SECTION 3: ISSUES IDENTIFICATION

3.0 Introduction

This section identifies and describes issues facing the Vermillion River Watershed (Watershed). These issues were identified through the resource inventories described in Sections 1 and 2, past studies, and workshops and public meetings held during preparation of the draft plan by the former watershed organization. Planning workshops held in 1998, and more recently in 2003 and 2004 with local and State agencies were also instrumental in identifying issues. Issues listed are fairly comprehensive because of the multiple mechanisms used to solicit input.

The intent of this section is to describe and define issues so that the Joint Powers Board and Watershed Planning Commission can make informed choices. Numerous organizations are responsible for management of water within the Watershed, not just the Joint Powers Board. Responsibilities in terms of goals and objectives, priorities, and implementation strategies selected by the Joint Powers Board for addressing the issues are presented in Sections 4 and 5.

Significant issues are listed below. Undoubtedly, there are additional issues that have not yet surfaced. New issues can be added and discussed at monthly Watershed Planning Commission and Joint Powers Board meetings as part of the on-going Watershed management process.

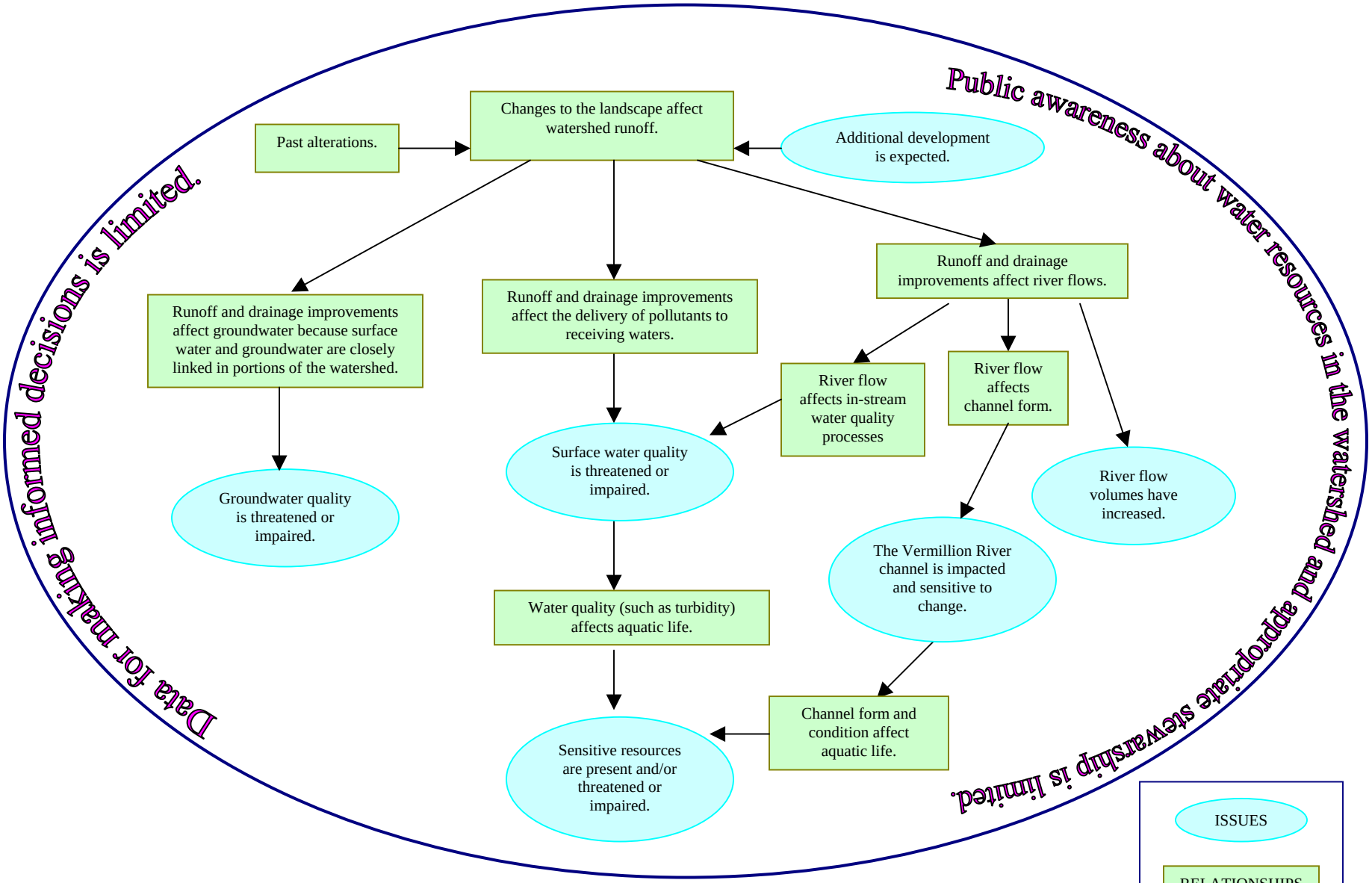
3.1 Issues

The primary issues identified include:

3.1.1 River flow volumes have increased
3.1.2 Surface water quality is threatened or impaired
3.1.3 Vermillion River channel/corridor is impacted and sensitive to change
3.1.4 Sensitive resources are present and/or threatened or impaired
3.1.5 Groundwater quality is threatened or impaired
3.1.6 Additional development is expected
3.1.7 Data for making informed decisions is limited
3.1.8 Public awareness about water resources in the Watershed and appropriate stewardship is limited.

A discussion of each issue is presented here. Many of the issues are interrelated. The most notable interrelationship is the hydrology of the Vermillion River (River) and the potential changes associated with anticipated urban development. The interrelationships are complicated; however, it is important to understand the basic relationships presented in Figure 3-1.

Figure 3.1. Vermillion River Watershed Conceptual Issues Model*



**This model is intended to be conceptual and describes only basic relationships.*

It is also important to understand that current impacts and impairments identified in the issues are a reflection of past and current activities in the watershed. These past activities include agriculture, urbanization and wastewater management. As the Watershed changes in the future, it is anticipated that agricultural land will be converted to urban land uses. Thus, much of the following discussion focuses on the issues associated with this change. However, agriculture will continue to be a significant land use in the Watershed and must play a role in managing current impacts and impairments.

