3.4. Lake Management

3.4.1. General Issue Statement

The Brown's Creek watershed is home to a few small, shallow lakes and several large open water wetlands/ponds that are locally regarded as lakes. While lake water quality trends are improving, many continue to face moderate to severe algal blooms occurring throughout the summer. Other issues facing the District's lakes include drastic fluctuations in water level, excessive aquatic plant communities, and threats to unique biological resources. Some of the District's lakes and ponds appear to have unique soft water chemistry that provides habitat for rare and uncommon aquatic plants, yet little is understood about the unique chemistry of these lakes and how it shapes their ecology and resilience to changes in the landscape. The BCWD is committed to protecting and improving water quality and the biological integrity of its lakes and large ponds and makes a concerted effort to manage these resources through the development and implementation of lake specific management plans.

3.4.2. Relevance to the District

Five of the District's lakes and large ponds are listed as impaired by the MPCA for nutrient concentration – these are Long Lake, Benz Lake, Goggins Lake, South School Section Lake, and Lynch Lake. Additionally, Long Lake received a new impairment for chloride in 2022. Impaired lakes do not meet state and federal water quality standards for maintaining "fishable and swimmable" conditions. Other lakes within the District are not listed as impaired, but have some level of degradation and could benefit from management or restoration actions to improve their water quality. Lakes with higher water quality, such as the recently delisted Plaisted Lake, require protection from impacts that could decrease water quality, fisheries habitat, or recreational enjoyment of the lake. Since the last iteration of the Watershed Management Plan, specific lake management plans have been developed to direct initiatives to maintain or improve these resources.

Many of the lakes in the watershed are categorized as "shallow lakes" (defined as having a depth of less than 15 feet over the majority of the lake). The ecology of shallow lakes is more dynamic because of more frequent mixing events, complex dissolved oxygen dynamics, and stronger interactions between the biological community. These lakes typically are either dominated by aquatic plants due to their shallow nature or have become over-nutrified and are dominated by algae. Accordingly shallow lakes are typically referred to as being in either a clear or turbid state. Nutrient management can transition lakes from a turbid algae dominated-state to a clear aquatic plant dominated-state. In its outreach efforts with lakeshore residents and lake users, the District focuses on explaining this phenomenon and its implication on lake management strategies.

To date, the BCWD has focused its management efforts on impacts related to land use changes in the watershed. Given the changes seen locally, nationally and world-wide, the BCWD is broadening its focus by considering impacts related to climate change (see Table X) and the benefits a healthy watershed provides to economic and social well-being (see Table X).

Table 20. Related Climate Change Impacts

Impact	Description	Indicators
More Extreme Precipitation Events	Heavier precipitation during rainfall events	- Increased risk of flooding
Drought	Extended period(s) of no or minimal precipitation impacting the supply of water	- Reduced water levels and higher temperatures can drastically affect fish, amphibians, and invertebrates.
Increases in Water Pollution Problems	Increases in sediment transport	- Increased stormwater runoff washes sediments (erosion) and other contaminants into waterbodies (i.e. TSS)
	Changes in snowfall patterns	- More ice during the winter requires application of more chemicals (i.e., chlorides)
Warmer Season	Warmer air temperatures result in warmer waters	- Higher temperatures can drastically affect fish, amphibians, and invertebrates
Extreme Heat	Extreme heat increases evaporation rates, drying up water sources such as ponds, rivers, and wetlands.	- Reduced water levels and higher temperatures can drastically affect fish, amphibians, and invertebrates - Cyanobacteria
Warming winters and fewer days below freezing (32°F)	- Without ice cover, lakes may experience higher rates of evaporation during the winter, leading to reduced water levels and changes in water chemistry. - Many aquatic species depend on ice cover for temperature regulation and protection from predators. Fewer cold days can increase stress on these species, particularly cold-water fish. - Ice cover on lakes and rivers helps regulate oxygen levels in the water. Without it, oxygen levels may decrease, leading to hypoxic (low oxygen) conditions that can stress or kill aquatic species. - Changes in Thermal Stratification: Water bodies like lakes typically experience a process called thermal stratification, where layers of water of different temperatures form during the summer and winter. Fewer cold days can prevent proper winter stratification,	- Later ice-in date and earlier ice-out date - Reduced ice thickness - Reduced oxygen measurements - Higher temperatures can drastically affect fish, amphibians, and invertebrates

	disrupting the mixing of nutrients and oxygen. This can lead to oxygen-deprived "dead zones" in lakes and reservoirs, harming fish and other aquatic organisms.	

Table 21. Lake Management opportunities which intersect with DEI principles

Impact	Description of the Need	How Ecological Health can help
Health and Well-Being	Access to green spaces is associated with improved physical and mental health, yet disadvantaged communities often have less access to parks, forests, and natural spaces.	- Retrofitting spaces to include more greenspace that can contribute to indirect physical and mental health outcomes. - By restoring natural landscapes and promoting green infrastructure, the BCWD can improve the quality of air and water in surrounding areas and mitigate the Urban Heat Island effect, which directly impacts public health, particularly in communities that have been historically marginalized or overlooked.
Climate Resilience and Vulnerability	Climate change disproportionately affects marginalized communities, who are more vulnerable to extreme weather events, droughts, and flooding.	- Reducing communities' exposure to hazards such as flooding and pollution. - Carbon sequestration (i.e., by increasing tree canopy, native vegetation, etc.)

