



BROWN'S CREEK WATERSHED DISTRICT
2008 ANNUAL REPORT
April 2009

Prepared by:

Brown's Creek Watershed District Board of Managers

Craig Leiser, President

Rick Vanzwol, Vice-President

Gail Pundsack, Vice-President

Connie Taillon, Treasurer

Gerald Johnson, Secretary

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1. Introduction

The Brown's Creek Watershed District was established by order of the Board of Water and Soil Resources (BWSR) of the State of Minnesota under statutory authority in October of 1997. The Watershed District was formed following the dissolution of the Brown's Creek Watershed Management Organization (BCWMO), a joint powers agency. A board of five managers was initially appointed by the BWSR and subsequently re-appointed by the Washington County commissioners. From the appointed board of managers the positions of President, Vice-President, Treasurer, and Secretary was elected. In one of its first actions, the newly selected board adopted the Watershed Management Plan that had been developed by its predecessor: the BCWMO. This action included two flood relief capital improvement amendments.

Since its inception, the Brown's Creek Watershed District Board has been committed to the two primary objectives of any watershed: preservation of water quality, and, reduction of risk to property owners due to flooding. The initial challenge was directed solely at surface water, but later events have focused increasing attention on the groundwater resources of the Watershed District as well. The Watershed board has also been active in attempting to integrate its plans and actions with various interests in land use and development of the governmental units within the boundaries of the Watershed.

2. Organization and Budget

a. Brown's Creek Watershed District – Board of Managers & Staff

BROWN'S CREEK WATERSHED DISTRICT - 2008 BOARD OF MANAGERS

Manager/ Address	Position	Term Expires	Community Liaison
Craig Leiser 10300 Kismet Lane Stillwater, MN 55082	President	10/22/10	Grant
Rick Vanzwol 9750 Jamaca Avenue North Grant, MN 55115	Vice- President/ CAC Liaison	10/22/09	Stillwater Township
Connie Taillon 3374 Staples Pl Stillwater, MN 55082	Treasurer	10/22/11	Oak Park Heights Lake Elmo
Gerald Johnson 302 Edgewood Avenue Stillwater, MN 55082	Secretary	10/22/09	City of Stillwater
Gail Pundsack 140 Northland Avenue Stillwater, MN 55082	Vice- President	10/22/10	Hugo May Township

The BCWD does not have any employees. The BCWD does contract with several organizations for professional services. In January 2007, the BCWD solicited proposals for engineering and legal services. At that time the firms of Emmons Olivier Resources, Inc. and Smith Partners P.L.L.P. were retained for engineering and legal services respectively. The following is a list of all contract support staff utilized by the BCWD in 2008.

BROWN'S CREEK WATERSHED DISTRICT CONTRACT SUPPORT STAFF

<u>Administrator</u>	<u>Attorney</u>	<u>Engineer</u>	<u>Recording Secretary</u>
Karen Kill Washington Conservation District 1380 West Frontage Rd, Hwy 36 Stillwater, MN 55082 651.275.1136 x26 karen.kill@mnwcd.org	Chuck Holtman/Louis Smith Smith Partners, P.L.L.P. Old Republic Title Building 400 Second Avenue South, Suite 1200 Minneapolis, MN 55401 612.344.1400 smith@smithpartners.com holtman@smithpartners.com	Camilla Correll, P.E. Emmons Olivier Resources, Inc. 651 Hale Avenue Oakdale, MN 55128 651.770.8448 colivier@eorinc.com	Debbie Meister (2008)

b. District Information

The Brown's Creek Watershed District (BCWD) is the governmental unit with primary responsibility for protecting the water resources of the Brown's Creek Watershed. The District was established in 1997 under the Minnesota Watershed District Act.

The District covers approximately 18,000 acres that drain into Brown's Creek, which then enters the St. Croix River. The watershed includes Brown's Creek—a DNR designated trout stream, and several small tributaries. The watershed includes twelve major lakes and numerous wetlands. The District includes portions of the Cities of Oak Park Heights, Grant, Hugo, Lake Elmo, and Stillwater along with portions of May and Stillwater Townships. The upper portion of the District is largely rural with farms, large-lot development and undeveloped grassland, cropland and forestland dominant. The lower portion of the District includes rapidly developing urban areas within the Cities of Stillwater and Oak Park Heights.

