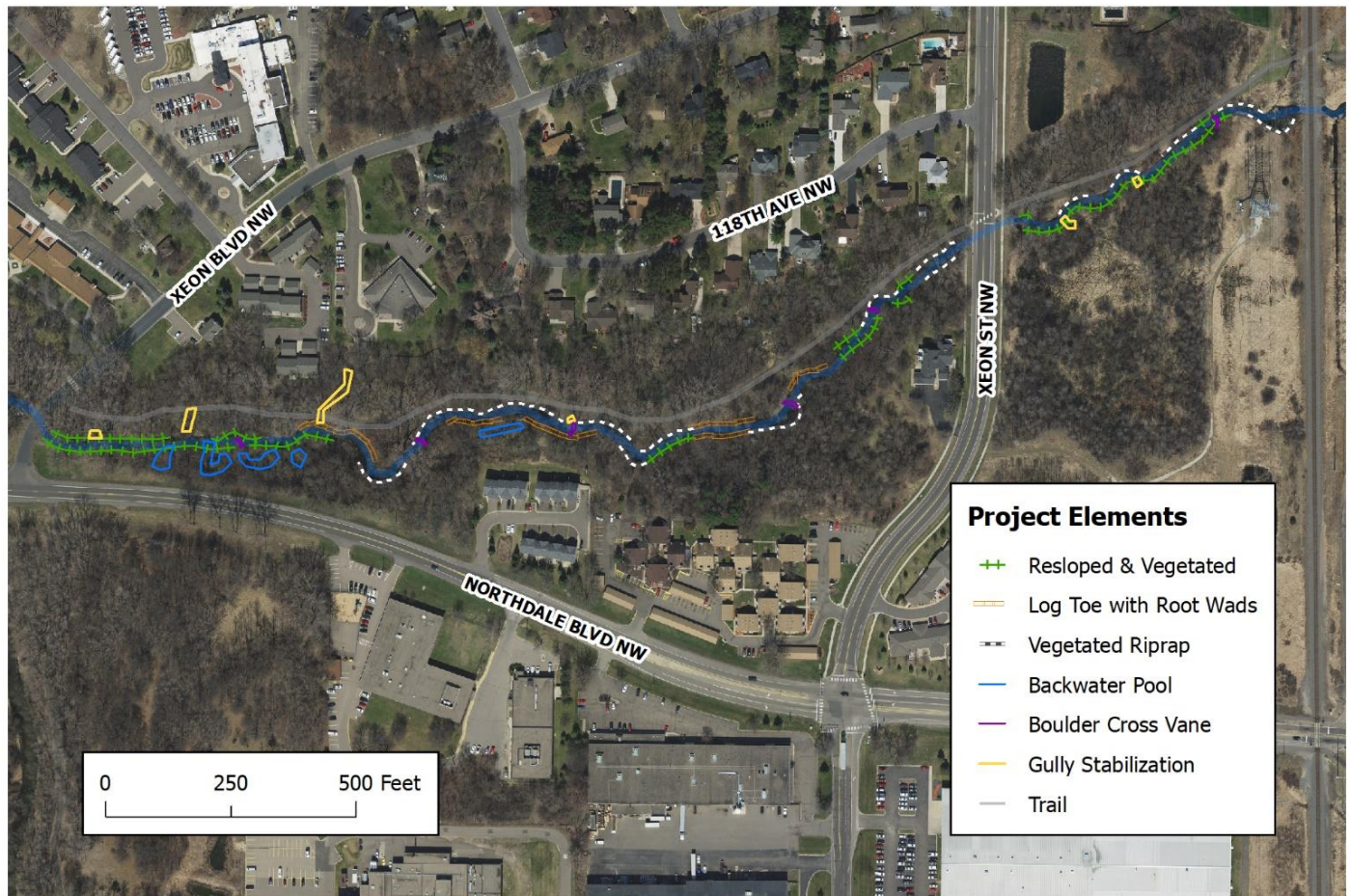


Lower Sand Creek Corridor Restoration Project

FY17 319 Grant #134304: Final Report



Coon Creek Watershed District

13632 Van Buren St NE Ham Lake, MN 55304

www.cooncreekwd.org/LowerSandCreekResto



Executive summary

The Sand Creek subwatershed drains 15.7 square miles of suburban land use in Blaine and Coon Rapids, MN. The headwaters consist of a series of ditched stormwater conveyance channels which coalesce to form the main stem of Sand Creek, a 2.2 mile reach that outflows to Coon Creek and then to the Mississippi River near the Coon Rapids Dam Regional Park. The main stem of Sand Creek (AUID 07010206-558) was added to Minnesota's 303(d) list of impaired waters for aquatic life impairments in 2006 due to macroinvertebrate bioassessments and for aquatic recreation impairments in 2016 due to elevated levels of *Escherichia coli* (*E. coli*). Sand Creek also failed to meet standards for fish biotic condition, but this impairment was deferred until the adoption of Tiered Aquatic Life Use (TALU) standards for modified reaches. Excess total phosphorus (TP), total suspended solids (TSS), habitat alterations, and altered hydrology were identified as the primary stressors to Sand Creek's biota as part of the US EPA's Causal Analysis/Diagnosis Decision Information System framework.

Since 2009, water quality in Sand Creek has been monitored annually at four sites. During baseflow, concentrations of TSS and TP generally meet state standards (median = 5.5 mg/L and 54 ug/L, respectively) and vary little between sampling locations. During storm events, both TSS and TP increase from upstream to downstream, with 14% and 40% of samples exceeding state standards at the downstream-most site. The primary sources of excess TSS and TP were determined to be stream bank erosion during high flow events (Hydromodification; Channel Erosion/Incision) and urban stormwater inputs (Urban Runoff; Residential). To meet pollution standards and reduce stress on biota, the 2016 Coon Creek Watershed TMDL study calls for annual load reductions of 10% of TSS and 33% of TP during the highest 10% of flows in Sand Creek which corresponds to approximately 36 tons of TSS and 813 pounds of TP per year. The 2016 Coon Creek WRAPS report identified streambank stabilization and riparian buffer enhancement as implementation strategies for meeting TSS and TP load reductions during high flows. A particular half mile section of Sand Creek was identified as a TSS loading hot-spot based on the results of a comprehensive inventory of erosion sites. The half mile project reach contained 16 eroding banks with an estimated cumulative annual TSS load of 372 tons, which is approximately 40% of the TSS load attributable to streambank erosion in the entire subwatershed.

