Testimony of the Upper Mississippi River Basin Association
Regarding the
Resilience of the Upper Mississippi River System

Submitted to the
House of Representatives
Select Committee on the Climate Crisis

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Chair Kathy Castor, Ranking Member Garrett Graves, and members of the Select Committee, I appreciate today's opportunity to underscore the value of investing in both the economic vitality and ecological integrity of the Mississippi River. The Governors of Illinois, Iowa, Minnesota, Missouri, and Wisconsin formed the Upper Mississippi River Basin Association (UMRBA) to foster interstate water resource planning and management, to facilitate dialogue and cooperative action, and to serve as an advocate of the states' collective interests. Through their steady, 40-year commitment to UMRBA, the states have worked diligently with federal partners and stakeholders to advance multi-use management of the river. Acknowledging the complex nature of the river system and array of human uses, UMRBA has always held that river management requires thoughtful and inclusive dialogue among the diverse suite of stakeholder representatives throughout the region.

The river is both a multi billion dollar economic engine and a treasured ecosystem abundant with fish and wildlife – generating revenues in excess of $600 billion annually and supporting over 1.86 million jobs in manufacturing, agriculture, tourism, recreation, navigation, and energy sectors. The river also provides an irreplaceable water supply source for citizens and industries throughout the Midwest. The system of locks and dams provides for the movement of low-cost goods that are essential to a strong national economy: gravel, fertilizers and agricultural commodities, salt, and energy products. The river also supports a $55 billion tourism and recreation industry built upon the serenity and adventure of the river's landscape and abundant opportunities for fishing and hunting.

Substantial changes in land use throughout the Upper Mississippi River watershed compounded with climate-driven shifts in precipitation are threatening public safety and critical infrastructure, impeding the safety and reliability of commercial navigation, limiting the economic resilience of communities, industries, and agriculture, and degrading fish and wildlife habitat in the river floodplain.

- In 2019 alone, the greatest volume of water flowed on the Upper Mississippi River through St. Louis in recorded history. Damages occurred from levees overtopping, uncontrolled underseepage (i.e., sand boils), interior flooding behind levees, and saturated soils reducing yields. Prolonged flooding conditions shortened the 2019 shipping season and subsequent sediment disposition constricted the navigation channel, resulting in a reduction of approximately 30 percent in tonnage shipped on the river compared to 2018 and of 25 percent compared to the 10-year average.

- The fourth National Climate Assessment reports that annual precipitation in the Midwest has increased from a rate of five percent to 15 percent from the first half of the last century (1901 to 1960) compared to present day (1986 to 2015). It estimates that winter and spring precipitation, which is more important to flood risk on the Upper Mississippi River, will increase by up to 30 percent by the end of this century. This includes more frequent heavy precipitation events. This increase in precipitation will directly result in rising river discharge. At Lock 3, Minnesota DNR estimates that the discharge conditions of the 1960s will double by 2060 if the calculated rate of change from 1960 to 2020 continues until 2060.
- The National Climate Assessment acknowledges that human activity is not a major component of past drought occurrences in the Midwest, and that it remains uncertain how droughts will behave in the future. However, the Assessment suggests that Midwest surface soil moisture likely will transition from excessive levels in spring due to increased precipitation to insufficient levels in summer driven by higher temperatures.

UMRBA's premise for its ongoing work to enhance ecological and economic resilience to climate change is that regional science, regional collaboration, and regional planning will lead us towards regional resilience.

Regional Science Will Inform Regional Planning

In 1978, UMRBA's predecessor federal-state Commission established science and monitoring as a fundamental priority for the Upper Mississippi River – at basic level, to comprehend the status and trends of the river's ecological characteristics. With over 30 years of continuous monitoring through the Upper Mississippi River Restoration program, we are armed with the best information on any large river system in the world. We are now able to quantify the resilience of the Upper Mississippi River ecosystem – in other words, its capacity to absorb disturbances and sustain its fundamental ecological characteristics to support abundant and diverse fish and wildlife habitat.

The Upper Mississippi River Restoration program[1] has studied the accumulating data to develop a broad base of understanding that is invaluable to its restoration practitioners. But I will highlight some examples of we have learned from that work and some questions that will benefit from continued monitoring and research.

We know that:

- On a 44-mile stretch of the river between Minnesota and Wisconsin (Pool 4), climate change coupled with land use changes is causing a shift in annual spring flood pulse to a relatively steady state of high water with the high flood peaks in summer. Long term monitoring shows that this is disrupting important relationships in the food chain. For example, zooplankton flourished in the slow river current in June, coinciding with paddlefish migration to the area. Nearly all local larval fish species and adults of some fish species depend on zooplankton as a food source. High and fast water conditions in early summer wash away zooplankton – that important food source.

