# CLIMATE ACTION FRAMEWORK

Building a resilient watershed for current and future generations

DECEMBER 2022

MINNEHAHA CREEK
WATERSHED DISTRICT

# MESSAGE FROM MCWD PRESIDENT

**At the Minnehaha Creek Watershed District (MCWD), we envision a landscape of vibrant communities where the natural and built environments exist in balance, creating value and enjoyment for all.**

MCWD's success with its partners has proven that we are most effective when we work closely with those who influence land use change. We have seen how the integration of land use planning and water resource management consistently produces sustainable solutions that maximize social, economic, and environmental benefits.

Within the watershed, more extreme flooding and drought are already impacting our treasured water resources and the communities that depend on them. As we all prepare to meet the challenges of a rapidly changing climate, the need for thoughtful, integrated planning is more important than ever.

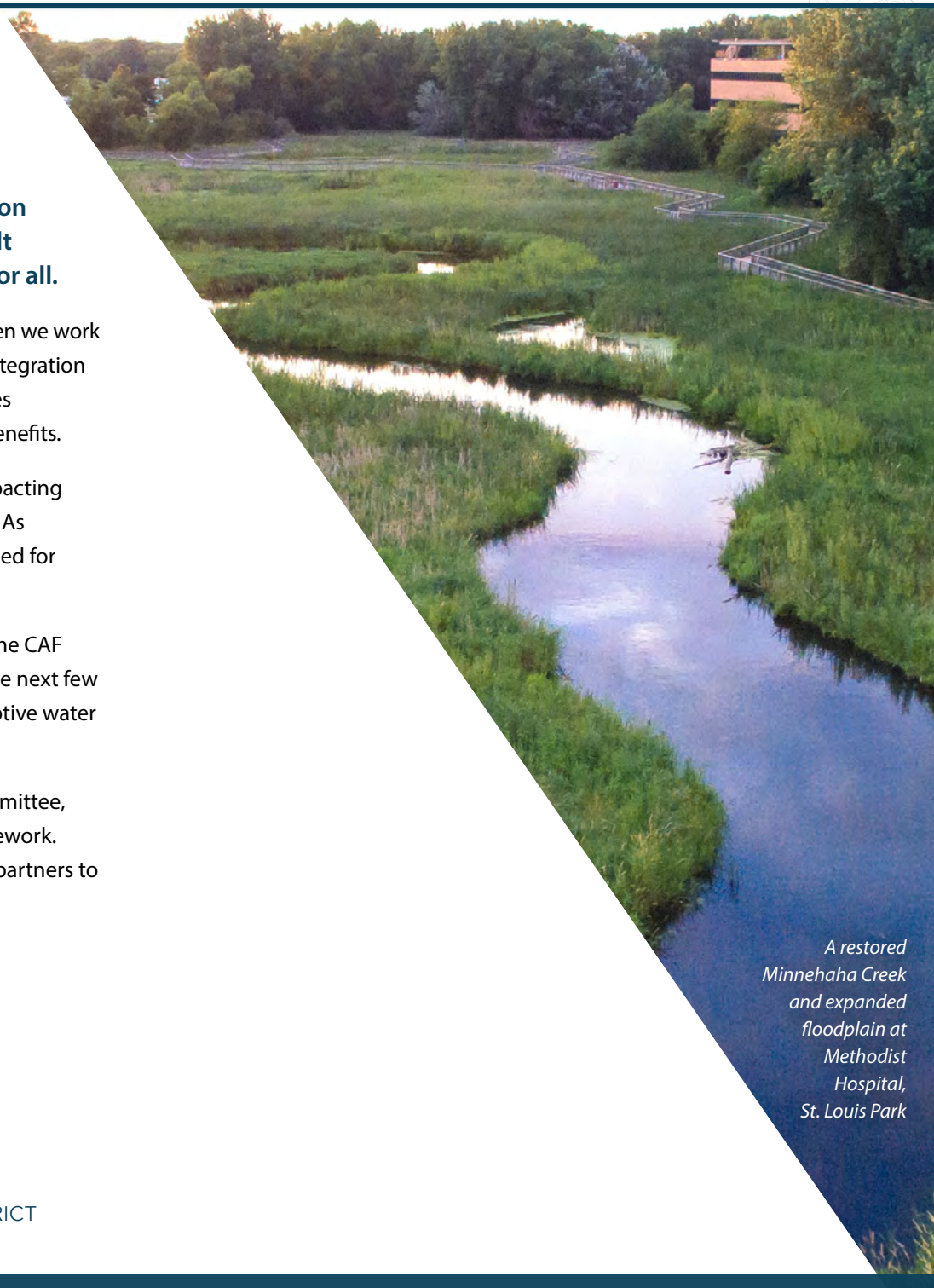
We developed the Climate Action Framework (CAF) to address this need. The CAF outlines a coordinated strategy for action and will guide our efforts over the next few years as we work closely with our local, regional, and state partners in adaptive water resource management planning.

I want to thank the MCWD Board of Managers, staff, Citizens Advisory Committee, and our strategic advisors for their work guiding and developing this framework. Important work lies ahead, and I look forward to engaging with our many partners to build a resilient future for the watershed and our communities.

Sincerely,

Sherry Davis White

**MCWD President**
**Sherry Davis White**



*A restored Minnehaha Creek and expanded floodplain at Methodist Hospital, St. Louis Park*

# TABLE OF CONTENTS



*Headwaters of Minnehaha Creek*



*Autumn colors at Minnehaha Falls*
*Photo credit: Justin Pruden*

# EXECUTIVE SUMMARY

## Climate change is already impacting our region.

Between 2010 and 2019, our watershed experienced the wettest decade on record, including a flood of record in 2014 that stressed natural systems and damaged the built environment. These periods of intense rainfall were followed by severe drought in 2021 and extreme drought in 2022,[6,7] which also brought the all-time driest September.

As we look to the future, these effects of climate change are expected to accelerate. The region is projected to experience more intense cycles between periods of extreme rainfall and drought, which will increase the strain on the watershed and our communities.

Understanding that our rainfall patterns are actively shifting, and that land use and water management are inextricably linked, reinforces the need to deepen and evolve our collaborative approach to address the growing challenges of a changing climate.