The Lower Sand Creek Corridor Restoration project stabilized all 16 actively eroding banks (2900 LF) and 5 adjacent gullies, established vegetative buffers along ½ mile of stream, and also improved in-stream and riparian habitat. Specifically, eroding banks were stabilized with vegetated riprap, root wads with log toe, or via regrading and vegetating using native seed mixes, live stakes, and native trees. The dense tree canopy along the project corridor was opened by thinning trees and clearing invasive buckthorn which allowed increased sunlight penetration for the native plantings to flourish, establishing a contiguous vegetated buffer to improve bank stability and filter overland runoff. In-stream habitat was improved by incorporating woody debris in the bank stabilization practices, installing 6 boulder cross vanes and log vanes to halt channel incision and create riffle-pool sequences, and by excavating 5 backwater pools in former oxbows to reconnect the adjacent floodplain and add lentic habitats. Combined, these BMPs reduced annual sediment and phosphorus loads by an estimated 372 tons and 316 pounds, respectively. Furthermore, these practices also reduced soil-bound bacteria loading to Sand Creek and downstream Coon Creek. Future planned water quality monitoring and biomonitoring (2020 assessment by MPCA) will verify these pollutant load reductions and biotic improvements towards eventual delisting of Sand Creek by 2045. Implementation of this project in 2018-19 constitutes the first phase of ongoing stream corridor restoration work to address bank erosion and poor in-stream habitat. Phase 2, the Middle Sand Creek Corridor Restoration project, is currently underway and is on schedule for completion in 2021. Prior to this work, several water quality improvement projects were completed in the drainage area including construction of a new ¼-ac stormwater pond, 25 rain gardens, and modifications of outlet structures to increase storage volume and reduce peak flows. Additional work in the watershed is required to address phosphorus and *E. coli* loading attributable to urban stormwater inputs.