[1] The Upper Mississippi River Restoration program, authorized by Congress in 1986, uniquely and effectively combines ecosystem restoration with scientific monitoring and research to improve fish and wildlife habitat on the Upper Mississippi River. The U.S. Army Corps of Engineers (USACE) has the ultimate responsibility for managing and executing UMRR-EMP, while the U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS), UMRBA, and the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin have their own specific responsibilities for implementing UMRR. Other federal agencies, nongovernmental organizations, and industry groups are also actively involved in UMRR implementation.

- Forest managers and scientists are also observing that high water conditions extending into summer are causing significant harm to the river's floodplain forests, with the forests' resilience is starting to fail. New hardwood trees are unable to establish and mature, leaving significant gaps in the forest canopy.
- Several consecutive years of more typical (lower) river flows can facilitate an ecological shift back to healthier conditions – allowing a regrowth in vegetation that then triggers a rebound in water quality and native fish. This illustrates the river's ability to be resilient to periods of sustained high water.

Continuing this long term monitoring will allow for making scientific observations about how the climate is affecting the river ecosystem and how species might use the Mississippi River's longitudinal orientation to adjust their respective ranges to their advantage. What changes in the ecosystem can we expect if the current shift to more water more of the time continues? How can we sufficiently build resilience in the ecosystem while working with the river's dynamic nature?

We also know that water – the amount flowing through the river, the duration it remains high or low, the rate of change between high and low levels as well as sediment and nutrients also greatly influence the river's economic resilience and the ensuing social impacts. We want to use science to inform solutions to these challenges that also consider the social and economic dimensions of various problems and alternatives. There are ongoing efforts that will substantially enhance our prediction and planning capabilities, of which I will name a few:

- The U.S. Army Corps of Engineer's development of a two-dimensional HEC-RAS model[2] and updates to flow frequency profiles[3]
- The U.S. Geological Survey's Illinois River Basin Next Generation Water Observing System[4]
- NOAA's Atlas-14[5] model improvements and other climate prediction tools as well as its National Integrated Drought Information System[6]

Regional Collaboration Will Advance Regional Planning

Major river systems like the Mississippi River require a sense of unity and a shared commitment to solutions among residents, communities, and businesses who live and operate within the river floodplains. Unity requires an appreciation of neighbors and conflicting interests and common knowledge of the resources and the problems and opportunities. It also requires having a shared vision for the future and a plan to achieve that future.

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[2] U.S. Army Corps of Engineers Upper Mississippi River System Hydraulic Model web page: https://www.mvr.usace.army.mil/Missions/Flood-Risk-Management/UMRS-Hydraulic-Model-Update/

[3] U.S. Army Corps of Engineers Upper Mississippi River System Flood Frequency Study web page: https://www.mvr.usace.army.mil/Missions/Flood-Risk-Management/Upper-Mississippi-Flow-Frequency-Study/

[4] U.S. Geological Survey Illinois River Next Generation Water Observing System web page: https://www.usgs.gov/mission-areas/water-resources/science/next-generation-water-observing-system-illinois-river-basin?qt-science_center_objects=0#qt-science_center_objects

[5] National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation Frequency Data Server: https://toolkit.climate.gov/dashboard-noaa-atlas-14-precipitation-frequency-data-server

[6] National Oceanic and Atmospheric Administration (NOAA) National Integrated Drought Information System (NIDIS) web page: https://www.drought.gov/

While local planning is important to the unique characteristics and resources of each individual river community, the interconnectedness among stakeholders from the southern tip of Illinois to the Twin Cities in Minnesota and everywhere in between calls for regional planning. Communities – people and business, river uses and users – on the Upper Mississippi River are inextricably linked. They share mutual experiences living and working alongside the dynamic river-floodplain. And, the actions of one affect the other.

Disaster events in the Midwest are typically regional events. Floods and droughts typically span a large geographic area with water resource management having implications far beyond a local community both upstream and downstream. Disaster-related mitigation, risk reduction, emergency response, and recovery can have profound, systemic implications regionally.

Achieving resilience will reside in our ability to work together and to find science-based solutions that consider the individual, community, and regional implications. We need to acknowledged that the discourse will be contentious at times and will always remain challenging. The issues are personal and involve people's families, homes, and livelihoods. UMRBA is committed to a transparent, objective, and inclusive process that involves developing informed consent to that process and to the ultimately shared solutions.

The complex array of human uses and interactions on the Upper Mississippi River will make obtaining informed consent inherently challenging. But, as indicative of the past, doing so will lead to solutions that are carried forward for decades and that result in sustained multi-purpose management.

