7.0 Kelles Coulee Subwatershed

7.1 Location and General Description

The Kelles Coulee Watershed is within the Lower St. Croix Watershed Management Organization, which had recently been incorporated into the enlarged Lower St. Croix Valley Watershed District (formerly Valley Branch Watershed District). This subwatershed is located in Sections 21, 22, 27, 28, and 29 with small areas within Sections 15, 32, and 33. Kelles Coulee flows into the St. Croix River in Section 23. **(See Figure 1)** The coulee channel commences as an intermittent channel in the south half of Section 28, then flows north and continues east into the St. Croix River a distance of approximately 16,100 feet (3.1 miles). The perennial reach of the channel begins in the Southeast quarter, of the southeast quarter, of Section 21 It has a approximate length of 9200 feet (1.7 miles). The approximate elevation at the Start of the Kelles Coulee main channel is 900, with an outlet elevation into the St. Croix River of approximately elevation 680.

Kelles Coulee is identified as a DNR- protected waterbody for the outlet into the St. Croix River to its intersection with Trading Post Trail, approximately at the center of Section 28. No other DNR-protected waterbodies are identified within this subwatershed.
Unlike the other riverine drainage systems within Afton (Valley Creek and Trout Brook), Kelles Coulee contains only one central drainage channel. Additional drainage from this subwatershed is provided by several intermittent streams (gullies). Kelles Coulee watershed, due to it single main drainage channel, was identified as one subwatershed. This subwatershed has a drainage area of approximately 2350 acres.
The lower watershed is characterized by woodlot landcover, with the upper watershed transitioning into agriculture landuse.

7.2 Landscape Units

The Kelles Coulee subwatershed is mapped with several significant landscape units. These Landscape Units include all or significant portions of 20-26. Further description and analysis is contained in the landscape portion of the NRI report.

7.3 Water Quality Management Goals

Specific water quality management goals for the Kelles Coulee subwatershed have not been established by the LSCWMO. Due to its drainage into the St. Croix River, the Kelles Coulee subwatershed receives a water quality ranking of high. **(See figure 2)**
General water quality goals, from the LSCWMO Plan which apply to Kelles Coulee include;

- Protecting of the existing natural drainage system.
- Managing gully erosion along tributaries that outlet directly into the St. Croix River is a priority.
- Maintaining water quality through the treatment or control of surface runoff.
- Maintaining or improving the quality of runoff waters from agricultural lands.
- Preventing flooding and erosion from surface runoff

- Controlling erosion and sedimentation on construction sites, agricultural lands, and along streambanks, lakeshores and roadsides.
- Utilizing wetlands for the treatment of stormwater runoff.
- Identifying and managing contributions from non point source pollution, (priorities are identified as; sediment, nutrients, fecal coliforms, and pesticides)

No water quality monitoring has been done within the Kelles Coulee subwatershed.
Appendix A contains additional information regarding the categorization of waterbodies, and general information on the evaluation of water quality management.

7.4 Groundwater Recharge/Infiltration/Permeability

The Kelles Coulee subwatershed is composed of a majority of moderate groundwater sensitivity ranking with small pockets of low sensitivity ranking. **(See Figure 3)** A noteworthy observation is that the Coulee floodplain area has a low ranking which is the lowest area in the landscape position. This means as water runoff occurs downstream, the less likely infiltration will occur. This is in contrast to the Valley Creek Subwatershed, where much of the higher infiltration is lower in the landscape position.

7.4 Erosion Index Ranking

The Kelles Coulee subwatershed receives a severe erosion potential ranking with an EI value of 19.98. This value is the highest of any subwatershed within Afton. This severe ranking is evident by the steep topography, including escarpments, and concentration of drainage features. **(See figure 6g)**

7.6 Natural Resource Inventory Results

The Kelles Coulee Natural Resource Inventory, completed by the Washington Soil and Water Conservation District (SWCD) gathered the above information in the spring of 2001. All information was gathered by utilizing Global Positioning System (GPS) Technology, and compiled and formatted using Geographic Information System (GIS) Technology.
The purpose of this report is to further describe the features inventoried, identification of feature criteria, the significance of inventorying these features, and general discussion of findings.
See figures 7b1-7b7 which illustrate natural resource feature mapped.

