City of River Falls
North Kinnickinnic River Monitoring Project

2004 Summary

Project Background:

A unique feature dominating the landscape of the City of River Falls is the Kinnickinnic (Kinni) River, a Class I trout stream that flows through the center of town. Recognizing the unique character of the Kinnickinnic, River Falls has invested time and money in the river corridor for the future enjoyment of fishing enthusiasts, hikers, canoeists and kayakers. The river is one of the premier, naturally sustaining trout fisheries in the Midwest, primarily producing brown trout. The Kinni arises from a series of large springs three miles north of Interstate 94, then flows southwesterly for 23 miles before entering the St. Croix River. In the vicinity of River Falls, the river is broad and shallow, averaging 40 feet wide and a foot deep.

Over the years, numerous projects have been implemented to protect and improve the condition of the river. In 2002, the City adopted a new Storm Water Management Ordinance, which is designed to protect the Kinnickinnic River from the negative impacts of storm water runoff associated with new development. The ordinance requires developers of new homes and businesses to utilize best management practices (BMPs) that infiltrate storm water runoff from rain events of 1.5 inches or less. Examples of these infiltration BMPs are grass swales, rain gardens, and large-development scale networks of ponds and infiltration areas. In the pond network, a wet detention pond collects and holds the storm water runoff and settles out pollutants such as suspended solids and nutrients. The cleaner water from the wet pond is gradually channeled to an infiltration area, where it percolates through the soil to recharge the groundwater system.

The goal of the City of River Falls Storm Water Management Ordinance is to prevent degradation of the Kinnickinnic River due to the effects of changes in storm water runoff caused by new development. Key strategies that have been implemented to achieve this goal include:

- Controlling rates of storm water runoff from developing and redeveloping areas as a method of preventing downstream flooding;
- Controlling the amount of sediment and associated pollutants contained in storm water runoff from developing and redeveloping areas;
- Controlling the volume of storm water runoff leaving developing and redeveloping areas as a method of replicating pre development hydrology.

Successful implementation of these strategies should result in the following desirable outcomes:

- No downstream flooding attributable to storm water runoff from developing and redeveloping areas.
- No detectible change in the thermal regime of the Kinnickinnic River associated with storm water runoff from developing and redeveloping areas.

- No detectable increase in the amount of sediment and associated pollutants attributable to storm water runoff from developing and redeveloping areas.
- No reduction in groundwater recharge attributable to developing and redeveloping areas.
- No detectable reduction in the base flow of the Kinnickinnic River associated with storm water runoff from developing and redeveloping areas.
- No detrimental change in the Macroinvertebrate community of the Kinnickinnic River associated with storm water runoff from developing and redeveloping areas.
- No reduction in the Trout populations of the Kinnickinnic River associated with storm water runoff from developing and redeveloping areas.
- No detrimental change in Trout habitat in the Kinnickinnic River associated with storm water runoff from developing and redeveloping areas.

Project Scope:

There has been concern about how new development in River Falls may affect the Kinnickinnic River by an increase in storm water runoff (water quantity) and pollutants from lawns, cars, etc. (water quality). As the Kinnickinnic River is one of the best coldwater streams in the state, there is a great concern for maintaining the health and well-being of the river's aquatic community. In order to take an active role in measuring the river's health and well being, the City has implemented a monitoring program aimed at evaluating the effectiveness of the Storm Water Management Ordinance for preventing degradation of the Kinnickinnic River due to new City development.

The goals of the North Kinnickinnic River Monitoring Project are to:

- Identify the present condition of the Kinnickinnic River through a number of physical, chemical, and biological monitoring measures;
- To continually monitor the river during the build-out phase of new subdivisions such as Sterling Ponds;

To continue to study the impact of the increase in human population near the river after the developments are completed and built out. To help support the monitoring project, the City applied for a grant from the Wisconsin Department of Natural Resources (WDNR). Since the City did not receive supplementary WDNR funding for this project, the project scope has been limited to the essential monitoring work that can be supported with City funding. The current scope of work includes temperature monitoring, water quality monitoring, base flow surveys, and monitoring of macroinvertebrates. Temperature monitoring, water quality monitoring, and base flow surveys will be conducted by City staff, while macroinvertebrate monitoring will be conducted with assistance from the University of Wisconsin River Falls.

