



## **Eagle Creek: Restoration and Reclamation in an Urbanizing Watershed**

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### **SITE AND SITUATION**

The City of Savage, located approximately 20 miles south of Minneapolis, Minnesota in the northeastern end of Scott County, is experiencing a population boom. Roughly 1,000 people move to the city each year, and the current population of 20,000 is expected to grow to more than 35,000 people by the year 2010. As part of this expansion a housing development was proposed for the west branch of local Eagle Creek (the creek consists of a west and east branch and a main stem). Out of the environmental review process conducted for the development came a set of reclamation and restoration measures. Also pursuant to the development and the review process was the purchase, by the Minnesota Department of Natural Resources (DNR), of a 400 foot corridor along the west branch. A management plan was created for the corridor, augmenting the already established reclamation and restoration measures. Implementation of these measures has been, and is to be, conducted through coordinated efforts of the DNR, the City of Savage, Trout Unlimited, and a host of volunteers.

Eagle Creek, and especially the west branch, has been allotted such extensive review because of its many unique qualities. The creek sits beautifully at the foot of the Minnesota River Valley bluffline. It is habitat to the last self-reproducing brown trout population in the metropolitan region, and the west branch contains two examples of a rare geologic feature; Boiling Springs I and II. It is hypothesized that these springs are artesian upwellings from the glacial drift or Prairie du Chien Group Layer, and some of the local Mdewakaton Sioux regard these springs as a holy site. The unusual name "Boiling Springs" derives from the "spilling over" or "boiling" effect created when these upwellings emerge within the waters of the west branch. The Eagle Creek area is also thought to be unique because of its remnant, albeit highly degraded, oak savanna and prairie sites. Further, the Eagle Creek area is a major flyway of migratory songbirds. A recent bird survey during a migratory period tallied 49 species. Finally, Eagle Creek is considered important because it drains roughly 900 acres into the Minnesota River; a polluted river that is the focus of extensive cleanup efforts.

The area surrounding Eagle Creek was formed as the Wisconsinian glaciers retreated roughly 10 to 12,000 years ago. As these glaciers retreated they formed the Glacial Lake Agassiz in the northwest corner of Minnesota, which was drained by the Glacial River Warren (the ancestor to the Minnesota River). As this river headed south it cut through newly deposited glacial drift and some areas of exposed bedrock. This process created a river valley and flood plains, and it is within these areas of

alluvial deposition that the west branch originates.

Vegetatively, the west branch is in the southern end of the deciduous forest-woodland zone of Minnesota. According to the DNR's classifications, the corridor along the west branch was most likely a mix of mesic to dry-mesic oak savanna and mesic to dry-mesic prairie.<sup>1</sup> The indicators for these classifications are: bur oaks and northern pin oaks; loamy fine sand to clay loam soil; mesic to dry-mesic habitat; level to moderately rolling topography; and a few shrub layer indicators, such as prairie smoke (*Geum triflorum*) and sand cherries (*Prunus pumila*).

Unfortunately, the Eagle Creek area has been degraded through years of farming, grazing and garbage dumping. Also a multitude of invasive species, such as buckthorn (*Rhamnus cathartica*) and box-elder (*Acer negundo*), have come to dominate large sections as the natural fire regime has been suppressed. Hope for a return to a more natural state exists though, as the reclamation and restoration plans are implemented.

## **INTENDED RESULTS AND MOTIVATION**

As previously stated, this restoration and reclamation project originates from two management and mitigation plans; one stemming from the environmental review conducted for the proposed development, and one stemming from the purchased DNR land. It should be noted that both of these management and mitigation plans were created by advisory committees which consisted of representatives from the DNR, the City of Savage, environmental interest groups, the local Mdewaukaton Sioux tribe, and county watershed engineers. These advisory committees allowed for a greater diversity of opinions to be heard, and created plans which were more likely to receive broad public support because they originated out of a participatory, group process.

The intended results of the reclamation and restoration measures (the Eagle Creek Project) can be discussed in terms of physical improvements and social improvements. The physical improvements are simply stated: to mitigate the potentially negative effects of the housing development and begin to reclaim and restore the corridor area and some of the neighboring areas to a pre-European settlement condition. Specifically, these results include the diversion of stormwater runoff away from the creek, and bringing the corridor area back to a more structurally and functionally natural ecosystem. The social improvements are equally as important, yet are more difficult to detail and assess. The social improvements include the building of a stronger community spirit and the establishment of a better relationship between residents and their environment; especially acknowledging how that environment is situated in regional, metropolitan, nation and international contexts. Although some utilitarian aspects have strongly been motivating people in this project (i.e. anglers interested in an increased trout population), it appears that the intrinsic value of the stated goals, i.e. the community built and the oak savanna/prairie restored, is what has been truly motivating people to act.

