
**THE RILEY PURGATORY BLUFF CREEK
WATERSHED DISTRICT
ANNUAL REPORT
FOR YEAR ENDING DECEMBER 31, 2009**

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I. INTRODUCTION

Pursuant to Minnesota Statutes Section 103D.351 and Minnesota Rules Section 8410.0150, the Board of Managers of the Riley Purgatory Bluff Creek Watershed District submits its 2008 Annual Activity Report. The report includes the District's members, technical and citizen advisors, summaries of the plans, goals, water management projects, and communication programs of the District. The District distributes its Annual Activity Report to the Minnesota Department of Natural Resources and the Board of Soil and Water Resources as provided by law.

Copies of the report or audit may be obtained from the District's Managers or through www.rileywd.org. The Managers invite comments and suggestions concerning this report.

II. APPOINTMENTS
Managers

NAME AND OFFICE	APPOINTING COUNTY	CONTACT INFORMATION	DATE OF TERM EXPIRATION
	Hennepin	9505 Highview Drive Eden Prairie, MN 55347 pforster@rileywd.org	7/31/2011
	Hennepin	18559 Kristie Lane Eden Prairie, MN 55346 mcasanova@rileywd.org	7/31/2010
	Carver	8412 Great Plains Boulevard Chanhassen, MN 55317 kwencl@rileywd.org	7/31/2012
	Hennepin	10351 Decatur Avenue South Bloomington, MN 55438 jcrafton@rileywd.org	7/31/2012
	Hennepin	18617 Covington Road Minnetonka, MN 55345 ksundberg@rileywd.org	7/31/2011

Citizen Advisory Committee Members

NAME	RESIDENCE	MAILING ADDRESS
[REDACTED]	Chanhassen	7199 Frontier Trail Chanhassen, MN 55317
[REDACTED]	Eden Prairie	9536 Lakeland Terrace Eden Prairie, MN 55347
[REDACTED]	Eden Prairie	9000 Riley Lake Road Eden Prairie, MN 55347
[REDACTED]	Chanhassen	7506 Erie Avenue Chanhassen, MN 55317
[REDACTED]	Chanhassen	7341 Frontier Trail Chanhassen, MN 55317
[REDACTED]	Eden Prairie	8011 Island Road Eden Prairie, MN 55347
[REDACTED]	Eden Prairie	9470 Lakeland Terrace Eden Prairie, MN 55347
[REDACTED]	Eden Prairie	17574 Belfast Cover Eden Prairie, MN 55347
[REDACTED]	Eden Prairie	16820 South Shore Lane Eden Prairie, MN 55346
[REDACTED]	Chanhassen	7000 Utica Lane Chanhassen, MN 55317
[REDACTED]	Chanhassen	7000 Utica Lane Chanhassen, MN 55317
[REDACTED]	Eden Prairie	7821 Bailey Drive Eden Prairie, MN 55347
[REDACTED]	Eden Prairie	17083 Terrey Pine Drive Eden Prairie, MN 55347

Technical Advisory Committee Members

<u>NAME AND OFFICE</u>	<u>ORGANIZATION</u>	<u>MAILING ADDRESS</u>
	City of Eden Prairie	8080 Mitchell Road Eden Prairie, MN 55344 (951) 949-8420
	City of Eden Prairie	8080 Mitchell Road Eden Prairie, MN 55344 (952) 949-8327
	City of Bloomington	1700 West 98 th Street Bloomington, MN 55431 (952) 563-4870
	City of Bloomington	1700 West 98 th Street Bloomington, MN 55431 (952) 563-4867
	City of Minnetonka	14600 Minnetonka Boulevard Minnetonka, MN 55343 (952) 939-8239
	City of Minnetonka	14600 Minnetonka Boulevard Minnetonka, MN 55343 (952) 939-8233
	City of Deephaven (Bolton & Menk, Inc.)	2638 Shadow Lane, Suite 200 Chaska, MN 55318 (952) 448-8838 x2607
	City of Shorewood	5755 Country Club Road Shorewood, MN 55331 (952) 829-7145
	City of Shorewood	5755 Country Club Road Shorewood, MN 55331
	City of Chanhassen	7700 Market Boulevard P.O. Box 147 Chanhassen, MN 55317 (952) 227-1169
	City of Chanhassen	7700 Market Boulevard P.O. Box 147 Chanhassen, MN 55317 (952) 227-1168