Successful implementation of this project was a result of strong existing partnerships between the Coon Creek Watershed District (project manager), City of Coon Rapids (landowner/ cooperator), Anoka Conservation District (technical assistance), and Wenck Associates (project engineer) with financial support from the Federal 319 Grant Program as well as the Minnesota Clean Water Fund. Additionally, this project helped build and foster relationships with the local community college, Anoka-Ramsey Community College, and the general public. Overall, public engagement activities as a part of this project reached over 26,200 local residents, raising awareness and understanding of local water quality impairments and promoting responsible stewardship of our water resources.

Project Implementation

Section I - Work plan review

The original work plan was implemented as is with no revisions or amendments. A summary of progress for each objective and task is outlined below. All activities and tasks were completed with no major issues, delays, or deviations from the work plan:

Objective 1: Project development

Task A: Partners coordination meetings: Regular communication between all project partners and adjacent landowners occurred throughout the project. A Joint Powers Agreement was executed between CCWD and the City of Coon Rapids (landowner/ cooperator). Several progress meetings were held to coordinate design, bidding, and project implementation. A final site walkthrough was held for sign off on project completion.

Task B: Complete design plans: The project engineer, Wenck, completed survey work and final design plans by July 2018 with input and revisions from CCWD and City of Coon Rapids staff. A project manual was prepared by August 2018 for the public bidding process.

Task C: Secure applicable permits and execute contract with contractor: DNR Waters and USACE permits were secured and the project was advertised for public bid in August. Bids were submitted by 9 contractors and the project was awarded to the lowest responsible bidder, Sunram Construction, on 8/27/18 for fall-winter construction. A construction agreement with Sunram was executed. Acquiring the USACE permit was a challenging process with long lead times and labor-intensive requirements and nearly resulted in having to delay construction. It would have been more efficient to start the process earlier, schedule a pre-construction meeting with USACE regulatory staff, and incorporate all necessary requirements into the design plans up front instead of going through several rounds of review and revisions. This also caused budget overruns for engineering services.

Objective 2: Construction

Task A: Mobilization and Site Preparation: Construction signage was posted, a safety fence was erected, erosion control BMPs were installed, construction equipment was mobilized, and the site was marked for tree removal and BMP placement. CCWD staff took on more of this work in-house than anticipated which resulted in budget discrepancies between planned in-kind match versus contracted services. Overall, it was much more efficient and cost effective to perform this work in-house.

Task B: Installation of stream stabilization BMPs: The project elements were constructed according to the design plans (tree-thinning and removal, bank resloping, root wads, vegetated riprap, cross vanes, backwater pools, turtle lofting logs, live stakes, seeding and planting, etc.) from October 2018-April 2019. This work went very well and came in significantly under budget.

Task C: Site restoration and demobilization: All heavy equipment was demobilized by spring 2018 and vegetation establishment work continued through fall 2019. The cold spring delayed establishment of native species and the site was overrun with opportunistic invasive species such as buckthorn and garlic mustard which necessitated more invasive species control and revegetation work than anticipated.