With a data-driven understanding of current and future impacts, and by bringing partners together to integrate their many goals, we will be able to deliver coordinated project and policy solutions across the watershed that equitably build resilience, support the growth of vibrant communities, and benefit the people within them.

*A flooded Meadowbrook Golf Course, June 2014 Photo credit: Erdahl Aerial Photos*

## SETTING OUR CLIMATE DIRECTION

As we look ahead, we recognize the need for a coordinated, strategic approach to address greenhouse gas emissions and prepare communities for climate impacts. Everyone has a role in climate action, and this framework outlines how MCWD will do its part for the region's current and future climate needs.

MCWD's Climate Action Framework is built on three pillars:

### Pillar 1: UNDERSTAND & PREDICT | *Learn more on page 14*

In order to meet the needs of the future, we must first have a high-resolution understanding of how water flows through the watershed *today*. That understanding can then be used to predict the range of impacts that changing precipitation may have in the future, on natural and built portions of the watershed. To achieve this, MCWD is expanding its data collection and analytical capabilities to predict vulnerabilities and risks across the watershed in the coming decades. These investments will allow MCWD to work alongside its member communities in planning for the future.

### Pillar 2: CONVENE & PLAN | *Learn more on page 15*

With new data that show how our watershed will respond to future flooding and drought, MCWD will be prepared to develop adaptation strategies in close collaboration with its partners. MCWD will bring state, regional, and local partners together, leveraging its understanding of future vulnerabilities to develop common goals, and align implementation priorities into a cohesive plan for climate action.

### Pillar 3: IMPLEMENT, MEASURE, & ADAPT | *Learn more on page 16*

With a foundation of sound science and alignment of mutual priorities, we must coordinate with partners throughout the watershed to make measurable progress towards our shared goals. MCWD will monitor progress and work with partners to adapt and evolve the approach as it gains new information, to protect and improve the watershed for future generations.

*Morning steam at the headwaters of Minnehaha Creek*

# INTRODUCTION

## WHY DEVELOP A CLIMATE ACTION FRAMEWORK?

**Communities in the Minnehaha Creek Watershed District (MCWD) have already begun to feel the effects of a warmer and wetter climate,** including localized and regional flooding during the wettest decade on record from 2010-2019, followed by periods of severe and extreme drought.[5,7] These disruptive patterns, which significantly impact both natural resources and communities, are expected to continue.

With more change on the horizon, the Climate Action Framework (CAF) will guide us in defining our role and lay the groundwork for collaborative strategies going forward. The CAF then serves both as a roadmap for near-term actions (see Appendix A), and sets the stage for mid-term engagement with local, regional, and state partners as climate action becomes a driving theme in the development of MCWD's 2027-2037 Watershed Management Plan.

## WANT TO LEARN MORE ABOUT MINNESOTA CLIMATE?

The Minnesota State Climatology Office gathers, archives, manages, and disseminates historical climate data in order to address climate impact questions.

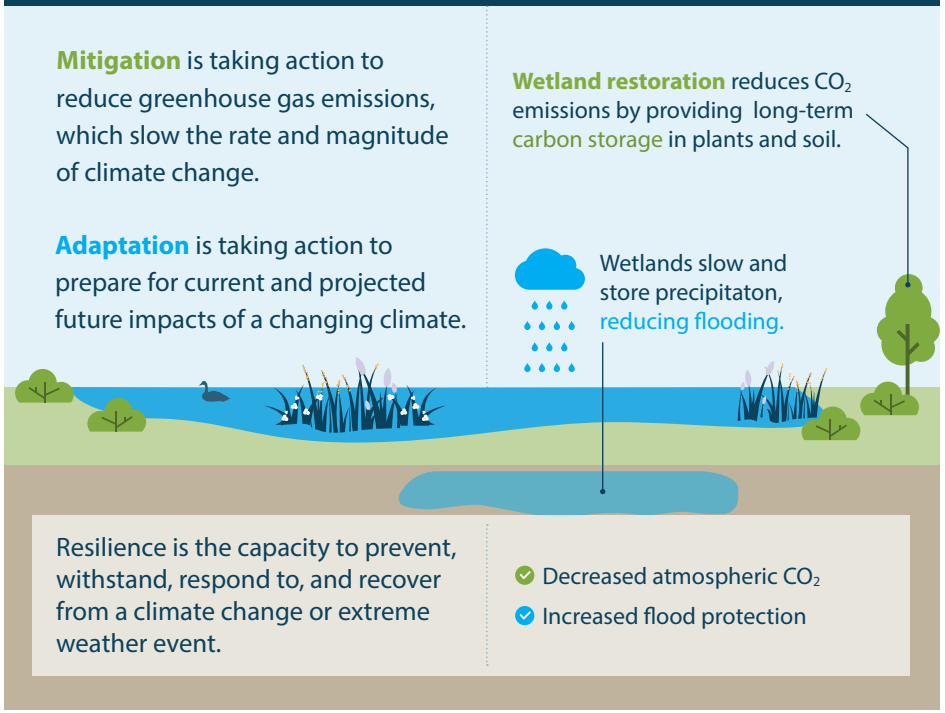
To learn more and explore climate data you can visit: https://climateapps.dnr.state.mn.us/index.htm.[7]

## THE NEED FOR MITIGATION & ADAPTATION

There are two primary tools to address climate change: **mitigation** and **adaptation**.

**Mitigation** is taking action to reduce greenhouse gas emissions, which slow the rate and magnitude of climate change.

**Adaptation** is taking action to prepare for current and projected future impacts of a changing climate.




Resilience is the capacity to prevent, withstand, respond to, and recover from a climate change or extreme weather event.

- Decreased atmospheric $CO_2$
- Increased flood protection

## OUR BALANCED URBAN ECOLOGY APPROACH

MCWD's Balanced Urban Ecology (BUE) policy is built on three fundamental principles:

- Healthy natural ecosystems are an integral component of vibrant communities, creating a sense of place, providing vital connections, and enhancing quality of life.
- Decisions made about the land directly affect the health of the watershed.
- MCWD can best achieve its mission, and the social and economic goals of its partners, by working in close partnership with the land use community.