As a part of the Third Generation Management Plan development, the BCWD Board of Managers adopted a vision statement and a mission statement, which were developed with input from the Citizens Advisory Committee and the Technical Advisory Committee.

Vision Statement

The Brown's Creek Watershed District is made up of communities interlaced with natural corridors. These natural corridors improve the function and value of the District's water resources and support a diverse population of plants, wildlife, and fish. The District brings people and the environment together to accommodate development that preserves the connection between surface water and groundwater and enhances the quality of these resources.

Mission Statement

The Brown's Creek Watershed District works with the community to:

- o Preserve and improve the quality of the District's water and natural resources;
- o Educate residents about the value of this ecosystem and advise residents of their potential impacts on the functions and values of the District's water and natural resources;
- o Find and implement acceptable solutions to water-related issues; and
- o Assure that the integrity of the watershed is preserved for future generations.

c. Audit Report

The audit of financial management of the District for January 1-December 31, 2008 was performed by the firm of HLB Tautges Redpath, Ltd. This audit revealed that in all material respects, the respective financial position of the governmental activities, each major fund and the aggregate remaining fund information of the Brown’s Creek Watershed District, as of December 31, 2008, and the respective changes in financial position for the year ended in conformity with accounting principals generally accepted in the United States of America.” A full copy of the 2008 audit is enclosed in Appendix A.

d. Citizens Advisory Committee

A list of the appointed Citizen’s Advisory Committee members are as follows:

First Name	Last Name	Address	City/State/Zip	Community
Norman Lee	Busse	12320 Dellwood Road	Stillwater, MN 55082	Stillwater Township
Tom	Henderson	1206 Eagle Ridge Trail	Stillwater, MN 55082	Stillwater
Sharon	Schwartz	9923 110th St N	Stillwater, MN 55082	Grant
Bill	Pelfrey	10503 North 117 th Street	Stillwater, MN 55082	Grant
Paul	Richtman	2854 Nightengale Court	Stillwater, MN 55082	Stillwater
Karen	Richtman	2854 Nightengale Court	Stillwater, MN 55082	Stillwater
Dan	Kalmon	309 East Willow St	Stillwater, MN 55082	Stillwater
Luanne	Fogelson	9850 103rd St N	Stillwater, MN 55082	Grant

The CAC opted not to elect officers. The District CAC met May 15, June 19, and July 17, 2008.

e. Final 2007 & Approved 2008 BCWD Budget

See attached Final 2008 and Approved 2009 Budgets

3. Projects and Programs

a. Capital Improvement Projects: Two capital improvement projects were incorporated into the BCWMO management plan adopted by the BCWD in 1997. These were the mitigation of periodic flooding in the School Section/Goggins/Plaisted Lake basin, and, a similar though smaller project in the Kismet basin. A third capital improvement project was added in 2005; this was the design and financial assistance towards the construction of the Kern Center Pond expansion in Oak Park Heights. A fourth capital improvement project was added in 2007 to improve water quality in Long Lake in the City of Stillwater.

1) Trout Habitat Preservation Project

Design and construction of the Goggins/School Section/Plaisted Lake project was initiated in 1999 and completed in 2001. This project was not merely a “drainage” project. Rather, it became known as the Trout Habitat Preservation Project (THPP) owing to the fact that it focused on protection and enhancements of the sensitive spring-fed headwaters of Brown’s Creek, as well as stabilization of water levels in the landlocked basin of the lakes. In operation, overflow from the lakes flows through a system of wetlands and into an infiltration basin that provides significant groundwater recharge into the headwater springs from which Brown’s Creek rises. This project was continued to be monitored in accordance with the Operation & Maintenance Plan.

In 2004, the District resolved a flowage easement issue with a downstream landowner by purchasing flowage rights across the property through a flowage agreement recorded with the Washington County Records Office. After continued project monitoring, the District felt as though the project has proven effective. The District applied for and won the Minnesota Association of Watershed District’s 2004 project of the year award for the Trout Habitat Preservation Project.

In 2005, the BCWD Board authorized analysis to determine how to recover infiltration rates in one of the basins that was showing signs of some reduction as a part of the on-going maintenance of the project. Infiltration recovery project designed in winter 2006 and was installed in January 2007.

The infiltration recovery project was monitored in 2007 and 2008. It was found to be an effective means of regaining acceptable infiltration rates. A dirt field road was determined to be a source of fine sediment to one of the infiltration practices. Culverts and catch basins leading to the practices were cleaned and the field road was rocked in 2008.