Task D: Construction Oversight: CCWD staff was onsite every day during active construction and held weekly progress meetings with the contractor, engineer, and project partners. Progress photos were taken regularly, construction progress reports were written and posted to the project web page, and an as-built survey was completed to verify the project was constructed according to plan. Wenck, the project engineer, was onsite regularly to stake and survey project elements, oversee work, process any necessary change orders, and provide final sign off. The specialty bioengineering work required a lot more oversight than anticipated and resulted in engineering cost overruns. During review of contractor invoicing, it was discovered that a subcontractor was not adhering to prevailing wage rules, so a change order was executed to satisfy this grant requirement. CCWD staff worked with the project engineer to ensure this requirement will be clearly outlined in all future project manuals.

Objective 3: Public involvement, education, and outreach

Task A: Host public open house: On May 22nd 2018, CCWD hosted a public open house at the Coon Rapids City Hall. Invitations were prepared and mailed to 62 households in the neighborhoods adjacent to the project area. 5 members of the public attended. A PowerPoint presentation was given by CCWD staff to provide the context and rationale for the project and introduce the specific design elements. This presentation was also posted to the project web page.

Task B: Design and install interpretive signage along project reach. Five interpretative signs about project elements were designed by teams of biology students at Anoka-Ramsey Community College through an innovative partnership with Dr. Kristen Genet's Biology classes over two semesters. CCWD provided oversight on sign content, design, and then did final edits prior to production. The signs were fabricated by the City of Coon Rapids and the required project overview sign was installed on-site on November 15th, 2019. The other four signs will be installed at strategic locations after the ground thaws in Spring of 2020. The timeline for sign installation was delayed due to the need for extensive edits prior to production. Despite some inefficiencies in this process, it helped to build a valuable long-term relationship between CCWD and the local community college.

Task C: Publish project updates: CCWD staff created and regularly updated a dedicated project webpage (<https://www.cooncreekwd.org/lowersandcreekresto>). As of Dec 2019, this webpage has had 1,010 unique views. Four newsletter articles about the project were also published in the Coon Rapids Community Connection quarterly newsletter which has a circulation of about 26,200 people. Three of the newsletter articles published were directly about the project and provided updates on its progress; these were published in fall of 2018, the spring of 2019, and the summer of 2019. The last article published in fall of 2019 also advertised the Lower Sand Creek Watershed Walks, a public outreach activity for interested citizens to take a guided tour of the project site.

Task D: Host public outreach event: Two watershed walks were held on September 19, 2019, one in the afternoon and one in the evening. These were attended by 22 residents and one city staff person. Watershed Walks were advertised through the city newsletter article and through social media and signs posted around the project site. The afternoon walk was filmed by the Coon Rapids Television Network (CTN) for broadcast on their community news that evening.

Objective 4: Grant administration, semiannual reporting, and final reporting:

Task A: Administration and reporting: CCWD Staff communicated with MPCA project manager, organized and maintained project files, tracked expenditures and in-kind match, paid invoices, and submitted all required quarterly invoices and semi-annual reports to MPCA.

Section II – Grant Results

Measurable Outcomes & Progress

The stated measurable outcomes compared against the actual results of the project are outlined below:

- 1) The installation of 5 types of BMPs along a half mile reach of Lower Sand Creek: 2 oxbow reconnections, 6 cross vanes (log and rock), bank stabilization/protection efforts (footer logs, root wads, cedar revetments, and vegetated riprap), regraded banks, and riparian revegetation

Actual Result: Installation of 8 types of BMPs along a half mile reach of Lower Sand Creek: 5 oxbow reconnections, 6 boulder vanes, 5 log vanes, 5 cover boulders, 2 turtle lofting logs, 2900 LF of bank stabilization practices (vegetated riprap, root wads with footer logs, and graded/ vegetated), and riparian revegetation (native sedge mix, native forbs and grasses mix, live stakes of 2 species of native shrubs, and planting of 5 native tree species).

- 2) TSS load reductions of 279-372 tons per year as measured by field surveys for erosion using the WI NRCS Direct Volume Method

Actual Result: TSS load reductions of 372 tons per year as measured by field surveys for erosion using the WI NRCS Direct Volume Method (all actively eroding banks were stabilized).