This philosophy of partnership and integrated planning will continue to guide our approach as we work to make our watershed more resilient to the impacts of climate change.

## FRAMEWORK DEVELOPMENT

To develop this CAF, MCWD completed a situational scan to inform our role and strategy for responding to climate change (see Appendix B). The MCWD Board, Citizens Advisory Committee (CAC), and staff conducted this scan guided by the following four questions:

- **What's Happening?** — Climate Science
- **What Are the Threats?** — Impacts & Vulnerabilities
- **What's Being Done?** — Governance Context & MCWD's Work
- **What's Our Role?** — MCWD's Climate Action Framework



*Outdoor recreation in the heart of Minneapolis, Bde Maka Ska*
*Photo credit: Justin Hickman*

# SITUATIONAL ASSESSMENT
# 1. GUIDING PRINCIPLES

Emerging from the situational scan of the science, impacts, and vulnerabilities, and broader governance on the issue of climate change, we identified four principles to guide MCWD's action:

**Sound Science** — Since its formation, MCWD has used data to understand problems and unlock solutions. As rainfall patterns shift due to climate change, we are expanding data collection and analytical methods, and using our new watershed understanding to guide our work with partners on high-impact projects.

**Partnership** — We will leverage available science alongside public and private partners to develop shared watershed climate action strategies and align investments to ensure we build climate resilient communities together.

**Flood Adaptation** — Flooding is one of the most significant threats to our built and natural environments, and flood management was MCWD's founding purpose. With knowledge of how shifting rainfall patterns will continue to impact the watershed and its communities, MCWD will focus its climate action on addressing the regional impacts of flooding in partnership with others.

**Watershed-Scale Solutions** — Adapting to the impacts of climate change will require coordinated action across federal, state, and local levels of government. To maximize results, MCWD will focus its efforts at a watershed scale, coordinating action across the jurisdictional boundaries of its 29 cities and townships, with an emphasis on solutions that provide the greatest regional benefit.


*Kenny Blumenfeld, State Senior Climatologist, presenting to MCWD's Citizens Advisory Committee, 2019*

# SITUATIONAL ASSESSMENT
# 2. CLIMATE SCIENCE

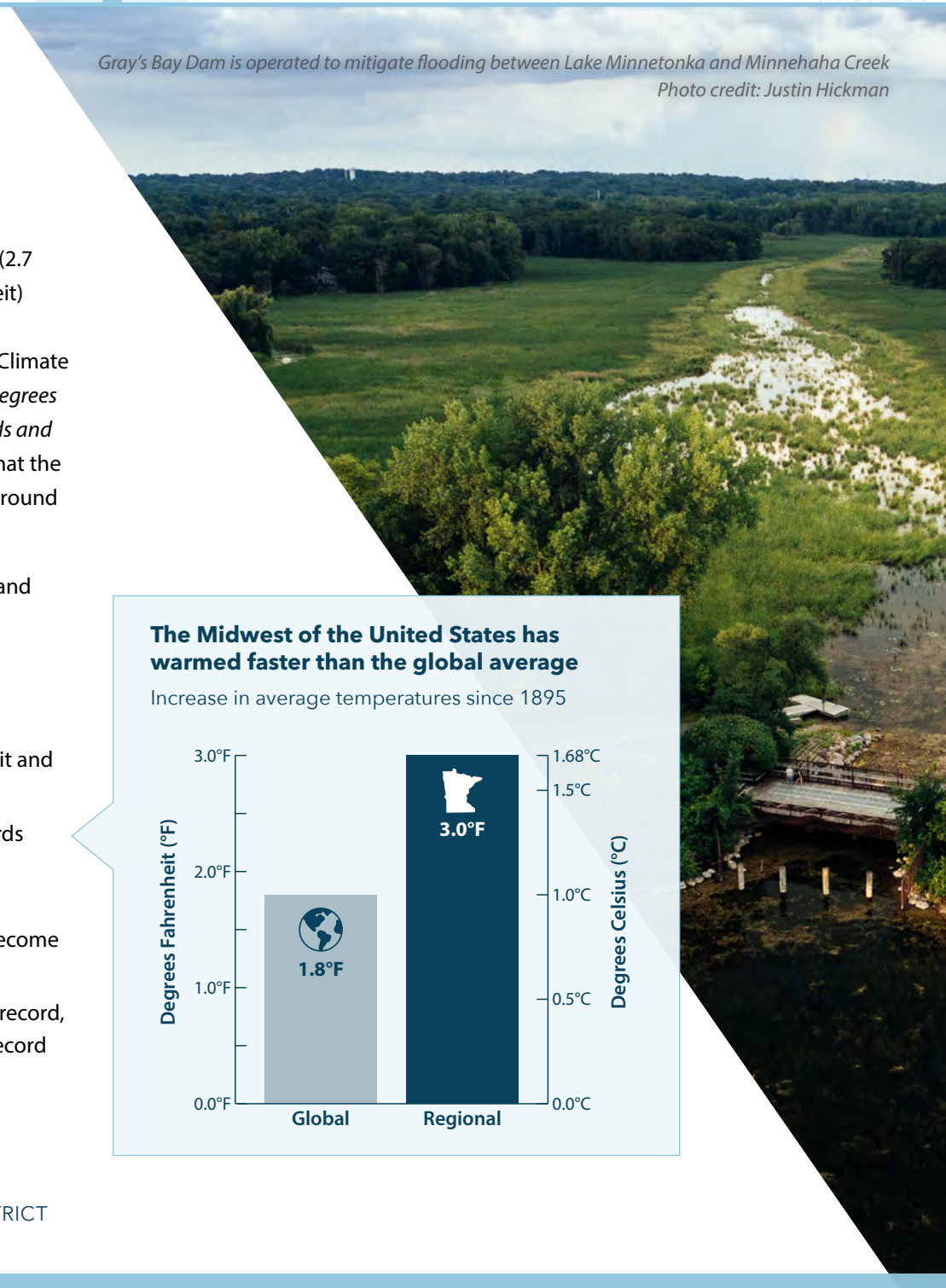
## GLOBAL & NATIONAL CLIMATE TRENDS

Globally, we are on a trajectory to exceed warming of 1.5 degrees Celsius (2.7 degrees Fahrenheit) by 2050, and 2 degrees Celsius (3.6 degrees Fahrenheit) by the end of the century unless significant reductions in greenhouse gas emissions occur in the coming decades. The Intergovernmental Panel on Climate Change (IPCC) Working Group II states that "*global warming reaching 1.5 degrees Celsius in the near term would cause unavoidable increases in climate hazards and present multiple risks to ecosystems and humans*." Meanwhile, data shows that the Midwest of the United States is warming faster compared to other areas around the globe.[1,2,3,6]

Understanding how these global climate trends are affecting our region, and watershed, is critical for local decision-making.