3.1.1 Issue: River Flow Volumes Have Increased

As discussed in Section 2, increases in River flows have been documented by:

- The 1998 U.S. Army Corps of Engineers (COE) study,
- The 2000 draft Watershed Management Plan, and
- The 2002 Vermillion River Volume Study conducted by Montgomery Watson Harza.

Downstream residents have also expressed concern about this issue. The challenge regarding this issue is in assessing the causes of the increased flow. As discussed in Section 2, the increased flow is likely caused by a combination of factors, including: increased precipitation, agricultural drainage practices, runoff from urban development, and expanded wastewater treatment plant discharges. In the future, additional development is expected in the Watershed; however, wastewater discharge will be decreasing. Hydrologic modeling completed by the COE, and modeling completed for the 2000 draft plan, and the Volume Study all showed that peak flows and volumes will increase if this development is completed without adequate stormwater management.

These same studies assessed various stormwater management strategies. Hydrologic modeling completed for the 2000 draft plan assessed ways of controlling increases in peak flood levels (i.e., 100-year storm), while the 2002 Volume Study assessed mechanisms for controlling flow volume increases for a number of storm sizes. In addition, with implementation of the Metropolitan Council Environmental Services Master Plan for the Empire Wastewater Treatment Plant (WWTP), approximately 25 acre-feet/day of discharge will be removed from the River. However, it is anticipated that discharge from the Elko/New Market Wastewater Facility will increase in the near future. The results of these efforts and studies show that it is possible to prevent further increases, and, to some extent, decrease overall flow volumes.

3.1.2 Issue: Surface Water Quality is Threatened or Impaired

Portions of the Vermillion River (River) and two lakes in the Watershed are on the Minnesota Pollution Control Agency (MCPA) 303(d) list of impaired waters, including:

- The Vermillion River, from the headwaters to Hastings, is impaired for aquatic recreation due to excessive fecal coliform bacteria. Although the River is impaired, citizens use the River for recreational purposes such as wading, swimming, kayaking and canoeing. (This is an issue because it brings them in direct contact with contaminated water.)
- The Vermillion River, from Hastings to Red Wing, is impaired for aquatic life due to turbidity (cloudiness), and excessive PCBs and mercury.
- Long Lake is impaired for aquatic recreation due to excessive nutrients.
- Farquar Lake is impaired for aquatic recreation due to excessive nutrients.
- Lake Marion is impaired for aquatic consumption due to mercury.
- Alimagnet Lake is impaired for aquatic recreation due to excessive nutrients.