3.4.3. Sub-Issue Areas

Water Quality Protection and Restoration

Lake water quality can be impacted by a number of factors which can be naturally occurring or anthropogenic in nature.

Excess inputs of nutrients, especially phosphorus, can cause accelerated eutrophication with symptoms that include excessive algae growth, decreased water clarity, and decreased levels of dissolved oxygen. These factors change the habitat in the lake and decrease public enjoyment of a lake. There are multiple ways in which phosphorus is added to lakes and ponds. This includes internal and external loading. Internal loading is when phosphorus is released from sediment within a water body. External loading is when phosphorus comes from a source outside of the water body.

Sediment is another common contributor to lake water quality degradation. Excess sediment accumulation due to erosion on the lake bottom changes the quality of spawning areas, decreases macroinvertebrate habitat, and allows nutrients to accumulate and become resuspended into the water column. Nutrient and sediment inputs can decrease the overall quality of a lake.

Chloride is a pollutant of emerging concern as it is very harmful to aquatic ecosystems and challenging to remove once it is introduced into water resources. Application of road salt during winter to manage ice, spray treatments on gravel roads during winter to manage dust, and water softener solutions contribute chloride to water resources through stormwater runoff.

Protecting high-quality lakes and restoring lakes that are already being impacted from land use change is of importance to the BCWD.

Lake Level Management

Lakes naturally fluctuate in water level, and this fluctuation is beneficial for the lake and the surrounding upland habitat. However, during drought conditions water levels could shift the littoral zone, which could be a potential mechanism for increased plant abundance driven by water level changes that host additional plant species. Conversely, extreme flood conditions can impact adjacent trees, structures and infrastructure (e.g. subsurface sewage treatment systems and roads). Managing excessively high lake levels may be necessary in some cases but should be conducted in a manner that takes into account the ecological function of the lake and natural lake level fluctuations. Lake level management is expected to become more challenging in the future as precipitation patterns trend toward more extreme wet and dry periods

Lake Functions and Values

Each lake within the BCWD is unique in many respects. Thus, each lake provides different functions and is valuable to the community in different ways. Lakes provide aesthetic value, habitat, flood storage and groundwater recharge functions, and recreational value, each to varying degrees. Many of the shallow lakes in the watershed display improving trends, though risks associated with algae domination and excessive aquatic vegetation, including invasive species persist. Several lakes possess unique water chemistry and/or plant communities of high biodiversity value. Evaluating the natural condition of the lake, educating residents about the natural condition, and determining local interests can assist in implementing effective lake management plans.

3.4.4. Policies, Goals, and Implementation

The policies, goals, and implementation items related to these sub-issue areas are summarized in the following tables. The sub-issue area is identified in a heading, followed by a related policy. The goals addressing that policy are lettered and stated, followed by the implementation items for that goal. This format is intended to clearly display how each policy and goal will be addressed.

Table 22. Lake Management Policies, Goals, and Implementation Activities

SUB-ISSUE:	**Water Quality Protection and Restoration**		
POLICY:	**The BCWD is committed to the restoration of water quality in degraded lakes and to the protection of water quality in lakes that meet state water quality standards.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Restore the water quality in District lakes and large ponds that do not currently meet State standards or their designated uses.	**1**	Conduct water quality monitoring of lakes in cooperation with municipalities, Washington County, and state agencies as appropriate to establish and evaluate progress toward water quality goals.
		2	Utilize the District's cost-share program to assist in implementation of Lake Management Plans through BMP installation by citizens.
		3 **4**	Implement watershed improvements in the relevant lake management plans for Long Lake, the South School Section Lake subwatershed, Benz Lake Management Plan, Woodpile Lake Management Plan, Masterman Lake Management Plan and Northern Chain of Lakes WRAPS- **SEE IMPLEMENTATION ACTIVITIES IDENTIFIED UNDER LAKE MANAGEMENT PLAN (TABLE 62)**
		4	Implement chloride source management activities in Long Lake
		5	Develop concept plan for retrofitting Cub Foods/Target parking lots to share with property owner Super Value Holdings by 2020.
B	Protect the water quality in District lakes and large ponds that currently meet State standards and their designated uses.	**1**	*Addressed through administration of the BCWD regulatory standards and criteria.*
		2	Utilize the District's cost-share program to assist in citizen installation of water quality improvement projects (including thermal BMPs) and water quantity (e.g. volume control) practices
		3	Support limited liability legislation and smart salting initiatives throughout the watershed
POLICY:	**BCWD will coordinate with municipalities and other government agencies in the management of Lake McKusick.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Meet the goals and objectives identified in the Lake McKusick Management Plan.	**1**	Develop preliminary plans for BMPs in contributing drainage area to address pollutant loads to McKusick Lake.
SUB-ISSUE:	**Lake Level Management**		
POLICY:	**The BCWD supports the management of lake levels in a way that balances the ecological functions of a lake with flood protection.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Maintain the natural hydrology of these lake systems	**1**	Continue to conduct lake level monitoring to track lake level trends
		2	*Addressed through administration of the BCWD regulatory standards and criteria.*
SUB-ISSUE:	**Lake Function and Values**		
POLICY:	**The BCWD supports the establishment of ecologically reasonable goals for the functions and values and recreational opportunities of District lakes based on the natural condition of each lake.**		
GOALS		**IMPLEMENTATION ITEM**	

