Table of Contents

List of Tables

List of Figures

List of Appendices

1.0 Introduction

The Sunrise River is located in the state of Minnesota with a watershed comprising 373 square miles. It is a tributary to the St. Croix River and is located in the northern part of the Minneapolis – St. Paul metropolitan area. The river is an important resource within the region and especially as a major tributary to the St. Croix which is federally designated as a Wild and Scenic river. Because the St. Croix forms a portion of the boundary between Minnesota and Wisconsin, as well as the water quality and biological diversity of the St. Croix, local, state and federal agencies are committed to protect and improve the St. Croix Basin.

The Sunrise watershed includes portions of Chisago, Isanti, Washington, and Anoka counties. These counties are growing rapidly and their populations have approximately doubled in the past 40 years. These development pressures have likely contributed to the impairment of the North and South Branches of the Sunrise River as well as several lakes. These waterbodies have been identified as contributors to significant impacts to downstream waters including the St. Croix.

1.1 Study Background

The U.S. Army Corps of Engineers, St. Paul District Regulatory Branch determined that a proactive approach to wetland mitigation banking could play a beneficial role in protecting and improving the both the Sunrise and St. Croix rivers. The intent is to:

- Identify historic and current wetlands in order to better understand areal extent and impacts,
- Examine types of wetlands that have been impacted, those that are most likely to be impacted in the future, and the types of mitigation banks that have been developed,
- Identify potential future wetland mitigation bank sites and rate the sites in general viability,
- Engage other local, state and federal agencies in a ranking of sites in a manner to best address concerns for watershed river impairments,
- Examine the selected sites in detail to further evaluate site viability as a wetland mitigation bank,
- Examine the sites in general in a regulatory and economic context, and
- Provide a final ranking of potential future wetland mitigation banking sites that will provide public and private entities with a framework for how to best address future development and improve both the St. Croix Basin and the Sunrise River watershed.

Phase 1 of this program completed the first three of the seven tasks above with the 2010 report “Inventory of Historical and Aerial Extent of Aquatic Resources in the Sunrise River Watershed.” Phase 2 of the program is intended to complete the final four tasks of the program.

1.2 Study Objective

The objective of this study was to progress the efforts in Phase 1 and to essentially complete the program outlined above. This included:

- attending stakeholder meetings
- identifying and evaluating potential mitigation strategies
- conducting site visits, and
- preparing a draft and final report

This report is the documentation of the study results.

2.0 Stakeholder Meetings

2.1 Methods & Assumptions

2.1.1 Stakeholder Meetings

In order to develop a unified vision for wetland mitigation banking in the Sunrise watershed that would address both regulatory and other stakeholder issues and concerns, a series of stakeholder meetings were held. The intent of these meetings was to engage these stakeholders in the process, to collectively identify issues and concerns with the Sunrise River, its watershed and tributary streams, and connect these results with the banking site evaluation process. The outcome would be the development of a hierarchal banking site ranking system that would become a part of each site's evaluation.

The results of these meetings were then filtered through a model developed by the Engineer Research and Development Center (ERDC) to provide the five levels of scoring for sites.

2.1.2 ERDC Model Methodology

ERDC model methodology has not been provided and therefore is not further detailed here.

2.2 Results

2.2.1 Stakeholder Meetings Summary

The results of the Stakeholder meetings has not been provided and therefore is not further detailed here.

2.2.2 ERDC Model Results and Utilization

The scoring of each site that was generated by the ERDC model was provided to the study as a factor to include in the site evaluation process. Initial site evaluation used stakeholder survey scores of 4 or 5 to provide focus and then sites were evaluated based on landscape ecological parameters such as patch size, edge effects, connectivity to other valuable resources nearby, and key vegetative communities. As the study progressed, the lower scored areas were reviewed as well with occasional high quality sites identified in these lower scoring areas.

The stakeholder scoring results have been included in the site specific information provided in Appendix A and as summarized in Table 1.

3.0 Mitigation Banking Strategies

3.1 Methods & Assumptions

Project-specific mitigation is typically done on the same project site as the proposed wetland impact. The intent is to replace lost wetland functions in the same geographic location. During the permitting process, the extent of the impacted wetlands is minimized wherever feasible, resulting in the smallest possible wetland impact footprint. The placement of on-site mitigation is often driven by site design considerations, and not through a larger scale landscape design process. Projects with on-site mitigation can result in a loss of wetland functions, often due to poor design and poor placement of the mitigation area within

the newly developed landscape. The design of these mitigation areas often ignores the concepts of core size and connectivity to other similar landscape features, and the resulting wetlands lack sufficient size and/or shape to function as viable plant communities or habitats.

The use of banking sites can serve as mitigation for multiple wetland impacts. The bank site can be a large patch that can function as the desired plant community and wetland type within the surrounding matrix. The result is that several small, scattered, and poorly placed and designed mitigation areas that would have been constructed on-site can be replaced through a well-designed, existing wetland bank that is already functioning successfully as a wetland. Wetland bank usage increases the likelihood that the goal of no net loss as well as replacement of impacted wetland functions will be successfully achieved.

3.2 Results

Because the ERDC model and stakeholder meeting results were not provided, no results can be provided here.

4.0 Site Specific Analysis

The study identified 20 highest priority sites. Each site required in-depth analysis in order to better evaluate and rank the sites, as well as providing discussion on site viability, likely wetland types, future design considerations, and other site issues. The intent of this information is to bridge the gap between the planning level site evaluation and possible future mitigation bank prospectuses. Appendix A contains the wetland mitigation banks site specific analysis and associated figures.