- 3) TP load reductions of 112-313 pounds per year calculated as a % by weight of TSS reductions using established literature values (0.40-0.84 lbs of TP per ton of TSS; Cross & Schlesinger 1995)

Actual Result: TP load reductions of 316 pounds per year calculated using the MN Board of Water and Soil Resources' Water Erosion Pollution Reduction Estimator for streambank erosion with sandy soils

- 4) Improved instream and riparian habitat as measured by increased MPCA Stream Habitat Assessment scores

Actual Result: TBD in 2020 during the next MPCA assessment cycle

- 5) Improved biological integrity as measured by increased macroinvertebrate and fish IBI scores

Actual Result: TBD in 2020 during the next MPCA assessment cycle

- 6) Increased public awareness and understanding of local aquatic life impairments as measured by circulating educational materials to over 26,000 people in the Watershed District and tracking attendance at public outreach events

Actual Result: Increased public awareness and understanding of local aquatic life impairments as measured by circulating educational materials to over 26,200 people in the Watershed District via the community newsletter, 1010 people via project webpage, 28 people attending 2 outreach events, and an unknown number of people via the on-site interpretive signage and CTN broadcast.

In our proposed evaluation plan, project success was to be defined as progress towards meeting the goals and interim milestones outlined in the Coon Creek Watershed WRAPS implementation table. Relevant goals and milestones for Sand Creek include the completion of 2-3 streambank stabilization projects, establishment of vegetated buffers along 20% of the stream channel, TSS concentrations below 30 mg/L in 90% of samples, and growing season TP concentrations below 100 ug/L. Progress was to be measured by comparing the percent improvement since project implementation to the percent improvement necessary over that same time period to be on track to meet TMDL goals by 2045.

The Lower Sand Creek Corridor Restoration Project resulted in the successful completion of a large streambank stabilization project (16 individual banks) and the establishment of vegetated buffers along 23% of the stream channel (.5 miles of 2.2-mile reach). Because this project was just completed in December 2019, we have not yet been able to collect water quality samples to measure concentrations of TSS or TP. Success will be evaluated by continuing the annual routine water quality monitoring program at established sites upstream, downstream, and within the project reach and comparing post-implementation results to past results to quantify percent improvement. Specifically, the percent of samples that exceed state standards will be calculated. Additionally, the results of MPCA stream habitat, macroinvertebrate, and fish assessments in 2020 will be compared to pre-project 2010 results. With completion of this project, we are ahead of schedule for delisting by 2045.

Project Products

- Web page content: www.cooncreekwd.org/lowersandcreekresto
- PowerPoint presentation for public open house meeting (attached)
- 5 interpretive signs (image files attached)
- 4 Coon Rapids Connection newsletter articles (attached)
- Coon Rapids Community TV Network news coverage video clip:
<https://www.youtube.com/watch?v=97MNGCRp0aA>
- Engineering plans (attached)
- Project photos (attached zip file; more available upon request)

Public Outreach and Education

The City of Coon Rapids and the Coon Creek Watershed District (CCWD) held a public open house on May 22nd, 2018, at Coon Rapids City Hall to inform residents and solicit comments about the Lower Sand Creek Corridor Restoration project. 62 households located adjacent to the project area were sent invitations by mail with 5 residents attending the open house.

Five interpretative signs about project elements were designed by teams of biology students at Anoka-Ramsey Community College through an innovative partnership with Dr. Kristen Genet's Biology classes over two semesters. CCWD provided oversight on sign content, design, and then did final edits prior to production. The required project overview sign was fabricated by the City of Coon Rapids and installed on-site on November 15th, 2019. The other four signs will be installed in Spring of 2020.