## MINNESOTA & REGIONAL CLIMATE TRENDS

- Between 1895 to 2020, Minnesota warmed by 3.0 degrees Fahrenheit and annual precipitation increased by an average of 3.4 inches.[6]
- As average temperatures are predicted to continue increasing towards mid-century, Minnesota is also expected to see increased periods of drought, as experienced in 2021 and 2022.[5,6]
- Both Minnesota and the Minnehaha Creek watershed continue to become warmer and wetter.[5,6,7]
- Between 2010-2019, the region experienced the wettest decade on record, including a flood of record in 2014 and the wettest seven years on record between 2013 and 2019.[7]



*Gray's Bay Dam is operated to mitigate flooding between Lake Minnetonka and Minnehaha Creek*
*Photo credit: Justin Hickman*

**The Midwest of the United States has warmed faster than the global average**

Increase in average temperatures since 1895

# SITUATIONAL ASSESSMENT
# 3. IMPACTS & VULNERABILITIES

**The increased frequency and severity of both flooding and drought will expose systemic vulnerabilities in our infrastructure, natural systems, and the communities we serve.**[5,6,7]

Therefore, it is vitally important that we develop plans for wise investments that allow us to equitably adapt to the effects of our wetter and warmer future throughout the watershed.

### Rising Temperatures

- Warmer temperatures, especially at night and during winter
- More high-heat days, extreme heat events, and periods of drought
- Increased algal growth and reduced water quality and clarity
- Degraded habitat quality and increased stress to native species

### Increasing Intensity & Frequency of Precipitation

- Increased frequency and magnitude of damaging floods
- Increased strain on buildings, roads, and storm sewer systems
- More pollution in waterways due to increased erosion and stormwater runoff
- Degraded habitat quality and increased stress to native species

*Minnehaha Creek overflowing its banks above Minnehaha Falls, 2014*

## CHANGES IN CLIMATE AFFECT EVERYONE BUT THE IMPACTS ARE NOT FELT EQUALLY

Due to a range of historical and ongoing social, economic, and political factors, some communities continue to feel the impacts of climate change more than others. Addressing equity in the context of climate adaptation is one of the three core principles in the State of Minnesota's Climate Action Framework, and will also guide MCWD as we develop climate strategies that address these vulnerabilities.[4]

# SITUATIONAL ASSESSMENT
# 4. GOVERNANCE CONTEXT

**Water is managed by federal, state, regional, and local governments.** By understanding the climate planning happening at these various levels, MCWD can best focus its own climate direction while integrating its work into that of public partners.

**Minnesota's Climate Action Framework** (2022) sets a vision of a carbon-neutral, resilient, and equitable future through six goals and a call for collective action.[4] Of the six, two goals and related priority actions clearly align with MCWD's role at a watershed scale in areas of both mitigation and adaptation:

- **Climate-smart natural and working lands.** Enhance climate benefits by absorbing and storing carbon, reducing emissions, and sustaining resilient landscapes.
  - Carbon sequestration and storage in forested lands, grasslands, and wetlands: Manage forests, grasslands, and wetlands for increased carbon sequestration and storage.
  - Sustainable landscapes and water management: Reduce greenhouse gases and improve landscape resilience through multipurpose water storage and management practices that protect farmlands, water supplies, and infrastructure.
- **Resilient communities.** Provide each Minnesota community with tools to plan and become resilient to its unique climate impacts.
  - Climate-smart communities: Build the capacity of Minnesota communities to protect against and withstand the effects of climate change.
  - Healthy community green spaces and water resources: Expand and protect tree canopies, parks, and other green spaces; protect lakes, rivers, and wetlands that provide community resilience benefits.

*Watershed-scale perspectives at Wassermann Lake Preserve, Victoria*
*Photo credit: Justin Cox Photography*


## UNDERSTANDING REGIONAL AND LOCAL PLANS

Refer to Appendix B for brief summaries of regional and local plans relevant to the watershed.

SITUATIONAL ASSESSMENT

# 5. ASSESSING MCWD'S WORK THROUGH A CLIMATE LENS

*Minnehaha Creek Preserve is an oasis for wildlife and people within an urban corridor, St. Louis Park*
*Photo credit: Justin Hickman*

MCWD has a long history of land stewardship and building high-impact projects, both of which have supplied the watershed with a range of climate mitigation and adaptation benefits. As we look to the future, we are also accounting for and building on the climate actions we have taken to date, including:

- **Planning and technical support** — MCWD works with partners to understand and address water quality and quantity issues. For example, working as part of a multi-agency team to diagnose why residents near Lake Nokomis in South Minneapolis experienced wet basements and yards, and identify solutions. The Lake Nokomis Area Groundwater & Surface Water Evaluation serves as a case study for the region on how climate change is already impacting communities based on historic land development patterns.

**Collaborative research and analysis**

- **Landscape improvements** — MCWD projects, land conservation, and regulatory policies have improved water quality, flood management, and ecological integrity across the watershed. Landscape restoration, stormwater management, and expanding wetland and floodplain storage provide both mitigation and adaptation benefits by sequestering carbon and building resilience.[8]

**Restoring and protecting the landscape**

- **Emergency preparedness and management** — MCWD serves as a key point of contact for emergency managers and affected communities, during flood emergencies. Over the last decade, in partnership with the National Weather Service, United States Geological Survey, and Hennepin County, we have continued to expand flood forecasting capabilities and preemptive communications and information sharing across communities.