4.1 Methods & Assumptions

4.1.1 GIS Data and Sources

Existing GIS Data

Existing, publically available GIS data sources utilized for in-depth site study and site-specific figures included the following:

- National Wetland Inventory (NWI) polygons (USFWS)
- Watershed and Catchment Boundaries (MN DNR)
- Minnesota County Biological Survey Native Plant Communities (MN DNR)
- Minnesota County Biological Survey Sites of Biodiversity Significance (MN DNR)
- Designated Trout Streams (MN DNR)
- 1:100,000-Scale Lakes and Rivers (MN DNR)
- Streams with Strahler Stream Order (MN DNR)
- Ditches and Drain Tiles (MN DNR)
- Metro Conservation Corridors (MN DNR)
- 2000 Central Region Regionally Significant Ecological Areas (MN DNR)
- Regional Ecological Corridors – MLCCS derived 2008 (MN DNR)
- State Wildlife Management Areas (MN DNR)
- Roads and Highways (MN DOT)
- USGS 7.5 Minute Topographic Maps
- General Land Office (GLO) Original Land Survey Plat Maps

Aerial photographs also included

- 2010, 2009, 2008, 2003 USDA Farm Service Agency (FSA) Color Aerial Photography
- 2008 USDA FSA Color-Infrared Aerial Photography
- 1991 USGS Panchromatic Leaf-off Aerial Photography
- 1938 Panchromatic Historical Aerials (MN DNR)

Historic Wetland Inventory

The Historic Inventory cataloged wetland conditions existing at the time of European settlement in the mid-19th century. Data for conducting the historic inventory is limited to Original Land Survey and County Soil Survey data.

For the purpose of this study, County Soil Survey data was used to determine historic wetlands based on the assumption that hydric soils take long periods of time to form. Therefore, hydric soils in former wetlands drained by humans would tend to retain the hydric characteristics that were observed during the soil survey. Areas developed or significantly disturbed at the time of the soil survey may not have been classified as a hydric soil and would therefore not be inventoried as a historic wetland. The soil survey has a relatively small fraction that is classified as disturbed soils so the net effect of this on the analysis is expected to be minor. The Original Land Survey was utilized as supplemental data to validate the accuracy of the soils data and to provide information regarding vegetation and aquatic resources at the time of European settlement.

For additional information on the Original Land Survey, County Soil Survey data, and the methods utilized by URS staff to create a Historical Wetland Inventory, please see Section 3 of the Sunrise River Watershed: Inventory of Historical and Aerial Extent of Aquatic Resources prepared in February 2010.

Existing Wetland Inventory

The Existing Inventory identified aquatic resources in the Sunrise Watershed at the time of the summer 2009 aerial photography dataset collection. A large body of data was procured to create and verify the existing wetland inventory dataset, including aerial photographs, National Wetland Inventory (NWI), Public Waters Inventory (PWI), and topographic datasets, as well as the use of ground reconnaissance.

The approach utilized soil survey data and NWI data to identify areas that may contain aquatic features. Areas that possibly contained aquatic features were identified by inspecting recent and historical aerial photos. Areas that did not contain hydric soils or NWI wetlands were also visually inspected. The PWI generally identified shallow marshes, deep marshes, shallow open water communities that were also identified in the NWI, as well as lakes. NWI, PWI, Soil Survey, topographic data, and earlier aerial photos were used to identify possible aquatic resources, but the final identification and delineation of a given aquatic body was based on its appearance in the 2009 watershed-wide imagery.

For more information on visual indicators, ground reconnaissance and GIS methodologies, and wetland types identified in the Existing Wetland Inventory, please see Section 3 of the Sunrise River Watershed: Inventory of Historical and Aerial Extent of Aquatic Resources prepared in February 2010.

4.1.2 Site Analysis Methods

Initial efforts to identify potential mitigation sites focused exclusively on areas with a stakeholder survey score of 4 or 5. This approach proved to be too limiting and resulted in small, dispersed proposed mitigation areas of little value for mitigation banking while ignoring larger areas with high restoration and banking potential.

A modified landscape ecology approach was adopted to incorporate additional criteria of importance to wetland mitigation banks and crediting agencies while retaining the value of the stakeholder survey scores. These criteria include recommendations for wetland patch size, patch connectivity, and vegetation consideration, all of which are likely to enhance the success of a wetland restoration or other mitigation site activity.

Criteria 1: Patch Size and Shape

Edge Effect

Larger patches will provide larger, more diverse, and higher quality wildlife habitat than smaller patches. Any patch of naturalized vegetation, whether wetland, grassland, or forest, will be influenced by the surrounding matrix in which it resides. The matrix, which could be agriculture or urban development, will exert an effect on the patch in what is known as the "edge effect". In this edge, the patch will be influenced by the matrix. For example, a forested patch surrounded by an agricultural patch will be influenced through increased light penetration, warmer air flow, and establishment of forest edge species.

Wetland patches located in residential development matrix are adversely affected by the surrounding land use. Placement of mitigation areas within a residential development seldom results in a high quality habitat. Influences of the residential matrix include runoff of pollutants, impacts to vegetation from adjacent property owners, and lack of proper maintenance of the native plant community. Such wetlands are typically low quality in terms of plant diversity and water quality.

Patch Core

The size and shape of the patch will determine the area of the patch core, the area that is not influenced by the surrounding matrix. The core size will in turn determine the species that can reside within the patch. Species requiring larger patches will not be able to inhabit smaller patches, restricting the diversity of species that can occupy a given patch.

Patches of habitat within in an otherwise disturbed matrix are not dissimilar from islands in the ocean. Organisms, whether they be plants or animals, that occupy a specific plant community will disperse from a given habitat. The larger the patch size and the closer the patch to other similar patches will determine the likelihood of an organism that has dispersed from another patch colonizing the patch. The smaller a patch and the more distant it is from similar patches, the less likely it will be colonized by additional species.

The shape of a patch will also influence the size of the core. The more elongated a patch, the smaller the core, and the larger the area influenced by the edge effect. Conversely, the more rounded a patch, the larger the core area, and the smaller the area of edge effect. This is because the influence of the matrix will be felt a given distance into the patch, based on the type of matrix and patch, regardless of its shape. A more rounded patch will have smaller perimeter relative to its area, whereas a more elongated patch will have a larger perimeter relative to its area.

Criteria 2: Patch Connectivity

Riparian Corridors

Connectivity between patches can be achieved through corridors of habitat that connect multiple patches. Organisms can disperse from one patch to another via a corridor of habitat.