## INTERVENTION

The interventions begin with the reclamation efforts to mitigate the effects of development; during and after the construction period; on the local water regime. It is estimated that the west branch originates primarily (95%)<sup>2</sup> as groundwater (much of which stems from Boiling Springs I), yet the increase of impervious surface associated with the development makes surface water runoff problematic. In order to insure that the local recharge/discharge rates are not altered too drastically, and that warmed, polluted water does not runoff the impervious surfaces into the habitat of the temperature and quality-sensitive trout, a series of six detention ponds has been created. These ponds run between the west and east branches capturing the storm water runoff and preventing any from entering the creek. These ponds are also "designed to allow for seepage and recharge of the water table aquifer,"<sup>3</sup> which, in turn, maintains the local groundwater discharge rates. These ponds run directly into the Minnesota River, thereby never draining directly into the creek.

Two other primary concerns addressed in the review process in regard to the local water regime were; the two Boiling Springs and the increased water use associated with the new housing development. Concerns were raised as to whether the created ponds would increase the local recharge rate too drastically, which would increase the discharge from the Boiling Springs, and affect the flow rate of the west branch. The proposed and accepted solution was to place the created detention ponds at least 500 feet from both Boiling Springs I and II. This placement was to insure that some, but not too much, local recharge did occur.

Solving the potential increased water use problem was, and continues to be, more difficult. The local water supply, the Prairie du Chien-Jordan aquifer, is already highly used, and it is estimated that further stress on the aquifer will affect Eagle Creek and the nearby Savage Fen Wetland Complex. Out of the review process came the decision to drill only one small new well to serve 30 plots, tying the rest of the 200 or so plots to the City of Savage's water system. Consequently, the City, in conjunction with neighboring municipalities, has begun to devise a regional water plan.

The non-hydrologic (i.e. vegetative) reclamation and restoration interventions have mostly been devised specifically for the DNR's 400 foot corridor. A local company, Prairie Restoration Inc. (PRI), has been hired to assist with the oak savanna and prairie restoration. PRI's plan is to: (1) burn the fields; (2) remove (cut and herbicide) the weedy species, such as buckthorn; (3) spray Roundup® on the new cohort of weeds produced by the burn; (4) till the soil; and, (5) plant a variety of prairie species in the form of seeds and seedlings, such as Big bluestem (*Andropogon gerardii*), and rough blazing star (*Liatris aspera*). They also intend to plant oak seedlings where appropriate. Other vegetative interventions include working with the developer to plant native species in the housing development after construction.

The in-stream interventions will most likely emphasize the increase of trout

habitat, even though the brown trout are not a native species. The in-stream interventions have not yet been strictly defined, yet they may include the removal of some of the beaver and beaver dams, and the implementation of artificial trout habitats (e.g. LUNKERS). It remains to be seen how the push for trout habitat will coalesce with the other present emphasis on the restoration of a more natural in-stream habitat.

The infrastructure to allow public access to the west branch will be created to have minimal structural and aesthetic impact. No new parking lot will be built near the creek; no picnic benches will be allowed in the management area; and only a six-foot wood chip trail will be created. Also, no "wheeled" devices or motorized vehicles will be allowed on the trail. An elevated observation platform will be built near Boiling Springs I, not only to assist in viewing, but also to discourage foot traffic in the immediate area and to indicate potential areas of danger (because the springs are fissures of some depth; an estimated 30 to 50 feet; falling in could be quite dangerous).

The final interventions consist of community involvement and education. At the most basic level this means interacting with homeowners adjacent to the creek; educating them about landscape practices so that their lots will integrate with the corridor. Yet a more progressive idea is to create an "Eagle Creek Advisory Committee". This participatory, decision-making entity would consist of local residents, city officials and agency representatives. It would educate the residents and officials about their local ecosystem; it would build relationships among the participants; and, it would empower people with an ability to affect some of the local land use decisions. Though this committee is still only in the proposal stage, it offers great promise as a means to insure that not only will the Eagle Creek reclamation and restoration occur, but that the project will be maintained for the long term.