2) Kismet Basin

The second project was the Kismet Basin project. After extensive negotiation with affected landowners, consideration of several alternate designs, each with varying degrees of drainage and infiltration, a final design was selected and the project

ordered in 2001. The project called for selection of a contractor and completion of most of the earth moving and heavy equipment phase in late 2001. Planting and landscape alterations took place in early 2002. This project also has residual monitoring and review by the BCWD into the future.

3) Kern Center Pond Expansion

In 2001, the BCWD was awarded \$25,000 from the Minnesota Board of Water and Soil Resources' (BWSR) Local Water Planning Challenge Grant Program. The objective of the project *BCWD Rules Implementation — Demonstration Site Plan* was to develop a demonstration site for the education of member communities, developers and citizens regarding the environmental controls and stormwater management standards required by the District's rules.

By 2002, the BCWD had identified the Kern Center Pond as a potential demonstration site for the District's rules. In order to ensure that future development within the Kern Center Commercial Area would meet the District's standards, and that peak flow rates and volumes under Hwy 36 were reduced, the BCWD offered to design the modifications that would achieve these goals. Since that decision was made, the BCWD and the City of Oak Park Heights have collaborated on the following: development of a Cooperative Agreement; design of the pond modifications; development of an Operation and Maintenance Plan; development of a Monitoring Plan; the construction process.

The construction of the Kern Center Pond modifications began in December of 2004. Final excavation and restoration of the site was completed in the spring of 2005. The goals of the modifications to the Kern Center Pond were: increased storage capacity; pretreatment of stormwater runoff; increased infiltration; and improved wildlife habitat. Continued monitoring of the infiltration basin at the Kern Center determined that the pond was not effectively infiltrating. A study was completed to determine the source of the issue. Sediment cores were taken. The problem was neither clogging nor presence of a confining layer. It appears that the pond has become connected with a perched groundwater system. The Board has budgeted for a study of the Kern Center drainage area to determine areas for volume control retrofits.

4) Long Lake Management Plan Implementation

The District developed the Long Lake Strategic Lake Management Plan to reduce total phosphorus by 35% from the subwatershed loading. This plan was developed with the guidance of a stakeholders group and a citizen task force made up of residents in the subwatershed. The District approved the plan in May 2006 began implementation, utilizing a 2006-07 Board of Water and Soil Resources Challenge Grant to fund \$75,000 of the implementation and is actively working towards obtaining additional grant funding. The total cost over 10 years will be approximately \$1.2 million to fully implement the subwatershed loading reductions from the Long Lake Management Plan.

In 2007, the District designed and installed two implementation projects. The North Marketplace pond improvements to the Cottage Pond and Wildwood pond will reduce the amount of total phosphorous loading to Long Lake by a total of 11 pounds per year. The total cost of these improvements were \$57,250 for a cost of \$5,204.55 per pound of total phosphorous removed.

In 2007, the Tower Drive Pond Improvement was implemented in collaboration with the City of Stillwater for an additional 4 pounds per year reduction in total phosphorous to Long Lake. The installation was less than \$200.

In 2007, the District designed and executed the Herberger's Pond improvement. The project is projected to reduce the annual total phosphorous load to Long Lake by 35 pounds. The total cost of the project was \$120,064 and calculates to a cost of \$3,440.40 per pound of total phosphorous removed. The project uses a device to filter dissolved phosphorous from small storm events or the first flush of larger events. This is a new application of such a device and has not been without its challenges. The District continues to work with the manufacturer to achieve optimal performance of the filter.

The Long Lake Management Plan also discusses management options to address internal phosphorous loading, which can often be a significant source of nutrients in a shallow lake. In January 2008, the BCWD Board authorized the District Engineer to complete a feasibility study on whether a temporary lake draw down is 1) hydrologically possible on Long Lake (could it be pumped, how long to refill, etc) and 2) what benefits would be seen. Some of the benefits that others have seen in other shallow lakes or wetlands is a reduction in exotic aquatic vegetation (not applicable to Long Lake), rough fish kill with ability to restock top down predator fishery, increase in emergent vegetation (shoreline plants), consolidation of flocculent sediments, increase in diversity of aquatic vegetation, reduction in nutrients, reduction in algae (scum/green color of water), increase in rooted aquatic vegetation. The BCWD is also interested in looking at whether the sediment deltas could be economically removed during a temporary draw down. The study will be completed in 2009.

