LOWER MINNESOTA RIVER
WATERSHED DISTRICT

Executive Summary for Action

Lower Minnesota River Watershed District Board of Managers Meeting
Wednesday, January 17, 2024

Agenda Item
Item 4. A. – Presentation by Len Kremer

Prepared By
Linda Loomis, Administrator

Summary
At the December Board of Manager meeting the Board received and filed a request from Mr. Len Kremer to make a presentation to the Board at its January 2024 meeting. Mr. Kremer will be present at the January Board meeting along with others from the Minnesota River Collaborative to make a presentation detailing work they have been engaged in.

The presentation has been provided to the LMRWD ad is attached for the Board's information. Additional information provided by the Collaborative is also attached.

Attachments
Additional Information from the Minnesota River Collaborative
PDF of the Power Point

Recommended Action
No action recommended

Additional Information

Brief Resume of Speakers

Len Kremer

Lori Cox

Suzanne Jiwani

Related Topics

Minnesota River Watershed Drainage Collaborative

Cumulative Effect of Agricultural Land Use and Artificial Drainage

Economic Impacts of Minnesota River Watershed Hydrologic Change

Lower Minnesota River Watershed Unique Resources

Testimony on Behalf of S.F. 3044, Scott Sparlin-Water Storage Legislation

News Articles

"Restoration work to prevent river flooding at Minnesota Valley National Wildlife Refuge".

"Gulf of Mexico 'dead zone' predicted to be twice the size of national goal. Again"

"America's largest water highway is in trouble, ominous for Midwest grain farmers".

Len Kremer

Consulting Water Resources Engineer, 1968-2018

Vice President, Senior Water Resources Engineer

Directed Preparation of Flood Insurance Studies for 75 Cities and Counties in Minnesota, North Dakota

Technical Advisor to Bassett Creek Water Management Commission, 1975-2017

Directed Design of the First Corps of Engineers Urban Flood Control Project for City of Minneapolis

Technical Advisor to the MDNR on the Reserve Mining Tailings Disposal Litigation

Technical Director, Hennepin County Solid Waste Disposal, EIS, 2008-2010

Water Resource Technical Advisor, Minnetonka, Lakeville, Minneapolis, Golden Valley

Citizens Advisory Committee, Minnesota River Total Suspended Solids, Total Maximum Daily Load Study, MPCA 2012-2015

Minnesota River Collaborative 2018-Present

Technical Review of Agricultural Drainage Improvement Projects

Planning of Storage Alternatives for Agricultural Drainage Improvement Projects

Technical Advisory Committee Member of BWSR Drainage Work Group

Lower Minnesota River Watershed District, 2003-2016

LMRWD President

Izzak Walton League Minnesota Division,1968-Present

Lori D. Cox

Owner/Operator Roots Return Heritage Farm LLC (MN) 2014-present

Diversified organic practices food farm (fruit, veg, herb)

Land and crop access leasing to new/emerging and BIPOC food farmers

Legislative Advocate for new/emerging farmers/natural farming systems/environment/human health

Panel and Conference Speaker, Consultant

Sr. Technical PM, Corporate Consultant 1996-2012

Royal Bank of Canada/Dain Rauscher (MN & WA)

J.P. Morgan Chase/Washington Mutual (WA)

ING Capital/Sharebuilder Corporation (WA)

Revel Consulting (WA)

Landscape Office Manager/Salesperson

The Nature Group 1995-1996

B.A Political Science, minor History 1994 – University of Minnesota

Board of Water and Soil Resources (BWSR) Citizen Representative – Board Director 2023-present

MN Ag Water Quality Certification Program - Advisory Board (MDA) 2019-present

MN Institute for Sustainable Agriculture (MISA) at UMN – Board Director 2019-present

Carver County Water Management Organization - Advisory Board 2019-present

Minnesota River Collaborative Member 2022-Present

Climate Land Leaders Member 2022-present

Carver County SWCD Outstanding Conservationist Award 2017

NACD Soil Champions Network

UMN CFANS Mentor, Volunteer

UMN Scholarships Donor (Undergrad and Grad)

UMN Bee Lab Sponsor

Suzanne Jiwani

Minnesota Department of Natural Resources, Floodplain Mapping Engineer 2001-2023

Updated NFIP floodplain mapping and supporting technical data for 90% of Minnesota

Secured $8 million in FEMA grants for updated flood mapping and manage grants

Establish risk-based priorities for statewide floodplain mapping and strategies for implementation

Provide technical expertise in hydraulic and hydrologic analysis and modeling, including management of the work of advance professional staff

Barr Engineering, Water Resources Engineer 1975-2001

Prepare hydraulic/hydrologic engineering flood studies for Minnesota and North Dakota

Prepare dam failure hydraulic/hydrologic analyses in Minnesota and Wisconsin

Managed projects to clean up groundwater contaminated by industrial waste

Education/Certification

Master of Science in Water Resource Engineering, Colorado State University 1981

Bachelor of Science in Civil Engineering, University of Minnesota 1976

Professional Engineer, State of Minnesota

Awards/Recognitions

Member, Minnehaha Creek Watershed District Citizens Advisory Committee

Member, Isaak Walton League

Larry Larson Meritorious Lifetime Achievement in Floodplain Management Award, Association of State Flood Plain Managers

Dave Ford Award, University of Minnesota Water Resource Center

Flood Plain Manger of the Year, Minnesota Association of Floodplain Managers

Young Engineer of the Year, Minnesota Federation of Engineering, Science and Technologies Society

Three-term Member, FEMA Technical Mapping Advisory Council

Past President, Minnesota Society of Professional Engineers

MINNESOTA RIVER WATERSHED DRAINAGE COLLABORATIVE

Minnesota is renowned for its northern lakes and streams. A couple of generations ago, a legendary beer jingle celebrated Minnesota as "The Land of Sky Blue Waters." Yet, southern Minnesota waters are troubled.

The namesake feature of the state is the Minnesota River. Its watershed dominates the southern part of the state. Despite a gubernatorial promise, the advisories are still: "Do not drink from or swim in the River", "watch out" if you expect to eat the fish you might catch. The Minnesota River is prone to recurring floods, some of biblical proportions, its waters are impaired---polluted, it carries vast quantities of sediment threatening to fill in downstream areas including Lake Pepin, it is a significant contributor to the hypoxia conditions at the Gulf of Mexico. A drumbeat of reports detail and document these and other problems and adverse effects of the Minnesota River.

Many have labored to address the water conditions in the Minnesota River basin. They range from a discontinued multi-county Joint Powers Board to current periodic River Congresses to groups like the Coalition for a Clean Minnesota River (CCMR), Clean Up the River Environment (CURE), Friends of the Minnesota Valley, Minnesota Center for Environmental Advocacy, and various wildlife and conservation organizations. Several government agencies, ag organizations and many individuals have put their shoulders to the wheel in the efforts to address and improve water management and water quality.

The MN River Collaborative is continuation of these efforts, building on a collaborative initiated by the Minnesota Center for Environmental Advocacy, the Minnesota Conservation Federation, the Fish & Wildlife Alliance, the Coalition for a Clean Minnesota River, Clean Up the River Environment, the New Ulm Area Sportfishermen, the Izaak Walton League and others, including volunteer scientists, affected landowners, and concerned individuals. Over the years, these groups and others have cooperatively and separately reviewed many diverse projects including increased drainage, assessed the risk of harmful impact, participated in drainage proceedings, and in some instances litigated decisions to undertake projects that violated the law. Many of these efforts resulted in favorable outcomes or negotiated settlements. In 2017, the collaborative examined a proposed drainage project in Waseca County which remains under review.

About five years ago the Izaak Walton League with others begin examining all new drainage improvement projects in the Minnesota River watershed. It obtained key documents: petitions for projects, engineering reports, comments from interested parties, and advisory letters from the Minnesota Department of Natural Resources (DNR). This became part of the Izaak Walton League's Upper Mississippi River Initiative (UMRI). This effort grew, expanded to continue the efforts of the collaborative previously summarized, and included volunteer civil engineers, lawyers, conservation activists, government agency retirees, and additional organizations. UMRI provided financial support for a part-time staff intern and expenses.