In order to keep residents informed about the project while in progress, a dedicated project webpage was created on the CCWD website; this has had 1,010 unique views since its creation in May of 2018. Four newsletter articles about the project were also published in the Coon Rapids Community Connection which has a circulation of about 26,200 people and is published quarterly. Three of the newsletter articles published were directly about the project and provided updates on its progress; these were published in fall of 2018, the spring of 2019, and the summer of 2019.

The last article published, in fall of 2019, advertised the Lower Sand Creek Watershed Walks, a public outreach activity for interested citizens to take a guided tour of the project site. These walks were also advertised through social media and signs around the project site. Two watershed walks were held on September 19, 2019, one in the afternoon and one in the evening. These were attended by 22 residents and one city staff person. The afternoon walk was filmed by the Coon Rapids Television Network (CTN) for broadcast on their community news that evening (broadcast audience numbers unknown).

Overall, we feel the public outreach and education activities were highly successful with over 26,200 residents learning about the project via newsletter articles, 1,010 CCWD via website visits, and 28 residents via face-to-face interactions with staff during organized outreach events. We do not know how many trail users there are, but they now have access to project information via permanent on-site interpretive signage.

Long-term Results

In addition to the tangible water quality, habitat, and public awareness benefits, the Lower Sand Creek Corridor Restoration project also served as an important demonstration project to illustrate the benefits of a holistic corridor restoration approach compared to individual bank stabilization projects (the status quo in our area). Successful implementation of this large-scale corridor project opened the eyes of public officials and citizens to the complex work needed to address our aquatic life impairments and the multiple benefits that can be achieved. Based on the demonstrated successes of this project, two similar projects have been planned and approved for implementation in 2020-2022: The Middle Sand Creek Corridor Restoration in Coon Rapids and the Coon Creek Park Corridor Restoration in Andover. Additionally, a new partnership with the Anoka-Ramsey Community College has been formed which should be mutually beneficial to both organizations going forward. CCWD intends to provide future opportunities for hands-on learning experiences and will benefit from the resulting work products. Local students will benefit from real life applied research opportunities in their community relevant to their field of study. We are very grateful for federal and state grant funding sources to support this work to assist with broadening the impact of our water management activities.

Section III – Final Expenditures

See attached spreadsheet for a detailed breakdown by cost category (grant, cash match, in-kind match).

Lower Sand Creek Corridor Restoration ITEMIZED PROJECT BUDGET AND EXPENDITURES	Budget Total	Cumulative Total Expended	Budget Balance Cumulative
OBJECTIVE 1: PROJECT DEVELOPMENT			
Task A: Partners coordination meetings	\$ 1,172.00	\$ 1,146.60	\$ 25.40
Task B: Complete design plans	\$ 12,150.00	\$ 15,342.12	\$ (3,192.12)
Task C: Secure permits and select contractor	\$ 14,750.00	\$ 15,142.45	\$ (392.45)
OBJECTIVE 1 - TOTAL	\$ 28,072.00	\$ 31,631.17	\$ (3,559.17)
OBJECTIVE 2: CONSTRUCTION			
Task A: Mobilization and site preparation	\$ 29,160.00	25,390.25	\$ 3,769.75
Task B: Installation of BMPs	\$ 360,153.00	\$ 318,805.55	\$ 41,347.45
Task C: Site restoration and demobilization	\$ 19,500.00	\$ 15,525.25	\$ 3,974.75
Task D: Construction oversight	\$ 8,710.00	\$ 17,849.95	\$ (9,139.95)
OBJECTIVE 2 - TOTAL	\$ 417,523.00	\$ 377,571.00	\$ 39,952.00
OBJECTIVE 3: PUBLIC INVOLVEMENT, EDUCATION, AND OUTREACH			
Task A: Host public open house	\$ 636.00	\$ 441.00	\$ 195.00
Task B: Design and install interpretive signage	\$ 6,110.00	\$ 4,247.81	\$ 1,862.19
Task C: Publish project updates	\$ 1,960.00	\$ 1,237.25	\$ 722.75
Task D: Host public outreach event	\$ 1,960.00	\$ 1,310.75	\$ 649.25
OBJECTIVE 3 - TOTAL	\$ 10,666.00	\$ 7,236.81	\$ 3,429.19
OBJECTIVE 4: ADMINISTRATION AND REPORTING			
Task A: grant administration & Reporting	\$ 8,460.00	\$ 5,708.25	\$ 2,751.75
OBJECTIVE 4 TOTAL	\$ 8,460.00	\$ 5,708.25	\$ 2,751.75
TOTAL	\$ 464,721.00	\$ 422,147.23	\$ 42,573.77