Riparian corridors are ideal because they tend to be natural wildlife corridors. The presence of a wide riparian zone that is vegetated with a native plant community will provide water quality benefits to the stream.

Corridors can also allow for movement of non-native and invasive species. For example, highway right of ways can allow for the spread of plant species such as leafy spurge (*Euphorbia esula*) and spotted knapweed (*Centaurea stoebe*).

The presence of barriers can be detrimental to organisms utilizing a corridor. Barriers such as roadways, power line right of ways, and developed areas can impede movement of organisms. Roadways can be hazardous as organisms attempting to cross them can be killed by traffic. Consideration of barriers and its influence on a variety of species should be considered when planning a corridor.

Riparian Corridor Establishment

The creation of riparian corridors (the area adjacent to a stream) can serve important functions for stream bank stability, water quality, and also serve as a habitat corridor that allows organisms to travel through the watershed to reach habitat patches, colonizing them and adding to species diversity. Improving the connection of the Sunrise River riparian corridor to the St. Croix River corridor would significantly improve the connectivity of the Carlos Avery Wildlife Management area to the larger St. Croix River Valley.

Just as smaller roads intersect major highways and connect communities, tributaries to the Sunrise River also serve as secondary corridors that connect features elsewhere in the watershed. These smaller waterways are less likely to have significant riparian plant communities due to their small size. These waterways can provide an important connectivity component to landscape features throughout the watershed.

Creating forested riparian zones have many advantages. Water quality will be improved through a reduction in erosion and the stabilization of stream banks. Shade created by the formation of a forest canopy will keep water temperatures low, improving the stream habitat for invertebrates and trout.

Credits available

Credits could be included if riparian areas restored are wetland or serve as an adjacent upland buffer to a wetland.

Criteria 3: Native Vegetation Proximity

Proximity to Native Plant Communities

The intent of any mitigation area including a wetland mitigation bank is to provide full hydrologic inputs into an appropriate landscape setting. However, these can suitable context for either native plants or invasives. Initial seeding and in place seed stock are extremely helpful but natural reseeding processes can augment bank development. Wind, water, and animal seed

dispersal can play a significant role in a wetlands ability to be robust and self-sustaining. Therefore, proximity to native plant communities and especially highly diverse native communities is important to understanding wetland mitigation bank viability.

Resistance to invasion of non-native and invasive species

All plant communities require maintenance by humans to maintain their quality. Non-native and invasive species will always be problematic. Wet meadow wetlands are susceptible to invasion of reed canary grass (*Phalaris arundinacea*). Woodlands can be invaded by European buckthorn (*Rhamnus carthatica*). Shallow marshes are frequently overrun by hybrid cattail (*Typha x glauca*). All of these species can form monocultures, outcompeting native species and limiting plant diversity.

Long term monitoring and maintenance are necessary. This type of stewardship is needed beyond the customary five year monitoring period that is conducted during the plant establishment period for mitigation or banking area.

Wetland Enhancement

Wetland enhancement, the improvement of specific wetland functions of an existing wetland. This would only improve one or more of the functions of an existing wetland, and not result in an increase in wetland area.

During the inventory phase of this study, it was observed that during the Original Land Survey of the 1800's many wetlands were identified as "tamarack swamps". These wetlands, as well as many wetlands that were presumably sedge meadows, are now dominated by monocultures of reed canary grass. A potential enhancement that would restore historic functions that are now lost would be the re-establishment of tamarack trees in a wetland. Provided that the soil conditions, pH, and other factors are appropriate, tamaracks could be reintroduced to a wetland currently dominated by reed canary grass as a way of improving the functions of that wetland. As an alternative, hardwood trees such as swamp white oak, bitternut hickory, bur oak, and other tree species tolerant of wet conditions could be established in a reed canary grass dominated wetland as a means of improving functions. This would not be the historic restoration that reestablishing tamarack would be. Converting a reed canary grass wetland to a hardwood swamp could be a way of controlling reed canary grass as the trees form a canopy, shading out the grass.

Tamarack restoration can be difficult. These trees tend to grow during drier times and become stunted during wetter times. The time scale to reestablish tamaracks could be several decades. A tamarack forest would not necessarily shade out reed canary grass, so a plan to eliminate this grass would still be needed.

Credits available

Credits for this type of activity are not offered under the WCA. The Corps offers 33% credit, and 50% for certain circumstances.

Through the use of multiple mapping sources as outlined above, sites were evaluated by wetland professionals for the characteristics and conditions provided below.

- Location and background including total acres, county, relationship to nearby towns, section, township and range, as well as basic description and pertinent general information
- Restoration value and benefit including GIS Stakeholder Survey scoring and site history based on GLO mapping interpretation

- General site characteristics including:
  - General information (size including subareas when appropriate, political city or township and watershed district)
  - Environmental information (drainage area to site, dominant hydrology source, landscape position, current estimate of wetlands on–site, current land use, mapped soil types, NWI mapped wetlands, ownership (private/public, single/multiple))
- Existing conditions
- Types of activities for mitigation credit such as restoration of previously existing wetlands, restoration of the historic stream alignment, establishment of upland oak forest buffer, etc. and the anticipated acreage per activity
- Targeted Outcome which is a discussion on wetland or plant community type
- Anticipated environmental benefit
- Primary watershed impairment issue addressed (if applicable)
- Potential for success/risk assessment
- Likelihood of success.

4.2 Results

The twenty identified sites were examined for their detailed location landscape context, site characteristics, potential for restoration, likely values, and likelihood for success. The results of the site specific examinations are summarized below with detailed site information provided in Appendix A.