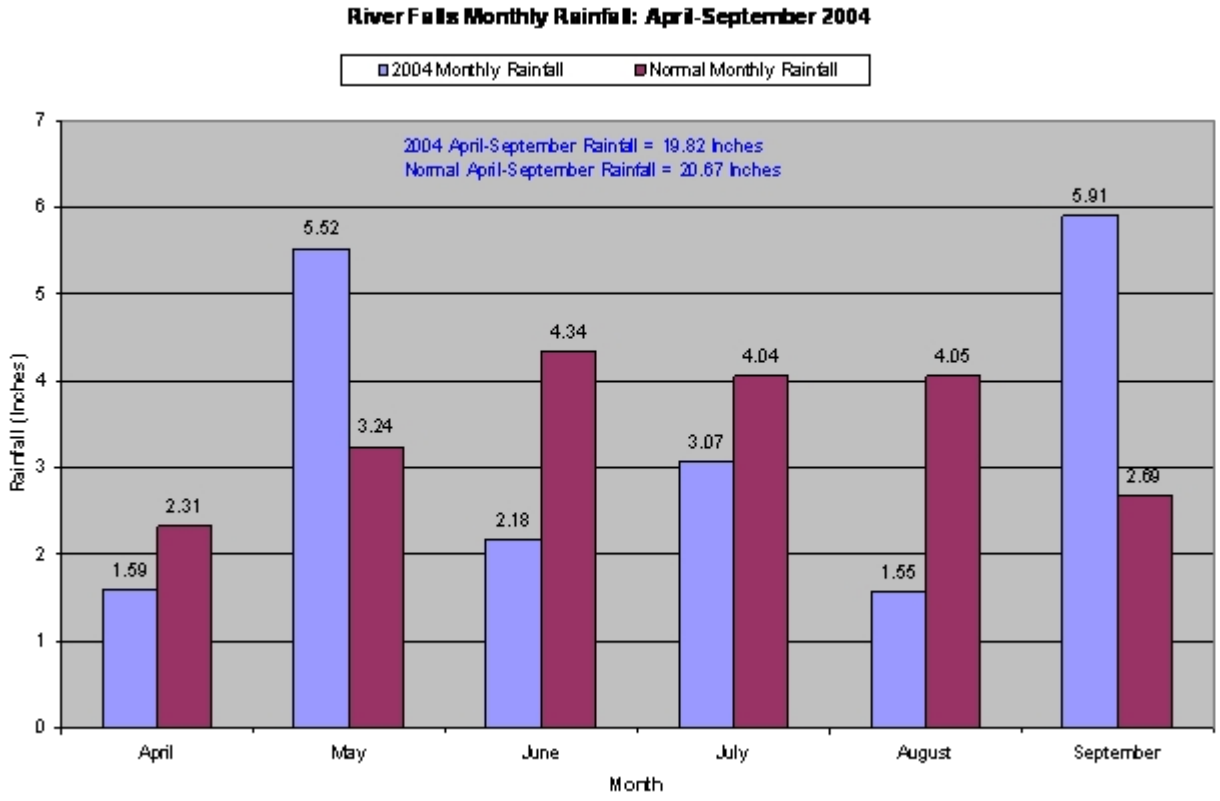
The City has retained Short Elliott Hendrickson (SEH) as a consultant to coordinate this monitoring project. The annual results of each of the four key monitoring components will be examined by SEH to determine if the new storm water ordinance appears to be to be protecting the Kinnickinnic River as new development occurs in the project area.

The North Kinnickinnic River Monitoring Project began in the spring of 2004, and the 2004 monitoring results are now available on the project website.