## **ASSESSMENTS OF SUCCESS**

The indicators of project success have been rather poorly defined, though this lack of clarity may be attributed to the complexity of the situation. As with the intended results discussed previously, there are two aspects occurring simultaneously; physical indicators and social indicators. The main physical indicators are those which are implicit in the goals of the interventions. Meaning, the prairie restoration will be judged by whether prairie plants are restored, and the success of the in-stream management will be measured by whether the trout survive and prosper. Plans to monitor water quality (e.g. dissolved oxygen) and flow have also been expressed, but as yet have not been implemented.

The social indicators may be assessed in such simplistic terms as the number of volunteers attending an Eagle Creek volunteer day, or the number of homeowners complaining about the necessary prairie burns. But the social success of this project

goes beyond simple numerics, which complexifies matters. How does one measure a sense of community? Or, how do you assess whether someone has developed a closer relationship with their local environment? These questions have no simple answers, yet in such an urban environment are as equally important as the measures of physical success. Realistically, so-called "social success" will be assessed by the amount of community involvement and acceptance of the project, especially if the Eagle Creek Advisory Committee is implemented. These indicators will not be tallied in numbers, rather they will be determined on a more intuitive level by the principal players in the process (i.e. the DNR representatives).

## **CRITIQUE**

There are two main criticisms of this project. First, the detention ponds to be created will be unnecessarily aesthetically and ecologically valueless. Second, the specific goals and the ecological and social indicators of the project need to be more clearly defined.

The series of six detention ponds to be created (two of which have already been built) are to be no more than ponds. The main value they possess will be strictly the functional one of collecting runoff diverted away from Eagle Creek and trapping sediment. These detention ponds could theoretically instead be stormwater wetlands (even more ideally, but often incorrectly considered politically unrealistic, would be a biofiltration process in the development, which could all but eliminate the curb-and-gutter system of stormwater drainage). Stormwater wetlands, could provide the same functional value as the ponds, while increasing the structural and aesthetic value of these areas. Stormwater wetlands, if created in such a way that their morphology is not solely focused on stormwater detention, i.e., their depth and side slopes are within a reasonable range for natural wetlands, could potentially house a larger diversity of wetland flora species while providing habitat to more fauna species. The emphasis on strictly functional value disregards the local and regional importance wetlands play in the Minnesota River Valley. As the Twin Cities continue to sprawl outward, more and more wetland habitat is being destroyed, and the necessity to create detention ponds in Savage is an excellent opportunity to help reclaim some of the ecologic and aesthetic aspects lost in this sprawl.

The most important criticism, though, is that the Eagle Creek Project needs to have more specific goals and measurements of success. As with any plan, the Eagle Creek reclamation and restoration plans are only as good as the implementation they instigate. Although some of the physical aspects of the project are clearly defined and on a path to being implemented, many of the physical and social goals have been insufficiently defined, and will, therefore, be insufficiently implemented and successful. For example, the decision of whether to increase trout habitat has not been adequately discussed, even as some of the reclamation efforts begin. The project

should have clearly stated goals with timelines and specifically indicated measurements of success. These goals and measurements are necessary to give people motivation--to let people know that this is where we are heading, this is what we think is important to acknowledge as we head there, and this is how we will know when we have arrived. Without specific goals, any achievement, no matter how valueless or insufficient, may cause the entire project to be deemed a success.

An important point to emphasize is that this reclamation and restoration project is occurring in an urban environment; a human-dominated environment. Questions arise as to what is the state to which we need to restore the area. Is it acceptable to promote a non-native species such as brown trout, if that species possesses certain social values? One of the most difficult questions stemming from this project has been: is the purpose of urban restoration and reclamation to solely strive for what is considered a pre-European natural state, or is it to help bring back a more structurally and functionally sound environment that may also incorporate specifically human determined attributes? The answer to this question will most likely be deciphered on a case by case basis, and in the case of Eagle Creek, it seems that a more anthropomorphic landscape will be created.

## **REFERENCES**

<sup>1</sup>Aaseng, Norman, et. al. Minnesota's Native Vegetation: A Key to Natural Communities Version 1.5. Minnesota Department of Natural Resources, St. Paul, Minnesota, 1993.

<sup>2</sup>BRW INC. and Barr Engineering Company. Alternative Urban Areawide Review: Savage Fen, Eagle Creek and Boiling Springs, City of Savage. City of Savage, Minnesota, 1994, 34.

<sup>3</sup>Ibid., 30.