Table 1 – Summary Of Information For Selected Sites

Site	Name	Location	Size (acres)	Potential for Success	Comments
1	North Branch Sod Fields	East of the City of North Branch, Chisago County	3,490	High	Stakeholder scores of 3 to 5.
2	Forest Lake	In the City of Forest Lake, Washington County	27	Medium	Stakeholder scores of 2 to 4.
3	North Shore Trail	East of Forest Lake, Washington County	5.6	Medium	Stakeholder score of 5.
4	Second Lake	Chisago County	6.6	Medium to Low	Stakeholder score of 4.
5	Park Trail	Chisago County	50.2	Medium	Stakeholder scores of 2 to 4.
6	Kost Trail	Chisago County	69.2	High	Stakeholder score of 5.
7	County Ditch 19	Isanti County	74.5	High	Stakeholder scores of 2 to 3.
8	Highway 95 & Virgo Street	Isanti County	24.0	Medium to High	Stakeholder scores of 3 to 4.
9	East of Tamarack Lake	east side of Tamarack Lake, Chisago County	33.9	High	Stakeholder scores of 3 to 4.
10	North Branch I-35	Chisago County	335	Medium to High	Stakeholder score of 1 to 3.
11	Wyoming Unit - Western	City of Wyoming, Chisago County	100 combined	High	Stakeholder scores of 3 to 4.
12	Wyoming Unit - Eastern	City of Wyoming, Chisago County	100 combined	High	Stakeholder score of 5.

13	Durant Street	west of Linwood Lake, Anoka County	98.2	High	Stakeholder score of 5.
14	Fawn Lake Drive	Anoka County	111.8	High	Stakeholder score of 5.
15	Martin W. Schubring WMA Connection	Anoka County	37.4	High	Stakeholder score of 5.
16	County Highway 12	Isanti County	51.3	Medium to Low	Stakeholder scores of 3 to 5.
17	I-35 and 360th Street	Chisago County	120.9	Medium	Stakeholder scores of 3 to 5.
18	Farmed Wetland Restoration	Isanti County	122.4	High	Stakeholder scores of 2 to 5.
19	County Road 78	Chisago County	92.8	Medium	Stakeholder scores of 2 to 3.
20	County Highway 30	Chisago County	120.2	Medium	Stakeholder scores of 4 to 5.

A detailed summary of such comprehensive review and discussion would be unwieldy if even possible. Therefore, a generalized summary of results based on characteristics and conditions is provided below.

- Locations – sites are identified in 4 counties
- Site size average 262 acres and range from 5.6 to 3,490 acres
- Average drainage areas to a site is 830 acres and ranges from 20 acres to 8,000 acres
- The dominant hydrological sources were determined to be either a combination of shallow groundwater and runoff from surrounding landscape or flow-through from adjacent areas.
- The primary landscape position of the sites is depressional (twelve sites), with floodplain existing on six sites.
- Agriculture is the predominant current land use of the sites.
- Ownership includes nine multiple owner sites, eight single owner sites and three sites where ownership was not determined.
- Types of activities estimates
  - 20 sites are identified restoration of previously existing wetland
  - 10 sites are identified for restoration of historic stream alignment
  - 19 sites are identified for the establishment of a buffer
- The likelihood for success was estimated as
  - 10 sites were highly likely to succeed
  - 2 sites were medium to highly likely to succeed
  - 6 sites were medium likely to succeed
  - 2 sites had a medium to low likelihood to succeed

The site specific analysis suggests that, while every site may have challenges, many sites are very viable candidates for multiple parameter mitigation banking. Sites that did not appear to have a high likelihood for success, we suggest potential bank sponsors review all sites in greater detail.

5.0 Mitigation Options

5.1 State Regulatory Programs

5.1.1 Wetland Conservation Act

At the State level, impacts to wetlands are regulated under the Wetland Conservation Act (WCA). Responsibility for administration of the WCA is shared by both local and state government. The local government unit ("LGU") is responsible for making the initial regulatory determinations for the program. The Board of Water and Soil Resources (BWSR) promulgates administrative rules for the program, provides training to LGUs, participates on technical evaluations panels, hears appeals from local government determinations, and assures proper implementation by LGUs.

If a permit is required for an activity under the WCA then the impacted wetland(s) must be replaced[1] under a replacement plan approved by the LGU. The WCA rules contain numerous specific requirements as to the location, amount, and type of replacement wetlands. In general, replacement may be provided by an applicant on a project-specific basis or by purchase of wetland mitigation bank credits. Mitigation for public transportation projects is governed by a separate section of the state rule that lays out specific requirements for wetland replacement based on the amount, type, and location of mitigation. State-imposed replacement ratios are lower for areas with lower historic wetland loss. Losses within the 7-county metro get special consideration because of high development pressure in that region. Some of the wetland mitigation requirement for public transportation projects is also predicated on the expectation that many of the losses associated public transportation projects are from road maintenance projects that are mitigated by a state-funded bank system dedicated specifically to providing mitigation for public transportation projects. The applicable requirements for wetland replacement in the Sunrise River Watershed are discussed in the following paragraphs.

5.1.2 Implementation of the WCA in the Sunrise River Watershed

Historic wetland loss, watershed boundaries, river basin boundaries, and high development pressure within the 7-county metropolitan area are all factors in determining where replacement of wetland impacts must occur in the Sunrise River Watershed and how much mitigation will be required as replacement.

Wetland impacts within the 7-county metropolitan area around Minneapolis and St. Paul must be replaced within or close to the 7-county metropolitan area. Within the Sunrise River watershed, Anoka and Washington counties are part of the seven county Twin Cities metropolitan area. Under the WCA regulations, for every one acre of wetland impact in Anoka and Washington Counties, at least one replacement acre (credit must come from somewhere within the 7-county metropolitan area. Mitigation for public transportation projects must come from the 7-county metropolitan area or from a major watershed that is at least partially within the 7-county metropolitan area (*e.g.,* the St. Croix River-Stillwater major watershed, which includes the Sunrise River watershed).

The WCA divides Minnesota counties and watersheds into three types based on the extent of pre-settlement wetlands remaining in a county. The pre-settlement wetland designations have replacement ratio and mitigation location implications for wetland replacement plan proposals under the WCA. The three area designations are:

[1] Replacement is the final step in the sequencing process under the WCA, replacing wetland impacts that remain avoidance and minimization. Unavoidable wetland impacts are "replaced" by restoring or creating wetlands of equal or greater public value.

i. Less Than 50 Percent Area. A county or watershed with less than 50 percent of the presettlement wetland area intact
ii. 50 percent To 80 percent Area. A county or watershed with at least 50 percent but less than 80 percent of the presettlement wetland area intact.
iii. Greater Than 80 Percent Area. A county or watershed with more than 80 percent of the presettlement wetland area intact.