**Expanding flood forecasting capabilities**

# CLIMATE ACTION FRAMEWORK

*Six Mile Marsh, with MCWD's prairie restoration in the foreground*
*Photo credit: Erdahl Aerial Photos*

## MCWD's Climate Action Framework is defined by three pillars.

These three pillars, which will guide our actions in the coming years, stem from principles that have supported our past success with partners.

1. Building on our principle of sound science, we must have the ability to **Understand and Predict** vulnerabilities and impacts across the watershed.
2. Given the mosaic of state, regional, and local governments involved, we must **Convene** with our partners, **and Plan** for a coordinated and cohesive watershed adaptation strategy to the predicted cycles of flooding and drought.
3. These plans will guide us and our partners as we **Implement** high-impact projects throughout our communities to generate regional benefit. As we continue to **Measure** the effects of climate change and the resilience being built, we will remain flexible and continue to work closely with partners to **Adapt** the watershed, and our approach.

Appendix A contains a list of MCWD's near-term actions under each pillar of its climate framework.

### Pillar 1
### UNDERSTAND & PREDICT

Expand data collection and analytical capabilities to predict vulnerabilities and risks across the watershed.

### Pillar 2
### CONVENE & PLAN

Collaborate with state, regional, and local partners to assess vulnerabilities to climate change within the watershed, and develop a coordinated project and policy strategy to build resilience.

### Pillar 3
### IMPLEMENT, MEASURE, & ADAPT

Coordinate with partners across the watershed to make measurable progress towards our shared goals, monitor progress, and adapt and evolve the approach to improve the watershed for future generations.

## PILLAR 1: UNDERSTAND & PREDICT

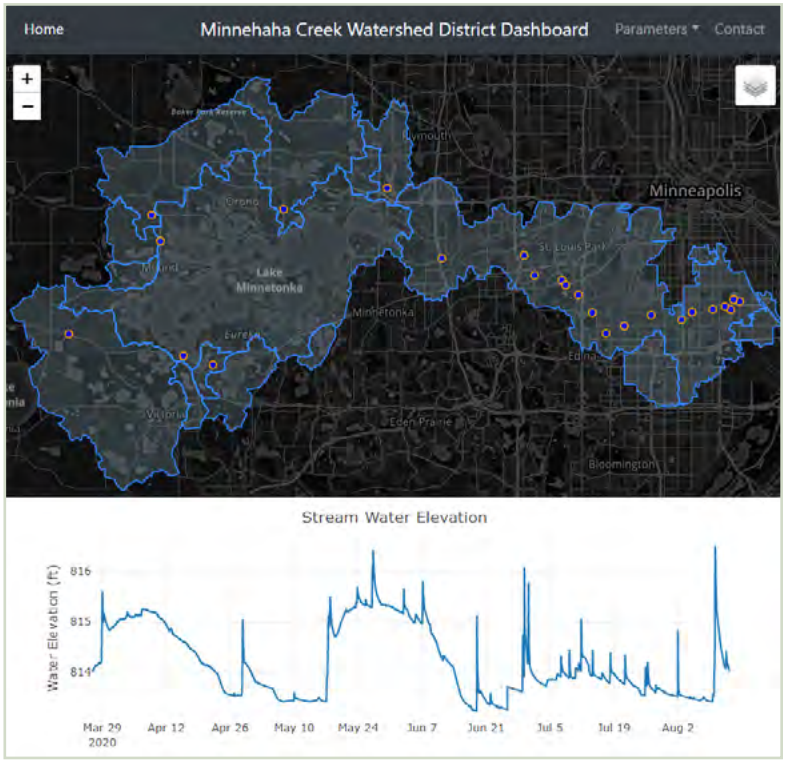
In order to work together to address the challenges of climate change, we must understand and predict how shifting precipitation patterns will impact the watershed, today and in the future. To quantify and plan for the climate pressures facing our natural systems, built environments, and communities, MCWD and its partners are already investing in the collection of new data sets, and the development of new planning tools to assess vulnerabilities, conduct scenario planning, and identify solutions.

With support from local, regional, and state partners, MCWD is actively advancing the following priorities:

- **Real-Time Water Level Monitoring** — The Real-Time Sensor Network (RESNET) collects high-resolution water level, flow, and water quality data across the watershed, in partnership with the United States Geological Survey, Hennepin County, and others. This enables MCWD to provide real-time water level information to partner agencies and the public, and also use the data to deepen MCWD's understanding of how the watershed is reacting to changing precipitation patterns.

- **Flood Forecasting** — A machine learning model will use remote sensing data from key RESNET locations to develop near-term flood forecasts, which support community-based emergency management and planning. Over time, these models will also support the optimization of the Gray's Bay Dam to maximize water storage and reduce flooding impacts through predictive operation and management.

- **Vulnerability & Scenario Planning** — A two-dimensional (2D) model of the watershed will integrate previously disparate data sets, including municipal storm sewer, land surface, and land cover, to visualize current and future flooding patterns. This model will serve as a watershed-scale planning tool, informing MCWD and partner decisions on the most valuable investments in climate adaptation projects and policies.




*Real-time sensor network (RESNET) measuring stream elevation for MCWD's 2D Watershed Model*

## PILLAR 2: CONVENE & PLAN

Changing precipitation patterns will have broad impacts throughout the watershed, and no single entity has the responsibility, authority, or resources to cope with all of them. Meaningful collaboration across our public agencies, and partnership with the private sector, will be the keys to successfully and sustainably meeting the challenges of the future.

Collaboration is a principle woven into the fabric of MCWD. Since its creation in 1967, MCWD has prioritized a partnership-based approach to water resource management, working closely alongside member communities to achieve its mission. From those experiences we know that the best results are a product of understanding local context and integrating our work with others to act on shared priorities.

In the face of climate change we are committed to carrying our philosophy of partnership forward, to build plans for cohesive action across the watershed. This will involve convening with MCWD's partners at cities, counties, and regional and state agencies beginning in 2023 to initiate climate conversations focused on:

- **Learning the challenges facing partners**, and their climate action plans and priorities.
- **Using a new 2D watershed model** to develop a shared understanding of water-focused vulnerabilities across the watershed, now and in the future.
- **Aligning goals, priorities, and strategies** for coordinated climate action with partners.