b. Rules and Permits: In accordance with statutory authority, the BCWD has developed "Rules" which derive from the management plan and are directed at providing consistent evaluation and approval for development of land, modifications in land usage, and preservation of natural resources as they relate to water management. These rules apply to volume and rate of water movement, buffers adjacent to water resources, shoreline/streambank modifications, stream and lake crossings, floodplain delineation and erosion control in instances of significant surface construction. Private parties, developers, and governmental agencies are required to submit plans and calculations to show how the proposed activity will be managed to comply with the rules. The process results in the issuance of a permit, which also directs certain measurement and enforcement activities to insure compliance. The District adopted the new rules effective May 1, 2007. BCWD continued a Digital Inspection Program and Seasonal Permit

Inspector in 2008. The inspector has been effective in gaining compliance on the sites. As the economy has declined, so have the number of new permits. The District only reviewed 17 permits in 2008 and many withdrew shortly after initiating the review process; only 10 permits were issued in 2008, versus nearly 40 in the previous year.

Conducted rules training in 2008 for municipalities within District to give better understanding of how the rules have changes, how rules apply to projects within the municipalities, how rules apply to municipal projects and how we can better work together through reviews.

Received partial funding from Washington County to develop a Groundwater Dependent Natural Resource Protection Comprehensive Management Plan in 2008. The management plan draft was completed by the end of 2008, but will go through review by the TAC in 2009.

c. Hydraulic and Hydrologic Study Phase II: The Brown's Creek Watershed District has invested approximately \$80,000 to develop a very exact Hydraulic and Hydrological study of the district watershed and sub-watersheds. The study incorporates the two-foot contour mapping, GIS location, a natural resources inventory, the North Washington Groundwater Study and an extensive update to the computerized modeling (XP-SWMM) necessary to manage the water resources of the District's lakes, ponds, wetlands, streams and Brown's Creek. This study was completed in 2004 and is being used as a tool to evaluate and permit building sites, developments, conditional use permits or other projects that directly or indirectly affect the quality and quantity of the District's water resources. This information was also used to assist Washington County in assessing floodplains for a FEMA map update of the county. The hydrologic information is also available through a GIS tool developed in 2004. The GIS tool is an easy interface to access District geospatial information, such as the 100-year high water levels for each delineated subwatershed in the District. After such a significant investment, the District has made it a priority to budget an annual fund to update the model as new studies are conducted and more detailed information is available.

d. Water Monitoring and Education Program: The BCWD supported several education and monitoring projects during the year to develop a profile of healthy watershed system so as to support its management of rules and permits. Continued the baseline-monitoring program, which includes macroinvertebrate monitoring, conducting water quality and flow monitoring in Brown's Creek and monitoring the water quality and level of the District's lakes.

The District continued its participation in the Volunteer Stream monitoring program; three area high school groups get the opportunity to do real science and the District gets quality-controlled data. The monitoring projects are done in conjunction with the Metropolitan Council's Water Outlet Monitoring Program (WOMP) and the Citizen Assisted Monitoring Program (CAMP).

The District continued to provide education of residents through the District website and also dedicated funding for the next three years for a shared stormwater educator position. Activities included “Blue Thumb House Parties,” Blue Thumb presentations to HOA’s, and Stormwater U trainings. BCWD continued the best management practices cost-share program as a method to educate District residents regarding methods to improve water quality.

The District began participating in a partnership to fund a shared stormwater educator position. This position was filled in July 2006 and the District has entered into a three-year commitment to partially fund the position. The District participated in the Washington County Watershed District Fair Booth in August 2007.

The District continued an award program entitled “Conservationist of the Year” to recognize exemplary watershed conservation efforts. The annual award was given to Mr. Andy Weaver for his dedication to leading the Stillwater High School biology students in the Volunteer Stream Monitoring on Brown’s Creek. Notification of this award was distributed to local papers to promote the program and provide positive outreach for the watershed.

e. Washington County Groundwater Plan: As part of Washington County’s adopted Groundwater Management Plan, the County has taken a lead role in coordinating groundwater protection efforts. Brown’s Creek Watershed District (BCWD) has been requested through the County Groundwater Plan to take a leading role in three activities.