Consultants

The principal consultants serve at the pleasure of the Board of Managers and for monthly flat fees. By requiring these terms, the Board of Managers retains independent contractor consultants who provide all of the necessary engineering, accounting, legal, public information, and administrative services without the need for employees' attendant salary, space, telephone, pension and insurance costs, while meeting statutory and regulatory requirements. The District's independent consultants effectively fulfill its obligations, goals, and objectives within the approved finances and budget. The following consultants served the District in 2009:

NAME	ORGANIZATION	MAILING ADDRESS AND TELEPHONE NUMBER
Mark Enochs	CH2MHILL Engineer	1295 Northland Drive, #200 Mendota Heights, MN 55120 (651) 688-8100
Dan Cavanaugh	Cavanaugh & Company P.A. Certified Public Accountant	1660 South Hwy 100, #500 St. Louis Park, MN 55416 (952) 697-3577
John Hoffman	ICS Agency, Inc. Insurance Agent	4901 West 77 th Street Minneapolis, MN 55435 (952) 835-4848
Mark C. Gibbs	HLB Tautges Redpath, Ltd. Auditor	4810 White Bear Parkway White Bear Lake, MN 55110 (651) 426-7000
Paul R. Haik	Krebsbach and Haik, Ltd Coordinator	100 South Fifth Street, #1900 Minneapolis, MN 55402 (612) 333-7400

III. PLAN PERFORMANCE

A. Basic Water Management Projects Petitioned by Municipalities

1. Riley Creek

In 2009, the District completed the Lake Riley Outlet Basic Water Management Project petitioned by the City of Eden Prairie. The project will result in stabilization of lake water levels and abate persistent high water levels which were impairing recreational use. The project will also reduce discharge rates into the lower valley of Riley Creek thereby reducing stream power and erosive flows. By doing so the Board of Managers will aid the City of Eden Prairie in its planned scarp rehabilitations; scarps had formed from various storm water discharges from lower valley roadways and developments. These combined efforts are anticipated to attenuate turbidity and resulting sediment discharges into floodplain wetlands adjacent to the Minnesota River.

2. Round Lake

In 2009, the District awarded the contract for construction of the Round Lake Basic Water Management Project after complying with recently promulgated sediment analysis and disposal requirements. The project is expected to be completed during the winter of 2009 and 2010. As part of their focus upon in-lake conditions, the Board of Managers continued harvest of invasive and excessive plant growth within the lake, resulting in removal of more than 190 tons. The plant material, due to its high phosphorous content, was provided to the University of Minnesota Landscape Arboretum for use as a fertilizer.

3. Purgatory Creek Restoration

The City of Minnetonka petitioned the District to implement a project in coordination with improvements to TH101 where it crosses Purgatory Creek. The Board of Managers determined the petition proper and ordered preparation of the report of the Engineer. The Engineer undertook to prepare and completed the report. The Managers are expected to take action on the report in 2010 and submit to the Board of Water and Soil Resources and the Department of Natural Resources prior to ordering hearing on the project in 2010. The project seeks to restore approximately 1,400 of creek and stabilize the area prior to potential increase in the volume of discharge in conjunction with roadway expansion.

B. Water Management Plan Projects

The Managers completed a review of the Proposed Water Management Plan and met to prepare revisions. Further updates are being made to implement a "One Water" strategy and enhance coordination of projects and related work. Non-regulatory projects continued with special emphasis upon lakes experiencing significant internal loading effects and invasive plant and fish species. The Managers have undertaken a close examination on the best means to enhancing public education and participation opportunities; the renewed examination is expected to lead to revisions of the proposed water management plan.

Current projects seek restoration and improvement of recreational and other beneficial uses and focus upon those lakes with significant internal loading effects and public beaches and access within residential areas. The Board of Managers intend over time to address each lake as financial opportunities arise. Because of the beneficial impacts which use attainability analyses showed significant inter-relationships between them, and due to a cooperative research project with the University of Minnesota, in part funding by the Legislative and Citizen Commission on Minnesota Resources, a single project is addressing water quality impacts associated with invasive species on Lakes Susan, Rice Marsh, and Riley.

1. Lotus Lake Outlet Analysis and Volume Control Project

The Lotus Lake Outlet Analysis and Volume Control Project arose from and intended to continue analysis of Purgatory Creek and complement prior vegetation and use attainability analyses. Because of the lack of a hydrologic and hydraulic model encompassing the entirety of Purgatory Creek, and as part of developing a district-wide model, the Managers directed the Engineer to prepare a SWMM model of the Lotus Lake watershed, which is the a significant part of the headwaters of Purgatory Creek. This model will be extended downstream in its next phase in order to further complement the physical and ecological classification of Purgatory Creek previously made. Due to reported, and anticipated, reconstruction of Highway 101, the Managers judged it essential to complete the Lotus Lake watershed prior to reconstruction to allow design of an appropriate outlet to serve beneficial uses and transportation needs.