Kelles Coulee Natural Resource Inventory Components					
Feature Inventoried	**Feature Type**	**Additional Inventory Information**	**Number of Features Mapped**	**Why Feature Was Mapped**	**Discussion**
Centerline Stream	line	percent canopy, riparian Landuse	NA	Identification of where stream is located, determine amount of tree/shrub cover, identify what is adjacent to the stream	This data can be used and compared as future site visits occur. Canopy can affect such things as stream temperature and vegetative growth in and along the stream. What is done along the stream impacts the stream itself.
Sediment Delivery	line	type, severity index	29	Identification of where sediment could be entering the creek, and therefore identify areas which may need to be addressed	In the US, sediment is the biggest polluter by volume. Sediment can impact water quality, habitat, and carry nutrients, and other chemicals.
Sediment-ation Site	area	Depression Area Type	5	Identification of areas where sediment from a sediment delivery site may settle before entering the creek	This data identifies and can be analyzed as to the amount of sediment that is treated. May be areas where future sediment treatment facilities are located.
Stream Width	point	number	5	Identification of stream characteristics	Data can be used in stream classification & stream flow analysis.
Streambank erosion	point	condition, size	37	Identification of areas where stream is unstable, and there is an opportunity for remediation	These areas identify where streambank stabilization is warranted and should undergo further analysis.
Plant Population	point	size, type	NA	Identification where significant plant populations exist	Plant populations may impact habitat, relate to sedimentation and nutrients.
Human-Made	point	type, extent/feature	76	Identifications of structures in and along creek	These structures may impact stream flow, habitat, water quantity and quality.
Sediment Sample Point	point	Number	NA	Locate sample collection point which will be analyzed	Coordinated with SCWRS for identification of sample location and numbers.
Tree Downfalls	point	none	70	Identification of where trees impede stream flow, and could provide habitat	May impact streamflow, streambank erosion, habitat
Seeps	point	none	16	Identification where groundwater may be discharging	May provide base flow & other inputs
Springs	point	none	0	Identification where groundwater is discharging	May provide baseflow & other inputs
		Total	**238**		

Centerline of Stream: This feature was mapped from the confluence of Kelles Coulee and the St. Croix River, to the origin of the stream channel in Section 28. The centerline of stream feature was mapped until approximately the end of the perennial portion of the stream, and upstream of this was identifies as sediment delivery site. In some cases the stream becomes braided. The Kelles Coulee

floodplain is very large and defined. The channel which appeared to be the most defined was mapped. This channel represents the low flow channel. The **percent canopy** was high over much of the stream, with only the upper most reaching having an open canopy. The **riparian landuse** was conspicuously undisturbed throughout most of the stream channel. The exceptions were at the beginning and end of the stream channel.

Sediment Delivery Site: This feature was mapped as a continuation of the main branch, and all intermittent channels which outlet into the main channel. All of the sediment delivery **types** which outletted into the main channel were mapped as gullies, while the terminus of the channel were waterways within agricultural area. The majority of the sediment delivery sites were mapped with a **severity index** of having slight erosion, although gullies with severe erosion are present. Several gullies along the south bluffline, within the Valliswood Subdivision have obtained a slight erosion ranking, due to erosion control structures being constructed.

Sedimentation Sites identified areas where soil deposition was evident or would likely occur. The majority of these areas within the Kelles Coulee subwatershed are ponding **(type)** areas. A couple of these are hydrologically linked with the main channel. Several of these are ponds created along with the gully control structures within the Valliswood subdivision. Not mapped as a sedimentation area, but a significant sedimentation area, is the Kelles Coulee floodplain itself. It is difficult to account for the amount of sediment treatment achieved by the floodplain. To assist in determining the likelihood of this, the flow paths of the sediment delivery areas were followed as far is they could be determined to the intersection with the main channel. The greater the distance the flow pattern terminated from the main channel, the greater the likelihood sediment treatment is occurring.

Stream Width: Stream widths were measured at points along the perennial Kelles Coulee The width of the stream was measured at bankfull, which is higher than the low or baseflow water level, and the water level during the mapping period. This feature was mapped to provide some base information regarding stream characteristics. Limited stream width values were recorded for the Kelles Coulee channel.