*MCWD partners engaged in subwatershed planning*

### BUILDING A RESILIENT FUTURE TOGETHER

By utilizing MCWD's investments under Pillar 1: Understand and Predict, MCWD and its partners can characterize water-driven climate vulnerabilities, evaluate various planning scenarios and respective tradeoffs, and make data-driven decisions with partners to effectively build resilience across the watershed.

## PILLAR 3: **IMPLEMENT, MEASURE, & ADAPT**

With new understanding of how shifting precipitation patterns will impact the watershed over time, and data-driven goals and strategies developed alongside our partners, MCWD will continue to take focused climate actions that emphasize:

- **Delivering high-impact projects** that build resilience and measurably benefit the natural resources, communities, and people within the watershed.
- **Shaping policy** at the interface of water and land use, to support integrated planning and partnerships that drive positive watershed outcomes.

As long-term climate strategies are developed with partners and integrated into policy in our 2027 Watershed Management Plan, MCWD will continue to balance its implementation of projects across the watershed to build climate resilience in the following ways:

- **Upper Watershed** – Work on a prioritized basis within the largest and most degraded tributaries to Lake Minnetonka, to maximize storage and manage runoff from the developing landscape.
- **Lower Watershed** – Work along Minnehaha Creek to regionally address flows from the redeveloping grid, and expand floodplain storage.
- **Gray's Bay Dam** – Use new real-time watershed data and machine learning models to optimize dam operations to mitigate flooding and sustain baseflows during drought.

*Long Lake Creek Wetland Restoration, Long Lake*
*Photo credit: Justin Hickman*

# LOOKING AHEAD

**MCWD is actively working with its partners to build a vibrant and resilient future for the watershed.**

With recent record flooding and extended periods of extreme drought, climate change is already here and impacting our natural resources and the communities around them. While we collectively take meaningful action right now, we also understand that meeting the needs of the future will require sustained attention over time.

That's why we developed this Climate Action Framework – to express MCWD's commitment to ongoing collaboration with all its partners, to continue planning and preparing for the future, and to ultimately memorialize our shared climate goals and strategy in our 2027 Watershed Management Plan.

Between now and 2027, the three pillars of climate action identified in this framework will support and guide us:

**Pillar 1: UNDERSTAND & PREDICT**

**Pillar 2: CONVENE & PLAN**

**Pillar 3: IMPLEMENT, MEASURE, & ADAPT**

Within each pillar are specific priorities for both MCWD's internal and collaborative partner-facing climate work. These near-term actions, summarized in Appendix A, serve as guideposts to the 2027 Watershed Management Plan.

We thank our partners across the watershed for their support, collaboration, and creative thinking as we move forward with this work together!

*Sunset at Lake of the Isles, Minneapolis*
*Photo credit: Mike Joslin*

# APPENDIX A: **NEAR-TERM ACTIONS**

The following tables provide a summary of MCWD's ongoing or near-term climate actions. The list below is not exhaustive and is intended to communicate MCWD's climate action priorities for 2022–2027. The list will be updated as additional actions and opportunities emerge. This work sets the stage for collaborative and data-driven implementation under our 2027 Watershed Management Plan.

## UNDERSTAND & PREDICT

Expand data collection and analytical capabilities to predict vulnerabilities and risks across the watershed.

| NEAR-TERM CLIMATE ACTIONS | TIMEFRAME |
|---|---|
| **Expand Real-Time Water Level Monitoring** – Build out MCWD's RESNET to expand the collection of high-resolution water quality, water level, and flow rate data, to provide real-time water level information to partner agencies and the public, to deepen the understanding of how the watershed is reacting to changing precipitation patterns, and to supply the data necessary to calibrate watershed models. | In Progress–2027 |
| **Improve Short-Term Water Level Predictions** – Leverage RESNET data with machine learning models to develop short-term water level predictions at key locations throughout the watershed that support preemptive emergency flooding communications, and the ongoing optimization of Gray's Bay Dam. | In Progress–2023 |
| **Optimize Gray's Bay Dam Operations** – Use real-time water level data, weather forecasts, and machine learning models to continue optimizing Gray's Bay Dam operations to maximize storage ahead of storms, minimize flooding, and extend baseflow during droughts to improve ecological function. | 2023–2027 |
| **Build a Pilot 2D Model** – Build a pilot 2D model, as a proof of concept, to assess appropriate model platform suitability for future climate scenario modeling, and build prototype data pipelines for automated collection and processing of municipal storm sewer data at a watershed scale. | In Progress–2023 |
| **Build a Watershed-Scale 2D Model** – Develop a watershed-scale 2D model that integrates municipal storm sewer data, land surface, land cover, and RESNET data to characterize and quantify vulnerabilities within the built and natural systems, and to inform collaborative decision-making on climate adaptation projects and policies. | 2023–2026 |

*Continued on the next page*

## NEAR-TERM ACTIONS — *cont'd.*

### UNDERSTAND & PREDICT — *cont'd.*

| NEAR-TERM CLIMATE ACTIONS | TIMEFRAME |
|---|---|
| **Assess Watershed Vulnerabilities** – Use the 2D model in combination with downscaled regional climate data to quantify and assess vulnerabilities within built and natural environments due to shifting precipitation patterns. | 2024–2026 |

### CONVENE & PLAN

Collaborate with state, regional, and local partners to assess vulnerabilities to climate change within the watershed, and develop a coordinated project and policy strategy to build resilience.