The Sunrise River Watershed is somewhat unique in the State of Minnesota in that all three of these designations occur somewhere within the 4 counties that make up the majority of the land area in the watershed. Washington County is designated a less than 50 percent county, Anoka and Chisago counties are designated 50 percent to 80 percent counties, and Isanti County is designated a greater than 80 percent county. Impacts in a less than 50 percent county must be replaced in a less than 50 percent county. Similarly, impacts in a 50 percent to 80 percent county may only be replaced by mitigation in a 50 percent to 80 percent metro county. Impacts in a greater than 80 percent county may be replaced in any county in the state, with preference for locations closer to the impact site.

When the various layers of mitigation constraints are combined, some counties of the Sunrise River Watershed have significantly greater mitigation requirements and limitations than others. A replacement plan applicant from Isanti County (greater than 80 percent) who needs to replace wetland impacts has a great many more mitigation options than an applicant from Anoka, Chisago or Washington counties. An applicant needing to replace wetland impacts in Washington County, a less than 50 percent county within the 7-county metropolitan area, would have to secure mitigation within a less than 50 percent county –with at least some of those credits from the metropolitan area where credit prices tend to be higher. An applicant needing mitigation credit for a project in Anoka County, a 50 to 80 percent county within the 7-county metropolitan area, would have to provide some mitigation from Anoka County, the only 50 to 80 percent county in the 7-county metropolitan area. An applicant needing mitigation credit for a project in Chisago County, a 50 to 80 percent county outside of the 7-county metropolitan area, would have to provide mitigation from somewhere among the eight 50 to 80 percent counties.

Under the WCA, the amount of replacement (mitigation) required is determined first by the pre-settlement wetland designations for the County in which the impact occurs. Impacts in the > 80% areas have a base replacement ratio of 1.5:1 while those in a 50% to 80% county or a < 50% county have a base replacement ratio of 2.5:1. Impacts to wetlands on agricultural lands that will remain in agricultural use require compensation at a 1.5:1 ratio. The amount of mitigation required varies with incentives (less mitigation required) for being within the same major watershed or bank service area, completing mitigation in advance (*e.g.*, bank credits), and mitigation of the same wetland type.

5.2 Federal Regulatory Program

5.2.1 Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act

At the federal level, impacts to wetlands and other waters of the United States (WUS) are regulated under the authority of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The U.S. Army Corps of Engineers (Corps) issues Department of the Army permits for regulated activities in WUS. The Environmental Protection Agency provides administrative oversight of the Corps' permit program.

As a condition of permits, compensatory mitigation often is required for impacts to WUS, especially wetlands and other special aquatic sites like riffle-pool complexes and vegetated mud flats. The framework for federal compensatory mitigation is laid out in the Federal Register in the April 10, 2008 mitigation rule (33CFR Parts 325 and 332, and 40 CFR Part 230). The St. Paul District subsequently provided additional, more detailed guidance for mitigation in Minnesota with their St. Paul District Policy for Wetland Compensatory Mitigation in Minnesota (January 2009). These rules and policies lay out the process to be followed in Minnesota to determine how best to offset of wetland/aquatic functions that are unavoidably lost due to impacts authorized by Corps permit. In general, replacement may be provided by an applicant on a project-specific basis or by purchase of wetland mitigation bank credits. The applicable federal requirements for wetland compensatory mitigation in the Sunrise River Watershed are discussed in the following paragraphs.

5.2.2 Implementation of Section 404 of the Clean Water Act in the Sunrise River Watershed

The federal wetland mitigation guidance for Minnesota contains a variety of specific requirements as to the location, amount, and type of replacement wetlands, with a preference for mitigation that is geographically and temporally closer to where and when the impact occurs. There is also a preference for compensatory mitigation proposals that develop wetland functions similar to the functions lost due to permitted impacts. Corps policy parallels state policy to some extent in that it also recognizes: 1) the importance of special protections for metropolitan areas with high development pressure, and 2) the need to provide special consideration for areas with high potential for wetland impacts (a large percentage of the area is currently wetland), but limited opportunity to restore wetland due to relatively few historic wetland losses.

Historic wetland loss, watershed boundaries, river basin boundaries, and high development pressure within the 7-county metropolitan area are all factors in determining where compensation for wetland impacts must occur in the Sunrise River Watershed and how much mitigation will be required as compensation.

The Corps has established basic and minimum mitigation ratios for Minnesota. The higher the ratio, the more mitigation credit is required to offset impacts authorized by Corps permits. Counties with more than 80% of their pre-settlement wetlands intact have lower basic and minimum mitigation ratios. In the Sunrise River watershed, only projects in Isanti County utilize these lower mitigation ratios.

For Corps permits, the amount of replacement (mitigation) required is determined first by the pre-settlement wetland designations for the County in which the impact occurs. Impacts in the > 80% counties (*e.g.*, Isanti) have a basic compensation ratio of 1.5:1; areas in the < 80% counties have a basic compensation ratio of 2.5:1. The minimum compensation ratio (*e.g.*, for impacts to farmed wetlands or degraded industrial sites) for impacts in > 80% counties is 1:1, while the minimum compensation ratio for authorized impacts in <80% counties is 2:1. Impacts to wetlands on agricultural lands that will remain in agricultural use require compensation at a 1.5:1 ratio. The amount of mitigation required varies with incentives (less mitigation required) for being within the same major watershed or bank service area, completing mitigation in advance (*e.g.*, bank credits), and mitigation of the same wetland type. Incentives are allowed for mitigation in advance, mitigation close to the impact site, or mitigation of the same wetland type (provides similar functions).