For each of these impairments, a total maximum daily load (TMDL) study is required. TMDLs are a process by which the sources of the pollutant are studied and allowable loads are calculated and allocated to each source so that the waterbody will meet its intended use (e.g., swimming). The MPCA is responsible for completing TMDLs. It is unclear who is responsible for implementing the daily load reductions resulting from the TMDLs. As discussed in Section 2, the fecal coliform bacteria study, which became a part of a regional fecal coliform bacteria TMDL, is complete; the turbidity TMDL is underway. The Joint Powers Board will need to determine the watershed organization's role in TMDL studies and implementation.

In addition to the existing impaired waters, water quality is threatened by runoff from expected new development. Some of this threat may be offset by improvements expected following removal of the Empire WWTP discharge from the River. It is expected that phosphorus and nitrate concentrations in the River below the WWTP will decrease. However, impacts of runoff on River temperatures affects aquatic life, particularly trout, which is an important local issue associated with urban development.

High concentrations of nitrate in the Vermillion River and other surface waters are a concern because surface water interacts with groundwater in the Watershed. High nitrate levels in drinking water are already an issue (see Section 3.1.5).

3.1.3 Issue: The Vermillion River channel/corridor is impacted and sensitive to disturbance

The 1999 Vermillion River Assessment found numerous streambank and channel stability problems, and that the stream types along the Main Branch are very sensitive to disturbance, providing high sediment supplies and having a very high potential for streambank erosion. For the stream types found, the quality and type of riparian vegetation has a significant controlling influence on bank erosion. Along the River, much of the streamside vegetation has been altered and converted to non-native grass. Non-native grasses do not have the rooting depth and density necessary to stabilize unconsolidated streambank soils. This susceptibility to change, along with riparian community alterations and changes in flow volume and duration, has contributed to channel instability.

There is also channel instability along the tributaries to the Main Branch, particularly gully erosion along the bluff at the eastern end of the Watershed.

3.1.4 Issue: Sensitive resources are present and/or are impaired

Section 1 identified a number of sensitive habitats and communities in the Watershed, including designated trout stream areas, natural communities, rare species, and wetlands. The designated trout stream area was recently expanded and trout populations appear to be good. Trout may be threatened, however, by anticipated urban development, if the development is not completed with appropriate, protective stormwater management mechanisms. Other sensitive resources, such as natural communities, rare species, and wetlands, have been largely depleted or have been substantially altered throughout the Watershed. The 1999 Dakota County 2020 Comprehensive Plan estimates that 80% to 90% of the original wetlands in the County have been drained or filled, and that only 2% or 9,400 acres of ruminant natural communities remain in the County. The largest natural community still in existence is the 3,000-acre floodplain forest along the Mississippi River in Ravenna Township called the Vermillion River Bottoms. Rare plants are generally associated with the remaining natural prairie and forest communities. Rare species of animals are scattered throughout the Watershed, including the Loggerhead Shrike, which makes its home in the central portion of the Watershed in Dakota County.

3.1.5 Issue: Groundwater quality is threatened or impaired

Cities and residents throughout the Watershed derive their drinking water from groundwater. High nitrates have been documented in groundwater and wells in the eastern portions of the Watershed near the City of Hastings. The results from one study of private drinking water wells found that more than half the wells had high nitrate levels (see Section 2 for additional detail):

- 26% exceeded the drinking water standard for nitrate of 10 mg/L (milligrams per liter);
- Another 26% were in the “elevated” range of 3 to 10 mg/L; and
- All City of Hastings municipal wells were below the drinking water standard, but ranged from 2.1 mg/L to 8.5 mg/L.

Additionally, the Minnesota Department of Health (MDH) closed Hastings Municipal Well #6 for several weeks in May 1999 after samples contained average nitrate levels of 10.5 mg/L.

Surface water interacts with groundwater in the Watershed. However, because of the complicated geology, high sensitivity to groundwater contamination, linkages between land use practices and groundwater contamination, and lack of sufficient monitoring data; impacts of this interaction are not fully understood. Evidence from the studies discussed in Section 2 suggests that:

- Irrigated agriculture, and to a lesser extent non-sewered development, could be contributing to nitrates in groundwater.

