Drought Impact Statements	Drought Impact Statements when D2 or worse conditions are observed.	INDIANA	NWS, NOAA	Ongoing	
Communicating the State of Indiana Water Resources	N/A	INDIANA	Purdue University, Indiana Water Resources Center	March 2017 – February 2018	
Local NWS Drought Impact Statements	Drought Impact Statements when D2 or worse conditions are observed.	INDIANA	NWS, NOAA	Ongoing	
Communicating the State of Indiana Water Resources	N/A	INDIANA	Purdue University, Indiana Water Resources Center	March 2017 – February 2018	

Activity 4.2: Snapshot of Some Activities Currently in the Midwest DEWS Project Matrix

Activity Title	Brief Description	State(s)	Who Is Involved?	DEWS Component(s)	Start/End Date
Illinois Drought Response Task Force	The purpose of the task force is to assist community and state officials and to provide the public with information and tools that promote better decision-making in water supply planning and reduce drought-related impacts.	Illinois	ISWS, IDNR (and other state agencies)	Observations and Monitoring; Planning and Preparedness	Ongoing
Indiana's Water Shortage Plan	The purpose of this plan is to provide the State of Indiana with an effective and systematic plan to assess and manage the State's water resources during a water shortage or potential water shortage to respond, to the maximum extent practicable, to the needs of its water users while protecting its environment.	Indiana	IDNR, IDHS, IDEM	Planning and Preparedness	Ongoing
Northwest Water Planning Alliance	The NWPA is working to ensure that dependable supplies of water are available for generations to come. Their mission is to collaboratively plan for and steward our shared river and groundwater resources to ensure a sustainable water supply for the people, economy, environment, and future generations.	Illinois	Federal, state and local agencies. Academic partners, Chicago Metropolitan Agency for Planning, Illinois Section of AWWA, private sector, NGOs	Planning and Preparedness; Communication and Outreach	Ongoing
System Wide Low Flow Management Plan, Mississippi River above St. Paul, MN	The purpose of this low-flow plan is to help ensure that "run-of-river" operations are strictly maintained during periods of low flow to minimize artificial flow fluctuations and protect the aquatic resources and other values of this nationally important river.	Minnesota	MNDNR, USGS, USACE, NWS, various Hydropower and Reservoir facility owners, power companies, local units of	Planning and Preparedness	Ongoing

			govt, tribal govt		
Island Lake Reservoir Technical Committee	The NWS participants in this technical committee, which is a collaboration with Minnesota Power, MN DNR and residents around Island Lake to determine reservoir management for the upcoming season.	Minnesota	Minnesota Power, MN DNR, NWS, Residents	Observations and Monitoring; Predictions and Forecasting; Planning and Preparedness; Communication and Outreach	Ongoing
North Central Region Climate Summary and Outlook Webinars	These monthly webinars interpret relatively complex climate information at various scales to a non-technical audience, encouraging discussion and questions from a cross section of governmental, academic, and private attendees.	Regional	NOAA, AASC, RCCs, NDMC, USDA, NIDIS	Observations and Monitoring; Predictions and Forecasting; Communication and Outreach	Ongoing

Activity 4.2: Interested in sharing an activity?

Please send Molly (molly.woloszyn@noaa.gov) an email and she will ask you to provide some details!

Activity 4.4: Enhance Drought Early Warning Capacity for Midwest Tribes

Description

Tribal nations and other entities (e.g., BIA, tribal alliances) are important stakeholders for the Midwest DEWS network. It will be critical to establish relationships with these stakeholders in order to ensure that they are receiving the data, resources, and early warning they need to make decisions regarding drought. In this activity, NIDIS and its partners will attend a Midwest-based tribal conference(s) to begin gathering and establishing tribal contacts in the region. Through conversations and/or a conference exhibit booth, an informal needs assessment will gather more information on drought and climate concerns of tribal entities in the Midwest, as well as what resources or information is needed to make decisions regarding drought. The findings of this informal needs assessment will guide future tribal work in the Midwest DEWS (e.g., training workshops, resource development, focus groups, etc.).