A special bank service area has been created for the Twin Cities metropolitan area to strive for replacement of 7-county metro wetland losses within the 8-digit HUC watersheds that overlap the 7-county metro area. The special service area allows for a reduced mitigation ratio if bank credits from those watersheds are utilized as compensatory mitigation for impacts in the 7-county metro area.

6.0 Banking Analysis

6.1 Methods and Assumptions

Mitigation banking analysis is often a blending of past market data and an estimation of future market demand. Future market demand can be very subjective, even past market data should be understood in the time dependent economic context. Such an exercise would be significant work. Therefore, the methods and assumptions of the banking analysis is the subjective balancing of the banking demand analysis and an examination of existing banks.

The methods for the mitigation banking analysis were not provided and therefor are not included here.

We do note that there are some industry recognized broad assumptions for what determines a successful mitigation bank. At the most basic level a mitigation bank is no different than any other commercial venture. The intent is to produce a valuable product for a minimum of cost and a maximum of revenue. Specific factors mitigation bankers commonly evaluate include:

- Location – In order to generate revenue, banks tend to be where there is a demand for their credits. This can be achieved by bank location and bank service area(s).
  - Bank Location – Banks should be located generally in a metropolitan market and/or sufficiently close to capture the demand that directly results from a volume of real estate development. While “developable land” will most commonly be used for real estate development, it is somewhat common to find land that the real estate market considers “undevelopable”. These locations can be effective locations for banks.
  - Service Area(s) – Where land is at a premium and is therefore costly, the primary and secondary service areas of a bank can sufficiently expand the bank’s location so that the bank does not need to be proximate to the immediate demand. Since mitigation ratios tend to increase between primary and secondary service areas, it is important to have as large of primary service area as possible. Secondary service areas are commonly based on either major regional ecological zones or even state boundaries.
- Siting – While siting is an extension of location, on site siting issues directly contribute to bank success.
  - Hydrology – In order to turn “land” into “wetland” suitable hydrology is required.
  - Topography – While generally level land is obviously most desirable, mitigation banks strive to develop a diversity of land topography in order to provide a diversity of wetland types. This variability allows the bank to respond to changing environmental conditions and gain a wide range of credits. When banks are also used for hunting, diversity can also provide an optimal mix of habitat types for wildlife use.
- Development Costs – While effectively locating and siting a bank can do a great deal to minimize costs, how much capital investment is required directly impacts fiscal viability of a bank.
  - Size – Efficiencies of scale generally dictate that the larger a size, the less cost per acre will be required to achieve site development. Therefore, assuming all siting and location issues are equal between two bank sites, the larger the site, the greater the profit.
  - Services – Design and permitting services must be taken into account with bank development. The easier the site is to develop, the less costly the design, permitting, and construction of the bank. However, if multiple banks can be developed in a like manner, service costs can be reduced.

- Maintenance – As noted in previous sections, if a site is problematic to maintain, it is less desirable as a bank. Maintenance costs can include invasive species control, reseeding/replanting, maintenance/repair of water control structures as well as any ditches or berms.

6.2 Mitigation Banking Demand Analysis

The mitigation banking demand analysis was not provided and is therefore not included here.

6.3 Existing Mitigation Banks within the Watershed

There are currently seven established compensatory mitigation banks in the Sunrise River Watershed. The banks can generally be classified into private commercial banks and single client banks. Private commercial banks make up six of the banks in the watershed and offer credits to the general public at market prices. Only five of these banks are currently considered active and have credits for sale. Understanding and evaluating the set of private commercial banks is complicated by the fact that not all of these banks have been approved to provide compensatory mitigation for impacts to waters of the United States authorized by the Corps under Section 404 of the Clean Water Act. Three banks have been approved under both the state and Federal programs, two banks have been approved under only the state program, and one bank has been partially approved for Federal purposes and approved in its entirety under the state program. The lone single client bank in the watershed is the Janet Johnson bank established by the State of Minnesota for its Local Road Replacement Program. The existing mitigation banks in the Sunrise River watershed are summarized in Table 2. A brief description of each bank is provided in the following paragraphs followed by a summary of the types and amounts of credits available from these banks. The parenthetical following the bank name indicates the approvals issued for the particular bank.

Table 2 – Summary of Existing Banks in the Sunrise River Watershed

Bank Name	County	Sunrise Subwatershed	Approval	Status	Size (acres)	Year Established	Total Approved Credits
Private Commercial Banks							
Boettcher Farm Preserve	Anoka	West Branch Sunrise River	Fed/State	Active	16.08	2007	16
Palme	Isanti	Middle North Branch Sunrise River	State	Active	21.2	2001	11.789
Goertz	Chisago	Lower North Branch Sunrise River	Fed/State	Active	37.5	2002	36.76
Pryor	Chisago	South Branch Sunrise River	Fed/State	Active	56.6	2007	1.28
Swenson	Washington	Bone Lake	Fed/State[1]	Active	8.8	2000	8.8
Sygulla	Anoka	South Branch Sunrise River	State	Closed	4.5	1995	0.1312

Single Client Banks							
Janet Johnson	Chisago	Lower North Branch Sunrise River	Fed/State	Active	415	2006	298.983

NOTES:
[1] Only a portion of the credits at the Swenson bank were approved for use by the Corps for offsetting impacts to waters of the United States.

6.3.1 Boettcher Farm Preserve Wetland Mitigation Bank (Federal and State)

The Boettcher Farm Preserve mitigation bank (Boettcher bank) is located in the West Branch Sunrise River subwatershed in Linwood Township, Anoka County. The bank site covers approximately 20.5 acres and generated 16 credits from the following activities: restoration of 12.58 acres of effectively drained wetlands, partial restoration and enhancement creation of 5.98 acres of degraded wetlands, and establishment of 1.95 acres of upland buffer. The bank application was approved by the Corps in April of 2007 following the state approval in February of that year. The initial release of 12.22 credits occurred in March of 2007 and consisted of 10.12 fresh (wet) meadow credits and 2.1 upland buffer credits. A second release of 3.78 shallow marsh credits occurred in January of 2010. The bank has an available credit balance of 0.4353 shallow marsh credits. The bank is identified as a private commercial bank.

