Mississippi River Basin / Gulf of Mexico Nutrient Runoff Network Info Bulletin

Sharing information and making connections from the headwaters to the gulf.

April 27, 2022

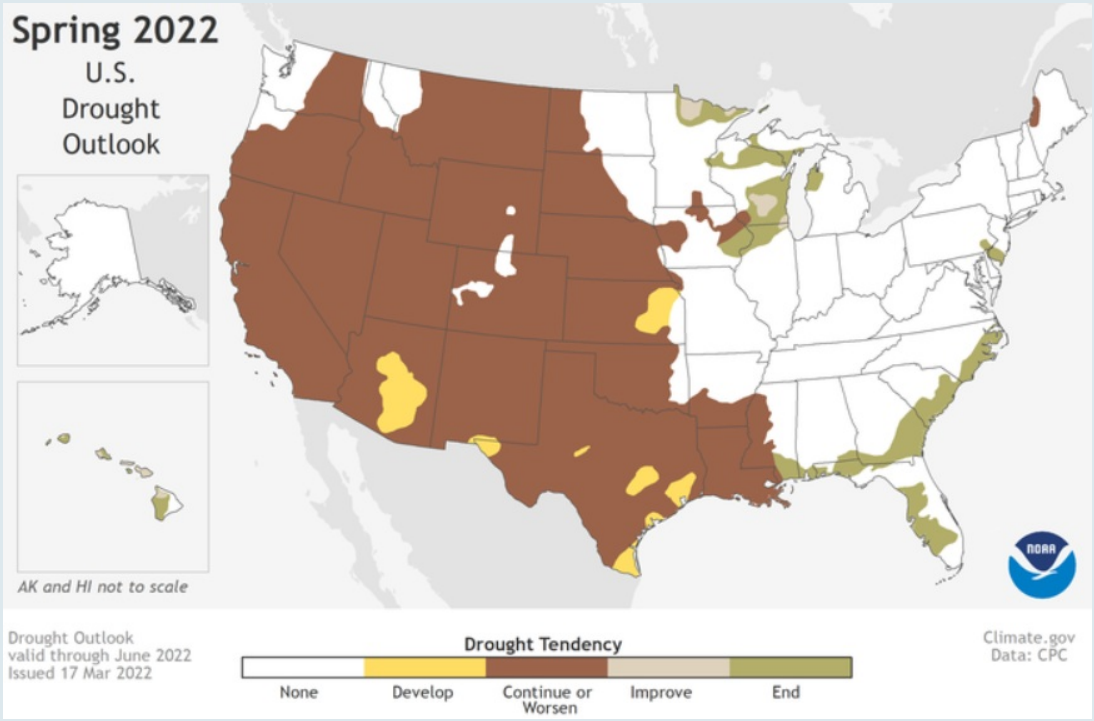
Welcome!

This bulletin is designed as a way to share information with those interested in nutrient runoff issues and impacts. ***We hope you find this a valuable resource and encourage you to be a part of the exchange!*** You can share resources or information for inclusion in future bulletins, or join the distribution list, by sending an email to noaa.centralregion@noaa.gov.

Outlooks and Forecasts

NOAA Releases 2022 Spring Outlook

Drought is expected to expand and worsen for much of the western U.S., as NOAA's Climate Prediction Center forecasts below-normal precipitation to go along with higher than average temperatures for much of the country. This is one of the key points from the **U.S. Spring Outlook** issued by NOAA for April - June, 2022, a product issued yearly to give advance warning of future conditions to local decision makers and emergency managers.