Outcome 1: Attend Midwest-based tribal conference.
Status: Done

Outcome 2: A report of the informal needs assessment findings, highlighting the drought and climate concerns and needs of Midwest tribes, and a strategy on how to provide those needs moving forward.
Status: Done/Ongoing

Progress

NIDIS partnered with the University of Colorado Masters of Environment Program in 2019 on a tribal engagement project focused in the Midwest and Missouri River Basin DEWS. The goals of this project include: to increase engagement through face-to-face contact with tribal resource managers, to increase NIDIS' visibility amongst tribes, to map and identify key drought vulnerabilities and capacity gaps, and to ensure that future engagement maximizes positive impact. **This summer, the CU MENV graduate students collected more than 100 key contacts, attended twelve tribal conferences and meetings, visited 15 reservations, and had in-depth discussions with more than 50 tribal resource managers from 20 reservations.**

The participating tribes will receive their own Tribal Drought Snapshot, which highlights drought trends and impacts, key capacity needs, future engagement opportunities, and key resources and contacts. In addition, the CU MENV team is developing a tribal engagement strategy for NIDIS.

Project Goals

To increase engagement through face-to-face contact with Tribal Resource Managers.

To increase NIDIS' visibility amongst tribes

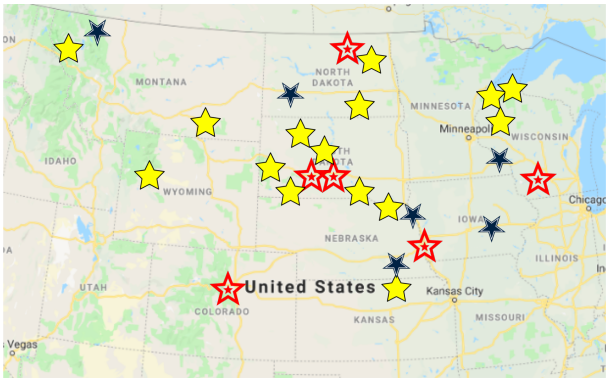
To map and identify key drought vulnerabilities and capacity gaps.

To ensure that future engagement maximises positive impact.

In-Person Engagement

Phase 1: Initial Engagement and Contact Collection

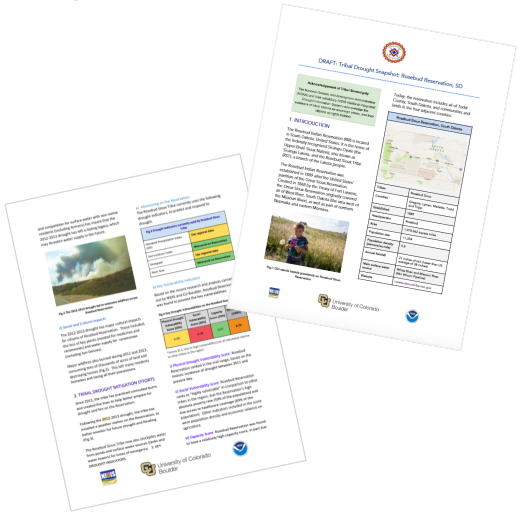
- More than 100 key contacts collected, including more than 20 strong allies.
- Attended 12 tribal conferences and meetings.
- Visited 15 Reservations.
- In-depth discussions with more than 50 Tribal Resource Managers from 20 Reservations.



Tribal Drought Snapshots

Phase 3: Finalizing Maps and Snapshots

- Development 20 Tribal Drought Snapshots
- Includes:
  - i) Drought trends and impacts
  - ii) Tribal drought mitigation efforts (monitoring and key vulnerabilities).
  - iii) Key capacity needs
  - iv) Future outlook
  - v) Future engagement opportunities
  - vi) Key resources and contacts



Key Engagement Learnings So Far..