The methods in which BCWD has working towards accomplishing the activities in 2008 are as follows:

ROLE: *Develop and adopt rules or policies on the quantity of water used in areas where existing wells and/or groundwater dependent natural resources could be negatively impacted by overuse of groundwater. Negative impacts include reduced flow to surface water bodies, lowering of lake or wetland levels, or interference with other wells.*

Accomplishments:

1. The Washington County Water Consortium has recommended four new rules for watershed districts to adopt to increase protection for groundwater resources in its report titled “Incorporating Groundwater Protection into Watershed District Rules” (December 2004). These rules included volume control standards, standards for protecting groundwater dependent natural resources, groundwater quality protections, and groundwater appropriations standards.

Brown's Creek Watershed District revised its rules, effective as of May 1, 2007. Many of these revisions provide enhanced surface and groundwater resource protection, specifically regarding additional volume control and groundwater dependent natural resource protection.

2. The BCWD will be working with Washington County and others to develop a Groundwater Dependent Natural Resource (GWDNR) Comprehensive

Management Plan for the fen in Grant, MN. The methodology will be documented and approved by a Technical Advisory Panel with hopes of being able to cost-effectively duplicate this work for other wetland GWDNRs. This work began in 2008 and will be concluded in 2009.

ROLE: *Provide education to citizens and public officials on the inter-relation of surface and groundwater quality and quantity; the value of and need to protect groundwater recharge areas and wetlands; and implementation of best management practices and low-impact development and redevelopment strategies to protect groundwater resources.*

Accomplishments:

1. BCWD Board has continued to partner in the shared Stormwater Educator Position. The District participated in the Stormwater U training to educate municipal technical staff on volume control standards. BCWD held municipal training on the specific BCWD rule revisions in 2008.
2. BCWD BMP Cost-share Program was in its third year in 2008. Cost sharing on 15 rain gardens/shoreline restorations, increasing infiltration in an area developed prior to the District's volume control rules.
3. BCWD participated in the Washington County Watershed District Fair Booth in August 2008.
4. BCWD Board and staff periodically attend meetings of the municipalities within the district.
5. Reviewed community Local Water Management Plans.

ROLE: *For all new developments and re-developments, adopt rules controlling stormwater runoff volume and establish performance standards based on issues identified in water resource plans, inventories or studies, and on available scientific literature.*

Accomplishments:

1. BCWD adopted rules controlling stormwater runoff volume in 1999. This rule has been effective since January 1, 2000. The BCWD revised its rules, effective May 1, 2007. The volume control standard was revised from using a 1.5 yr rain event (2.6 inches) to 2 yr (2.8 inches) in 24 hours rain event, now compares proposed post-development runoff to pre-settlement conditions vs. pre-development, now promotes soil amendments to alleviate construction site soil compaction, and no longer gives an impervious allowance.

f. Washington County Water Consortium: The BCWD has also been an active participant in the Washington County Water Consortium. The Water Consortium, which was identified in the County's water governance study, is the process to be implemented to assure consistent performance between watershed districts in accounting, rules development, groundwater management, budgetary development and sharing of information regarding studies or research.

g. Minnesota Association of Watershed Districts: BCWD was an active participant in the Minnesota Association of Watershed Districts at the state level as well. One manager and the administrator attended the annual meeting as well as several associated meetings during the year.

h. Third Generation Management Plan: BCWD Third Generation management plan was adopted by BWSR in January 2007 and by the BCWD Board in February 2007.

i. BCWD Homeowner BMP Cost-share Program: Cost share program had 15 projects installed in 2008 and approvals for an additional 15 projects to be completed in 2009 with 2008 funding.

j. Brown's Creek TMDL for Biota Impairment: Phase I and Phase II Stressor Identification

- o BCWD completed the Phase I and II Biota Impairment Stressor Identification in conjunction with the Minnesota Pollution Control Agency and the Washington Conservation District.
- o The TMDL is currently being developed in 2009 for total suspended solids, dissolved oxygen, temperature and copper.

k. Plan Reviews: Reviewed the Local Water Management Plans of the communities. BCWD Board and staff periodically attend meetings of the municipalities within the district.

l. McKusick Lake Management Plan: The District monitored the diversion structure drainage to McKusick Lake with an automated sampler and flow meters, as well as took grab samples at four additional sites along the Long Lake drainage system.