| NEAR-TERM CLIMATE ACTIONS | TIMEFRAME |
|---|---|
| **Develop Stakeholder Engagement Plan** – Building off ongoing stakeholder processes, develop a plan to engage local, regional, and state partners, from a technical to policy level, in MCWD's climate action planning leading from now to the delivery of the 2027 Watershed Management Plan. | 2023 |
| **Convene and Engage Partners in Climate Conversations** – Gather with state, regional, and local-level staff and policymakers to discuss issues of climate change, understand the challenges facing partners, and their respective climate action plans and priorities. | 2023–2024 |
| **Discuss Vulnerabilities and Conduct Scenario Planning** – Use MCWD's 2D model with local, regional, and state partners, to evaluate climate vulnerabilities within the watershed's built and natural systems and evaluate the tradeoffs of various potential project and policy strategies or scenarios. | 2024–2025 |
| **Develop Project and Policy Strategy for a Resilient Watershed** – Build clarity and consensus with partners on a project and policy strategy and roles, to build a resilient watershed in the face of climate change, for integration into MCWD's 2027 Watershed Management Plan. | 2025–2027 |
| **Build and Integrate an Equity Lens** – Continue developing and integrating an equity framework to inform MCWD's planning and implementation of climate action. | 2023–2025 |

*Continued on the next page*

## NEAR-TERM ACTIONS — *cont'd.*

### CONVENE & PLAN — *cont'd.*

| NEAR-TERM CLIMATE ACTIONS | TIMEFRAME |
|---|---|
| **Develop Flood Action Plan** – Develop a flood action plan to delineate MCWD's role and operations in gathering and communicating real-time watershed information with emergency managers and the general public during flood events. | 2023–2024 |

### IMPLEMENT, MEASURE, & ADAPT

Coordinate with partners across the watershed to make measurable progress towards our shared goals, monitor progress, and adapt and evolve the approach to improve the watershed for future generations.

| NEAR-TERM CLIMATE ACTIONS | TIMEFRAME |
|---|---|
| **Implement Projects that Build a Resilient Landscape** – Continue to factor mitigation and adaptation into MCWD capital projects and planning to deliver high-impact projects across the watershed that build landscape resilience to changing precipitation patterns. | In Progress–2027 |
| **Measure the Climate Benefits of MCWD's Existing Projects** – Evaluate and account for the climate mitigation and adaptation benefits from MCWD's existing capital projects and land assets. | 2024–2027 |
| **Evaluate and Improve MCWD Operations** – Evaluate opportunities within MCWD operations, and implement changes to reduce greenhouse gas emissions. | 2024–2027 |
| **Modernize Gray's Bay Dam** – Assess the feasibility of modernizing Gray's Bay Dam with technology that link operations to MCWD's RESNET, forecasts, and short-term machine learning predictions of water levels, to maximize storage and minimize flooding before and during flood producing rain events. | 2026–2027 |

# APPENDIX B: **CLIMATE ACTION FRAMEWORK DEVELOPMENT PROCESS**

As a leader in watershed management, the operator of Gray's Bay Dam, and an agency responsible for a considerable number of natural resources across a diverse landscape of local communities, MCWD recognized a need to define our role and strategy for responding to climate change in coordination with our partners. In 2019, we initiated a planning effort to develop the climate strategy outlined in this document.

MCWD's staff, Citizens Advisory Committee, and Board of Managers participated in a process to review and discuss the climate science, regional climate impacts and vulnerabilities, Minnesota climate governance, and MCWD's climate work completed to date. These discussions informed the development of the guiding principles, three pillars, and near-term climate actions presented in this document. External advisors also provided guidance on the Climate Action Framework.

## MCWD DISCOVERY WORK (2019–PRESENT)

**Climate Science**

Starting in 2019, MCWD staff conducted an extensive review of the most recent and relevant climate science. We incorporated climate trend data and conducted research to understand the climate science from a global to regional level. This included but was not limited to:

- Intergovernmental Panel on Climate Change (IPCC) assessments and support materials
- US Global Change Research Program, 2018 Fourth National Climate Assessment Midwest
- Minnesota Department of Natural Resources Climatology Office
- Research articles from the University of Minnesota and elsewhere:
  - Eutrophication will increase methane emissions from lakes and impoundments during the 21st century
  - Eutrophication of lakes will significantly increase greenhouse gas emission

In addition, MCWD District Engineer's *September 23, 2021, Technical Memorandum*[8] identified actions that could be taken to support climate change mitigation. This memorandum highlighted key activities and methodologies that could be used to quantify the mitigation benefits of MCWD's projects and outlined some of the inputs required for such quantification estimates through the lens of carbon sequestration.

**Climate Governance**

MCWD staff conducted a climate governance scan to understand the status of climate action planning and implementation taking place throughout the state, particularly for adaptation. This scan included review of climate-related plans and policies across the layers of state, regional, and local government. In total, staff reviewed 143 plans from watershed districts, counties, and state agencies. Thirty-six of the 143 plans included climate-change-specific policies and/or implementation activities described below.

- **State Agencies**: 13 of 13 State of Minnesota plans reviewed included relevant climate content.
- **Counties**: 15 of 85 plans reviewed had relevant climate content.
- **Watershed Management Organizations**: 8 of 45 plans reviewed had relevant climate content.

At the state level, the scan included an overview of each agency engaged in water management to determine the extent of climate change adaptation policies and planning at an agency level. State level agencies are engaged in climate change adaptation and resilience conversations, and all of those reviewed for this scan took part in the 2017 Interagency Climate Adaptation Team report, which outlined the roles of different government entities and priorities related to climate change adaptation and resilience. In 2020, the Environmental Quality Board completed its State Water Plan, and in 2022, the State released its Climate Action Framework. These resources provide a statewide approach to climate action.

At a regional level, the Metropolitan Council has formed a Climate Work Group focused on drafting its own organizational Climate Action Plan. This will be an objective-based plan with an environmental justice framework.

County plans that addressed climate adaptation focused primarily on gathering data (monitoring and modeling), providing education and outreach, and coordinating with other government entities. In 2021, Hennepin County published its Climate Action Plan that focuses on reducing greenhouse gas emissions to a net zero by 2050 based on the IPCC science. This Climate Action Plan is focused on adapting to climate change in ways that "reduce vulnerabilities and ensure a more equitable and resilient" county.

Several watershed district plans include goals, priorities, and implementation activities related to adapting resource protection strategies in response to climate change. These include additional monitoring, modeling/forecasting, identifying stormwater best management practices that require increased capacity, stricter permitting requirements, conducting education and outreach, and coordinating with other units of government.