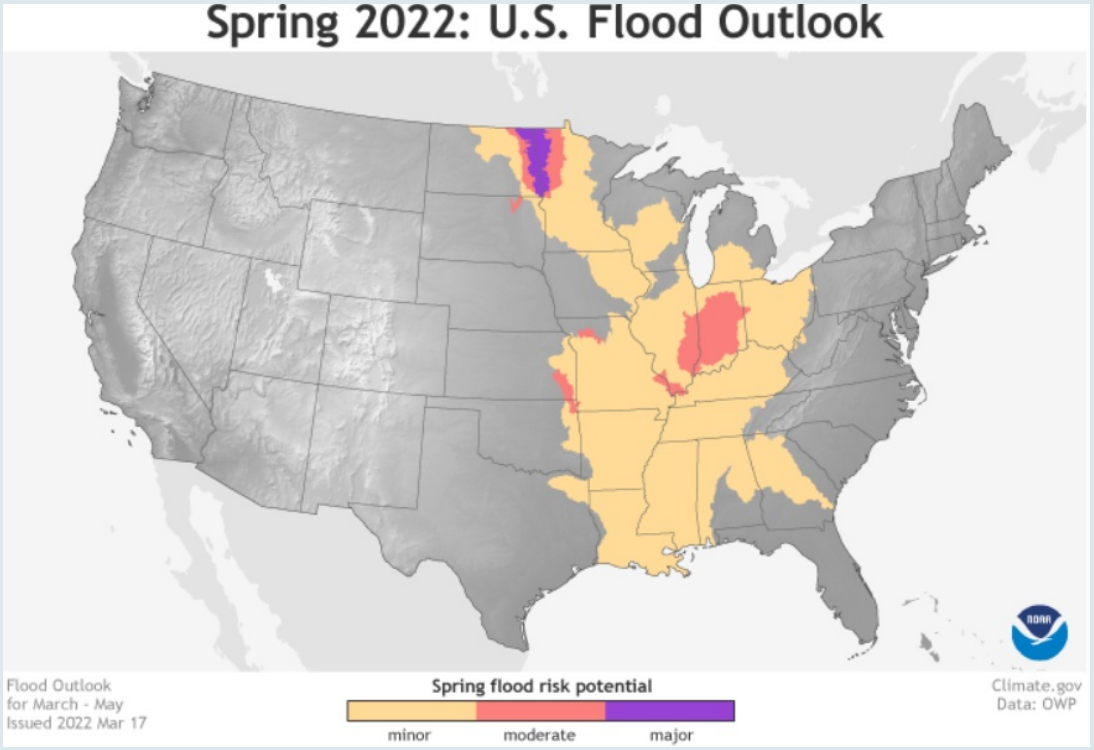


This map depicts where there is a greater than 50% chance of drought persistence, development, or improvement based on short- and long-range statistical and dynamical forecasts during March 17 through June 30, 2022. (NOAA)

While spring snowmelt in the west is unlikely to cause flooding, there is a greater than 50% chance of minor to moderate flooding for much of the eastern Mississippi River basin, and a risk for major flooding along the Red River of the North. “Due to late fall and winter precipitation, which saturated soils and increased streamflows, major flood risk potential is expected for the Red River of the North in North Dakota and moderate flood

potential for the James River in South Dakota," said Ed Clark, director, NOAA's National Water Center.

Changes in precipitation will influence river discharges into the Gulf, which carry the majority of nutrients fueling the annual dead zone, so examining spring flood risk in the basin can provide a useful indicator of the possible size of the dead zone during the summer. The predicted spring flood risk across the Mississippi-Atchafalaya River Basin will likely lead to average or normal hypoxic conditions in the northern Gulf of Mexico this summer. Large portions of the basin are not predicted to have an elevated flood risk or having near normal risk of minor flooding this spring. Absent major flooding, normal springtime discharges of nutrients and freshwater from the Mississippi River are predicted.