The vision for action expanded. Initially it focused on obtaining information on new drainage projects. It placed this information in a publicly available spreadsheet or matrix and looked at planned projects impact on downstream areas, especially flooding, habitat, water quality, and sedimentation. Continuing activities have ranged from critically commenting on drainage improvement projects in public hearings required by the Minnesota Drainage Code, to requesting environmental assessment worksheets, to seeking working relationships with groups like the Soil Health Coalition, to working with farmers and landowners, to consulting with the DNR, to seeking out other potentially interested organizations, to

participating in the Minnesota Drainage Working Group, to proposing legislation, to supporting litigation, and to encouraging funding of water storage to avoid the adverse effects from drainage projects. It has been open to any interested party, operated informally by consensus with informal direction and good faith collaboration.

This collaborative effort can be an effective, efficient path forward. By capitalizing on volunteer energy and expertise, it minimizes costs and avoids the redundancy and slippage of multiple organizations. Still, even this volunteer-driven effort requires financial resources to provide logistical support and to fairly compensate those who are not securely retired. At this time participating groups and individuals are exploring how best to maintain and finance the effort. Broad support will be important if we are to achieve shared objectives.

A modest proposal for future efforts is to continue to make key decisions in the larger collaborative setting and to have different groups and individuals take leadership for various areas of activity:

-Collect basic information on drainage and other water management projects with a focus on the Minnesota River watershed,
-Identify projects of concern,
-Promote and participate in educational and other outreach programs with public agencies and with landowners seeking drainage,
-Develop and advance legislative proposals and participate in policy making activity,
-Coordinate fundraising efforts,
-Serve as a fiscal agent,
-Maintain publicity and media outreach,
-Provide gentle leadership to keep collaborative effort organized and forward looking.

Again, active individuals and groups should continue to make key decisions in an inclusive, collaborative setting. Participation should be open to others who share the same vision. Each group is free to do its own fundraising and to determine what financial or staff support to provide to the collaborative efforts.

Decisions should be made by good-faith consensus. This means taking the time to listen to one another. It means seeking unanimity. It means that after having had a full opportunity for discussion, those who may disagree with a clear majority would recognize that the others will proceed.

A name for the effort is beyond the scope of this memorandum. A possibility is: "Minnesota River Collaborative."

DM 12/5/22

Cumulative Effects of Agricultural Land Use and Artificial Drainage

In the last 50 years the hydrology of the Minnesota River watershed has changed dramatically. The mean discharge at Jordon has doubled from 3100 cubic feet per second (cfs) for the period 1936 through 1977 to more than 6000 cfs for the period 1978 through 2007. There has also been a threefold increase in rare and extreme flows. This change in the hydrology has been shown to principally be the result of the conversion of agricultural production from small grains and forage crops to soybeans and the more intense artificial drainage associated with the conversion.

Flow duration curves at Jordon show that frequent channel forming flows have changed significantly. During the period 1934 through 1949, a discharge of 1000 cfs was exceeded only 5 percent of the time, for the period after 1949, 1000 cfs was exceeded more than 20 percent of the time. The same is true for many of the tributaries of the Minnesota River. This change in the hydrology has been shown to principally be the result of the conversion of agricultural production from small grains and forage crops to soybeans and the more intense artificial drainage associated with the conversion.

Based on MPCA data sediment loads from the Minnesota River watershed to the Mississippi River have more than doubled over the period 1980 through 2005 from approximately 0.6 million tons per year to approximately 1.2 million tons per year. Recent studies have determined that the principal causes of the increased sediment loading have been due to the cumulative effect of artificial drainage associated with the land use changes in the watershed.

According to research conducted by the MPCA as part of the South Metro TMDL Lake Pepin is expected to be filled with sediment in 340 years at the current deposition rate. Lake Pepin is filling at ten times its natural rate. The MPCA research found that it would have taken 4000 years to fill the lake with the sediment deposition rate that existed in the 1970's. The Minnesota River contributes 85% of the sediment load.

Mississippi River flow from Minnesota is responsible for a portion of the nutrients that have created the hypoxia zone in the Gulf of Mexico. The contributing states have set goals to lower both phosphorus and nitrates in Mississippi River flow to reduce the extent of the hypoxia zone. Minnesota proposed a 20 percent reduction in the nitrate load from Minnesota by 2025. However, nitrate loads are greater because agricultural acreage and runoff from drain tile have increased. The Minnesota River is the major source of nitrate loads in Mississippi River flows.

With increasing sediment loads, phosphorus loading to Lake Pepin has increased by more than seven times the natural rate. Lake water phosphorus concentrations have increased from about 50 parts per

billion to 200 ppb, making Lake Pepin highly eutrophic. The high nutrient loads have resulted in prolific algae growth which has reduced dissolved oxygen and resulted in fish kills.

An extensive riverbank armoring project has recently been completed by the City of Mankato to stop erosion of the banks of the river and protect municipal infrastructure. A similar riverbank armoring project is proposed by the City of Savage to protect a future city park from riverbank erosion. The severe bank erosion has been caused by increased discharge, the threefold increase in rare and extreme flows and the longer duration of channel forming flows.

Developed communities and public facilities throughout the watershed have determined that new flood control efforts will be needed to protect infrastructure and development from increased river flows and the increased duration of flooding, The increased flows have also created a need for reinforcement of municipal flood control projects constructed in the past in order to provide continued protection. The City of Carver is currently modifying its flood control project to provide additional protection.

Increased sediment deposition in Pool 2 of the Mississippi River navigation channel that results from increased bank erosion has impeded downstream commercial river borne shipping and recreational boating. Dredging of the navigation channel has been limited in the last several years because of a lack of dredge spoil disposal locations which has required that the size of barge tows to be reduced increasing the cost of shipping.

Many once successful agricultural production facilities in the vicinity of the rivers in the watershed are currently subject to frequent crop losses due to flooding. A family farm in the vicinity of Jordan has been farming about 1000 acres for more than 100 years. In the first 50 years they lost their crop due to flooding once and in the next 50 years they lost their crops due to flooding more than 40 times. Since they can no longer purchase crop insurance, they no longer farm the land.

There have been suggestions that these increases in runoff and river flows have been due to increased precipitation, but that assertion has been proven to be insignificant by many investigations including by the MPCA, Belmont, Schottler and many others. Their research has shown that the change in water yield, the percentage of rainfall that runs off and is tributary to the river has more than tripled from 7 percent in the 1930's to over 20 percent at the present time.

Economic Impacts of Minnesota River Watersheds Hydrologic Change

-The cost to implement the proposed sediment reduction strategy for the Minnesota River Watershed to meet Minnesota's water quality standards for the river.

-The gradual loss of the recreational and scenic value of Lake Pepin and its impact on local business.

-Flood damages resulting from higher and more frequent peak discharges and runoff volume due to agricultural drainage and more intense land use.

-Increased dredging and dredge disposal costs for maintaining the Mississippi and Minnesota River navigation channel.

-Dredging of marinas and barge fleeting areas along the Minnesota and Mississippi River Navigation channel and dredging for access to the navigation channel and dredge disposal costs.

-Costs to upgrade the several flood damage reduction projects along the Minnesota River.

-The lost recreational value of the Minnesota River due to the loss of fisheries habitat.

-Increased cost of maintaining flood prone public recreational facilities in flood plain areas.

-The lost recreational value of flood plain lakes along the Minnesota River due to sediment deposition.

-The lost recreational value of flood plain lakes along the Minnesota River due to sediment deposition.

-Increased flood damage due to higher flood levels and longer duration of flooding because sediment deposition in overbank floodplain areas reduced conveyance.