A	Establish shoreline vegetation improvement goals for lakes	**1**	Incorporate shoreline vegetation surveying into Lake Management Plans and monitoring
		2	Utilize the District's cost-share program to assist in property owner installation of shoreline rehabilitation projects that can provide a water quality improvement
		3	Highlight shoreline conservation efforts of specific properties and showcase these through shoreland property outreach materials
		4	Implement a citizen science initiative using the DNR's *Score Your Shore* tool to gather data and track shoreline health across the district
B	Achieve a clear water state conditions in the district's shallow lakes and ponds	**1**	Utilize subwatershed management plans and/or internal load management to monitor progress towards a clear water state
C	Better understand soft water chemistry of district's lakes to inform basin specific management activities	**1**	Inventory lakes for water chemistry and plant communities to determine where soft water lakes are and what characteristics of the contributing drainage area supports their chemistry.
D	Better understand the distribution and growth of aquatic plant communities and how to manage them	**1**	Monitor aquatic plant communities via point-intercept surveys on a 5-10 year cycle for each lake. *(Rationale being that aquatic plant communities are a good, relatively cheap option for monitoring lake response to changes in water quality/climate change/other factors, a good data point for overall function and value, and BCWD has lots of potential for unique species).*
		2	Establish a lake vegetation management policy. *PLSLWD has one of these and it helps give guidance to when the District will/won't intervene in vegetation management. More food for thought as it may not be as big of a deal for BCWD since it doesn't have the large recreational lakes of PLSLWD with as many landowner AIS complaints. But can help focus efforts if vegetation management becomes a common request.*

Table 23. Projected Expenditures (in 1,000's) for Lake Management Practices

Implementation Activities	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	10-Yr. Total
Develop Lake Management Plans for Bass Lake East and West. Plan would include strategies to reduce watershed nutrient loading and internal phosphorus loading.	--	--	--	--	20	--	--	--	--	--	20
Long Lake Management Activities	18	15	5	10	16	29	35	49	72	75	324
South School Section Lake Management Activities	--	15	12..5	12..5	12..5	12..5	12..5	12..5	12..5	12..5	115
Management Activities for All other District Lakes and Large Ponds	10	10	30	25	20	--	30	35	25	35	220
Develop concept plan for retrofitting Cub Foods/Target parking lots to share with property owner Super Value Holding by 2020.	--	--	--	15	--	--	--	--	--	--	15

Develop concept plan for Trooien property to demonstrate more sustainable development approach.	--	15	--	--	--	--	--	--	--	--	15
Develop concept plan for Herbergers property to share with property owner Michael Holdings.	--	--	15	--	--	--	--	--	--	--	15
Total for Lake Management	**28.3**	**55**	**63**	**63**	**69**	**42**	**78**	**97**	**110**	**123**	**724**

Table 24. Lake Management Implementation Activities from Table 16 addressed by Baseline Monitoring Program

Conduct water quality monitoring of lakes in cooperation with municipalities, Washington County, and state agencies.
Continue to conduct lake level monitoring to track lake level trends

Table 25. Lake Management Implementation Activities from Table 16 where implementation costs covered under another Issue Category

Implementation Activity	Issue Category where implementation cost is identified (Table #)
Utilize the District's cost-share program to assist in the implementation of Lake Management Plans through best management practice installation by citizens.	Stormwater Management (Table 5)

3.8. Ecological Health

3.8.1. General Issue Statement

The restoration and protection of the District's surface water resources requires a healthy watershed where the natural cover supports hydrologic and geomorphic processes, habitat of sufficient size and quality to support native aquatic species and riparian species, and water quality that supports healthy biological communities. The BCWD shares discoveries of unique and sensitive plants and animals to increase awareness of the value of protecting healthy watersheds and improve understanding of management actions needed to avoid adverse impacts.

3.8.2. Relevance to the District

The BCWD is home to several unique ecosystems which provide habitat for rare and sensitive plant and animal communities. Given the rate at which land use changes have occurred in the eastern part of the Twin Cities Metropolitan Area, the watershed still has a number of high-quality resources which warrant protection.

To-date the BCWD has focused a significant amount of effort on the protection and restoration of Brown's Creek, a cold-water fishery located on the boundary of the Twin Cities Metropolitan Area. Given its designation as a cold-water fishery, Brown's Creek has been actively managed by the Minnesota DNR as a trout stream and a significant amount of attention has been given to the trout population of the creek. In addition to the trout, the Brown's Creek corridor supports a variety of unique and rare species such as Rainbow Darter (*Etheostoma caeruleum*), Blanding's Turtle (*Emydoidea blandingii*), and coldwater dependent macroinvertebrates. The steep topography, geologic setting, and high quality vegetation of the Brown's Creek Gorge supports Walking Fern (*Asplenium rhizophyllum*), Butternut (*Juglans cinerea*), and foraging and nesting habitat for Louisiana Waterthrush (*Parkesia motacilla*).
More recently, the BCWD has been focusing on its lakes, ponds and wetlands. Lake management activities have resulted in the discovery of Snailseed Pondweed (*Potamogeton bicupulatus*), an endangered aquatic plant which indicates the need to better understand the water chemistry of these lakes and the management activities needed to sustain these sensitive species. Similarly, a wetland inventory conducted in 2024 resulted in the discovery of a Cranberry Bog (Northern Shrub Shore Fen) which is home to carnivorous round leaved sundew, bog cranberry, and a continuous carpet of sphagnum moss. The presence of these rare species is an indication of the watershed system's health and the need for protection by the BCWD as well as private landowners.