- High sensitivity to groundwater contamination conditions enhance the lower Watershed's susceptibility to nitrates from irrigated agriculture.
- Interactions between surface and groundwater vary along the upper and lower sections of the Watershed. Cold-water inputs to the River help maintain temperatures suitable for brown trout.
- Complicated geology (bedrock rift valley) requires detailed monitoring in order to understand groundwater contributions and losses, and water quality processes.

The high sensitivity of groundwater to contamination and the known interaction between the Vermillion River and groundwater, in combination with additional development expected in the Watershed, means that groundwater could be threatened not only by nitrates but by other pollutants as well. A study by the MPCA (Nitrate in Minnesota Groundwater: A GWMAP Perspective, September 1998) found that nitrate levels in groundwater under agricultural lands was higher than groundwater under non-developed lands, but also that development was correlated with elevated groundwater nitrate levels in sewered and non-sewered areas. Urban development also introduces other pollutants. Areas of high sensitivity to groundwater contamination may not be suitable for stormwater management practices that use infiltration, especially in municipal well recharge/wellhead protection areas. Industrial and vehicle fueling facilities are examples of land uses that could pose significant potential hazards to groundwater protection in high sensitivity areas.

3.1.6 Issue: Additional development is expected

As discussed in Section 1, additional development in the Watershed is expected, including: residential, commercial and industrial buildings and facilities; additional groundwater supply use; additional aggregate mining; additional wastewater; and increased recreational needs. These are discussed separately in the following text.

Additional residential, commercial and industrial buildings and facilities. Development significantly changes local surface drainage patterns. Impervious surface covers soils that would otherwise infiltrate water, and natural drainage ways are replaced with storm sewers, paved channels, ditches, and other artificial drainage devices. Impervious surfaces and artificial drainage increase the volume and accelerate the rate of surface runoff reaching receiving waters. The effects of higher runoff volumes and rates on water resources are higher flows, flooding, erosion, and adverse impacts on aquatic habitats (Figure 3-1).

In addition to changing the hydrology in an area, development also increases the potential for pollution of water resources. Because the human population is concentrated, more materials are manufactured, consumed, and disposed of in developed areas. Not only is the number of possible pollutants increased, but also the opportunities for them to be released into the environment. Large quantities of wastewater and solid waste are generated in developed areas that must be treated and/or disposed. Construction sites

disturb land and can result in substantial erosion. Erosion rates can be 20,000 to 40,000 times higher at construction sites than vegetated areas. After construction, impervious surfaces are likely places for the deposition of contaminants from vehicles, industry, lawn care, pets, sediment, organic litter (e.g., grass clippings), and trash. These contaminants are more likely to reach water resources because there is more surface runoff to transport pollutants and there are fewer natural filtration systems (like vegetation and wetlands) to remove pollutants.

Additional Groundwater Use. Urban and rural areas in the Watershed use water from local aquifers to supply residents and businesses. A majority of the land use in the Watershed is agricultural in nature and will remain so into the 2020s. For some of this agricultural land, high-capacity irrigation wells withdraw a total annual average of 3.3 billion gallons of water from local aquifers (see Section 2, Water Resources, for more information).

Although there are over five times the number of high-capacity agricultural irrigation wells, the average municipal supply well pumps over ten times more water per year than the average irrigation well, at over twenty times the rate. Annually, municipal supply wells withdraw an average of 3.5 billion gallons of water from groundwater resources. Although this is comparable to the amount of water withdrawn for irrigation (3.3 billion gallons), urbanized areas generally have a greater water demand per capita than rural areas. As urban areas and population continue to expand, the demand on local groundwater resources will also continue to increase. The consumption of groundwater that occurs in urban areas can lead to several water quantity problems, some of which were discussed under the previous heading.

Additional Aggregate Mining. As discussed in Section 2, there are excellent natural aggregate deposits of sand, gravel, and bedrock – a valuable natural resource – within the Watershed. Mining of these materials can often occur down to a level at or below the water table. Water levels within mines and quarries can be directly linked to the groundwater system. In some cases, in order to remove water so mining can continue, de-watering methods are used to lower the water table in and around the mine. By lowering the natural water table, vegetation and nearby wetland habitats can be impacted. For the Vermillion River, dewatering could potentially diminish groundwater discharges to the River that supply cold water necessary for trout.