In 2009, the model was completed but calibration showed need for further investigation of groundwater seepage or other loss of water during the water cycle. The Managers ordered this investigation and are awaiting report of the results in 2010.

2. Lotus Lake Water Quality Improvement Project

This project intends to directly address internal loadings. In 2008, plant harvesting and water quality investigations revealed potential public health effects of cyanobacteria and, similar to Lakes Susan, Rice Marsh, and Riley, invasive species impacts. The Engineer has proposed cooperation with the Center for Disease Control to investigate public health effects and the Managers authorized measurement of sediment oxygen demands to develop data to design a restoration and treatment strategy.

3. Fish Barrier & Invasive Species Control

This project addresses invasive species, particularly the common carp, with the dual aims of evaluating then damage it causes and developing cost-effect measures to sustainably control it.

The project is expected to advance understanding of important aspects of water pollution which the Managers can address, especially turbidity and excess nutrient loading which has already been identified as causes for impairment of the effected waters. This project is part of a phased district-wide initiative which will be carried over to lakes within the Purgatory Creek and Bluff Creek watersheds once developed and verified.

In 2009, three novel methods were tested to remove carp that otherwise could not be located: 1) Open-water seining coupled with bait attractants and radio-tagged carp, 2) Trap netting assisted coupled with a food reward and radio-tagged carp, and 3) Under-ice seining using robotic submarines and radio-tagged carp. Open-water seining was twice tested twice and appears effective in lakes with dense aggregations of carp but relatively inefficient in lakes with reduced densities. A new trap-netting technique using a small 25m x 25m lift net was relatively

successful showing promising results; its efficiency might be improved with a larger net. A modified net is being prepared for testing in 2010. Lastly, under-ice seining was successfully deployed twice and enabled catch most of the adult carp in both Lakes Susan and Riley with single, strategic hauls. Studies are presently underway to improve predictive capabilities.

Efforts to develop targets for carp removal have produced notable results. Seventy-eight percent of the adult carp were removed from Lake Susan and approximately 30- 50% from Lake Riley. The carp biomass in Lake Susan is now 90 kg/ ha while that in Lake Riley will be precisely determined with upcoming samplings. Because of this success, census and removal is expanding in 2010 to Lakes Lucy and Ann as part of implementing a one water approach. Water quality measurements and other biological parameters showed statistically significant improvements in water quality and plant cover in Lake Susan after carp removal suggesting 90 kg/ ha is a reasonable target. The beneficial effects of this removal also revealed the apparently key role of phosphorous cycle leading to late summer algal blooms; anoxic bottom sediments rather than watershed runoff appears as the major source of phosphorus in the mid-late summer with wind mixing leading to the algal blooms. With stabilization of the plant community sediment oxygenation may now be feasible given carp removal.

Another key success of the project was developing a novel carp barrier design utilizing horizontally-mounted PVC piping. It functioned very well and stopped all adult carp (verified by electro-fishing) while permitting the passage of pass game-fish (pike) to assure spawning and production of a year- class. Bubble barriers are also being developed in the laboratory with LCCMR support. As a result of this barrier success and electro-fishing surveys, it appears efforts

have prevented successful recruitment of young-of-year carp. Finally, young-of the-year carp were not found at any location in the summer of 2009 (including Lake Susan where control seems to be successful), except for the Staring Lake Outlet/Purgatory Creek Recreational Area above Lake Starring which lacked native predatory fishes. This result supported the hypothesis that the recruitment of carp is sporadic and is driven by the absence of game-fish following winterkill events and thus can be controlled. Work to confirm this finding is budgeted and contract amendments for expanded investigation are expected to be approved for 2010.

Sediment oxygen demand (SOD) studies were also successfully conducted on Lucy Lake, Lake Ann, Susan Lake, and Riley Lake. Results from these studies will be used in managing internal phosphorus loading in these lakes.