4. Goals for 2009

- *Capital Improvement Projects:*
 - Continue monitoring of THPP & Kismet Basin Stabilization
 - Develop retrofit options for Kern Center Infiltration
 - Begin performance monitoring of the Herberger's Pond improvements.
 - Finalize Long Lake drawdown feasibility study.
- *Rule Revisions & Permitting:*
 - Continue to implement the revised rules adopted in May 2007 through existing permitting program.
 - Groundwater Dependent Natural Resource Protection –Finalize the Fen GWDNR Comprehensive Management Plan in 2009 and incorporate into District Rules.
- *Monitoring:*
 - Continue the District's baseline monitoring program to prepare for future lake management plans and TMDL studies. Monitor effectiveness of capital improvement projects. Use collected data to develop better management strategies.
 - Refine loading to McKusick Lake with additional grab sampling sites along Long Lake/Diversion Structure drainage.
- *Education:*
 - Continue to work with residents to implement the best management practices cost-share program.
 - Continue with the storm water education program through the shared stormwater education position, targeting municipal & developer education as well as the general public.
 - Continue to work with the area high school students to monitor the macroinvertebrates in Brown's Creek.
 - Upgrade website with interactive mapping tools.
 - Develop and implement a Stormwater Audit Program with the Washington Conservation District and Middle St. Croix WMO through Clean Water Legacy grant.
 - Continue "Conservationist of the Year" award program.
- *Land Conservation Program & Plan Reviews:*
 - Develop and implement land conservation priorities for the District.
 - Review municipalities comprehensive plans and local water management plans, assisting them with the integration of natural resource/open space planning.
- *McKusick Lake Management Plan:*
 - Continue to work with the City of Stillwater and Middle St. Croix Water Management Organization to obtain additional monitoring data and begin implementation of the McKusick Lake Management Plan within the legal boundaries of the District.
 - Joint application to MPCA with City of Stillwater for Long, Lily, McKusick Lakes TMDL study.
- *Benz Lake Management Plan:*

- Work with the Benz Lake Association and the City of Grant to finalize a Benz Lake Management Plan.
- Amend cost-share priority areas to include Benz Lake.
- Target Benz Lake residents for Stormwater Audit program.
- *Brown's Creek TMDL for Biota Impairment:*
 - Work with the Washington Conservation District and the Minnesota Pollution Control Agency on the Brown's Creek Biota TMDL – Phase II. The work will continue through August 2009.
- *Modeling upgrades:*
 - Upgrades to Hydrologic and Hydraulics Model and additional inventory information collection, including structure and stormwater facility inventories
- *BCWD Homeowner BMP Cost-share Program:*
 - Continue the BMP Cost-share program with a goal of 15 new raingarden projects in 2009.
- *BCWD LGU/Demonstration Cost-Share Program:*
 - Washington County HRA retrofits – Long Lake subwatershed water quality improvements
 - Northland Ave Stormwater Pond retrofit
 - Long Lake Shoreline Restoration – City of Stillwater Park land – 75% grant from BWSR through native plant grant
 - Brown's Creek Restoration – 50% matching grant from Trout Unlimited:
 - Address areas mowed to streambank and/or highly impacted by human landscaping practices
 - Address areas of streambank instability due to reed canary grass
 - Increase shading
 - Stream flow near Stone Arch Bridge

APPENDIX A

2008 WATER MONITORING SUMMARY

This report focuses on the summary and comparison of the lake and stream water quality data collected by the Washington Conservation District (WCD) from 2000-2008 and previous monitoring seasons. In 2008, one stream monitoring site was added to the monitoring program as part of the larger Brown's Creek TMDL (Total Maximum Daily Load) study; Brown's Creek at the Stonebridge. In addition to these sites, BCWD continued to monitor Masterman Lake, Bass Lake East (82-0124), Bass Lake West (82-0123), Lynch Lake, July Avenue Wetland, Wood Pile Lake, Pat Lake, Goggins Lake, Kismet Basin, Long Lake, South School Section Lake, and Benz Lake, and began monitoring Plaisted Lake in 2008. Brown's Creek was monitored at the Headwaters (110th St.), Highway 15, McKusick Road, Stonebridge and Highway 96; Long Lake drainage sites were monitored at 62nd St. and the Marketplace Pond; the tributary to McKusick Lake was monitored at the Brown's Creek Diversion Structure; and the Diversion drainage was monitored at Long Lake outlet, Jackson WMA outlet, and Boutwell Rd. crossing.