To date, the BCWD has focused its management efforts on impacts related to land use changes in the watershed. Given the changes seen locally, nationally and world-wide, the BCWD is broadening its focus by considering impacts related to climate change (see Table X) and the benefits a healthy watershed provides to economic and social well-being (see Table X).

Table 40. Impacts of climate change on Ecological Health

Impact	Description	Indicators
Extreme Heat	Extreme heat increases evaporation rates, drying up water sources such as ponds, rivers, and wetlands.	- Reduced reproductive success: Heat stress can lower reproductive success by reducing the fertility of animals or the survival rates of eggs and offspring. For example, heat waves can cause nest abandonment or reduce the hatching success of eggs in birds, reptiles, and amphibians. - Disruption of aquatic habitats: Reduced water levels in rivers, lakes, and streams can threaten fish and other aquatic organisms, as these species depend on specific water conditions for survival. Warmer water temperatures can also reduce dissolved oxygen levels, stressing or killing aquatic life. - Proliferation of invasive species: Some invasive species, including certain plants, insects, and animals, thrive in hotter conditions and may outcompete native species, altering ecosystems and threatening biodiversity. Invasive insects, such as bark beetles, have devastated forests weakened by heat stress.
Warming winters and fewer days below freezing (32°F)		- Increasing presence of species traditionally found further south while traditional northern species die out - Invasive Species Expansion: Fewer cold days can help invasive species, which are often better adapted to warmer conditions, survive and spread. This can have serious consequences for native wildlife by altering habitat structure and resource availability. - Plants and insects that emerge earlier due to fewer cold days may not synchronize with the life cycles of their pollinators or herbivores. - Warmer winters with more frequent rain can cause increased soil erosion in upland areas, leading to higher sediment loads in water bodies.
Extreme Precipitation	Washington County has and will continue to experience more wet conditions caused by increased precipitation. Precipitation increases are occurring in each season of the year, with the largest increases in spring and summer.	- Wetland areas or floodplains might become permanently submerged, reducing the amount of usable land for species like small mammals, ground-nesting birds, and reptiles. - Intense rainfall can cause soil erosion, particularly on slopes or deforested areas. Erosion leads to loss of plant cover, which is

	Not only has precipitation increased, but the intensity and frequency of large events have also increased.	essential for shelter, food, and nesting for many animals. - Extreme rainfall can lead to streambank erosion, which destroys habitats for aquatic and semi-aquatic animals such as amphibians, fish, and birds. Fish spawning sites can be disrupted as sediment buries eggs or larvae. - Increased water flow in rivers and streams can wash away aquatic organisms, disrupt breeding areas, and destroy the structure of habitats. - Excessive sediment in water can cover the river or lakebed, smothering fish eggs, aquatic plants, and invertebrates that are crucial to the food chain. This degradation can reduce biodiversity and the health of aquatic ecosystems. - Extreme rainfall washes nutrients (like nitrogen and phosphorus from fertilizers) and pollutants (like pesticides, heavy metals, and waste) into water bodies. - Disturbed landscapes and flooded areas can become ideal for invasive species to spread, often outcompeting native plants. - Wildlife and plant species that require specific conditions (e.g., dry soil, stable habitats) may be outcompeted by more generalist species, leading to a decline in biodiversity.
Drought	Extended period(s) of no or minimal precipitation impacting the supply of water	- Habitat fragmentation: As animals move to find water, they may cross human-dominated landscapes, leading to more road crossings, vehicle collisions, and habitat fragmentation. - Aquatic ecosystems are especially vulnerable to drought. Reduced water levels and higher temperatures can drastically affect fish, amphibians, and invertebrates. - Drought weakens plant root systems, increasing soil erosion and leading to long-term vegetation loss. The loss of vegetation increases soil erosion, which can lead to the degradation of habitats, particularly in areas prone to wind or water erosion. - Drought can lead to long-term shifts in species composition and biodiversity, favoring drought-tolerant species over more sensitive ones. - Soil degradation: Heat and drought can degrade soil health, leading to erosion, reduced fertility, and the loss of organisms

		that contribute to nutrient cycling. This can have long-term consequences for ecosystem productivity and resilience.

Table 41. Ecological Health opportunities which intersect with DEI principles

Impact	Description of the Need	How Ecological Health can help
Equitable access to clean water	A healthy watershed ensures that water is clean, reliable, and accessible to all communities, regardless of their socio-economic status, race, or geographic location.	- By maintaining clean lakes, ponds, wetlands, streams and groundwater the Brown's Creek watershed supports basic services that are critical to the well-being of all communities, particularly those that may not have the resources to combat pollution or environmental degradation.
Environmental Justice	Environmental justice seeks to address the unfair distribution of environmental benefits and burdens, particularly for communities that have been historically marginalized or overlooked.	- Healthy watershed management can prioritize including voices from marginalized communities, ensuring they have a say in decisions that affect their local environment. This leads to policies that reflect the needs of diverse communities and prevent further environmental inequities.
Inclusive Economic Benefits	Economic disparities are often tied to environmental degradation, with disadvantaged communities being most affected by poor watershed health. Inclusive watershed management can provide economic opportunities for all populations.	- Healthy watersheds contribute to healthier ecosystems that can support recreation, tourism, and other economic activities. - Ensuring that water quality improvement projects are implemented equitably and impacts to property values. - Investments in watershed restoration and maintenance can lead to the creation of sustainable jobs, from restoration work to green infrastructure development, benefiting local economies. These jobs should be accessible to underrepresented groups, creating pathways for economic inclusion.
Community Engagement and Empowerment	DEI in environmental planning requires inclusive processes where diverse communities have the opportunity to participate in the design and implementation of watershed management efforts.	- Healthy watershed initiatives can actively engage community members from diverse backgrounds in decision-making, planning, and restoration activities. This includes reaching out to underrepresented groups, hosting culturally relevant events, and providing education in multiple languages to ensure that all voices are heard. - Communities that are engaged in watershed health are empowered to take ownership of their local environment. Supporting leadership opportunities within minority and underserved groups ensures that they are involved in the long-term sustainability of their water resources.