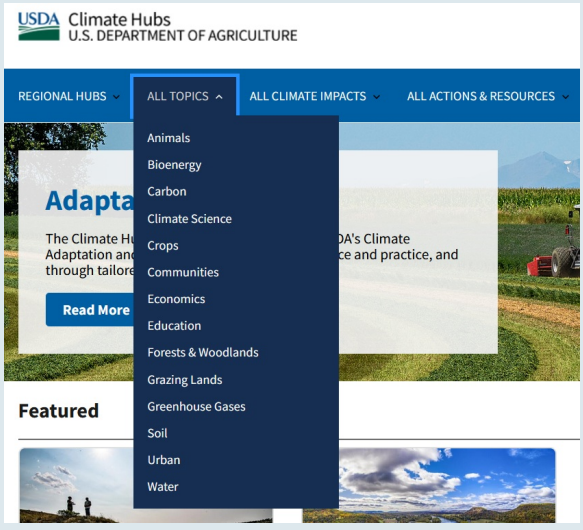
*This map depicts the locations where there is a greater than 50% chance of moderate or minor flooding during March through May, 2022. The Flood Outlook is one component of the **U.S. Spring Outlook**. (NOAA)*

Spotlight: USDA Climate Hubs

USDA Climate Hubs

The **US Department of Agriculture's (USDA) Climate Hubs** are a collaboration between the Department's agencies and led by the Agricultural Research Service and the Forest Service. Located at ten regional locations, these hubs help program agencies provide tools and information to scientists, farmers, and other land managers, with a vision for robust and healthy agricultural production and natural resources under increasing climate variability and climate change.

The USDA Climate Hubs, organized around 10 regions of the U.S., develop and deliver science-based, region-specific information and technologies to agricultural and natural resource managers to aid in decision-making, and to provide access to assistance to implement those decisions. (USDA)



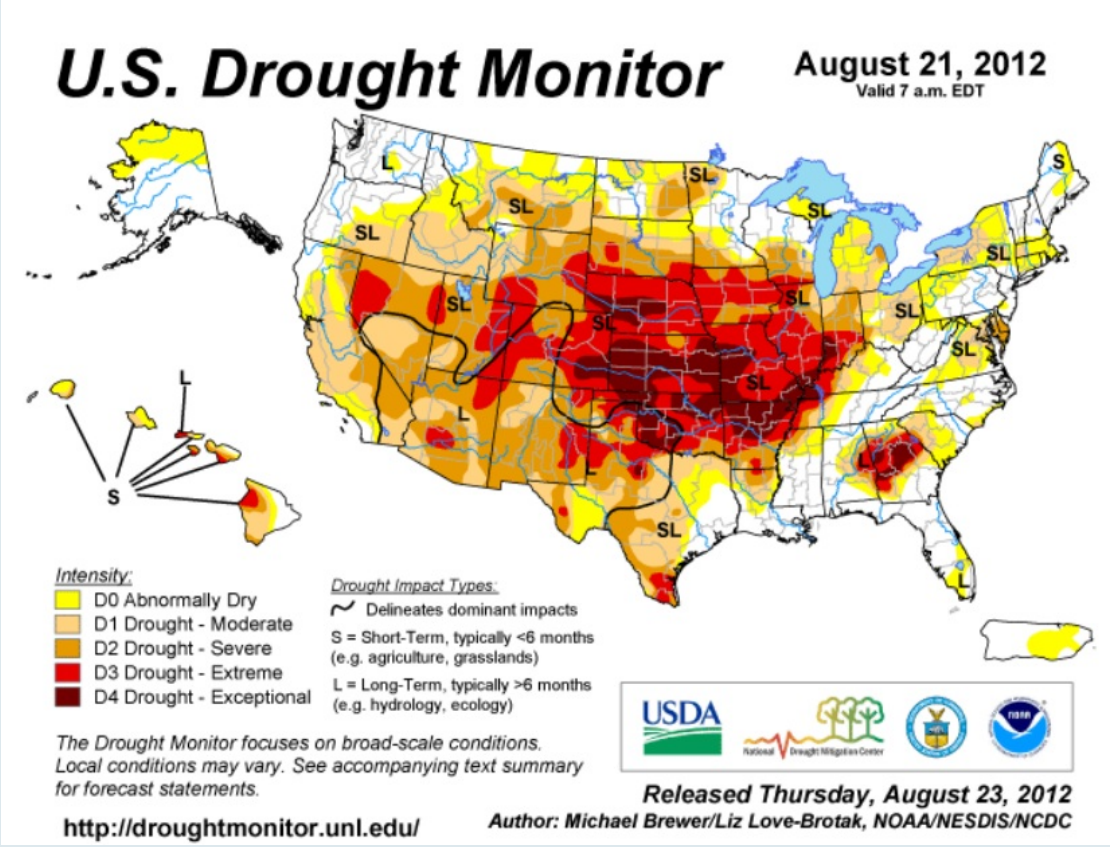
The Climate Hubs **website** serves useful information and resources split into 14 different topics, covering a range of areas from "Animals" to "Water". Each topic area is capable of being sorted by region of interest, to allow a land manager or researcher to quickly find the tools and information they care most about.