Additional Wastewater. Additional development means increased wastewater. The Metropolitan Council recently completed a facility plan for the Empire WWTP that will eliminate wastewater discharges from that facility to the Vermillion River in 2007 or 2008. However, growth in the Elko/New Market area is expected and there are plans to upgrade and expand the Elko/New Market plant, which may include temporarily increasing discharge to the Vermillion River. The Metropolitan Council is preparing an interceptor plan for the Elko/New Market plant that will eliminate discharge from the plant by 2010.

Increased Recreational Needs. The landscape and water resources of the Watershed provide important recreational value. With increasing development and population in the Watershed, demand for water-based recreation will increase. According to MDNR

information, there is inadequate public access to public water resources, such as the Vermillion river and its tributaries, Farquar Lake, Long Lake and Lake Alimagnet, to meet the current and future recreational demand. Public input while preparing the 2000 draft watershed management plan revealed an interest in being able to canoe the Vermillion River, and a desire for more public access to the River.

3.1.7 Issue: Data for making informed decisions is limited

The hydrology and issues facing the Watershed are complicated and interrelated. Good information of recent origin is necessary for making informed decisions. Although, there is much information on the Watershed (see Sections 1 and 2), and a number of recent studies, additional information is needed to reduce uncertainty and to track effective management efforts to support adaptive management. Specific data collection needs and some of the on-going/new efforts include:

- The need for a better understanding of surface water and groundwater interactions. This began with Phase 1 of the Hastings Area Nitrate Study (HANS); Phase 2 began in 2005.
- Determining the location of groundwater recharge areas and their interrelationship with surface water is necessary to protect the cold-water fishery, maintain stream base-flows, improve water quality, and protect the ecological integrity of the Vermillion River. Stormwater management, greenway planning, and development are intertwined. The *Vermillion River Headwaters Groundwater Recharge Area Inventory* will provide the real-world information and guidance necessary to protect surficial groundwater resources and cold-water fisheries.
- The need for a better understanding of the magnitude of sources of water within the Watershed. This began with the existing river gauge network; however, additional years of data are needed before definitive conclusions can be made.
- The need for a better understanding of turbidity, mercury and PCB impairments of the River. Current data is sufficient to identify impairment, but not to diagnose the causes and the water quality mechanisms involved. The MPCA is starting to collect additional information on turbidity and PCBs in 2004.
- The need for a better understanding of the “thermal quality” of the River and the impact of land disturbing activities and other actions on River temperature. Thermal monitoring is underway and past data is available, but more data is needed to predict the impacts of watershed changes on River temperature.
- The need to track the effectiveness of implementing the recommendations of the Vermillion River Fecal Coliform TMDL Study.
- The need to periodically assess the health of aquatic communities and sensitive biological resources. The Vermillion River Watch, the Wetland Health Evaluation Project and the MnDNR frequently complete biological monitoring efforts.
- The need for on-going surface and groundwater monitoring to identify trends and problems before they become severe, and to track overall effectiveness of management efforts so they can be adapted and improved. As discussed in Section 2, the Joint Powers Organization currently has a water quality monitoring program operated in conjunction with the gauge network. However,

it is anticipated that Metropolitan Council Environmental Services monitoring efforts will be scaled back once the Empire WWTP discharge is removed.

3.1.8 Issue: Public awareness about water resources in the Watershed and appropriate stewardship is limited

Public awareness of Watershed issues has increased significantly in recent years. The efforts of the Dakota County Soil and Water Conservation District, University of Minnesota Extension Service – Dakota County, Friends of the Mississippi River, the Minnesota Department of Natural Resources, and the Metropolitan Council have increased awareness. However, many residents and local officials, with responsibility for land use decisions, remain unaware that they live in the Vermillion River Watershed, and that what they do on the landscape affects water quality and flow in the River. Many residents are also unaware of the existence of the Vermillion River Watershed Joint Powers Organization (VRWJPO), and the Joint Powers Board's authority, responsibilities and roles.

Summary

Eight primary issues are identified for the Vermillion River Watershed. These issues are interrelated, as shown in simple form in Figure 3-1. The VRWJPO goals, objectives and priorities, with respect to these issues, are discussed in Sections 4 and 5.