

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

Sharing information and making connections from the headwaters to the gulf

April 9, 2024

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.

Spotlight: WaterAware - A NWS Hydrology Outreach Initiative

Flooding and drought are responsible for more fatalities and are more costly than any other weather-related phenomena. The best way to diminish damage to life and property due to these disasters is to provide education on flood safety, drought mitigation, and the science behind National Weather Service (NWS) river and flood forecasts. WaterAware does just that by serving as the new NWS hydrology outreach program for ages K-adult.

The initiative supports a water-ready public with outreach materials spanning the temporal scales of water resource issues; from flash flooding, flood inundation, and dam breaks to drought, snowmelt runoff, and water supply.



WaterAware consists of a group of on-demand NWS hydrology outreach representatives who can be scheduled for in-person or virtual educational sessions. It offers a variety of high-quality hydrology and water resources materials and activities that are tailored to each age group all the way up to adults.

The WaterAware program is more than just educational outreach sessions. Additional subgroups handle topics such as the recruitment of NWS hydrologists, minority outreach and recruitment, and graphic design of the materials. Scan the QR code on flier (below), use this [link](#), or email amanda.roberts@noaa.gov or belkys.melendez@noaa.gov for more information or to schedule a session.



WATERAWARE

A National Weather Service Hydrology Outreach Initiative



HYDROLOGY & Water Resources Educational Programs

Junior Hydrologist

Ages 12-18

Register anytime!
Attend 4 sessions in
6 Months for a certificate!

Choose from topics like:
River Basics
Floods & Flood Safety
Drought
Water Supply
River Forecasting
Flash Flooding
Dams and Dam Breaks
And Much More!

Hydro Hotseat

Ages 12-Adult

Learn about all the tools hydrologists use to forecast rivers, then become the forecaster yourself with our Hydro Hotseat forecaster simulation!

You'll use a real-life flooding case study to forecast river stages!

Individual Sessions

Any Age, K-Adult

Select from topics like:
River Basics
The Water Cycle
Floods & Flood Safety
Drought
Water Supply
Dams and Dam Breaks
Flash Flooding
Probabilistic Forecasting
Ice Jams/Snowmelt
River Forecasting
And Much More!

Virtual and In-Person Sessions!
Questions?

Email amanda.roberts@noaa.gov or
belkys.melendez@noaa.gov

A flyer for WaterAware, the National Weather Service hydrology outreach initiative, highlighting the variety of hydrology and water resources educational programs offered to the public. (National Weather Service)

Outlooks and Forecasts

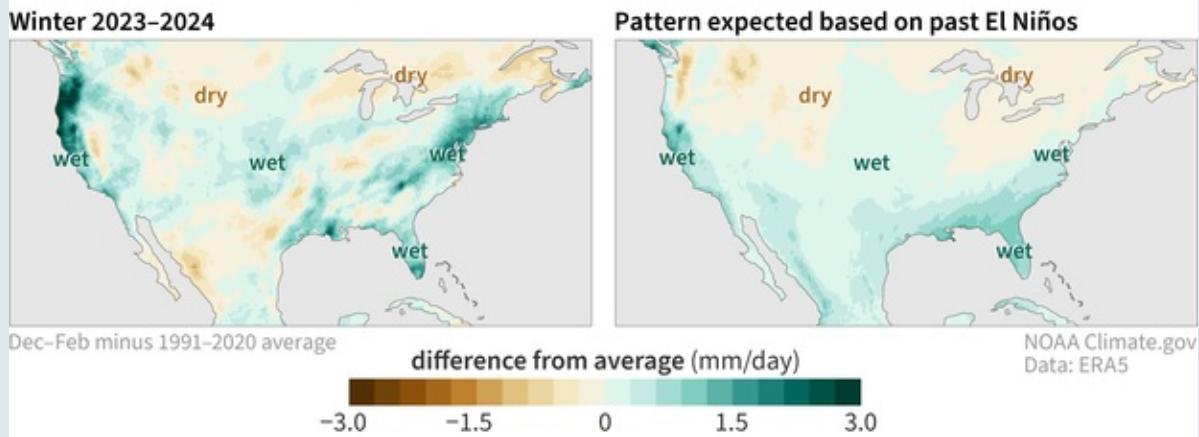
El Niño/La Niña - A Change is Coming

A strong El Niño occurred over this past winter, impacting the pattern of precipitation across the continental U.S. as the shifting jet stream brought wetter conditions to the southern tier, especially in California and the southeastern U.S. While much of this winter's precipitation lined up with the expected El Niño pattern, the Pacific Northwest and Northeast were much wetter than expected, while portions of the south were drier than observed during past El Niños.