A great example of the valuable information found here is **this interactive, virtual tour** of a University of Maryland Eastern Shore (UMES) field research station - found under the "Water" topic. This virtual tour highlights work by UMES researchers to test the effectiveness of permeable reactive barriers on removing nutrients from shallow groundwater, and allows a unique view of the process connecting research and land management for stakeholders in the Chesapeake bay.

From the Midwest Climate Hub: Droughts and Nutrient Runoff

As drought conditions continue and are projected to worsen in portions of the western Mississippi River basin, it is important to consider the potential impacts on water quality. Laurie Nowatzke, coordinator for the Midwest Climate Hub, recently dug into the existing literature on the connection between droughts and nutrient runoff. She found numerous studies showing that the drought conditions in 2012, coupled with the wetter-than-average spring of 2013 resulted in high nitrate loadings.

One of these studies (**Ikenberry et al., 2014**) evaluated headwater drainages to the Des Moines River upstream of Des Moines, Iowa, and found that 2013's wet spring was associated with a substantial spike in nitrate yield. Another (**Tomer et al., 2019**), which focused on a National Wildlife Refuge in central Iowa, found the largest flow-weighted concentrations of nitrate came after droughts in 2006 and 2012, as "soil N that is mineralized during drought accumulates and is subsequently released as stream flow recovers from drought."



Drought conditions in the Mississippi River basin in 2012 were particularly widespread, and when followed with the wetter-than-average spring of 2013, led to measurable increases in nitrate loadings. (USDA)

The observed water quality impacts following the 2012 drought were not just limited to Iowa. **Van Metre et al., 2016** reported on anomalously high nitrate concentrations at numerous locations in Iowa and Minnesota, and **Pellerin et al., 2014** measured a large flush of stored nitrate on the lower Mississippi River at Baton Rouge, Louisiana in from the 2012 drought and 2013 flooding.

While there are currently no projections for how the current drought conditions might impact future nutrient loading or Gulf of Mexico hypoxia, it is good to be aware of the potential for future increases - especially if drought is followed by widespread flooding.

Nutrient Runoff News

Hypoxia Task Force Success Stories

Members of the **Hypoxia Task Force** are involved in many successful projects and programs aimed at reducing nutrient loads and improving water quality. This work is highlighted in a **StoryMap** presenting four themes: technology and practices to reduce nutrient pollution, strategies for success, monitoring and assessment, and funding/financing projects.

Two new stories feature Arkansas and Minnesota projects which have used Clean Water State Revolving Funds (CWSRF) to implement nonpoint source conservation/water quality improvement projects. Arkansas used CWSRF to develop their Septic Remediation Pilot Project, a service helping homeowners replace failing septic systems in two targeted priority watersheds. Minnesota used CWSRF funds to provide a reliable and sustainable funding source for implementing nonpoint source pollution control practices and projects which prevent, reduce, or eliminate a water quality concern as part of their AgBMP Loan Program.