Climate Resilience and Vulnerability	Climate change disproportionately affects marginalized communities, who are more vulnerable to extreme weather events, droughts, and flooding—all of which are linked to watershed health.	- Healthy watersheds act as natural buffers against the impacts of climate change by regulating water flow, preventing flooding, and maintaining groundwater supplies. Ensuring that these benefits are distributed equitably can help vulnerable communities better withstand the impacts of climate change. - Watershed management plans can focus on areas where communities face the highest risk of climate impacts. By prioritizing these areas, managers can ensure that historically marginalized communities are not left more vulnerable to environmental disasters.
Cultural and Recreational Inclusion	Diverse cultural and recreational needs must be considered in the management of water resources, ensuring that all communities have access to natural spaces that support their well-being and traditions.	- Many Indigenous communities and other ethnic groups have deep cultural ties to water bodies and natural ecosystems. A healthy watershed protects these areas, preserving important cultural and spiritual sites. - Healthy watersheds support outdoor recreational activities such as fishing, swimming, and hiking, which should be accessible to all communities. Watershed management can ensure that parks, lakes, and rivers are open and safe for use by all demographic groups, promoting inclusivity in nature-based recreation.
Education and Outreach	Promoting awareness of water issues and stewardship opportunities must reach diverse audiences to build a more inclusive environmental movement.	- Watershed programs can include targeted education efforts that reach diverse communities, particularly those historically excluded from environmental education. Programs in schools, community centers, and local organizations can raise awareness about the importance of water conservation and offer opportunities for all groups to engage in watershed protection. - Ensuring that educational materials and outreach efforts are available in multiple languages and are culturally relevant is critical for engaging diverse communities in watershed health. This fosters a sense of inclusivity and participation in water resource management.

3.8.3. Sub-Issue Areas

Degraded Fisheries

A healthy fish community is an indicator of resource health, and also an important component to maintaining a high-quality aquatic resource. Environmental stressors continue to threaten the integrity of the watershed's fish-supporting resources. These stressors can include metals, nutrients, sediment, temperature, and Aquatic Invasive Species (AIS).

Protect and Restore the Function of Upland Areas

The BCWD is home to several plant and animal species that are sensitive and valuable from an ecological standpoint. These plant and animal species are indicators of a healthy watershed which is a reflection of the land use in the rural portions of the watershed, resulting in more intact upland areas. The BCWD intends to protect and enhance these upland areas in order to maximize the ecosystem services (i.e., filtration, groundwater recharge, wildlife habitat, rate control) provided by this part of the landscape.

Invasive Species

Invasive species continue to spread throughout the region. Some invasive species pose direct risks to water resources within lakes and wetlands, while others pose indirect impacts in upland areas where they impact land cover and soil health. For example, Common buckthorn (*Rhamunus cathartica*) negatively impacts the understory which results in soil erosion and increased nutrient and sediment loads to downstream resources. Managing species that negatively impact the water resources plays an important role in maintaining the ecological integrity of the watershed.

3.8.4. Policies, Goals, and Implementation

The policies, goals, and implementation items related to these sub-issue areas are summarized in the following tables. The sub-issue area is identified in a heading, followed by a related policy. The goals addressing that policy are lettered and stated, followed by the implementation items for that goal. This format is intended to clearly display how each policy and goal will be addressed.

Table 42. Ecological Health Policies, Goals, and Implementation Activities

SUB-ISSUE:	**Degraded fisheries**		
POLICY:	**BCWD aims to support a robust and healthy fishery as a vital component to ecological health.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Promote healthy and diverse fish communities represented by species representative of the MNDNR lake or stream classifications	**1**	Conduct additional sampling on Brown's Creek to determine the population status and distribution of the Rainbow darter in the gorge.
		2	Conduct fish barrier assessment to determine potential for fish passage through 95 / 96 box culverts in 2016, then determine fish passage through remaining road crossings to Manning avenue if no barrier present in the gorge.
		3	Work with the DNR to develop a fish stocking plan
		4	Work with community groups (e.g. Stillwater High School and Trout Unlimited) to develop fish rearing plans
B	TSS loads within the contributing drainage area need to be reduced by 74% on average in order to meet these loading limits. (Brown's Creek TMDL Implementation Plan, EOR, 2012)	**1**	Annually analyze progress toward the TSS reduction goal based on evaluation of the collected monitoring data (conducted as part of the baseline monitoring program).
		2	**SEE IMPLEMENTATION ACTIVITIES IDENTIFIED UNDER BROWN'S CREEK MANAGEMENT PLAN (TABLE 61)**
C	Restore impaired lakes so that they meet state standards for total phosphorous, chlorophyll A concentration and Secchi depth.	**1**	**SEE IMPLEMENTATION ACTIVITIES IDENTIFIED UNDER LAKE MANAGEMENT PLAN (TABLE 62)**
D	Achieve the TP Load Reduction goal of 148 lbs. established at the Diversion Structure as identified in the McKusick Lake and Lily Lake Management Plans.	**1**	Re-assess water quality data collected in contributing drainage area to Diversion Structure to evaluate pollutant loading and identify sources.
E	Identify and preserve important aquatic wildlife habitat and fish spawning areas	**1**	Continue surveys for mussels in the lower gorge, particularly upstream of the 2015 unique Species Inventory survey area. Many riffles in the lower gorge have not been surveyed.
		2	Compile a herptile record database developed from available records and initiate citizen volunteer Amphibian and Reptile Survey.
			Removal of fish barriers?
			Creation of fish refugia?
SUB-ISSUE:	**Protect and Restore the Function of Upland Areas**		
POLICY:	**The BCWD is committed to maintaining the ecological integrity and connectivity of intact ecosystems.**		
GOALS		**IMPLEMENTATION ITEM**	