-The cost of riverbank protection programs such as the Mankato and Shakopee projects to protect public infrastructure.

-The cost of upgrades to protect public infrastructure such as waste-water treatment facilities, roadways and bridges from higher flood levels and longer duration of flooding.

-The cost of new water treatment facilities for cities with nitrate contaminated groundwater supplies.

-The value of crop losses on agricultural properties along the Minnesota River and tributaries due to more frequent flooding.

-Decreased property values due to more frequent and longer duration of flooding.

-Damage to private properties along the rivers and tributaries due to bank scour caused by increased peak discharge, more frequent flood flows and longer duration of frequent discharges.

-The cost to protect private properties along the river and its tributaries from bank scour and bank failures.

LOWER MINNESOTA RIVER WATERSHED DISTRICT

Unique Resources

1. Minnesota Valley National Wildlife Refuge
- 14,000 Acre Wildlife Refuge
- 2 Visitor and Education Centers
- Bass Ponds and Trout Stream

2. Fort Snelling State Park
- 2930 Acre Park at Junction of Minnesota and Mississippi Rivers

3. Minnesota Valley State Trail
- State Trail, Fort Snelling to LeSueur

4. Savage Fen Wetland Complex
- 425 Acres Wetlands
- 64 Acres Calcareous Fen

5. Eagle Creek
- Naturally Reproducing Brown Trout Fishery

6. Boiling Springs
- Artesian Spring at Eagle Creek Headwaters

7. Nichols Fen
- 7 acre Calcareous Fen

8. Courthouse Lake
- Rainbow, Brook, Brown, Lake Trout Stocking

9. Assumption Creek
- Naturally Reproducing Brook Trout

10. Seminary Fen
- 600+ acre Wetland Complex
- 64 Acre Calcareous Fen
- Highest Quality Calcareous Fen in Metro Area

11. Floodplain Lakes
- Rice, Grass, Fischer, Coleman, and Nine Mile Lakes

Minnesota State Senate 3-8-22
Environment and Natural Resources Finance Committee
Testimony on behalf of **S.F. 3044**

Chair Senator Ingebrigtsen and Committee Members,

My name is Scott Sparlin, I am the Coordinator/Facilitator for the Minnesota River Congress and the Executive Director of the Coalition for a Clean Minnesota River. This is my 33rd year working on Minnesota River Watershed issues.

We have reached a water management crisis in Minnesota, certainly not limited to anywhere in the state, but especially evident in the Minnesota River Watershed. Due to land use practices both urban and rural we have now reached the point that if we do not begin to both temporarily and permanently store more water, we will continue to experience increased collective, infrastructural, societal, and business losses at an unacceptable rate putting many Minnesotans at risk. Exacerbating this condition is the climatic trend and future prediction of increased rainfalls in short periods of time. The combination of all these factors leads first to small and medium sized tributary streambank erosion. Then the dislodged sediments combined with the increased rate flows enable even more sediments and nutrients to be delivered to our lakes, major tributaries, and main stems where they then flow downstream to the Mississippi River, Lake Pepin and ultimately the Gulf of Mexico.

We are a water blessed state and the time to invest in a major water storage initiative is upon us. The compelling data concerning the need, especially in the Minnesota River Basin, has been thoroughly studied and is well documented. The fact is, most of society has observed and intuitively known this for a long time. We have engineered ourselves into this condition and we also have the technical knowhow to mitigate it. We now need the commitment, and the significant financial resources, to accomplish the goal. In many cases our government (all of us) paid to create the challenges we are faced with. The time is now for all of us to come together for the greater good of future generations of Minnesotans and those downstream. This is not an investment we can ignore, or we will pay much higher prices in short years to come.

It is our belief that we need specifically targeted temporary and permanent water storage funds to be directed to the implementors such as Soil and Water Conservation Districts, Watershed Districts and participating willing landowners.

Scientific Background

Extensive scientific data collected over decades shows clearly that we need to put more water storage on the landscape. Additional water storage will protect infrastructure and improve water quality. Diverse water storage practices, such as replacing historically drained lakes and

wetlands and increasing soil health, will all help to achieve this goal. The climatic trend and future prediction of increased rainfalls in short periods of time will only exacerbate the issue.

The Minnesota River Congress is using the Collaborative for Sediment Source Reduction (CSSR) and Management Options Simulation Model (MOSM) study recommendations in conjunction with the rich datasets available through state agency monitoring, assessment and conservation targeting (WRAPS, TMDLS, 1W1P) to support the case for the need for more water storage. We have enlisted researchers at state agencies and elsewhere who have completed studies to help provide data and documentation (e.g. Patrick Belmont, Karen Gran, Chris Lenhart, Peter Wilcock and numerous others).

After over 3 years and 25 basin-wide meetings attended by a diverse cross section of the population, it has become very apparent that any way water storage in any form can be accomplished is of the utmost priority. Over and over from every part of the basin we heard water storage has to be addressed if we are going to be serious about protecting our infrastructure and improving our surface water. The good news is it can be achieved without adversely affecting agri-business or community development. We simply need it to be realistically funded to the degree it needs to be effective. It already has been prioritized by the implementers. We have written support from numerous entities supporting our efforts to see this come to fruition. Here is a daily growing list of support.

City of Henderson (signed endorsement and resolution)
City of Granite Falls (signed endorsement and resolution)
City of Eden Prairie (signed resolution)
City of Arlington (signed endorsement)
City of Amboy (signed endorsement)
City of New Ulm (signed resolution)
City of Mankato (signed resolution)
City of Olivia (signed endorsement)
City of Nicollet (signed endorsement and resolution)
City of Redwood Falls (signed resolution)
City of Springfield (signed resolution and indorsement)
City of St. Peter (signed endorsement)
City of Winthrop (signed resolution and endorsement)
City of LeSueur (signed resolution and endorsement)
Minnesota Association of Watershed Districts (resolution passed and signed)
Lower Minnesota River Watershed District (resolution passed and signed)
Izaak Walton League MN State Chapter (resolution passed)
Lake Pepin Legacy Alliance (signed endorsement and resolution)
Brown County SWCD (signed endorsement)
Blue Earth County SWCD (signed endorsement)
Martin County SWCD (signed endorsement)
Faribault County SWCD (signed resolution)
Cottonwood County SWCD (signed endorsement)
McCloud County SWCD (verbal endorsement)

Nicollet Conservation Club (signed endorsement)
MASWCD (relative resolution)
Area 6 SWCD (11 Counties) (in principle)
Area 5 SWCD (10 Counties) (in principle)
Friends of Pool 2 (signed endorsement)
Crystal Waters Project (signed endorsement)
Minnesota River Congress (signed endorsement)
New Ulm Area Sport Fishermen (signed endorsement)
Rural Advantage (signed endorsement)
Clean Up the River Environment-CURE (signed endorsement)
The Coalition for a Clean Minnesota River (signed endorsement and resolution)
Redwood Country Farmers Union (resolution passed and signed) (State Pending)
Friends of the Minnesota Valley (signed endorsement)
Izaak Walton League MN Valley Chapter (signed resolution)
Minnesota Center for Environmental Advocacy (signed endorsement)
Anglers for Habitat (signed endorsement)
Minnesota Conservation Federation (signed endorsement)
Fish and Wildlife Legislative Alliance (signed endorsement)
Blue Earth Project (signed endorsement)
Save the Kasota Prairie (signed endorsement)

Thank you for this opportunity and I will gladly answer any questions you may have.

For More Information
Contact Scott Sparlin, Coordinator/Facilitator, Minnesota River Congress
sesparlin@gmail.com (507 276 2280)
https://www.mnrivercongress.org/

WEST METRO

Restoration work to prevent river flooding at Minnesota Valley National Wildlife Refuge

The $4.1 million project will help control water levels on the federal conservation land.