Precipitation:

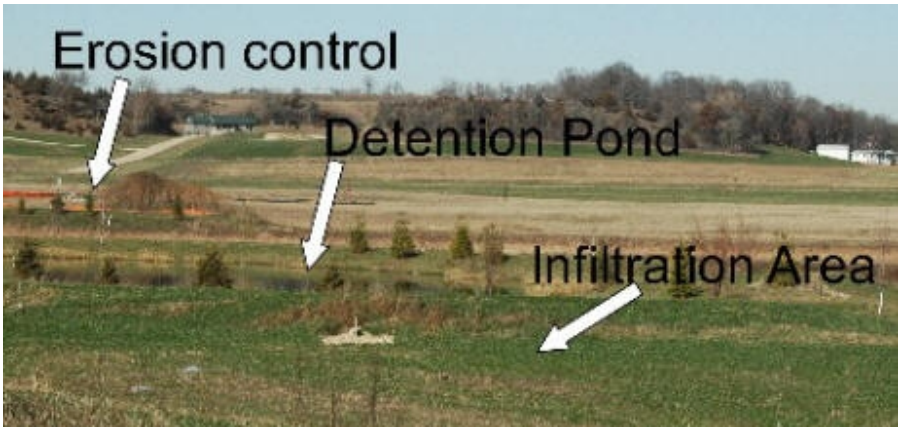
A total of 19.82 inches of precipitation was recorded in River Falls during the April-September 2004 period, compared to the normal total of 20.67 inches for this time period. Rain fell on 55 days, or 30% of the April-September 2004 period.

The months of April, June, July and August 2004 were drier than normal; whereas the months of May and September were wetter than normal. Nearly 60% of the total April-September rainfall occurred in May and September.



Infiltration:

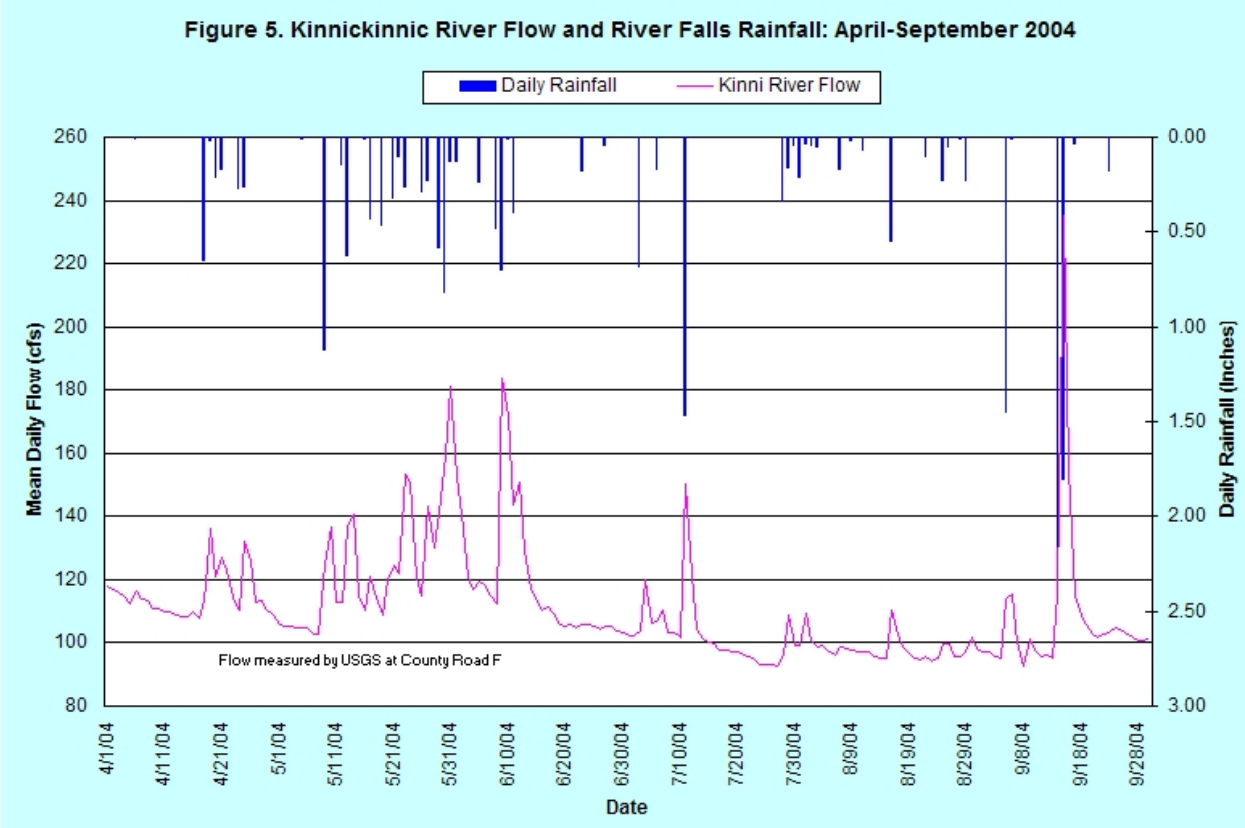
The City of River Falls Storm Water Management Ordinance, which requires infiltration of all storm water runoff from rain events of 1.5 inch or less, would have provided infiltration of 94% (18.58 inches) of the total rainfall (19.82 inches) that occurred during the April-September 2004 period.