Grant project summary

Project title: Lower Sand Creek Corridor Restoration Project

Organization (Grantee): Coon Creek Watershed District

Project start date: 3/26/2018 Project end date: 12/31/2019 Report submittal date: 1/31/2020

Grantee contact name: Justine Dauphinais Title: Water Quality Coordinator

Address: 13632 Van Buren St NE

City: Ham Lake State: MN Zip: 55304

Phone number: 763-755-0975 Fax: _____ Email: jdauphinais@cooncreekwd.org

Basin (Red, Minnesota, St. Croix, etc.) /Watershed & 8 digit HUC:: Mississippi River- Twin Cities; 07010206 County: Anoka

Project type (check one):

- ☐ Clean Water Partnership
- ☐ Total Maximum Daily Load (TMDL)/Watershed Restoration or Protection Strategy (WRAPS) Development
- ☒ 319 Implementation
- ☐ 319 Demonstration, Education, Research
- ☐ TMDL/WRAPS Implementation

Grant funding

Final grant amount: \$248,332.66 Final total project costs: \$422,147.23

Matching funds: Final cash: \$150,783.02 Final in-kind: \$23,031.55 Final Loan: \$0

MPCA project manager: Tom Estabrooks

Executive summary of project

Problem

Sand Creek was added to Minnesota's 303(d) list of impaired waters for aquatic life impairments in 2006 due to macroinvertebrate bioassessments and for aquatic recreation in 2016 due to elevated levels of E. coli. Excess total phosphorus, total suspended solids, habitat alterations, and altered hydrology were identified as the primary stressors to Sand Creek's biota. The primary sources of excess TSS and TP were determined to be stream bank erosion during high flow events and urban stormwater inputs.

Waterbody improved

Sand Creek is a 2.2-mile long stream located in Anoka County, MN. Sand creek and its headwater ditches serve as a stormwater conveyance for a 16 sq mile suburban watershed before joining with Coon Creek and discharging to the Mississippi River.

Project highlights

This 2018-19 project stabilized 2900 LF of actively eroding banks and 5 gullies, established vegetative buffers along ½ mile of stream, and also improved in-stream and riparian habitat. Specifically, eroding banks were stabilized with vegetated riprap, root wads with log toe, or via regrading and vegetating using native species. The dense tree canopy along the project corridor was opened up by thinning trees and clearing invasive buckthorn which allowed for the native plantings to flourish, establishing a contiguous vegetated buffer to improve bank stability and filter overland runoff. In-stream habitat was improved by incorporating woody debris in stabilization practices, installing boulder and log vanes to halt channel incision and create riffle-pool sequences, and by excavating 5 backwater pools in former oxbows to reconnect the adjacent floodplain and add lentic habitats.

Results

Combined, this project reduced annual sediment and phosphorus loads by an estimated 372 tons and 316 pounds, respectively. Furthermore, these practices also reduced soil-bound bacteria loading to Sand Creek and downstream Coon Creek. Future planned water quality monitoring and biomonitoring will verify these pollutant load reductions and biotic improvements.