As we move into spring, forecasters expect El Niño to transition over to neutral conditions, with a 62%

[chance of moving into La Niña by June-August](#). Similar to El Niño, La Niña affects global temperature and precipitation patterns. During summer and early fall, La Niña can be a contributing factor in the Atlantic hurricane season. By reducing wind shear, La Niña can make it easier for hurricanes to strengthen. NOAA's hurricane outlook comes out in May, so we'll know more then about how La Niña, ocean temperatures, and other factors are likely to affect hurricane activity this season.

How well did winter precipitation match the typical El Niño pattern?



The precipitation difference from average for this past winter (left; Dec-Feb 2023-24) and the geographic pattern of precipitation we'd expect for this past winter based on El Niño winters from 1952-2022 (right). The precipitation pattern for this past winter is a reasonably good match for the El Niño pattern. (NOAA Climate.gov image, based on analysis by Nat Johnson)

[NOAA Issues Spring Outlook](#)

The National Oceanic and Atmospheric Administration (NOAA) just issued its [2024 Spring Outlook](#), highlighting weather, drought, and flood predictions for the April through June period. Key takeaways include above average temperatures forecast for most of the continental U.S. and Alaska, and a lower-than-average flood risk for the entire country partly due to historically-low snowfall in the Upper Great Plains and western U.S. "This is the first Spring Outlook since 2021 with no population expected to be impacted by major flooding," said Ed Clark, director, NOAA's National Water Center. "Of growing concern will be the potentially low flows on the Mississippi River this summer into fall due to well-below snowpack and precipitation in most of the Northern Plains and Midwest. This could have potential impacts on those navigation and commercial interests that depend on water from the Mississippi River."

Nutrient Runoff News

[UMRBA 2023 How Clean is the River? Report](#)

The Upper Mississippi River Basin Association (UMBRA) released its 2023 [How Clean is the River?](#) report in January. With the aim of understanding water quality trends in the Upper Mississippi River Basin, this report includes water quality data and analysis from 1989 to 2018. Here are some of the key findings related to nutrients:

Phosphorus continues to decline in the Upper Mississippi River System largely due to successes from nonpoint source such as soil health management. Reduction measures at point sources throughout the System have also led to these improvements. Ammonia, a fraction of total nitrogen, is also generally decreasing. Ammonia can be toxic to aquatic life.

These are important improvements in water quality because excess nutrients cause algae overgrowth,

which can harm water quality, food resources, habitat, and decrease oxygen concentrations, all which have an effect on aquatic life and outdoor recreation opportunities.

Excess nutrients in the river originate from various sources, including agriculture, stormwater runoff, and wastewater. Achieving nutrient reductions requires a multifaceted approach.

Even with these successes, work remains to further reduce nitrogen and phosphorus loading to the Gulf of Mexico Hypoxic Zone. Overall the nitrogen trend is weak in confidence, but there are select areas in the System that are increasing and decreasing in concentration (see the Report for additional details). Nitrogen originates from nonpoint sources, such as urban and agricultural runoff, or pollution runoff from a broad area. The Hypoxic Zone receives attention nationwide because of its low oxygen levels—conditions that are not suitable for aquatic life to survive. Local problems with excess nutrients cause the overgrowth of algae and result in diminished recreational opportunities.

This report follows the first How Clean is the River? report released in 1989, and underscores the value of coordinated and comprehensive water quality monitoring in the Upper Mississippi River Basin. (*Image: The Upper Mississippi River Basin Association represents member states of Illinois, Minnesota, Missouri, and Wisconsin. UMRBA.org*)



Fact Sheet: HABs and Their Health-Related Effects on Animals



Cyanobacterial harmful algal blooms (HABs) occur when naturally-occurring cyanobacteria grow in excess, often due to warm temperatures and nutrient runoff. Some of these HABs can produce toxins poisonous to humans and animals. A [new fact sheet](#) focuses on the effects of these HABs and their toxins on animals. It describes what to watch out for in surface waterbodies, signs of toxicity in animals, gives tips for domestic animal exposure and livestock exposure, and provides information on what you can do if you notice HABs occurring or if you suspect an animal has been poisoned. Contact information is included for the national Poison Control line, and state contacts are also listed for those states in the North Central region of the U.S. This new fact sheet was developed by the Algal Bloom Action Team, a collaboration of water professionals, researchers, and educators from the national network of Water Resources Research Institutes, the North Central Region Water Network, and Cooperative Extensions from the 12 states in the North Central Region of the U.S. (*Image: Axel, a 16 month-old black lab was swimming in a river, downstream from a reservoir experiencing a HAB event. Axel later collapsed and was taken to a veterinarian. Despite treatment, Axel died five hours later. Photo courtesy of his owner, Jerry Benedick via KVAL.com*)

Photo courtesy of his owner, Jerry Benedick via KVAL.com)

Axel, a 16 month-old black lab was swimming in a river, downstream from a reservoir experiencing a HAB event. Axel later collapsed and was taken to a veterinarian. Despite treatment, Axel died five hours later.