Regional Plans and Coordinated Action Will Result in Regional Resilience

The region benefits from a deeply rooted partnership among federal, state, local, and nongovernmental interests as well as community leaders. Through our predecessors' foresight and commitment to integrated management, we are gifted with robust solutions for adapting to, and mitigating, the effects of climate change. Today, I would like to elaborate on two ongoing efforts in the Upper Mississippi River, discuss the benefits of nutrient reduction strategies in the watershed, and present the basin states' priorities for resilience planning.

The Upper Mississippi River Restoration program has restored over 100,000 acres of the river's natural mosaic of braided channels and backwaters, increasing the quantity, quality, and diversity of habitat available for a wide range of fish and wildlife. Learning from past experience, islands are constructed with the right topography to restore healthy hardwood forests by keeping the trees drier during more frequent and longer floods. It will continue to expand our understanding of the complex dynamics and interactions among various ecosystem characteristics and watershed drivers.

The Navigation and Ecosystem Sustainability Program[7] is a comprehensive and integrated plan for meeting current and future shipping demands, stimulating economic growth, and improving the health and resilience of the river ecosystem. The new locks would enable the standard tow to pass without separating its barges, allow for two-way traffic, and prevent a shutdown of all riverine transportation during times of routine maintenance.

[7] The Navigation and Ecosystem Sustainability Program (NESP) was authorized by Congress in 2007 to construct new 1,200-foot locks at Lock and Dams 20, 21, 22, 24, and 25 on the Upper Mississippi River and at La Grange and Peoria on the Illinois Waterway; small-scale navigation efficiency projects such as switchboats at Locks 20-25, mooring cells at Locks 14, 22, and La Grange and a guidewall extension at Lock 22; and comparable ecological restoration funding to address the effects of the lock and dam system and related impacts.

These improvements will address the navigation system's longstanding infrastructure needs, ensure its resilience as well as improving the resilience of the nation's multi-modal surface transportation network. NESP will improve conditions for fish and wildlife through modified dam operations to restore natural river level variability, protect wetlands and lakes from fluctuating water levels and high sedimentation, restore forest health and diversity, recreate islands to provide refuge and food for many species of fish and wildlife, and restore natural diversity of water velocities and depths to improve fish habitat. Collectively, these restoration activities will help ensure that thousands of species of birds, fish and other wildlife continue to thrive within a changing climate.

We respectfully request continued support for the Upper Mississippi River Restoration program and construction funding for the Navigation and Ecosystem Sustainability Program.

The health, function, and viability of the mainstem Mississippi River reflects the performance of the watershed as a whole. It is widely acknowledged that actions must be taken in the watershed to reduce the challenges in the river. While important strides in conservation practices and point and nonpoint source loading reductions have been achieved, attaining the goals we have collectively set for reducing nutrient loading through the 2008 *Gulf Hypoxia Action Plan*[8] will require acceleration of its implementation. We respectfully request an increase in federal support for the ongoing implementation of the states' nutrient reduction strategies, including improving the utilization of existing programs while also dedicating resources specific to fulfilling the 2008 Action Plan.

And, finally, UMRBA is bringing together those who live and work in the floodplain for the purposes of increasing resilience of the Upper Mississippi River to major flood events, prolonged drought, and excessive sediment by fostering dynamic, balanced, objective, and adaptive approaches management in a multi-purpose management context.

As the Governors' joint interstate collaborative, UMRBA is serving as the convening entity for collective action among federal partners, localities, academic institutions, and stakeholders. While we continue to advance actions to improve knowledge, address policy limitations, obtain resources, and secure working agreements, UMRBA's specific objectives for long term resilience planning are to:

1) Develop an integrated, comprehensive, and systems-based plan to minimize the threat to health and safety resulting from flooding by using structural and nonstructural floodplain management measures
2) Develop new, or renew existing, comprehensive long-term channel management plans that are sustainable, cost-effective, and ecologically sensitive
3) Develop mitigation strategies for multi-year drought events that would increase the resilience of communities and economies adjacent to, or dependent on, the Upper Mississippi and Illinois Rivers

Resilience planning on the Upper Mississippi River will be inherently shaped by, and will need to build upon, a tremendous and complex history of Upper Mississippi River management. We will benefit from the rich history of multi-jurisdictional cooperation, pulling from the unique strengths of our federal partners and other public and private stakeholders.

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[8] Hypoxia Task Force 2008 Gulf Hypoxia Action Plan: https://www.epa.gov/sites/production/files/2015-03/documents/2008_8_28_msbasin_ghap2008_update082608.pdf

UMRBA applauds this Committee's focus on creating a national dialogue around climate change and on finding and investing in sound solutions. We believe that the science, collaboration, and planning on the Upper Mississippi River can serve as a model for other regions of the country and other floodplain systems across the world. We would appreciate an opportunity to continue working with you.

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