Partnerships

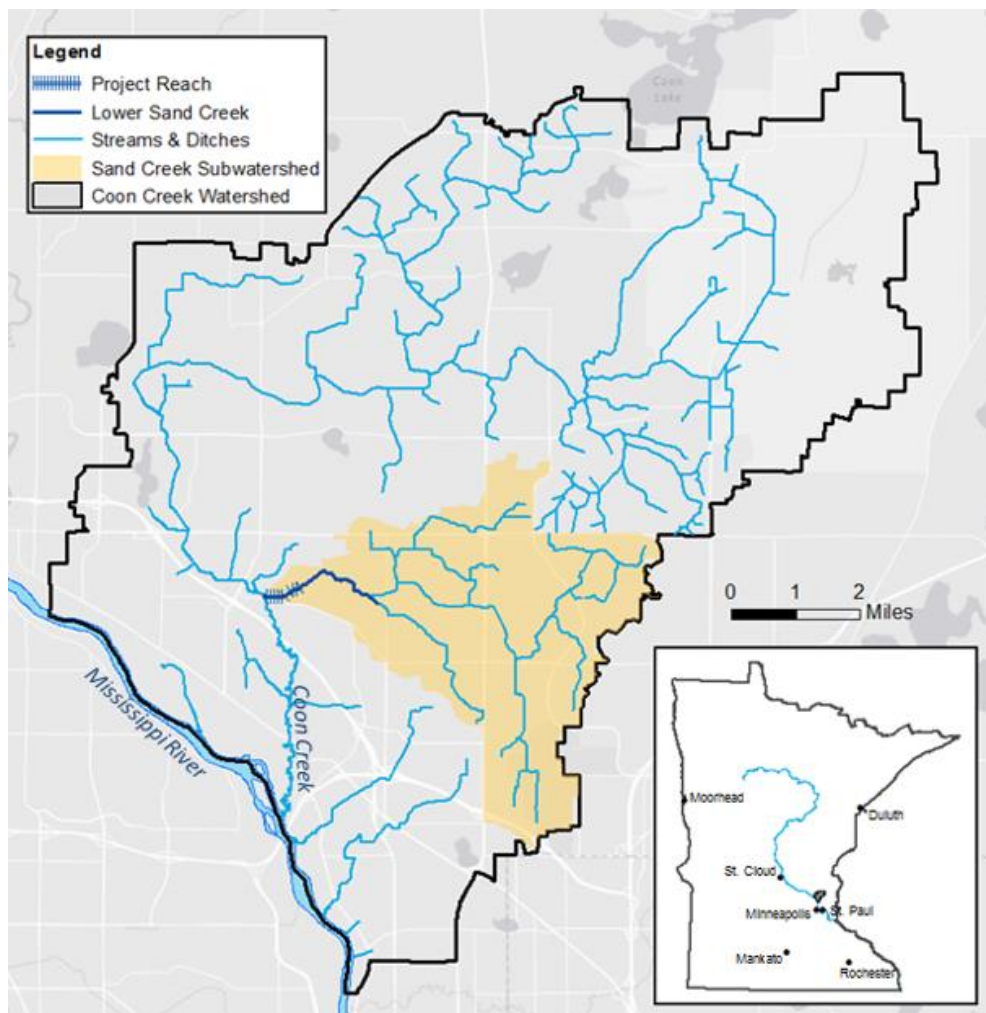
Coon Creek Watershed District; Grantee, project manager, in-kind support

City of Coon Rapids; landowner, cooperator, in-kind support

Wenck Associates; project engineer

Anoka Conservation District; planning and technical assistance

Pictures *(additional pictures attached)*



Location of project reach in Coon Rapids, MN within the Sand Creek Subwatershed



A former oxbow was excavated and reconnected with the channel as a backwater habitat



CCWD Information & Education Coordinator, Dawn Doering, leading a watershed walk outreach event



An eroded bank before and after stabilization with vegetated riprap



An eroded bank before and after stabilization with log toe and root wads



A severely eroded bank before and after stabilization via regrading and revegetating



Operations & Maintenance Coordinator, Jon Janke, explaining the project elements to Anoka-Ramsey Community College students to provide content and context for interpretive signage