Streambank Erosion: Streambank erosion was observed and mapped along perennial and intermittent reaches of Kelles Coulee. Frequency and severity **(condition and size)** of erosion tended to increase the further downstream the Kelles Coulee channel. It was also observed that areas of severe erosion occurred where there was a convergence of a sediment delivery area with the main channel. In these cases the erosion tended to be channel head cutting. Erosion tended to occur in channel meanders.

Plant Populations were not mapped within the Kelles Coulee Subwatershed

Human-Made Features were mapped along all areas of the Valley Creek Sub-watershed. It is noteworthy that, likely due to the difficulty in access because of the steep escarpments, that man-made feature were few within the main channel of Kelles Coulee.

Sediment Sample Points were not mapped within the Kelles Coulee Watershed

Tree Downfalls: were mapped within the perennial Valley Creek, though on a limited basis. This is due to the nonexistence of trout to create a habitat concern.

Seeps were found within the perennial portion of Kelles Coulee, and also several sediment delivery areas along the main channel.

Springs were not found within the Kelles Coulee subwatershed.

8.0 Swede Hill Subwatershed

8.1 Location and General Description

The Swede Hill Creek Watershed is within the Lower St. Croix Watershed Management Organization, which had recently been incorporated into the enlarged Lower St. Croix Valley Watershed District (formerly Valley Branch Watershed District). This subwatershed is located of Sections 26, 27, 34, and 35 and flows to the east into the St. Croix River **(See Figure 1).** Drainage from this subwatershed is provided by several intermittent streams (gullies). Swede Hollow watershed has a watershed of approximately 840 acres.

8.2 Landscape Units

The Swede Hill subwatershed is mapped as one Landscape Unit, identified as 24. Afton State Park is located within the Swede Hill Watershed which is an unmapped Landscape Unit. Further description and analysis is contained in the landscape portion of the NRI report.

8.3 Water Quality Management Goals

Specific water quality management goals for the Swede Hill subwatershed have not been established by the LSCWMO. Due to its drainage into the St. Croix River, the Swede Hill subwatershed receives a water quality ranking of high. **(See figure 2)** The LSCWMO plan identifies gully erosion along tributaries that outlet directly into the St. Croix River to be a priority concern. Contributions from non point source pollution, (identified in order of priority to be, sediment, nutrients, fecal coliforms, and pesticides) was determined to be the most significant water quality concern.
The LSCWMO water management plan identifies the protection of existing natural drainage system a goal.
No water quality monitoring has been done within the LSCWMO.

8.4 Groundwater Recharge/Infiltration/Permeability

The Swede Hill subwatershed is composed of a majority of moderate groundwater sensitivity ranking. Small pockets of low sensitivity ranking are present which roughly parallels the St. Croix River, and tributary drainage. **(See Figure 3)** No trends are evident for this subwatershed.

8.5 Erosion Index Ranking

The Swede Hill subwatershed receives a severe erosion potential ranking with an EI value of 15.84. This value is the second highest of any subwatershed within Afton. This severe ranking is evident by the steep topography and concentration of drainage features. **(See figure 6h)**

9.0 Trout Brook Subwatershed

9.1 Location and General Description

The Trout Brook Watershed is within the Lower St. Croix Watershed Management Organization, which had recently been incorporated into the enlarged Lower St. Croix Valley Watershed District (formerly Valley Branch Watershed District). This subwatershed is located in Sections 31, 32, 33, 34, 35 with small areas within Sections 30 and 27. Much of the Trout Brook watershed, as well as the main channel and tributaries is located within Denmark Township. Trout Brook flows into the St. Croix River in Section 2 of Denmark Township. The Trout Brook channel commences as an intermittent channel at approximately the center of the Southeast quarter, of Section 30, then flows south approximately one mile, and continues east into the St. Croix River a distance of 20,700 feet (3.9 miles). The perennial reach of the channel begins in the SW1/4, SE1/4, Section 32 flowing for a distance of 14,000 feet (2.7 miles). The elevation at the start of Trout Brook is approximately 1000, with an outlet elevation into the St. Croix River of approximately elevation 680. **(See Figure 1)**

The Trout Brook Watershed is broken into four subwatershed, which are located in Afton and Denmark Township.