4. Mitchell Lake Water Quality Improvement Project

Work in Mitchell Lake focused upon an Oxygenation Pilot Project. In this project pure oxygen was injected into the deep area in the northern bay of Mitchell Lake. This goal of this project was two-fold. The first goal was the technical criterion for success: to raise the oxidation reduction potential in the hypolimnion to values high enough to suppress phosphorus release from sediments. The second goal was to learn the efficacy of pure oxygen technology suitable for small-lake applications. Oxygenation technologies for large reservoirs are well-understood. The technical criterion was met, but at a flow of oxygen lower than was intended occurred due to iron-fouling issues of the diffuser system. An alternate diffuser design which will avoid this reduced flow will be used on future applications.

Even with lower than expected oxygen flow, data showed tremendous success in reducing phosphorous discharge. The success though also revealed potential difficulty in application to shallow lakes due to repeated wind mixing potential. This wind mixing effect suggests the technique may be best applied for lakes which remain stratified and that an alternate technique using food-grade calcium peroxide more effective for shallow wind-mixed lakes. Plant harvesting continued and dramatically enhanced recreational use and may have avoided significant phosphorous discharge.

5. Lake Susan Shoreline Restoration

This project focuses upon a shoreline restoration compatible with wildlife habitat needs. Grant applications were submitted to seek funding to expedite this work.

In addition, the Managers initiated a preliminary study to assess the response of aquatic macrophytes in Lake Susan to carp removal and to provide a preliminary assessment of approaches to establish and enhance native submersed vegetation.

Surveys of the aquatic plant community in June and August indicated that plants increased in frequency and biomass with the improved spring water clarity. In June, the invasive curlyleaf pondweed and Eurasian water milfoil were common but did not dominate and high densities of milfoil weevils through the summer likely kept the milfoil in check. Native plant biomass increased during summer despite low clarity after July and sago and narrowleaf pondweeds recruited and are very desirable. Experimental transplantation of 5 native plants from Lake Ann was successful. Water stargrass, bushy pondweed and northern watermilfoil survived well and grew in most plots. Chara and water celery survived in some plots but fared more

poorly. Plants generally did better in caged exclosures but this is more likely due to protection for waves and debris rather than herbivory. Plots will be assess after iceout next spring.

C. Other Matters

1. Water Quantity and Quality Monitoring Data

The Board of Managers authorized development of an integrated, comprehensive means for collecting, storing, and disseminating data concerning water resources. The Engineer completed this collection and implemented web-based distribution and facilitated incorporation into State agency databases. The data is available through www.rileywd.org.

2. Local Plan Adoption and Implementation

The District was not asked to act upon any local water management plan approvals.

3. Annual Communication

For its annual communications, the District coordinated for publication of articles in its official newspapers and held two public community meetings; one in May and the other in December to report on work of the District. An additional annual publication identifying membership and contact and related information was published. Copies of the presentations are available through www.rileywd.org, and are incorporated by reference.

4. Solicitation of Interest Proposals

In 2009, the District again solicited professional services by publication in local news papers and special mailings. Interest will again be solicited in 2011.

5. Maintenance

The Managers directed an inspection of District structures, which included the Chain-of-Lakes, Staring Lake Outlet-Purgatory Creek Recreation Area a, Lake Riley, and Lake Riley Outlet basic water management projects and the Townline Road weir. Other than the weir, most structures were in stable condition though requiring minor maintenance. Maintenance is expected to be ordered in 2010 following presentation of specific recommendations and cost estimates.

IV. FINANCIAL AND AUDIT REPORTS

A. Reporting of Revenues and Expenditures

An audit report prepared by a certified public accounting firm is incorporated by reference. The audit includes a balance sheet, a classification of revenues and expenditures, an analysis of changes in final balances, and contains all additional statements considered necessary for full financial disclosure.

B. Budget Adopted for 2010

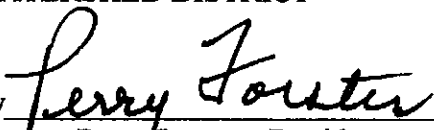
The adopted annual budgets are available through www.rileywd.org and are incorporated by reference.

V. CONCLUSION

With its second generation plan analyses complete, and a new third generation plan underway and focused restoration projects, the Board of Manager is positioned to undertake larger basic water management projects to protect and improve the water quality of the District as petitioned by municipalities and citizen led and prioritized projects identified within the current and proposed water management plans. Together these projects are an important step in assuring compliance with the requirements of the mandates of the Minnesota Pollution Control Agency, pursuant to the Federal Clean Water Act, assisting cities in their water pollution prevention plans, and giving meaning to citizen led and prioritized needs.

Respectfully submitted,

RILEY-PURGATORY-BLUFF CREEK
WATERSHED DISTRICT

By 
Perry Forster, President