By Greg Stanley (https://www.startribune.com/greg-stanley/6370510/) Star Tribune

JUNE 30, 2020 — 10:03PM

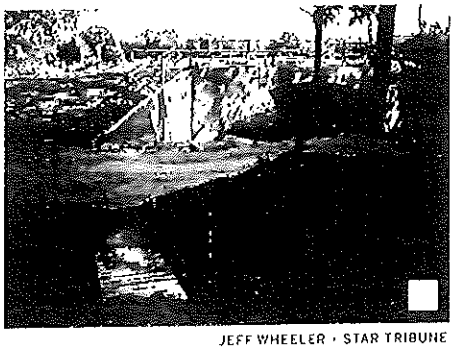
Just a few miles south of Minneapolis, along the final bends of the Minnesota River, large sections of a national wildlife refuge are under water.

The old and failing culverts in the Minnesota Valley National Wildlife Refuge can no longer keep up with the increasing rainfall, erosion and intensive draining systems that have caused the river to flow at twice its historical strength. The floods are drowning out native plants and habitats needed by birds and migrating waterfowl, as well as closing some of the hiking trails and bird-watching and hunting land used by about 300,000 visitors a year.

The U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service will begin a $4.1 million project this summer to build and replace a series of culverts and structures to lower water levels in the refuge.

The work, which will take about two years to complete, will help restore a wide variety of vegetation critical to migrating birds in a chain of ponds near Shakopee, Eden Prairie and Bloomington, said Eric Mruz, deputy refuge manager.

"Basically, we have lost the ability to manage water levels at several of these ponds and I honestly think that the flooding here is only going to get worse," Mruz said.

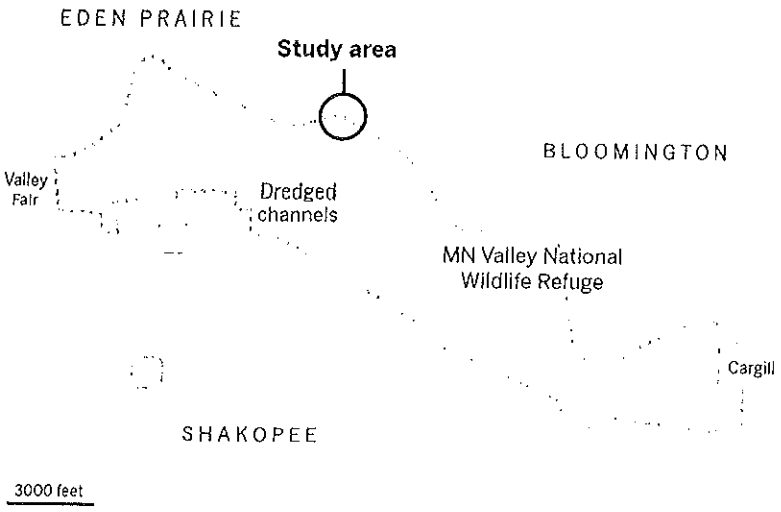


JEFF WHEELER • STAR TRIBUNE

A new bridge at the Minnesota Valley National Wildlife Refuge over a stream that runs into the Minnesota River will lessen the need for the

Urban refuge

U.S. Fish and Wildlife will begin a $4.1 million project to better drain the increasingly floo of the few refuges in the country so close to a major city.



Map: Eddie Thomas, Star Tribune • Source: U.S. Army Corp of Engineers; U.S. Fish and Wildlife Service

The refuge, which was created in the 1970s, is one of only a handful in the country located so close to a major urban area. It stretches along the last 70 miles or so of the Minnesota, from the city of Henderson to Bloomington, just before the river empties into the Mississippi River. It offers one of the rare spots in the Twin Cities where hikers can make it deep into the stillness of a marsh, or walk through one of the last remaining pockets of oak savanna in the state.

More than 50,000 ducks and geese stop in the refuge during spring and fall migrations, according to Audubon Minnesota, which lists the preserve as one of the state's most important bird areas. It's home to more than 260 different species of birds, at least 100 of which are known to nest there, according to the conservation group.

It's a marvel that such a sanctuary exists so close to the more than 4 million people who live in the area, said Robert Petzel, volunteer and president of the Minnesota Valley Refuge Friends organization.

It's home to miles of deep hiking and biking trails, rare trumpeter swans, tundra swans, bluebirds and flickers, he said.

"It's a wonderful place to get away from everything else might that might be going on," Petzel said.

Since the state largely shut down this spring because of the COVID-19 pandemic, the wildlife refuge has also become a refuge for families and hikers from across the metro area and the 14 counties the federal land touches.

What has long been more of a hidden gem is now receiving perhaps the most attention it has ever gotten from the public, Mruz said. In the months since the first cases of COVID-19 were found in Minnesota, the refuge has received about five times as many daily visitors as it had had in previous years.

But the increase in visitors comes as the hydrology of the Minnesota River has changed, according to the Army Corps and a number of federal and state studies.

The river's flow has more than doubled (https://www.startribune.com/as-minnesota-river-expands-erosion-damage-grows/567716172/) over the past decade, meaning water is rushing through with twice the force it did on average from 1950 to 2010. That's largely because the state is receiving more intense storms and rainfall than it has before, including last year, which went down as the wettest in Minnesota's history.

And over the past several decades, landowners in western and central Minnesota have drained more acres for row crops, funneling that water into the river and its tributaries.

The soft soil the Minnesota cuts through has always been prone to erosion. Now with the river's increased strength, the water is rapidly eating away its shoreline, doubling the width of the river in some segments and washing away homes and other structures.

The new drainage and water flow systems in the refuge were designed with the changing hydrology in mind, Mruz said.

"These structures are going to be big enough, we think, to handle that extra load of water," he said.

Greg Stanley is an environmental reporter for the Star Tribune. He has previously covered water issues, development and politics in Florida's Everglades and in northern Illinois.

greg.stanley@startribune.com 612-673-4882 greggstanley

LOCAL

Gulf of Mexico 'dead zone' predicted to be twice the size of national goal. Again.

Scientists forecast the low-oxygen zone will be around 4,100 square miles this summer, despite federal efforts to reduce nutrient runoff from fertilizer use on Midwest farms.

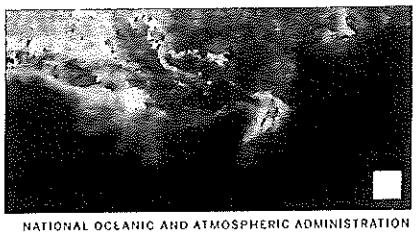
JUNE 5, 2023 — 4:13PM

Scientists have released their 2023 forecast for the so-called "dead zone" in the Gulf of Mexico — predicting it will be about 4,100 square miles this summer. That's much bigger than last year (https://thelensnola.org/2022/08/03/dead-zone-smaller-than-expected-but-bigger-than-desired/), but still smaller than average.

The dead zone is a hypoxic area (https://oceanservice.noaa.gov/hazards/hypoxia/) where low oxygen can kill fish and other marine life. It's caused by excessive nutrient runoff, largely from fertilizer used on farm fields in the Midwest, which ends up in the Mississippi River and flows south to the Gulf.

The National Oceanic and Atmospheric Administration uses models and data from the U.S. Geological Survey to forecast the size of the dead zone each year. Data from river and stream gauges showed that nitrate and phosphorus discharges were below average in the Mississippi River and Atchafalaya River, which splits off in south Louisiana.

While some see this season's forecast as good news, it is still well above the federal Hypoxia Task Force (https://www.epa.gov/ms-htf)'s goal of shrinking the dead zone to 1,900 square miles or smaller by 2035. The area's five-year average size is 4,280 square miles, more than double that target, and has trended mostly larger over time (https://www.columbiamissourian.com/priceofplenty/landscape/a-lifetime-of-research-links-gulf-of-mexico-dead-zone-to-midwest-fertilizer-runoff/article_1d216dd2-f9bb-11ed-bba0-5b8d35ccleae.html).



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

The Gulf of Mexico's hypoxic "dead zone" at the end of the Mississippi River is seen by satellite south of Louisiana in 2017.