Storm water best management practices in place at Sterling Ponds

Kinnickinnic River Flow:

The flow of the Kinnickinnic River is a reflection of precipitation and storm water runoff from predominantly agricultural and urban land uses throughout the 165-square mile Kinnickinnic River Watershed. The mean (average) daily flow of the Kinnickinnic River at County Highway F during the April-September 2004 period is presented in the figure below. Daily rainfall, as measured in River Falls, is also presented in the figure below.



Frequent rainfall in May and early June 2004 resulted in a series of 5 substantial runoff events, with peak flows ranging from 137-184 cubic feet per second (cfs). Drier conditions and below-normal rainfall prevailed in June, July, and August 2004. However, a 1.47-inch rainfall on July 11 produced a significant runoff event in mid-July, with a peak flow of 150 cfs. Back-to-back 2.44-inch and 1.80-inch rain events on September 14 and 15 produced the largest runoff event of the year, with a peak flow of 235 cfs and a 7-day duration.

Please note: The USGS Monitoring Station at County Road F is very near the confluence of the Kinnickinnic River with the St. Croix River. The flow monitor is **not** within the monitoring area of this study. However, the data does show the tie between storm water influences (runoff events) and the flow of the river through its entire system.

Temperature Monitoring:

Information about the thermal impacts of untreated storm water runoff can be found in the *"Ther mal Impacts"* section of the North Kinni Monitoring website.

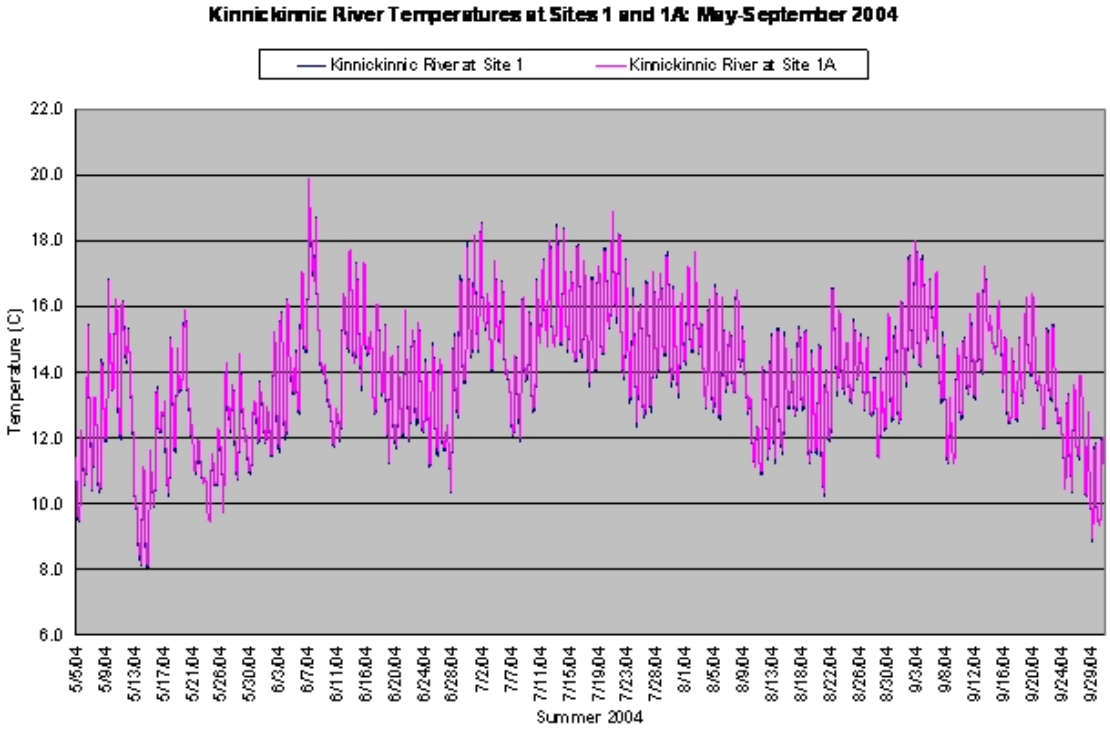
Kinnickinnic River Temperature Monitoring Results:
May-September 2004 (summer) temperature monitoring data were obtained for the Kinnickinnic River at Sites 1, 1A and 2. River temperatures at these three monitoring sites averaged 13.8°C and ranged from 7.7-19.9°C over the course of the summer. Near-normal river temperatures probably prevailed in the North Kinnickinnic River Monitoring Project Area during the summer