'Smart Wetlands' Help Illinois Farmers Reduce Nutrient Runoff

A partnership between The Wetlands Initiative (TWI) and Ducks Unlimited (DU) is allowing Illinois farmers to **install 'Smart Wetlands'** which reduce nutrient runoff from agricultural fields. The Illinois River Watershed is one of the largest contributors to the Gulf of Mexico's dead zone, a large area of oxygen-depleted water caused by nitrogen and phosphorus runoff in the Mississippi River basin. Smart Wetlands, small, constructed wetlands

which use naturally occurring processes to remove excess nutrients from agricultural tile drainage, are able to treat runoff from hundreds of acres of drained cropland. Between 2016 and 2019, a single four-acre Smart Wetland in Walnut, Illinois was able to remove more than 7,200 pounds of nitrates, or up to 46 pounds per acre in the drainage area.

Smart Wetlands can help Illinois meet its nutrient reduction goals of reducing its phosphorus load by 25% and its nitrate-nitrogen load by 15% by 2025. (The Wetlands Institute)

$5M for Improving Water Quality in the Ohio River Basin

$5 million in **H2Ohio grant funding** will be directed to 13 wetland projects in 11 counties to help improve water quality in the Ohio River Basin. Each project will create wetlands, restore wetlands on hydric soils, and/or enhance water quality at existing wetlands and floodplains, with the overarching goals of addressing nutrient loading and contributing to water quality improvement in the Ohio River and its tributaries.

U.S. Plans to Double Cover Crop Planting

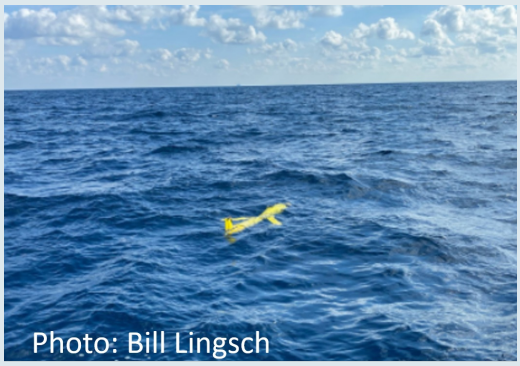
The U.S. plans on **doubling the country's cover crop plantings** to 30 million acres by 2030 under a new Department of Agriculture conservation program launched on Monday. The agency's Natural Resources Conservation Service will spend $38 million to help farmers in 11 states plant crops at a time fields are often left fallow, which can bolster soil health, limit soil erosion (and nutrient runoff) and capture and store carbon. Farmers and ranchers in Arkansas, California, Colorado, Georgia, Iowa, Michigan, Mississippi, Ohio, Pennsylvania, South Carolina and South Dakota will be eligible for incentives under the program, with goals for expanding in coming years.

Innovations in Monitoring

Addressing Water Treatment Challenges on the Maumee River

The city of Defiance, OH depends on the Maumee River for its drinking water, but high ammonia levels can make it difficult and expensive to treat the raw river water. A recent grant from NOAA's Great Lakes Observing System has made it possible to install a **new monitoring system** which gives continuous readings of ammonia and other nitrates in the river. This real-time information gives officials the ability to time the pumping of river water into the city's reservoir when nutrient levels are low, and reduces algal blooms in the reservoir and the need for chemical treatment.

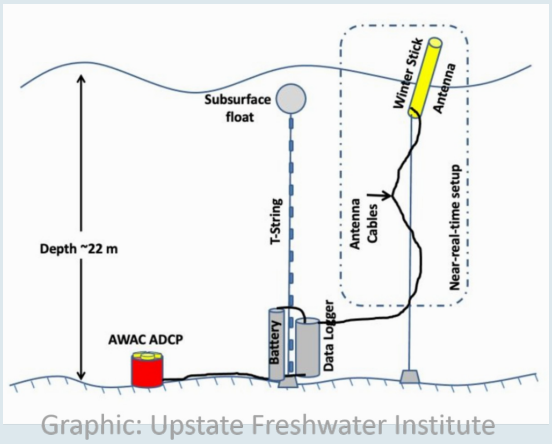
Gliders in the Gulf



A Slocum glider, an autonomous underwater vehicle which collects and transmits data, recently completed a **102-day, 2,387 mile mission** in the Gulf of Mexico designed to collect information to improve hurricane forecasting. This incredible trip tested whether the glider could navigate around Florida and up the East Coast successfully while gathering information about multiple marine systems — all during a single mission and while using minimal battery power and only buoyancy — no propeller or motor — to travel. Unlike research vessels, gliders can operate under hurricane wind conditions while conducting observations and transmitting data continuously; they can also operate 24 hours a day, seven days a week, gathering information at all times — providing much-needed data ahead of storms.