Don Scavia, an emeritus professor at the University of Michigan, leads one of several research teams partnering with the federal government on the annual forecast.

"Lack of a downward trend in the dead zone illustrates that current efforts to reduce those loads have not been effective," he said. "Clearly, the federal and state agencies and Congress continue to prioritize industrial agriculture over water quality."

America's largest water highway is in trouble, ominous for Midwest grain farmers

Sixty percent of America's grain flows down the Mississippi River. Last fall, traffic ground to a halt due to low water, causing concern for Minnesota farmers during harvest.

By Christopher VondracekStar Tribune SEPTEMBER 16, 2023 — 5:23PM

ON THE MISSISSIPPI RIVER - Jim Kennedy watches the river like a hawk.

From his view 33 feet up in the pilot house, Kennedy stares out wide windows at blackened driftwood, eddies, even sometimes rambunctious yachters steaming up the wide, blue waters of the Mississippi River near St. Paul.

"They're about the worst kind," Kennedy said, on the Tuesday after Labor Day. "Drunk yachters. But they can't be helped."

Another problem that can't be helped? Mother Nature's curveballs, like this year's devastating drought in America's heartland. And another trying year for U.S. agricultural exports, due to the high cost of diesel and lower commodity prices.

In a typical year, 60% of the nation's grain flows downstream to the Gulf of Mexico, loaded onto barges parked at terminals along the Mississippi River. The barges are often tucked below interstate overpasses or along remote stretches of inland waterways, noticed only by boater or beaver.

But, lately, the working river has garnered more attention as concern grows over the aging locks-and-dams system built in the Roosevelt administration. The industry has been further strained by scarce labor and whiplashing weather that at times makes navigability uncertain.

Farmers and grain buyers, including agribusiness titans in the Twin Cities, are increasingly watchful.

GALLERY 1/21

SHARI L. GROSS, STAR TRIBUNE

Gallery: Jim Kennedy captained the Mendota, a harbor boat in the Upper River Services fleet, as it travels down the Mississippi River in St. Paul on Tuesday, Sept. 5, 2023.

"On this part of the river, we're here because of ag," said Lee Nelson, president of Upper River Services. He noted an outstate farmer — say in southern Minnesota — may not want to drive all the way to downtown St. Paul to the Mississippi terminal.

"But he can get to the water [in Savage, Minn.]," Nelson said, referring to the grain terminals in the outer Twin Cities suburb sitting on the Minnesota River.

Kevin Hall, a supply chain vice president at Inver Grove Heights-based CHS, Inc., stared last week at a bank of video screens on the wall of the trading floor of the nation's largest farmer-owned cooperative at the Inver Grove Heights headquarters.

On screen were live-feeds of terminals from Savage on the Minnesota River all the way down to Myrtle Grove, La. The last major floods hit in the 1920s, prompting the U.S. government to begin damming up the Mississippi during the Depression, Hall said.

"It was catastrophic to the communities down the river," he said. "But it was to create this navigable waterway."

The river north of St. Louis — with two dozen locks and dams — is not the problem. The infrastructure there works, keeping a consistent flow for barges moving past Winona, Dubuque, Iowa, and Quincy, Ill., industry sources say.

But lack of water in the whole system could mean a repeat of last year's near-catastrophewhen water levels dropped too low for steel-bottomed barges to traverse.

"When the Mississippi River had disruption last year, it was a major disruption to the country," Hall said.

Last fall, barge traffic on the southern portion of the Mississippi River — part of an intermodal system of riverways, highways and railways once the envy of the world — ground to a halt.

Television news carried images of more than 2,000 barges stuck in a queue. The U.S. Coast Guard briefly halted traffic in Memphis and Vicksburg, Miss., after boats ran aground on sandbars. An AccuWeather report estimated river snags cost the country $20 billion.

As this year's harvest begins, water levels on the storied Mississippi are once again dropping. The river is below 5-feet deep in the Quad Cities on the Iowa-Illinois border. More than 50% of Minnesota is currently in at least "severe" drought, according to a national monitor. In St. Louis, barge rates — the per-ton cost to ship on the river — are spiking.

And the row-croppers of the Upper Midwest, who need the floating vessels to carry their corn or soybeans to the world, are watching with trepidation.

"As harvest approaches, really all we can do is wait to see what happens with the river," Brad Hovel, a Cannon Falls farmer and secretary of Minnesota Soybean Growers Association, said. "We might be eating our basis."

A farmer's basis — that is, the profit farmers can make at the elevator over futures contracts posted in Chicago — could weaken if the U.S. Coast Guard imposes greater draft restrictions (how deep a boat can dip below the water's surface) to protect boats from running aground.

Hovel said farmers in his neighborhood of southeastern Minnesota can put grain on rail, often traveling up to the Twin Ports in Duluth or out to the Pacific Northwest. They might also truck grain to two crush facilities in Mankato. But the terminals along the Mississippi are vital.

"We've only got a little bit of wiggle room," Hovel said.

The challenges couldn't hit at worse time, as U.S. farmers fight to reclaim past supremacy in exports. This year, Brazilian farmers are on path to surpass U.S. corn-growers as the world's top exporter. Brazil is tops in soybean, too, overcoming supply challenges that long bedeviled the South American ag giant.

Justin Cauley, CHS' senior director of transportation, said Brazil farmers are reporting 40-day lines at some terminals.

"A [bulk] vessel sitting costs about $20 [thousand] to $30,000 a day," Cauley said. "They're able to let their vessels sit for 40 days and still be competitive against the U.S."

Those on the working river say what's needed is infrastructure upgrades. The 2021 Bipartisan Infrastructure Bill that passed Congress and was signed by President Joe Biden allocated $2.5 billion for the inland waterways. Ongoing dredging of the river — such as two low spots near Savage this past summer — is an evergreen need, as well.

But industry officials say they also need more workers interested in joining a boat.

Back in the waterways near St. Paul, Kennedy is at home on his boat. There's a fridge for long days. He arrives by 6 a.m. and often works until dark. He likes the job and sleeps each night at home in Cottage Grove. He's seen early morning fishermen, wildlife and scenes along the river that most recreationists and oil painters dream of.

Nestled between two windows, a placard dedicated to his son, Joseph Kennedy, an Army specialist who was killed in Afghanistan in 2011, reads "Some Gave All."

"He worked here," Jim said, quietly. "He was a good worker."

Out on driftwood, a bald eagle was perched, surveying the region. Kennedy says he didn't see those big birds in his first couple of decades on the river. But the waterway — and the life around the banks — keeps changing.