of 2004, since the 2004 average summer air temperature of 18.7°C (65.6°F) was only slightly lower than the normal average summer air temperature of 19.2°C (66.5°F).

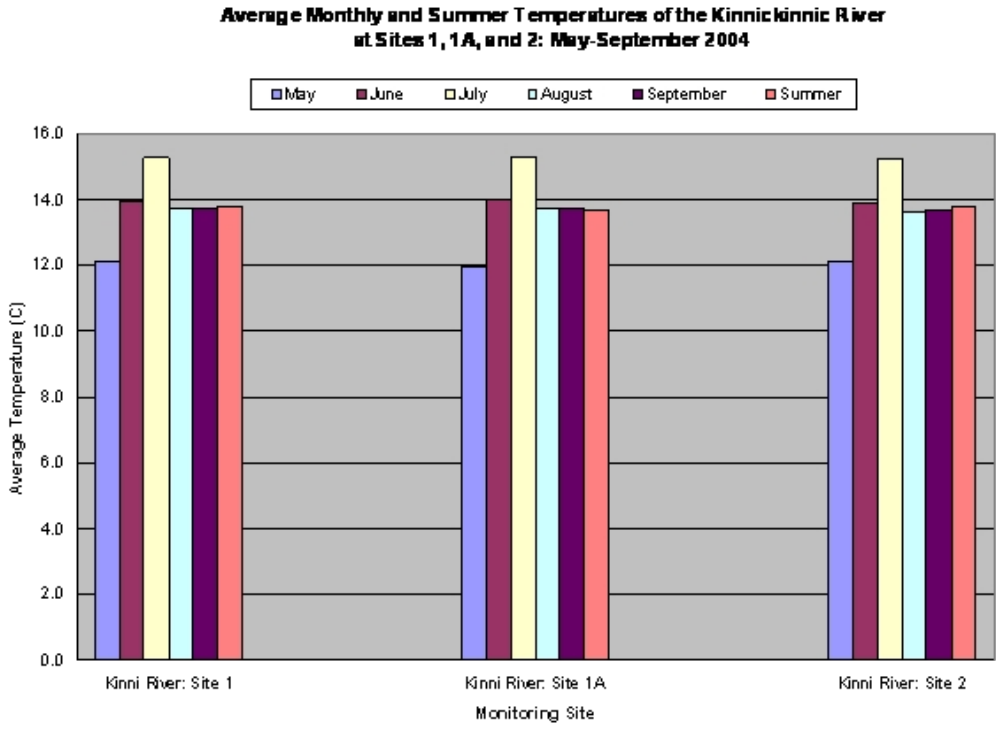
No storm water-related thermal impacts were evident at Site 1, downstream from Sumner Creek and Sterling Ponds, during the summer of 2004.

City of River Falls monitoring station at Site 1

Upstream summer temperatures at Sites 1A and 2 were nearly identical to downstream summer temperatures at Site 1. A comparison of temperatures at Site 1A (upstream) and Site 1 (downstream) is shown below.