A	Preserve, conserve, and restore natural resources by implementing sustainable practices that promote biodiversity and healthy ecosystems (Washington County Natural Resource Systems Framework).	**1**	Implement native plant community preservation and restoration projects utilizing the District's land protection priorities.
		2	Enhance the management of the BCWD's ecosystem services by implementing pollinator conservation strategies (e.g. recognize and support exemplar projects which restore and enhance habitat for pollinator species, work with road authorities to control invasives and promote establishment of pollinator species, work with county and municipalities to develop mowing plan and schedule that is more conducive to stormwater management and pollinator species)
		3	Work with the City of Stillwater and area residents to conduct on-going monitoring of the oak forest found on the west side of Long Lake (identified as a Rare Feature) to evaluate its quality, and if any management activities are needed to ensure its sustainability.
		4	Improve ecosystem services by creating a program that focuses on restoring forests, wetlands, and grasslands to help reduce the impacts of climate change, such as flooding, heat islands, and soil erosion.
		5	Work with municipalities to establish tree preservation goals and requirements.
		6	Work with landowners to diversify their woodlands through forest management plans
B	Turf to native plant conversion goal. Enhancing ecosystem services of the landscape. Greater native/natural space vegetation requirement. More resilient landscape for wet/dry conditions.	**1**	Identify target area and criteria for priority habitat conversion areas.
		2	Consider rule change to allow credits for turf conversion
		3	Implement through the cost-share program
		4	EMWREP education and outreach
SUB-ISSUE:	**Invasive Species**		
POLICY:	**The District takes an active role in preventing the spread of invasive species through education, partnerships, monitoring, and invasive species management projects.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Initiate and support aquatic invasive species (AIS) management projects on private and public lands where connected to water quality management	**1**	Continue to monitor aquatic invasive species and implement controls when it's determined to be a water quality issue.
		2	Record the location of invasive species and implement control measures if it's determined to have water quality impacts or threats to native plant communities.
		3	Address aquatic invasive species management by providing education and outreach to residents and individuals recreating in the watershed.
		4	Utilize the cost-share program to assist with invasive species management where there is a water quality benefit and/or co-benefit towards other beneficial goals.
		5	Support initiatives by the County and other regional partners on AIS management.

		6	Education and outreach regarding bait disposal and pet release.
B	Initiate and support terrestrial invasive species management projects on private and public lands where connected to water quality management	**1**	Conduct on-going vegetation surveys (every five years) to evaluate community quality and invasive species to provide a more robust dataset that can be used to evaluate trends in plant community composition. A minimum of 5 wetland and 5 upland plots should be established for long-term monitoring.
		2	Provide public and private landowners with tools and resources needed to manage existing habitat, improve species diversity, and protect against invasive species, erosion, and overuse (LSCR1W1P).

[Turf to native plant conversion image]

Table 43. Projected Expenditures (in 1,000's) for Ecological Health

Implementation Activities	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	10-Yr. Total
Conduct additional sampling on Brown's Creek to determine the population status and distribution of the Rainbow darter in the gorge.	2	--	--	--	2	--	--	--	2	--	6
Continue surveys for mussels in the lower gorge, particularly upstream of the 2015 unique Species Inventory survey area. Many riffles in the lower gorge have not been surveyed.	--	--	2.5	--	--	--	--	--	--	2.5	5
Compile a herptile record database developed from available records and initiate citizen volunteer Amphibian and Reptile Survey.	--	--	--	3.5	--	--	--	--	--	--	3.5
Implement native plant community preservation and restoration projects utilizing District's land protection priorities.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5
Enhance management of BCWD's ecosystem services by implementing pollinator conservation strategies.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5
Continue to monitor aquatic invasive species & implement controls when it's determined to be a water quality issue.	--	--	1	1	1	1	1	1	1	1	8
Record the location of terrestrial exotic and invasive species and implement control measures if it's determined to have water quality impacts.	--	--	1	1	1	1	1	1	1	1	8
Conduct on-going vegetation surveys (every five years) to evaluate community quality and invasive species to provide a more robust dataset that can be used to evaluate trends in plant community composition: min. of 5 wetland and 5 upland plots should be established for long-term monitoring.	--	--	10	--	--	--	--	5	--	--	15
Total for Ecological Health	**3**	**1**	**15.5**	**6.5**	**5**	**3**	**3**	**8**	**3**	**7.5**	**55.5**

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Table 44. Ecological Health Implementation Activities from Table 30 addressed by East Metro Water Resource Education Program

Address AIS management by providing education and outreach to individuals recreating in the watershed.