Trout Brook is identified as a DNR- protected waterbody for the outlet into the St. Croix River to its intersection with 50th Street, approximately at the north line of Section 31. One additional DNR protected waterbody (#82-483w is identified within this subwatershed in Section 5, Denmark Township. It appears this waterbody outlets into the main channel of Trout Brook approximately one mile away.

The Trout Brook watershed contains several significant drainage channels. The main channel starts within Aftón before meandering into Denmark Township approximately 2 miles downstream. It continues within Denmark Township for approximately a mile before reentering Afton. It continues within Afton for about one half mile before finally exiting Afton as the channel continues to the St. Croix River. Additional drainage from this subwatershed is provided by several intermittent streams (gullies). Trout Brook watershed, due to it multiple main drainage channels, was split into four subwatersheds. The Trout Brook watershed has a drainage area of approximately 5400 acres The lower watershed is characterized by woodlot landcover, with the upper watershed transitioning into agriculture Landuse.

9.2 Landscape Units

The Trout Brook subwatershed is mapped with several significant landscape units. All or a significant portion of Landscape Units 27-30 are located in this Subwatershed. Further description and analysis is contained in the landscape portion of the NRI report.

9.3 Water Quality Management Goals

Specific water quality management goals for the Trout Brook subwatershed have not been established by the LSCWMO. Due to it's drainage into the St. Croix River, the Kelles Coulee subwatershed receives a water quality ranking of high. **(See figure 2)**
General Water Quality Goals, from the LSCWMO Plan which apply to Trout Brook include;

- Protecting of the existing natural drainage system.
- Managing gully erosion along tributaries that outlet directly into the St. Croix River is a priority.
- Maintaining water quality through the treatment or control of surface runoff.
- Maintaining or improving the quality of runoff waters from agricultural lands.
- Preventing flooding and erosion from surface runoff
- Controlling erosion and sedimentation on construction sites, agricultural lands, and along streambanks, lakeshores and roadsides.
- Utilizing wetlands for the treatment of stormwater runoff.
- Identifying and managing contributions from non point source pollution, (priorities are identified as; sediment, nutrients, fecal coliforms, and pesticides)

No water quality monitoring has been done within the Trout Brook subwatershed.

9.4 Groundwater Recharge/Infiltration/Permeability

The Trout Brook subwatershed is composed of a majority of moderate groundwater sensitivity ranking with small pockets of low sensitivity ranking. A noteworthy observation is that the much of the main channel area and some adjacent intermittent channel areas have low rankings. These areas are the lower areas in the landscape position. This means as water runoff occurs downstream, infiltration is less likely to occur, and more runoff could occur. This is in contrast to the Valley Creek Subwatershed, where much of the higher infiltration is lower in the landscape position. **(See Figure 3)**

9.5 Erosion Index Ranking

The Trout Brook subwatershed receives a severe erosion potential ranking with an EI value of 14.27. Three of the four subwatershed receive a severe ranking with a the lowest ranking being in TRB3 with a value of 7.54 , and the highest being in TRB2 with a value of 18.99. This severe ranking is evident by the steep topography, including escarpments, and concentration of drainage features. In general the topography and soil erodibility go from lower to higher moving from west to east (downstream) in the watershed. **(See figure 6i1-6i4 and Table 2)**

9.6 Natural Resource Inventory Results

The Trout Brook Natural Resource Inventory, completed by the Washington Soil and Water Conservation District (SWCD) gathered the above information in the fall of 2000, and spring of 2001. All information was gathered by utilizing Global Positioning System (GPS) Technology, and compiled and formatted using Geographic Information System (GIS) Technology. To demonstrate the location of continuous water flow a small portion of the main channel was inventoried within Denmark Township. No other inventory information was gathered within Denmark Township.