In 2008, the 13 lakes monitored had good to very poor water quality ratings and were classified as, eutrophic (Bass Lake West, Benz, July Avenue Wetland, Long Lake, Masterman Lake, Pat Lake, South School Section Lake and Wood Pile Lake) and hypereutrophic (Bass Lake East, Goggins Lake, Kismet Basin, Lynch Lake, and Plaisted Lake).

The overall 2008 lake grades for BCWD lakes were:

- Bass Lake West – B
- Long Lake – C+
- Bass Lake East – C
- Benz Lake – C-
- July Avenue Wetland – C
- Masterman Lake – C
- Pat Lake – C
- Wood Pile Lake – C
- South School Section Lake – C
- Kismet Basin – D+
- Goggins Lake – D+
- Plaisted Lake –D+
- Lynch Lake – F.

Of the lakes with historical data available, five lakes showed a slight deterioration in water quality for the 2008 season (Bass Lake East, Kismet Basin, Masterman Lake, Pat Lake and Woodpile Lake), two lakes maintained their water quality (Bass Lake West and Lynch Lake), and five lakes improved in water quality (Benz Lake, Goggins Lake, July Avenue, Long Lake, and South School Section Lake). Goggins Lake, Kismet Basin, Plaisted Lake and Lynch Lake were considered worse than the ecoregion range for total phosphorus, total Kjeldahl nitrogen, chlorophyll-*a*, and Secchi disk transparency. Bass Lake West was the only lake with all parameters within the ecoregion range for total phosphorus, total Kjeldahl nitrogen, chlorophyll-

a, and Secchi disk transparency. In 2008, the Washington Conservation District conducted Kendall Tau statistical analysis of all lakes monitored by WCD to determine any long-term water quality trends. For Brown's Creek Watershed District lakes, only two lakes had a significant trend. Goggins Lake had a statistically significant decreasing Secchi transparency trend ($p < 0.10$) and Long Lake had significantly increasing Secchi disk transparency and improving total phosphorus trends.

In 2008, BCWD added one stream monitoring station to its existing network of stream monitoring sites as part of the Brown's Creek TMDL. The new station was installed to measure discharge, water chemistry, and water quality along Brown's Creek at Brown's Creek at the Stonebridge. BCWD continued monitoring stream/stormwater sites at: Brown's Creek at the mouth (Hwy 96), Brown's Creek at McKusick Road, Brown's Creek at Hwy 15, Brown's Creek at 110th St., the Brown's Creek Diversion Structure, Long Lake Inlet at 62nd St., and Long Lake Inlet at Marketplace Pond.

Of the stream/stormwater sites monitored in BCWD, Brown's Creek at Hwy 15, Brown's Creek at Highway 96 and the Brown's Creek Diversion Structure showed decreased total discharges in 2008 compared to 2007. Of the sites monitored in 2008, Brown's Creek at 110th Street, Brown's Creek at Highway 15, the Diversion Structure, and Long Lake Inlet at Marketplace Pond showed reduced TP loads in 2008 compared to 2007. Brown's Creek at 110th Street and at Highway 96, Brown's Creek Diversion Structure, and Long Lake Inlet at Marketplace Pond showed reductions in total loads of TSS during the 2008 season compared to 2007.

Temperatures in Brown's Creek for 2008 displayed some interesting results when looking at thermal impacts. The minimum daily temperature at the outlet of Brown's Creek (Hwy 96) never exceeded 20° C, which is the temperature threshold where low impacts to trout survival are observed. As in 2007, the Hwy 15 and McKusick Road sites recorded no daily minimum temperatures above 20° C. One important and equally interesting note is that the 110th St. and Diversion Structure sites have the highest daily maximum temperatures. These large diurnal temperature swings are difficult to explain, but may be due to the lack of stream channel confinement in the wetland complexes upstream of Diversion Structure and Brown's Creek at 110th St. This lack of confinement may be allowing more surface area of water to be affected by atmospheric diurnal warming and cooling temperatures.

The MPCA and the MN DNR, as part of the Brown's Creek TMDL, conducted fisheries surveys in 2008 as well as historically as part of their biological monitoring programs. Due to differences in sampling procedures between agencies, variation in results, and the complexity of reporting these results while not being the organization that collected the data, those data are not shown in this report. Annual fish stocking occurred as it usually does on a yearly basis. In 2008, 1000 brown trout were stocked in Brown's Creek. This stocking follows the MN DNR long-term management plan for trout stocking efforts in Brown's Creek.

APPENDIX B

2008 AUDIT REPORT

See Attached