Table 45. Ecological Health Implementation Activities from Table 30 where implementation costs covered under another Issue Category

Implementation Activity	Issue Category where implementation cost is identified (Table #)
Utilize the District's cost-share program to assist in the implementation of Lake Management Plans through best management practice installation by citizens - Cost identified in Implementation Activity X under Stormwater Management.	Stormwater Management (Table 5)
Re-assess water quality data collected in contributing drainage area to Diversion Structure to evaluate pollutant loading and identify sources.	Stormwater Management (Table 5)
Promote stormwater reuse by working with local businesses, local units of government and Washington County to incorporate BMPs into new development or redevelopment projects.	Stormwater Management (Table 5)
Conduct fish barrier assessment to determine potential for fish passage through 95 / 96 box culverts in 2016, then determine fish passage through remaining road crossings to Manning avenue if no barrier present in the gorge.	Stream Management (Table 13)
Annually analyze progress toward the TSS reduction goal based on evaluation of the collected monitoring data (conducted as part of the baseline monitoring program).	Stream Management (Table 13)
Utilize the cost-share program to assist with invasive species management where there is a water quality benefit.	Stormwater Management (Table 5)

3.13. Land Conservation

3.13.1. General Issue Statement

Changes in land use threaten to degrade the quality of water resources and limit wildlife habitat. Land use practices can reduce the area of land covered with native vegetation, increase erosion and stormwater runoff, and break wildlife habitat into small, disconnected areas unable to support high quality, diverse populations. The development of a land conservation program allows entities to set aside critical parts of the landscape for the protection and restoration of downstream waterbodies.

3.13.2. Relevance to the District

Land use changes in the District are often made adjacent to and encroaching on water resources and natural areas. Proper management of stormwater runoff and erosion will limit the water quality and quantity impacts to these resources but will not fully maintain the ecological quality or function and value of the resources if adjacent lands are managed in a way that does not maintain native vegetative communities and wildlife habitat. In 2017, the BCWD acquired a property so that it may be protected by a conservation easement. This acquisition adds a new role for the BCWD Board of Managers as they consider the management needs and potential uses for this property.

To date, the BCWD has focused its management efforts on impacts related to land use changes in the watershed. Given the changes seen locally, nationally and world-wide, the BCWD is broadening its focus by considering impacts related to climate change (see Table X) and the benefits land conservation provides to economic and social well-being (see Table X).

Table 67. Related Climate Change Impacts

Impact	Description	Indicators
Extreme Heat	Extreme heat increases evaporation rates, drying up water sources such as ponds, rivers, and wetlands.	- Proliferation of invasive species: Some invasive species, including certain plants, insects, and animals, thrive in hotter conditions and may outcompete native species, altering ecosystems and threatening biodiversity. Invasive insects, such as bark beetles, have devastated forests weakened by heat stress.
Warming winters and fewer days below freezing (32°F)		- Increasing presence of species traditionally found further south while traditional northern species die out - Invasive Species Expansion: Fewer cold days can help invasive species, which are often better adapted to warmer conditions, survive and spread. This can have serious consequences for native wildlife by altering habitat structure and resource availability.

		- Warmer winters with more frequent rain can cause increased soil erosion in upland areas, leading to higher sediment loads in water bodies.
Extreme Precipitation	Heavier precipitation during rainfall events	- Intense rainfall can cause soil erosion, particularly on slopes or deforested areas. Erosion leads to loss of plant cover, which is essential for shelter, food, and nesting for many animals. - Extreme rainfall can lead to streambank erosion, which destroys habitats for aquatic and semi-aquatic animals such as amphibians, fish, and birds. Fish spawning sites can be disrupted as sediment buries eggs or larvae. - Increased water flow in rivers and streams can wash away aquatic organisms, disrupt breeding areas, and destroy the structure of habitats. - Excessive sediment in water can cover the river or lakebed, smothering fish eggs, aquatic plants, and invertebrates that are crucial to the food chain. This degradation can reduce biodiversity and the health of aquatic ecosystems. - Extreme rainfall washes nutrients (like nitrogen and phosphorus from fertilizers) and pollutants (like pesticides, heavy metals, and waste) into water bodies. - Disturbed landscapes and flooded areas can become ideal for invasive species to spread, often outcompeting native plants. - Wildlife and plant species that require specific conditions (e.g., dry soil, stable habitats) may be outcompeted by more generalist species, leading to a decline in biodiversity.
Drought	Extended period(s) of no or minimal precipitation impacting the supply of water	- Habitat fragmentation: As animals move to find water, they may cross human-dominated landscapes, leading to more road crossings, vehicle collisions, and habitat fragmentation.