6.3.2 Duane Palme Bank (State)

The Duane Palme bank is a 21.2 acre site located in the Middle North Branch Sunrise River subwatershed in Isanti County. The initial, and only, release of credits occurred in October 2001 and consisted of a total of 11.789 credits comprised of deep marsh (1.29), upland buffer (1.449), and shrub-carr or alder thicket (9.05) credit types. The bank has an available credit balance of 8.5525 credits and is identified as a combination public/private bank.

6.3.3 Goertz Bank (Federal and State)

The Goertz wetland bank is a 37.5-acre parcel located in the Lower North Branch Sunrise River subwatershed in Lent Township, Chisago County. According to the wetland bank application submitted in 1999, prior to 1965 the area consisted primarily of shallow marsh and fresh (wet) meadow wetland plant community types. At some point between 1965 and 1973, the area was drained and put into agricultural production. The majority of the site was farmed until 1998. In August 1999 Mr. Goertz submitted a banking application to Chisago County and the U.S. Army Corps of Engineers for a 55-acre bank that would consist of fresh (wet) meadow, shrub-carr or alder thicket, and hardwood swamp. After several modifications of the original plan, in September of 2002 state and Federal agencies certified 22 fresh (wet) meadow credits and 1.48 shallow marsh credits at the bank site and approved these credits for sale. An additional release of 7.2 fresh (wet) meadow credits and 1.08 shallow marsh credits was approved by the agencies in March of 2006. The bank has an available credit balance of 4.84 credits consisting of 3.37 fresh (wet) meadow credits and 1.47 shallow marsh credits. The bank is identified as a combination public/private bank.

6.3.4 Janet Johnson bank (Federal and State)

The Janet Johnson wetland bank is a 415-acre site located in the Lower North Branch Sunrise River subwatershed in the City of North Branch, Chisago County. The bank was constructed by the Minnesota Board of Water and Soil Resources as a single client bank to provide credits for the State of Minnesota's Local Road Replacement Program. Development of the bank

site occurred in two phases beginning with Phase I in 2006. The goal of Phase I was to restore wetland hydrology to approximately 175 acres of fresh (wet) meadow, shallow marsh, shrub-carr or alder thicket, and hardwood swamp wetlands. The Phase II work at the site was completed in 2009 and involved added an additional 215 acres to the bank. During Phase II 34 acres of wetland were completely restored to functioning wetlands and an additional 25 acres of wetland were partially restored. In addition, upland buffer was established on 144 acres of woodland and 12 acres of upland grassland.

An initial release of credits for the Phase I restoration work was approved in January of 2008 and consisted of the following: 12.9 fresh (wet) meadow credits, 9.75 shallow marsh credits, 4.43 hardwood swamp credits, and 3.53 upland buffer credits. Two additional credit releases occurred in 2010. The first was in January and added 137.17 fresh (wet) meadow credits, 8.03 shallow marsh credits, and 41.078 upland buffer credits. In December 2010 the agencies approved a third credit release consisting of 17.59 fresh (wet) meadow credits, 6.565 shallow marsh credits, and 57.94 upland buffer credits. The bank has an available credit balance of 251.5802 credits consisting of 150.5972 fresh (wet) meadow credits, 12.705 shallow marsh credits, and 88.278 upland buffer credits. As mentioned previously the Janet Johnson bank is a single client and is used exclusively to offset road authority projects eligible for the State's Local Road Replacement Program.

6.3.5 Pryor Bank (Federal and State)

The Pryor mitigation bank is a 56.16 acre preservation bank consisting of hardwood swamp, bog, fresh (wet) meadow, shallow marsh, deep marsh, and upland buffer. The site is located in the South Branch Sunrise River subwatershed in the City of Wyoming, Chisago County. A wetland bank application was submitted in May 2007 proposing preservation of the 56.16 acre site containing 43.92 acres of wetlands and 12.24 acres of upland buffer. The plan also included management and control of invasive species in the wetland areas. The application was approved in June of 2007 and the initial release of 1.84 credits consisting of 0.41 credits of hardwood swamp, 0.18 credits of bog, 0.15 credits of fresh (wet) meadow, 0.05 credits of shallow marsh, 0.03 credits of deep marsh, and 0.46 credits of upland buffer occurred in November of that year. There have been no additional credit releases for this bank since the initial deposit in 2007. The bank has an available credit balance of 0.3889 credits consisting of 0.101 hardwood swamp credits, 0.18 bog credits, 0.05 shallow marsh credits, 0.03 deep marsh credits, and 0.0279 upland buffer credits. The bank is identified as a combination public/private bank.