River Runner - Track the Path of a Raindrop Anywhere in the World

A team of US scientists and developers have come out with a global map allowing you to track the progress of a raindrop from where it lands anywhere in the world to its ending point, such as a lake or ocean. This [global version of River Runner](#) simulates the path a raindrop would take, assuming runoff into a stream and from there to a terminating location, and is an open source tool based on open data and open source software components. The tool's visualization was developed by Sam Learner, while Dave Blodgett, Kyle Onda, and Ben Webb developed the back end to demonstrate how open data, open source software, and open standards can be leveraged to create innovative water information products and applications. To learn more about this open source tool, such as how to download its hydrologic data, [click here](#).

Reduced Tile Drainage in the Midwest?

Some Midwest states [reported a reduction](#) in acreage of

subsurface tile drainage for the period between 2017 and 2022, according to newly-released 2022 Ag Census data. Subsurface tile drainage is a widespread agricultural practice in the Midwest that helps to drain soil that otherwise would be too wet for farming. In some cases without drainage, crop production could be much lower and soil compaction could occur if field operations occur on wet soil. Drainage can also improve nitrogen use efficiency, leading to less nitrogen fertilizer input. On the other hand, this practice can lead to less groundwater recharge, speed up the loss of soil organic matter, and even increase phosphorus transport into local waterways.



From 2012 to 2017, all Midwest states reported an increase in tile drainage, and the total area drained increased from 40.1 million to 50.4 million acres. From 2017 to 2022, six Midwest states (IA, MO, IL, IN, OH, and MI) showed a reduction in acreage of subsurface tile drainage, and the total area drained in Midwest decreased from 50.4 million to 48.1 million acres. A reduction in tile-drained area was not expected, especially with increasing frequency of high-intensity rainfall, and there are a few potential explanations for this unexpected Ag Census result: The response rate for the Ag Census dropped from 71.8% in 2017 down to 61.0% in 2022, and the coefficient of variation (a measure of uncertainty) rose from an average of 7.0% in 2017 to 14.9% in 2022. As well, there was a reduction in acreage of cropland harvested throughout the Midwest between 2017 and 2022, which might have played a role in this unexpected reduction of reported tile drainage. (Image: Water flows out of a tile drain and into a nearby ditch in Indiana. Although draining waterlogged fields improves crop growth, drainage water can carry excess nutrients. J. Frankenberger)

Assessing the Impacts of Climate Change on Midwest Agriculture

The U.S. Department of Agriculture's Midwest Climate Hub has [developed agricultural vulnerability assessments](#) for each state in the region. These assessments provide historical climate change from 1979-2021 as well as projected changes under future greenhouse gas emissions scenarios. They also lay out impacts of these changes (historical and projected) on agriculture in the Midwest, and describe considerations for how farmers can adapt to these impacts. Climate metrics presented in these assessments include temperature, precipitation, and humidity. These state by state assessments are currently available for Illinois, Minnesota, and Wisconsin, and assessments for the rest of the states in the Midwest (Indiana, Iowa, Kentucky, Michigan, Missouri, and Ohio) will be available soon.

Floating Flowers to Mitigate Nutrient Pollution

New research indicates growing flowers on floating rafts is a promising, nature-based solution to nutrient pollution. Florida International University (FIU) post-doctoral scientist Jazmin Locke-Rodriguez describes how the process works in [this video](#).



Marigold flowers floating on an inexpensive foam mat and growing in nutrient polluted water. Flowers grown in these conditions were found to remove significantly more phosphorus and nitrogen than in water without flowers (Jazmin Locke-Rodriguez).

Inspired by agricultural practices of Indigenous Americans, this study tested the idea of growing cut flowers on floating rafts as a way to remove excess nutrients from waterways. Flower seedlings, including zinnias, sunflowers, and giant marigolds, were grown in 620-gallon outdoor test tanks in water with high concentrations of nitrogen and phosphorus over a 12-week period. The FIU researchers found 52% more phosphorus and 36% more nitrogen were removed from tanks with floating flowers than from untreated tanks. This research is being scaled up to show how floating cut-flower farms could be a sustainable option for mitigating nutrient pollution. [Click here](#) to find out more.