Table 68. Land Conservation opportunities which intersect with DEI principles

Impact	Description of the Need	How Ecological Health can help
Equitable access to land and natural resources	Historically, land conservation programs have sometimes overlooked marginalized communities, leading to unequal access to natural spaces and the	- Land Conservation Programs can prioritize the creation of public lands or community green spaces in underserved areas, ensuring equitable access to nature for recreation, mental health, and cultural practices.

	benefits of land conservation. Many low-income, Indigenous, and communities of color have been systematically excluded from land ownership and access to natural areas.	- Making conservation land (i.e. Brown's Creek Conservation Area) an inclusive space for all of the communities living in the watershed.
Environmental Justice	Communities of color and low-income populations are often disproportionately impacted by environmental degradation, including poor land use, industrial development, and pollution. Land conservation can help by protecting these communities from further harm.	- Conservation programs can prioritize the protection and restoration of lands in or near communities that are at greater risk of environmental hazards. For example, creating green spaces or preserving wetlands can help reduce flooding or pollution in vulnerable neighborhoods. - By conserving or restoring forests, wetlands, and floodplains near marginalized communities, programs can act as natural buffers that mitigate the impacts of climate change and extreme weather events, which often disproportionately affect these populations.
Inclusive Decision-Making	Historically, land conservation decisions have been made without the input of diverse communities, leading to a lack of representation and inclusion in environmental management decisions.	- Conservation efforts can include local communities, especially those from underrepresented groups, in decision-making processes. This ensures that land conservation projects reflect the priorities, values, and needs of all stakeholders. - Programs that engage local organizations, Indigenous groups, and minority communities in co-management or stewardship initiatives ensure that conservation projects benefit from diverse perspectives and knowledge systems. - Providing education, leadership training, and resources to minority communities allows for greater participation in land conservation efforts and creates opportunities for local leadership.
Climate Resilience and Vulnerability	Climate change disproportionately affects marginalized communities, who are more vulnerable to extreme weather events, droughts, and flooding.	- Conservation programs that focus on restoring forests, wetlands, and grasslands can help reduce the impacts of climate change, such as flooding, heat islands, and soil erosion, particularly in low-income and marginalized areas.
Cultural Preservation and Recognition	Many Indigenous and ethnic communities have deep cultural and spiritual connections to land and water. Conservation programs can either support or conflict with these connections, depending on	- Conservation programs can prioritize the protection of lands and associated waters that have cultural, historical, or spiritual significance to Indigenous peoples and other minority communities. This promotes not only ecological conservation but also cultural heritage preservation.

	how they are designed and implemented.	- Land conservation programs can benefit from integrating Indigenous knowledge systems, which have long traditions of sustainable land management. Recognizing and respecting traditional ecological knowledge can enhance the effectiveness of conservation efforts while promoting inclusivity.

3.13.3. Sub-Issue Areas

Preservation of Natural Areas, Connections between Natural Areas, and Groundwater Recharge Zones

While the impacts of development can be managed, key natural resources can be lost in the process. Conservation of groundwater recharge zones, surface water resources, and natural resources can be effectively accomplished through preservation of key natural areas. Land conservation can preserve and restore resource quality, provide stormwater benefits, protect groundwater recharge, ensure the sustainability of wildlife habitat connections, and create spaces that allow people access to natural spaces they do not have access to otherwise.

3.13.4. Policies, Goals, and Implementation

The policies, goals, and implementation items related to these sub-issue areas are summarized in the following tables. The sub-issue area is identified in a heading, followed by a related policy. The goals addressing that policy are lettered and stated, followed by the implementation items for that goal. This format is intended to clearly display how each policy and goal will be addressed.

Wetland along County Road 57

Table 69. Land Conservation Policies, Goals, and Implementation Activities			
SUB-ISSUE:	**Protection of natural areas, connections between natural areas, and groundwater recharge zones**		
POLICY:	**The BCWD will work with communities, agencies and non-profits, as appropriate, to protect land throughout the District in order to preserve and restore the resource quality, stormwater benefits, groundwater recharge, wildlife habitat connection, and access to natural spaces provided by key upland and lowland areas.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Identify and pursue opportunities to preserve and restore land within the watershed that protect and restore high quality native plant communities and/or connect critical habitat areas.	**1**	Review and revise land protection corridors and priorities to reflect current resource protection needs (e.g. recharge areas, unique resources, and land adjacent to District's resources).
		2	Work with member communities to set standards for development near and within the identified land protection corridors and to determine allowed uses within corridors that will provide necessary flexibility while preserving the water and habitat benefits of the corridor.
		3	Purchase property as land conservation opportunities arise within priority areas.
		4	Partner to conduct estate planning workshops and connection to land trusts.
B	Preserve and restore District owned easements	**1**	Develop and implement management plans for District owned easements.
		2	Restore the Brown's Creek Conservation Area by implementing the activities identified in the Management Plan which includes Natural Areas Management and Usage Implementation costs for a 10-year period.
C	Utilize space for public engagement/outreach	**1**	Work with adjacent landowners to create additional buffer to the Conservation Easement
		2	Share and educate the public about the restoration activity and unique species

Table 70. Projected Expenditures (in 1,000's) for Land Conservation

Implementation Activities	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	10-Yr Total
Review and revise land protection corridors and priorities to reflect current resource protection needs (e.g. recharge areas)	--	--	--	--	--	20	--	--	--	--	20

Work with member communities to set standards for development near and within the identified land protection corridors and to determine allowed uses within corridors that will provide necessary flexibility while preserving the water and habitat benefits of the corridor.	--	--	--	--	--	--	5	--	--	--	5
Restore the Brown's Creek Conservation Area by implementing the activities identified in the Management Plan which includes Natural Areas Management and Usage Implementation costs for a 10-year period.	54	73	36	19	23	16	16	10	10	10	266
Develop landowner interest in land protection, promote stewardship and acquire conservation easements and/or lands in coordination with the Department of Natural Resources, Washington County, the Natural Resource Conservation Service, the Minnesota Land Trust, and the Trust for Public Land as appropriate.	25	25	25	25	25	50	50	50	50	50	375
Total for Land Conservation	**79**	**98**	**61**	**44**	**48**	**86**	**71**	**60**	**60**	**60**	**666**