At the local level, we assessed the plans of municipalities within MCWD's jurisdiction to understand the landscape of climate action planning. We reviewed plans from all 29 communities within our jurisdiction, plus the Minneapolis Park & Recreation Board. Generally, the plans of the larger and more developed cities within the lower watershed included climate change policies and action steps, and these were focused primarily on mitigation efforts.

**Other Resources**

MCWD staff also reviewed climate planning documents from outside Minnesota. Below is a list of informative planning documents utilized during the development of this framework. The list is not comprehensive but is included to convey the scope of research and review.

- US Global Change Research Program, 2018, Fourth National Climate Assessment
- US Climate Resilience Toolkit
- NOAA Climate Program Office and Metropolitan Mayor Caucus, 2021 Climate Action Plan for the Chicago Region
- District of Columbia, 2019 Resilient DC: A Strategy to Thrive in the Face of Change
- District of Columbia, Climate Ready DC: Plan to Adapt to a Changing Climate
- Milwaukee Metropolitan Sewerage District, 2019 Resilience Plan
- East Bay Municipal Utility District (EBMUD), 2021 Climate Action Plan: Sustainability & Resilience
- City of Portland and Multnomah County, 2014 Climate Change Preparation Strategy: Preparing for Local Impacts
- City of Portland and Multnomah County, 2015 Climate Action Plan

## CLIMATE ACTION FRAMEWORK CONTRIBUTORS

MCWD thanks the Board of Managers, Citizens Advisory Committee, and external advisors for their time and contributions in developing the Climate Action Framework.

**Board of Managers (2019; 2021–2022)**

- June 2019: Need for Climate Strategy
- March 2021: Climate Planning Overview
- December 2021: Climate Action Framework
- January 2022: Watershed Questions and Role Considerations
- February 2022: Mitigation Actions and Near-term Actions

**MCWD Board of Managers**
Manager Sherry Davis White, President
Manager Bill Olson, Vice President
Manager Jessica Loftus, Treasurer
Manager Eugene Maxwell, Secretary
Manager Arun Hejmadi
Manager Richard Miller
Manager Steve Sando

**Citizens Advisory Committee (2020–2022)**

Over the course of 2020-2021, the MCWD's appointed advisory board, our Citizens Advisory Committee (CAC), was engaged in a series of discussions to advise MCWD as we developed our strategy for responding to climate change. This discovery phase of work included exploration of climate trends, the roles and plans of other government entities, the threats and opportunities presented by a changing climate, and MCWD's strengths and weaknesses for responding. Using the insights drawn from these discussions, staff developed the draft Climate Action Framework. Below is a summary of the CAC's work.

- March 2020: Climate Science
- June 2020: Governance Scan
- October 2020: Climate Planning
- November 2020: Climate Impacts and Vulnerabilities
- March 2021: Climate Series Wrap-Up
- April 2021: CAC's Climate Series Report

**Citizens Advisory Committee (CAC) Members**
Chair, John F. Salditt
Vice Chair, Peter Rechelbacher
Executive Officer, William (Bill) C. Bushnell
Executive Officer, Brian Girard
Emily Balogh
Kim David
Dan S. Flo
Drew McGovern
Richard Nyquist
David Oltmans
Cassandra S. Ordway
Marc E. Rosenberg

## EXTERNAL ADVISORS (2022)

MCWD technical and legal advisors reviewed the Climate Action Framework to provide guidance on our strategy and approach. Special thanks to Kenny Blumenfeld (State Senior Climatologist, Minnesota Department of Natural Resources), Louis Smith (Smith Partners), Chuck Holtman (Smith Partners), and Christopher Meehan (District Engineer, Stantec).

## APPENDIX C: **ABBREVIATIONS**

**2D** — Two-dimensional

**CAC** — Citizens Advisory Committee

**CAF** — Minnehaha Creek Watershed District's Climate Action Framework

**$CO_2$** — Carbon dioxide

**IPCC** — Intergovernmental Panel on Climate Change

**MCWD** — Minnehaha Creek Watershed District

**RESNET** — Real-Time Sensor Network

## APPENDIX D: **REFERENCES**

1. Intergovernmental Panel on Climate Change (IPCC), 2021. IPCC Summary for Policymakers from Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report. Accessed February 2022. Available at: AR6 Climate Change 2021: The Physical Science Basis — IPCC

2. Intergovernmental Panel on Climate Change (IPCC), 2022. IPCC Summary for Policymakers: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report. Accessed March 2022. Available at: https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

3. Intergovernmental Panel on Climate Change (IPCC), 2022. IPCC Summary for Policymakers: Climate Change 2022: Mitigation of Climate change. Contribution of Working Group III to the Sixth Assessment Report. Accessed April 2022. Available at: https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf

4. Minnesota Climate Action Framework, 2022. Accessed October 2022. Available at: https://climate.state.mn.us/minnesotas-climate-action-framework

5. Minnesota Department of Natural Resources (DNR), 2021. The Drought of 2021. Accessed January 2022. Available at: https://www.dnr.state.mn.us/climate/journal/drought-2021.html

6. Minnesota Department of Natural Resources (DNR), 2022. Climate trends. Accessed February 2022. Available at: Climate trends | Minnesota DNR (state.mn.us)

7. Minnesota Department of Natural Resources (DNR), 2022. Climate data. Accessed February 2022. Available at: https://climateapps.dnr.state.mn.us/index.htm

8. Stantec, 2021. Climate Action Framework Technical Memo. September 23, 2021.

## PHOTOS

**Front Cover:**
*Left: Arden Park restoration area and park shelter, Edina*
*Top right: An afternoon at Cottageville Park, Hopkins*
*Center right: Summer at Minnehaha Falls (Photo credit: Justin Pruden)*
*Bottom right: A swan at Six Mile Creek*

**Back Cover:**
*Left: Wassermann Lake Preserve (Photo credit: Justin Cox Photography)*
*Top right: Winter sunset (Photo credit: Justin Hickman)*
*Bottom right: Minnehaha Creek Preserve (Photo credit: Justin Hickman)*

# CLIMATE ACTION FRAMEWORK

## Minnehaha Creek Watershed District

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