1. Major variations in drought exposure, social vulnerability and capacity exist between tribes; with limited resources available, it is vital that NIDIS supports tribes with least support.
2. Authentic and meaningful engagement requires long-term relationship building; face-to-face contact is vital in beginning to build trust.
3. Mistrust of Federal agencies due to the "extractive" nature of many tribal projects; Many federal projects are one-sided. A challenge with this project.
4. High staff turnover leads to engagement lethargy; This undermines long-term impact, trust and relationship building.
5. Tribal sovereignty is everything; Engagement must also be culturally relevant and respectful.
6. Tribes want simpler, more culturally relevant data: Drought.gov can be difficult to navigate and daunting, even for technical staff. Tribal Decision Dashboards have been well-received.

Recommendations

1. With limited staff and resources, it's vital that NIDIS targets their support wisely; Rankings, Maps and Snapshots can be used to help determine where and which support can have the most positive impact for tribes.
2. Recruitment of dedicated NIDIS Tribal Engagement staff; to continue building trust and scaling up drought engagement, including trainings and technical support.
3. Develop a NIDIS tribal web-platform, with simplified drought-predictions and resources; Tribes want simpler, more culturally relevant data.
4. Develop a Tribal Drought-Response Toolkit; including flow diagrams, key contacts and resources.

The next page has an example of the first page of a DRAFT tribal snapshot – if you would like to see more tribal snapshots for the Midwest region, please email Molly (molly.woloszyn@noaa.gov).

BAD RIVER RESERVATION

TRIBAL DROUGHT SNAPSHOT

Acknowledgement of Tribal Sovereignty

The National Oceanic and Atmospheric Administration (NOAA) and NIDIS (National Integrated Drought Information System) acknowledge the existence of tribal nations as sovereign states, and their citizens as rights-holders.

1. INTRODUCTION

The Bad River Band is one of six federally recognized Ojibwe bands of Native Americans living in Wisconsin. Following the Treaty of 1854, four of the tribes (Bad River, Red Cliff, Lac Du Flambeau, Lac Courte Oreilles, St. Croix and Mole Lakenow) were relocated to the Bad River Reservation. The Reservation is located on the south shore of Lake Superior.[1]

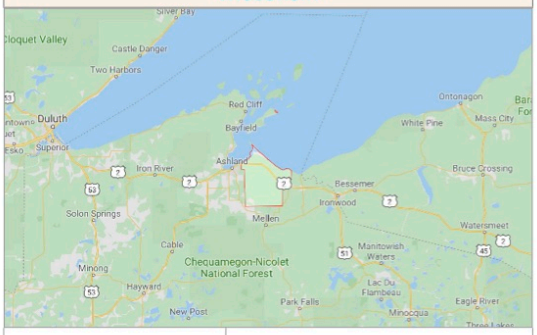
The Chippewa or Ojibwe Nation is one of the three largest native nations in North America. Ojibwe people are culturally known as semi-nomadic hunters, fishermen and gatherers.[2]

Wild Rice Harvesting on the Bad River ©Native Village

The Reservation has a humid continental climate with four distinct seasons. Winters are long and cold, influenced by continental polar air masses from northwest Canada and the Arctic. Summers are cool to warm, dominated by moist tropical air masses from the Gulf of Mexico. Flooding has greatly affected the Reservation.[4]

The Bad River Reservation is a water-rich environment located in the downstream portion

The Bad River Band of Lake Superior Chippewa in Wisconsin



Tribes	Bad River, Red Cliff, Lac Du Flambeau, Lac Courte Oreilles, St. Croix and Mole Lake
Counties	Ashland and Iron Counties
Established	1854
Headquarters	Odanah, WI
Area	244 sq miles
Population Size	1545
Population Density	6 persons per sq mile
Annual Precipitation	30.8 inches (historical annual totals range from 18.2 [1925] to 44 inches [1951])[3]
Main Surface and/or Groundwater Source	Bad River Watershed
Website	hhttp://www.badriver-nsn.gov

A collaboration between: NOAA NIDIS University of Colorado Boulder