The purpose of this report is to further describe the features inventoried, identification of feature criteria, the significance of inventorying these features, and general discussion of findings. **See figures 7c1-7c7 which illustrate NRI features mapped.**

Trout Brook Natural Resource Inventory Components					
Feature Inventoried	**Feature Type**	**Additional Inventory Information**	**Number of Features Mapped**	**Why Feature Was Mapped**	**Discussion**
Centerline Stream	line	percent canopy, riparian Landuse	NA	Identification of where stream is located, determine amount of tree/shrub cover, identify what is adjacent to the stream	This data can be used and compared as future site visits occur. Canopy can affect such things as stream temperature and vegetative growth in and along the stream. What is done along the stream impacts the stream itself.
Sediment Delivery	line	type, severity index	16	Identification of where sediment could be entering the creek, and therefore identify areas which may need to be addressed	In the US, sediment is the biggest polluter by volume. Sediment can impact water quality, habitat, and carry nutrients, and other chemicals.
Sediment-ation Site	area	Depression Area Type	17	Identification of areas where sediment from a sediment delivery site may settle before entering the creek	This data identifies and can be analyzed as to the amount of sediment that is treated. May be areas where future sediment treatment facilities are located.
Stream Width	point	number	43	Identification of stream characteristics	Data can be used in stream classification & stream flow analysis.
Streambank erosion	point	condition, size	25	Identification of areas where stream is unstable, and there is an opportunity for remediation	These areas identify where streambank stabilization is warranted and should undergo further analysis.
Plant Population	point	size, type	NA	Identification where significant plant populations exist	Plant populations may impact habitat, relate to sedimentation and nutrients.
Human-Made	point	type, extent/feature	167	Identifications of structures in and along creek	These structures may impact stream flow, habitat, water quantity and quality.
Sediment Sample Point	point	Number	NA	Locate sample collection point which will be analyzed	Coordinated with SCWRS for identification of sample location and numbers.
Tree Downfalls	point	none	81	Identification of where trees impede stream flow, and could provide habitat	May impact streamflow, streambank erosion, habitat
Seeps	point	none	28	Identification where groundwater may be discharging	May provide base flow & other inputs
Springs	point	none	0	Identification where groundwater is discharging	May provide baseflow & other inputs
		Total	**377**		

Centerline of Stream: This feature was mapped from approximately the intersection of the main channel with the City of Afton boundary at the south line of Section 34, to the origin of the perennial

stream channel in Section 32. The centerline of stream feature was mapped until approximately the end of the perennial portion of the stream, and upstream of this was identifies as sediment delivery site. The **percent canopy** tended to be high in the lower reaches, and opened within approximately the upper two thirds. The **riparian Landuse** was variable. The lower reach, within Afton State Park, contains intermittent undisturbed and trailways. Intermediate reaches contained current or evidence of recent pastureland. The upper reached is dominated by cropland.

Sediment Delivery Site: This feature was mapped as a continuation of the main branch, and all intermittent channels which outlet into the main channel. The sediment delivery areas **(type)** mapped in the lower reaches of the main channel were mapped as gullies, while the upper channel were waterways or nonerosive cropped within agricultural area. The majority of the sediment delivery sites were mapped as having **(severity index)** slight erosion, although gullies with severe erosion are present.

Sedimentation Site Sedimentation Areas identified areas where soil deposition was evident. The most significant **type** of sedimentation sites were ponding areas within the main channel. The largest of these is a man-made pond located in the southeast quarter of the southeast quarter of Section 32. Like the Kelles Coulee drainage area, some sedimentation areas were located at the start of sediment delivery areas.

Stream Width: Stream widths were measured at points along the perennial Trout Brook. The width of the stream was measured at bankfull, which is higher than the low or baseflow water level, and the water level during the mapping period. This feature was mapped to provide some base information regarding stream characteristics.

Streambank Erosion: Streambank erosion was observed and mapped along perennial and intermittent reaches of Trout Brook. Streambank erosion **condition and size** tended to be moderate.

Plant Populations were not mapped for the Trout Brook drainage channel

Human-Made features were mapped throughout the Trout Brook subwatershed. Human made feature were more prevalent than Kelles Coulee, but were more spread out than Valley Creek. In general, the human-made features found tended to be associated with the agricultural Landuse prevalent in this area, which the human-made features along Valley Creek were more indicative of the rural development present.

Sediment Sample Points were not collected in the Trout Brook subwatershed.

Tree Downfalls were mapped within the perennial Trout Brook if it made it difficult to walk the stream. Since identification of tree downfalls was not associated with trout habitat, it was not as high priority for mapping.

Seeps were predominately along perennial sections of Trout Brook.

Springs were not found within the Trout Brook subwatershed.