New NWS Website for Water Forecast Services

The National Weather Service (NWS) [has released a new experimental website](#), called the National Water Prediction Service, as a gateway to the agency's water data and forecast information. This new website centralizes data from the NWS Advanced Hydrologic Prediction Service and the Office of Water Prediction, and is intended to be mobile-friendly, modern, efficient, and aims to allow users the flexibility to make critical decisions with regard to water.

Empowering The Next Generation of Ecologists in the Southeastern US

A new project called Woods to Water (W2W) [has been launched](#) to help early career scientists understand linkages between terrestrial and aquatic ecosystems. This \$3M initiative is funded by the National Science Foundation and guided by a team of researchers led by the University of Alabama. W2W participants will have the opportunity to blend classroom learning with field work, lab work, and research in order to build ecological expertise and confidence. W2W cohorts will also have chances to share their research and earn certification as ecologists. As part of the program, they will also receive an annual stipend support of \$32,500, an allowance for health insurance and reduced-cost housing. Three cohorts of participants will each have a year-long training, with the first cohort starting in May 2024. More information about applying can be found on the [W2W website](#).



A New Tool for Visualizing Precipitation Data (CoCoRaHS)

The Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) is a non-profit, community-based network of volunteers working together to measure and map precipitation in all fifty states. As precipitation is quite variable over small distances, the measurements taken by these volunteers allow us to see this variability and better understand precipitation patterns. Thanks to a grant from NOAA's Office of Education and donations from CoCoRaHS observers and supporters, a new [CoCoRaHS Data Explorer](#) has just been released. This tool includes both past and current observations from across the country, and allows users to explore how patterns of precipitation are changing. Anyone can search for particular stations by map, or filter for stations that have collected data consistently over a certain period of time. The data collected by volunteers have a range of uses, and this new data explorer intends to provide the public easy access to this data using innovative data visualization.

Funding Opportunities

[NOAA Restore Funding - Long Term Trends in the Gulf of Mexico Ecosystem](#)- Submission deadline August 22, 2024; Public information webinar April 11, 2024 ([register here](#))

[Inflation Reduction Act Community Change Grants Program](#) - Submission deadline November 21, 2024

[NOAA Planet Stewards 2024/2025 Funding Opportunity \(up to \\$5,000\)](#) - Submission deadline June 2, 2024

Jobs, Fellowships, and Graduate Assistantships

[Farmers Helping Hellbenders Outreach Internship](#) - Corydon or Salem, IN; application deadline April 12, 2024

[EPA Integrated Environmental Modelling Fellowship](#) - Research Triangle Park, NC; application deadline April 26, 2024

[Postdoc Research Associate in Climate-Smart Strategies and Impact on the Biogeochemistry of Bioenergy Crops](#) - Vernon, TX; application deadline May 1, 2024

[Postdoc Research Associate in Remote Sensing and Sustainability](#) - Madison, WI; application deadline May 1, 2024

[LSU Master's Assistantship](#) - Baton Rouge, LA; application deadline May 13, 2024

[Postdoc Research Associate in Forest Hydrology and Biogeochemistry](#) - Starkville, MS; application deadline May 31, 2024

[PhD Student Position in Nitrogen Information Systems](#) - Frostburg, MD; application deadline June 28, 2024

[PhD and Master's Assistantships in Aquatic Ecology and Harmful Algal Blooms](#) - Auburn, AL; application deadline August 1, 2024

[Gulf Ecosystem Initiative Postdoc](#) - Santa Barbara, CA; application deadline September 30, 2024

[NOAA Student Opportunities Database](#) - For students of any level (grade school through graduate school, even recent graduates), this database includes one-day events, summer internships, multi-year fellowships, and more!

Upcoming Meetings and Events

[Webinar: Phosphorus Management and Water Quality](#) - 2:00 PM CDT, April 10, 2024

National Marine Educators Association Conference - July 28 - August 1, 2024 in Boston, MA

2024 Gulf of Mexico Climate and Resilience Community of Practice Annual Meeting - April 23-25, 2024
in Moss Point, MS

Nutrient Runoff Quiz!

Are you an expert on nutrient runoff, harmful algal blooms, and hypoxia?
Test your knowledge with our trivia quiz!

CLICK HERE : Nutrient Runoff Quiz - April 2024

2024 Leaderboard

*Kristen Laursen (NOAA) - 8 points total
Kelly Drinnen (NOAA) - 8 points total
Brian Astifan (NOAA) - 8 points total
Jeff Meyers (NOAA) - 8 points total*



Runoff from a timber-harvested plot enters a headwater stream in north central Louisiana (Abram DaSilva).

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