6.3.6 Swenson Bank (Partial Federal and Non-Federal)

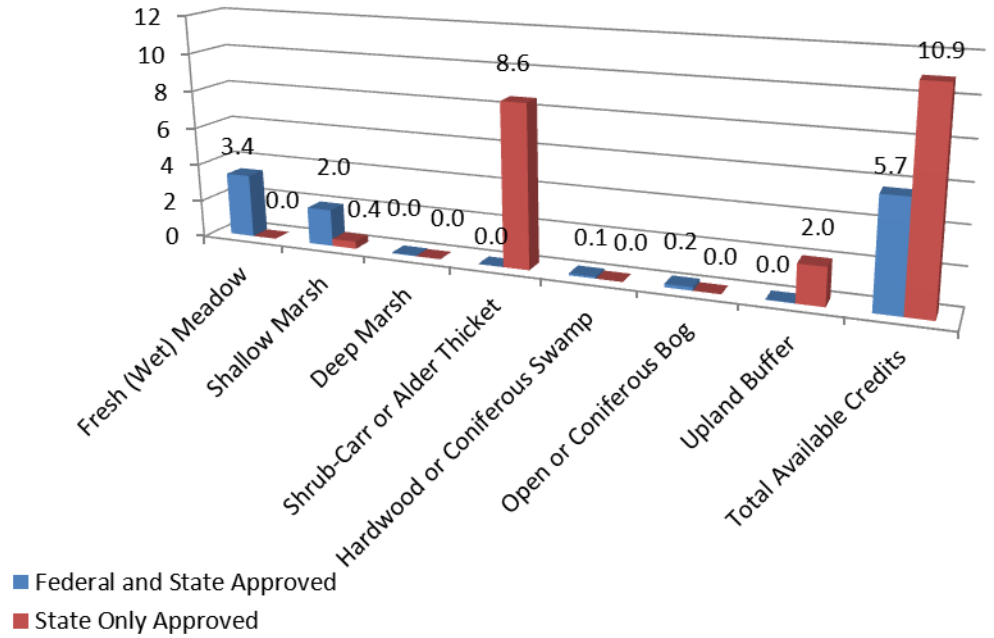
The Swenson bank is a 17.9-acre site located in the Bone Lake subwatershed in Washington County. The bank was formally established in 2000 but received only partial approval by the Corps of Engineers. As a result the bank has separate accounts for Federal and non-Federal credits. In December 2000, the Corps of Engineers certified the release of 0.44 shallow marsh credits and 1.79 fresh (wet) meadow credits. At the same time, an additional 2.8 shallow marsh credits and 3.77 upland buffer credits were certified for use to offset impacts under the Minnesota Wetland Conservation Act. No additional credit releases have occurred since the initial release in 2000. Of the 2.23 credits originally receiving Federal approval, the bank has an available balance of 0.0065 shallow marsh credits. The balance of credits approved only for use on non-Federal projects currently stands at 0.9063 consisting of 0.3825 shallow marsh credits and 0.5238 upland buffer credits. The bank is identified as a combination public/private bank.

6.3.7 Sygulla Bank (Non-Federal)

The Sygulla bank is a 4.5-acre site located in the South Branch Sunrise River subwatershed in Anoka County. The initial and only, release of credits occurred in 1995 and consisted of a total of 0.1312 fresh (wet) meadow credits. Those credits were withdrawn with one transaction in 1997 and the bank has been considered closed since that time.

Currently, the private commercial banks located within the Sunrise River watershed have an available balance of 16.6 credits with 5.7 of these credits having been approved for use to offset impacts under the Section 404 program (see Figure 1 below).[2] The Section 404 eligible credits are comprised almost exclusively of fresh (wet) meadow and shallow marsh credits from the Goertz bank. Of the 10.9 credits that are approved only for use in the state regulatory program, over 90% of this balance (8.6 credits) is made up of shrub-carr or alder thicket type credits from the Duane Palme bank. The remaining credits available for purchase are concentrated primarily in the Goertz and Palme banks since no other bank in the watershed has an outstanding credit balance greater than one.

Figure 1
Sunrise River Watershed
Private Commercial Mitigation Banks
Amount of Available Credits By Type



6.4 Pending Mitigation Banks

The District is currently involved in the review of one mitigation bank proposal in the Sunrise River watershed. The site, identified as the Strandlund Phase I Wetland Bank is located in Sections 29 and 32, T. 34N., R. 22W., Anoka County. The site is located in the West Branch Sunrise River subwatershed and drains via a ditch to Typo Creek and eventually the West Branch Sunrise River. On July 22, 2011 the District transmitted the draft Mitigation Bank Instrument to the sponsor for

[2] All of the credits identified in this report have been approved for use under the State of Minnesota Wetland Conservation Act.

signature. As of September 1, 2011 the sponsor had not returned a signed copy and the proposed bank site remained in a pending status.[3]

The proposed bank site consists of 0.56 acre of wooded upland and 6.66 acres of cropland. The cropland area of the site is considered drained wetland and has been in agricultural production since the 1950s. The bank sponsor proposes to restore 6.6 acres of wetland consisting of 6.21 acres of fresh wet meadow and 0.45 acres of shallow marsh by removing surface soils to groundwater levels. Approximately 0.56 acre of upland buffer would also be restored along the western edge of the site. Based on the preliminary analysis completed by the District, the proposed bank would generate 6.80 credits consisting of: 6.21 credits of fresh wet meadow, 0.45 credits of shallow marsh, and 0.14 credits of upland buffer.

6.5 Mitigation Banking Alternatives

The mitigation banking alternative is difficult to complete given the lack of previous sections.

6.6 Mitigation Bank Demand Plan

As the Mitigation Bank Demand Plan necessarily must rely on the Mitigation Bank Demand Analysis which was note provided, no Mitigation Bank Demand Plan is able to be provided.

7.0 Summary

There are too many missing sections to reasonably summarize the report.

[3] The bank plan was approved by Linwood Township, the Local Government Unit under the Minnesota Wetland Conservation Act, on February 24, 2011.

8.0 Bibliography

Chisago County, MN, 2006. Chisago County Local Water Management Plan, 2006-2011

Delaney, B.C., Nordquist, G.E. 1995. Minnesota's St. Croix River Valley and the Anoka Sandplain: A Guide to Native Habitats. University of Minnesota Press.

Galatowitsch, S.M. 1990. Using the original land survey notes to reconstruct presettlement landscapes in the American west. Great Basin Naturalist 50(2): 181-191.

Lentz, D. L., ed 2000. Imperfect balance: landscape transformations in the Precolumbian Americas. New York: Columbia University Press. pp. xviii-xix

Minnesota Dept of Employment and Economic Development, 2008. *Chisago County Labor Market Profile*. Prepared with Cameron Macht. http://chisagocounty.org/pdf-files/07-08ChisagoCoLaborProfile.pdf

University of Minnesota, 2007, Raster-based land cover data set. Derived from 30 meter resolution Thematic Mapper satellite imagery covering parts of Minnesota and Wisconsin. Remote Sensing and Geospatial Analysis Laboratory.

U.S. Census Bureau, 2010, Website: http://www.census.gov/

USGS, 2003. National Land Cover Database Zone 41 Land Cover Layer, Edition 1.0, http://www.mrlc.gov

Zielinski, J, 2002. *Watershed Vulnerability Analysis*. Center for Watershed Protection, January 2002