Since these types of gliders can efficiently collect and transmit data on water temperature, salinity, dissolved oxygen, conductivity, and other parameters, their uses are quite broad and are still being explored. In fact, NOAA's Integrated Ocean Observing System recently awarded The University of Southern Mississippi a 3-year grant to develop cost-efficient technology that will gather water-quality data throughout the water column using autonomous surface vehicles and deploy them in real-time.

Ice, Ice Baby (Problem? Yo, I'll Solve It)



Graphic: Upstate Freshwater Institute

Collecting real-time information on Great Lakes water conditions during winter has always been a challenge for researchers. For roughly one third of the year (December through March), any equipment left out must contend with quickly-forming and shifting ice, as well as storms that bring strong winds and waves. However, environmental monitoring data from this time of year are crucial for understanding lake processes and how they are changing. To solve this problem, a team from the Upstate Freshwater Institute led by engineer Dave O'Donnell have worked to build and test an **over-winter monitoring system** on Lake Ontario. Consisting of an acoustic wave and current profiler, a thermistor string composed of multiple temperature sensors at varying depths in the water column, an antenna running from the lake bottom to a float at the surface, and a modem and data logger for transmitting the data, this system has been sending real-time wave and temperature data multiple times each day since November 2021. Data such as these help the National Weather Service (NWS) provide small craft advisories for the lake, and provide months of previously non-existent verification data for the NWS wave model. The success of this monitoring system over the past few months may lead to more coverage across the Great Lakes, and a better understanding of winter-time conditions.

Jobs and Graduate Assistantships

EPA Nutrient Pollution Management Fellowship - apply by 5/31/2022

Postdoctoral Researcher - Ecology of Harmful Algal Blooms- apply by 6/1/2022

EPA Health Effects of Harmful Algal Blooms (HABs) Internship - apply by 5/26/2022

NOAA Postgraduate Fellowship in Algal Toxin Detection through Analytical Chemistry - apply by 6/1/2022

NOAA Postgraduate Fellowship in Algal Toxin Detection through Biochemical Methods- apply by 6/1/2022

Technician - Auburn University Marine Extension and Research Center - apply by 4/30/2022

More nutrient-, harmful algal bloom-, and hypoxia-related job opportunities and graduate positions can be found here.

Funding Opportunities

NOAA Funding - Actionable Science- Details to come June 2022

Upcoming Meetings

SECOORA 2022 Annual Meeting - June 8-9, 2022, in Atlanta, GA

NCRWN Climate Intersections Conference - July 12-14, 2022, in Duluth, MN

Gulf of Mexico Climate and Resilience Community of Practice Annual Meeting- October 4-6, 2022, in Sarasota, FL

Bays and Bayous Symposium - January 23-25, 2023, in Mobile, AL

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NOAA Regional Collaboration NETWORK

This bulletin is compiled by the NOAA Central Region Collaboration Team and Gulf of Mexico Regional Collaboration Teams nutrient runoff working group. Members represent Minnesota, Louisiana, and Mississippi-Alabama Sea Grant Programs, National Water Extension Program, Northern Gulf Institute, Mississippi State University, University of Minnesota Water Resources Center, North Central Region Water Network, NOAA National Center for Coastal Ocean Science, NOAA National Weather Service Forecast Offices and River Forecast Centers.

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NOAA Regional Collaboration: Improving NOAA's service to the Nation