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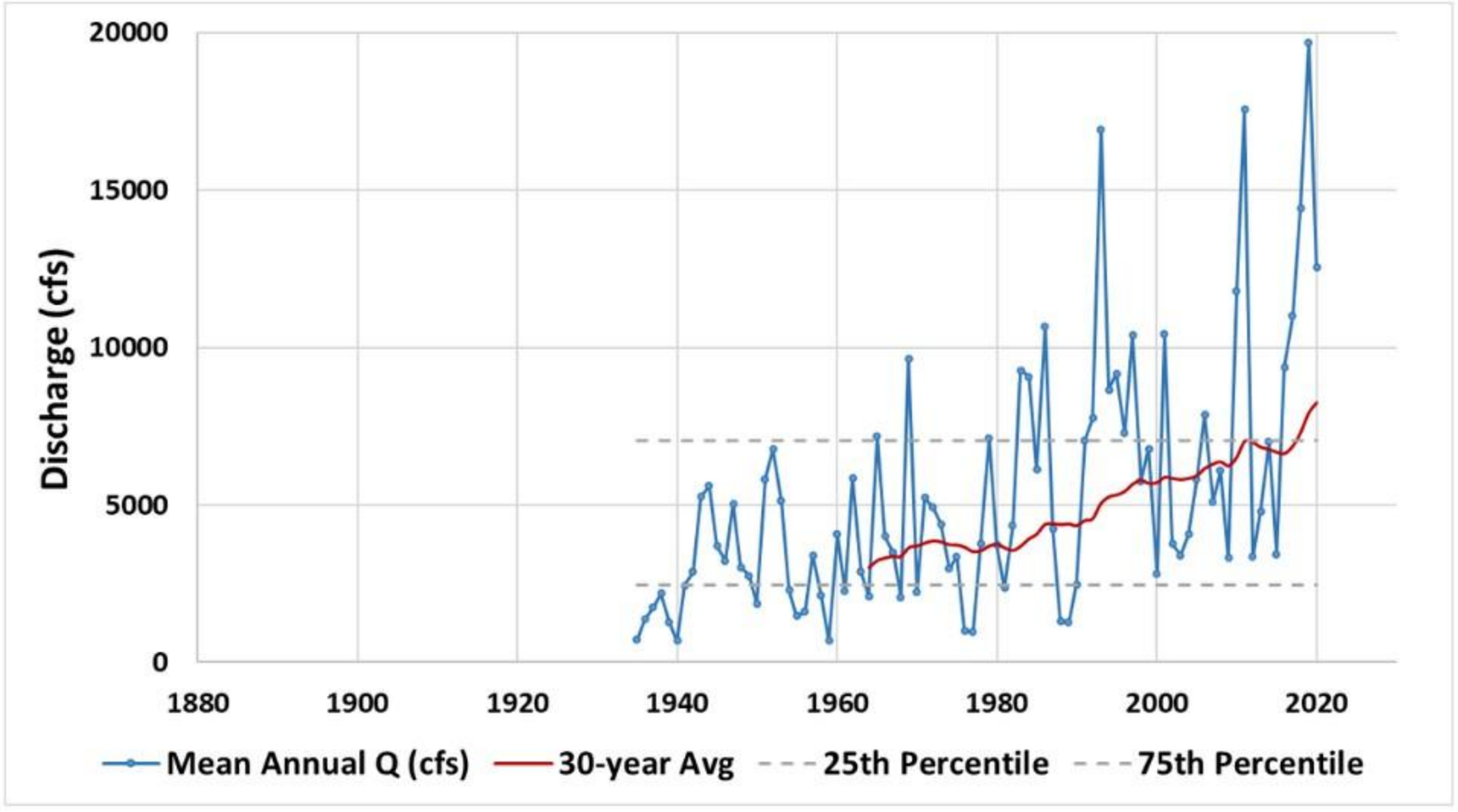
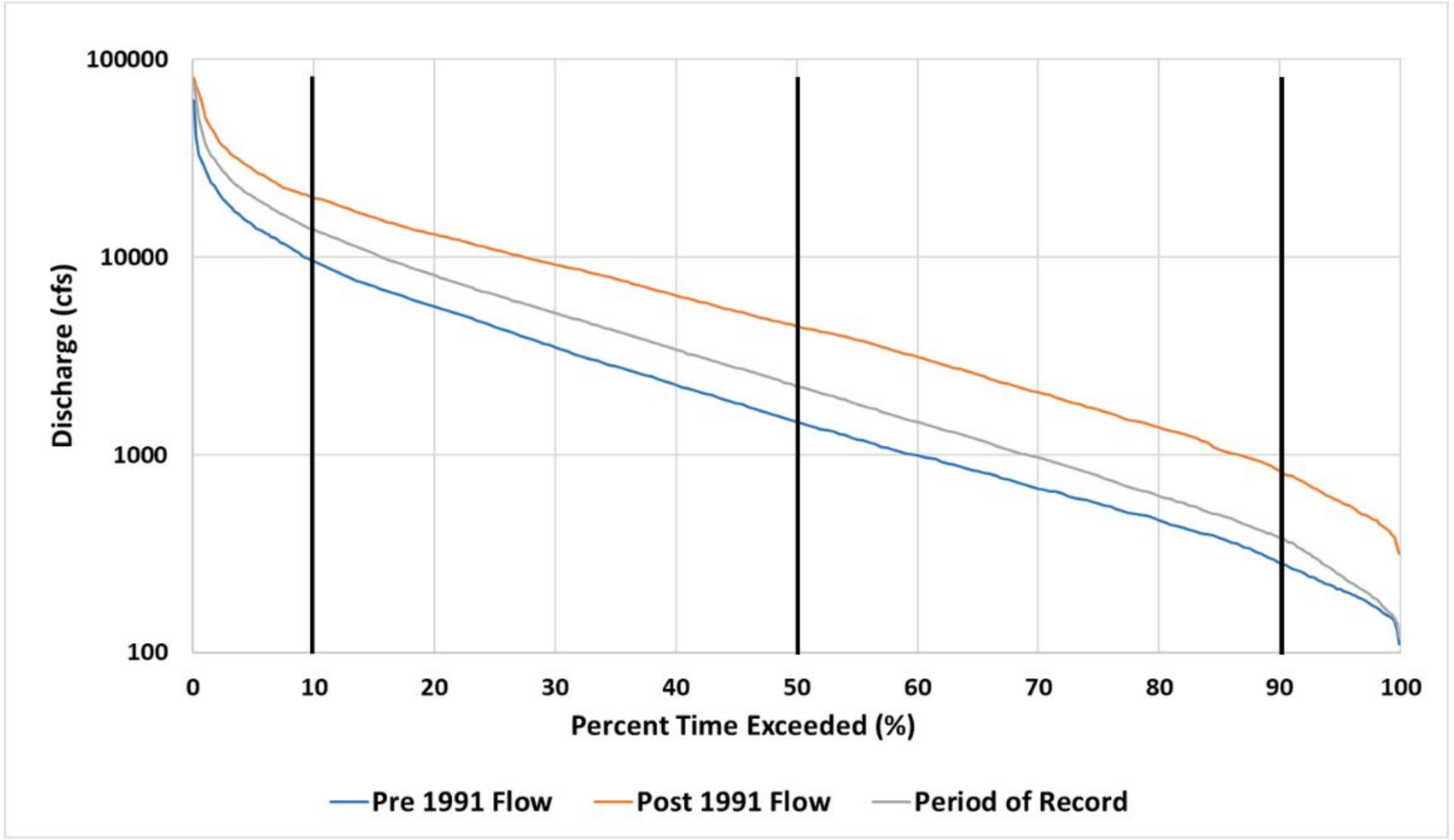
The Muddy Minnesota River

Minnesota River Watershed Issues

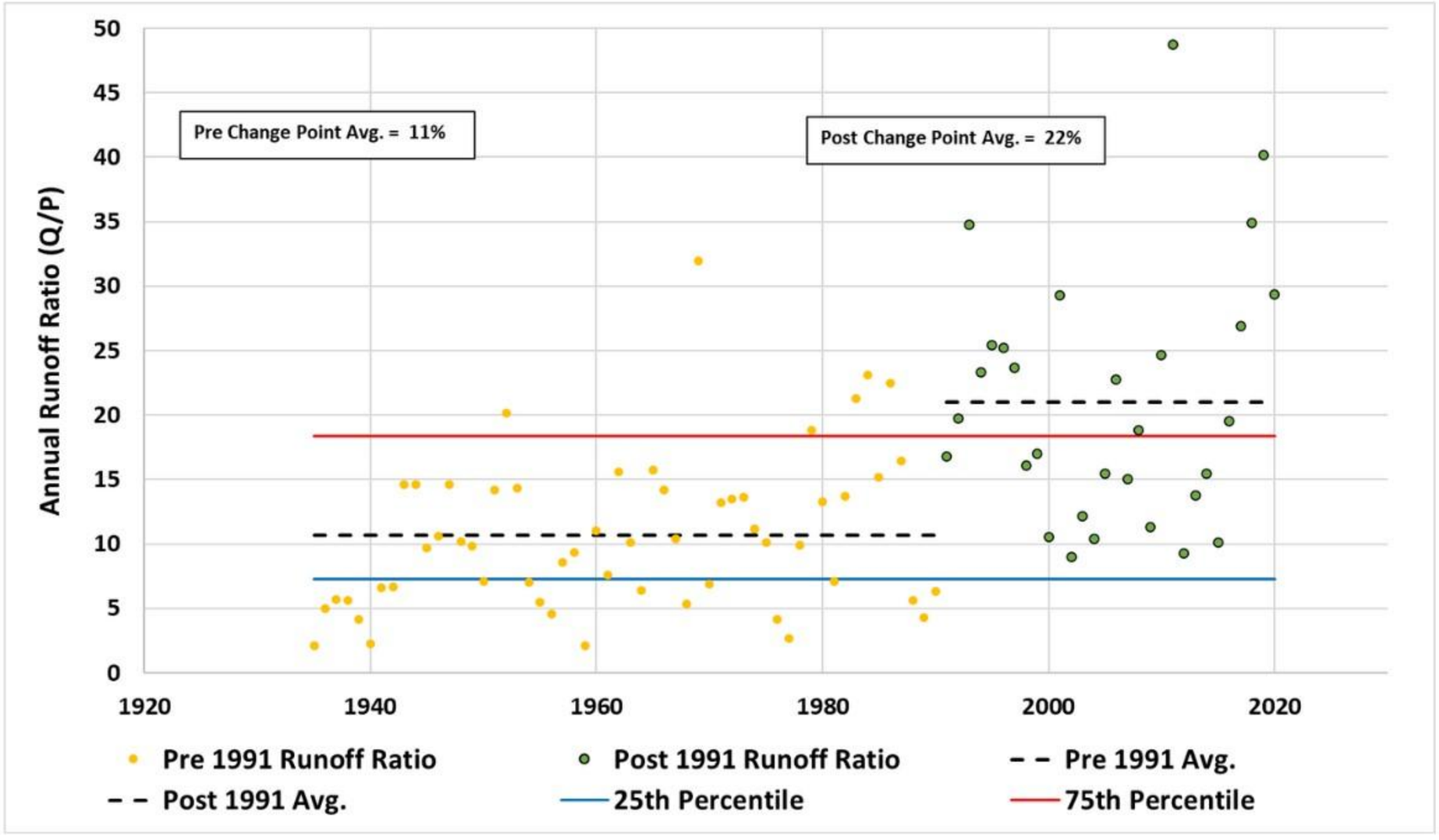
- Mean discharge doubled, more frequent extreme peak discharges, greater flow volume.
- Sediment loads doubled because of more stream bank erosion.
- Nutrient loads are increasing (Phosphorus and Nitrates) as are agricultural pesticide loads (Contaminants of Emerging Concern).
- Many streams in upper watershed are impaired for bacteria.



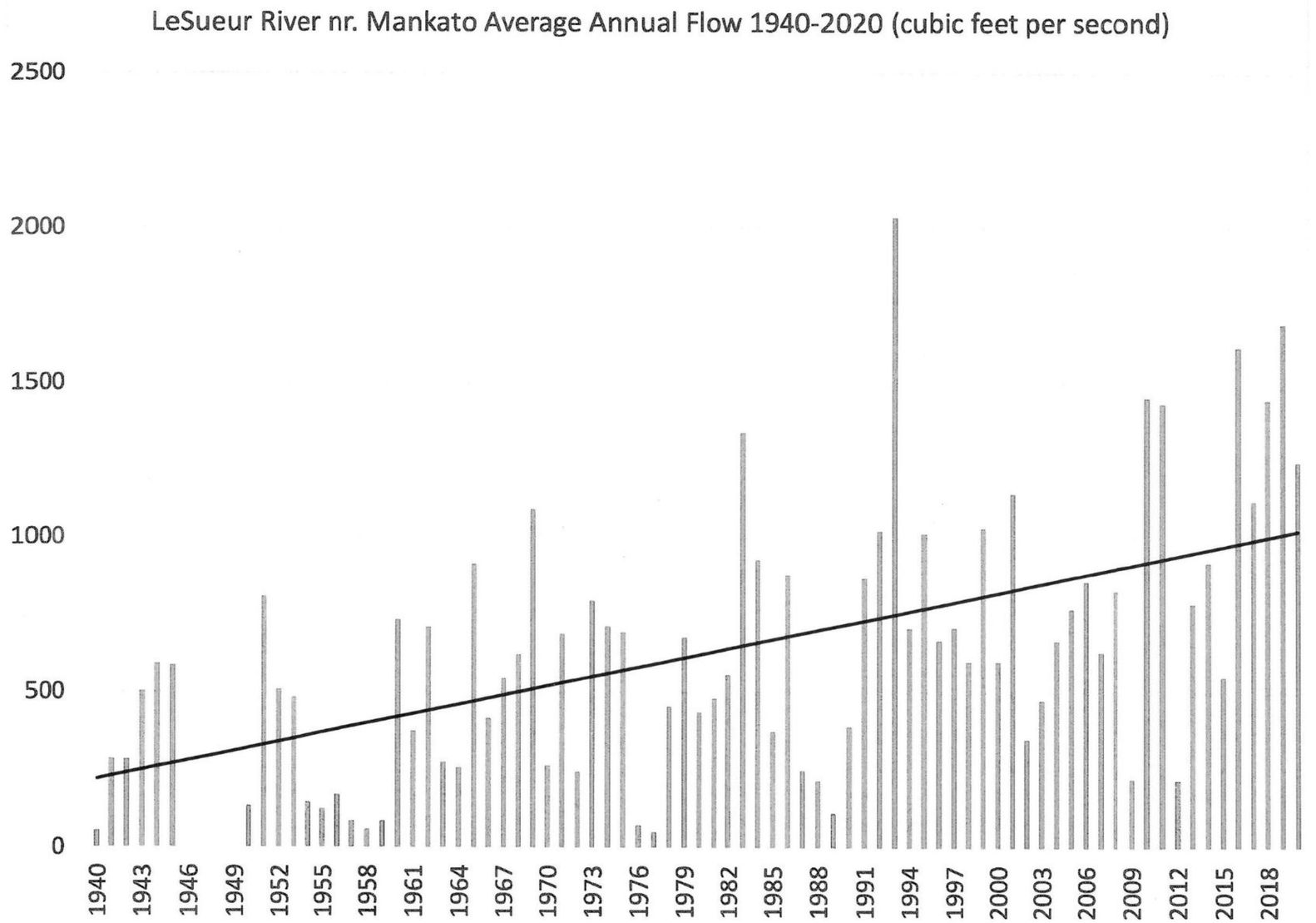
Annual mean discharge for the Minnesota River near Jordan (05330000) (USGS 2020)



Flow duration curves for the Minnesota River near Jordan (05330000)



Annual runoff ratios for the Minnesota River near Jordan (05330000)


LeSueur River nr. Mankato Average Annual Flow 1940-2020 (cubic feet per second)
2500
2000
1500
1000
500
0
1940
1943
1946
1949
1952
1955
1958
1961
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018

Le Sueur River Bank Erosion

Increased Runoff is Causing More River Bank Erosion

The Muddy Minnesota River

Membership of the Minnesota River Collaborative

Environmental Groups

- Minnesota Center for Environmental Advocacy (MCEA)
- Izaak Walton League
- Friends of the Minnesota Valley
- Coalition for a Clean Minnesota River
- Clean Up the River Environment (CURE)
- Lake Pepin Legacy Alliance

Individuals, Designations

- Practicing Attorneys (3)
- Retired Attorneys (3)
- Farmers, Landowners (3)
- Hydrologists (2)
- Conservationists (4)
- Water Resources Engineers (4)
- Former MN Legislator (1)
- Retired Economist (1)
- Former US Legislator (1)
- Geotechnical Engineer (1)
- Environmental Scientists (3)
- Geographer (1)
- Community Advocate (1)
- Water Policy Specialist (1)

Drainage Effects

- Economic Impacts
- Local, Regional, Business, Individual
- Projections (Climate change scenarios = low/high)
- Upstream
- Downstream
- Flooding
- Channel Stability
- Sedimentation
- Dredging
- Human Activity

Economic Impacts Modeling Example

Apply model parameters to measured loadings

		Watershed loading (land sources only)		Watershed damage via drainage		
DNR name	acres	TSS T/yr	Total Nitrogen lbs/yr	TSS $/yr	N $/yr remediated	N $/yr avoided
Minnesota River - Headwaters	645,000	6,000	943,000			
Pomme de Terre River	560,000	9,000	1,358,000			
Lac Qui Parle River	632,000	12,000	1,698,000			
Minnesota River - Yellow Medicine River	1,333,000	40,000	6,098,000			
Chippewa River	1,330,000	1,000	234,000			
Redwood River	448,000	5,000	4,121,000			
Minnesota River - Mankato	862,000	53,000	10,287,000			
Cottonwood River	841,000	21,000	9,858,000			
Blue Earth River	889,000	32,000	37,613,000			
Watonwan River	559,000	9,000	8,921,000			
Le Sueur River	711,000	63,000	17,731,000			
Lower Minnesota River	1,174,000	41,000	15,475,000			
At mouth	9,984,000	292,000	114,337,000	0	0	0

The Muddy Minnesota River

Two of the Collaborative Actions:

- Reviewing drainage improvement projects and objecting to projects that cause downstream impacts.
- Advocating for changes in the state’s programs to protect water resources.

Limbo Creek

A protected public water

Lyon County CD 14

Review of proposed project revealed large increases in flow discharges

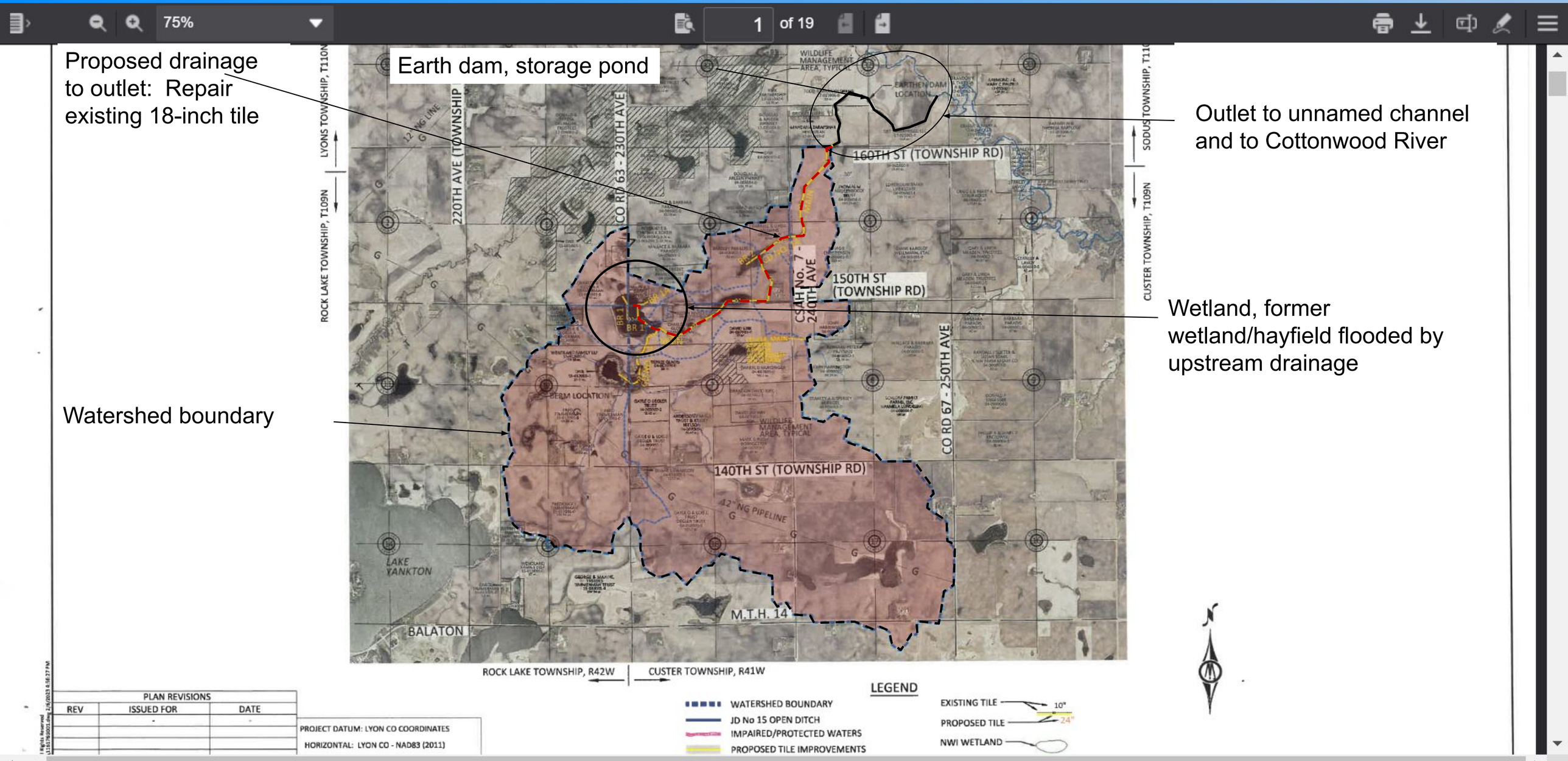
Approx. frequency of a channel forming flow (approx. 1.5 to 2-year flood event)

Table 6: Calculation of Additional Flow

Runoff Event	Existing Flow (CFS)	Proposed Flow ½" Design (CFS)	Change in Flow ½" Design (CFS)	Proposed Flow 1/4" Design (CFS)	Change in Flow 1/4" Design (CFS)
2-Year	78.1	152.5	74.4	134.8	56.7
5-Year	123.5	209.5	86	165.8	42.3
10-Year	157.2	247.6	90.4	195.5	38.3
25-Year	209.1	310.5	101.4	242.7	33.6
50-Year	467.0	389.4	-77.6	296.1	-170.9
100-Year	905.2	814.1	-91.1	371.6	-533.6

Proposed project discharge for different runoff events

CD-14, LYON COUNTY: PROJECT AS CURRENTLY PROPOSED



BWSR Storage Program

Competitive grant program to control water volume and rates to protect infrastructure, improve water quality, and mitigate climate change impacts.
Legislature appropriated $17 Million in funds for this grant program last year.

Drainage Work Group Subcommittee on Adequate Outlet Report

Subcommittee Goal:

- Consensus on what needs to be included in the Engineering Reports for Drainage Improvement Projects.

Consensus Points

- Increased bank erosion is a flooding impact from increased water yield.
- Damages are caused both by the peak and the duration of flows.
- Minnesota River needs a watershed basin model to determine the cumulative impacts of changes to runoff.

Non-Consensus Points

- Analysis of flood impacts should include analysis of channel forming flows because bank erosion is a flooding impact.
- Evaluation of adequate outlet adequacy should include impacts listed in MN statute 103E.015.

Water Storage in the Minnesota River Basin

"… determine the flow reduction benefits received from the placement of storage measures in key locations throughout the basin."

"Lower Minnesota River Watershed District (commitment has been received to sponsor this effort)."

From *Minnesota River Basin Interagency Study, 2020, U.S. Army Corps of Engineers*

Request to change Drainage Law 103E.015

Drainage Improvement Projects *Must*:

- Evaluate the effect of channel forming flows on sediment loads
- Regulate private drainage systems
- Evaluate Groundwater impacts
- Not increase nutrient loads or pesticide loads to downstream waters
- Include the cost of restoration for MN River hydrology in cost/benefit analysis

QUESTIONS?

The Muddy Minnesota River