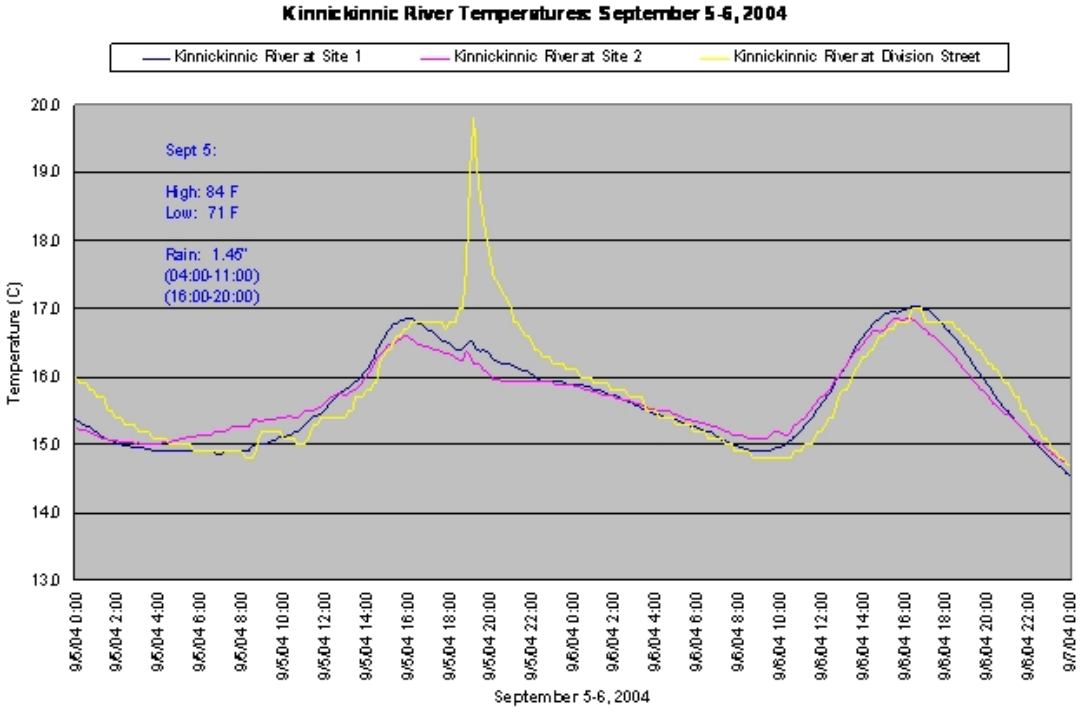


The average monthly and summer temperatures at Sites 1, 1A and 2 were also nearly identical, as shown below.



The summer 2004 temperature regime in the Kinnickinnic River at Sites 1, 1A and 2 was ideal for coldwater macroinvertebrate and brown trout communities. Approximately 95% of all temperatures recorded at Sites 1, 1A and 2 during the May-September 2004 period were less than 17°C, which is the top of the optimum temperature range for a healthy coldwater macroinvertebrate community. A temperature of 17°C is considered to be the optimal temperature for brown trout survival. Greater than 99% of all temperatures recorded at Sites 1, 1A and 2 during the May-September 2004 period were less than 19°C, which is the top of the optimum temperature range for brown trout growth. One hundred percent of all temperatures recorded at Sites 1, 1A and 2 during the May-September 2004 period were less than 20°C, which is the top of the optimum temperature range for brown trout survival.

No thermal spikes were apparent at Site 1 during seven significant rainfall and runoff events in May, June, July, and September 2004. For example, in contrast to a very distinct thermal spike at Division Street (a heavily impacted site downstream of the monitoring area) during the September 5 rainfall event, no thermal spike was apparent at Site1, downstream from Sumner Creek and Sterling Ponds.



With limited development in the Sterling Ponds subdivision in 2004, some of the Sterling Ponds storm water management practices (wet detention ponds and erosion control measures) in place, and with Sumner Creek providing a lengthy buffer between the subdivision and the Kinnickinnic River, any Sterling Ponds storm water impacts on the river were projected to be minimal in 2004. As such, the 2004 Kinnickinnic River temperature monitoring data should serve as a useful baseline condition for evaluating the future effectiveness of the City of River Falls Storm Water Management Ordinance as development progresses at Sterling Ponds.

A direct storm sewer discharge to the Kinnickinnic River at Division Street

Sumner Creek and Sterling Ponds Temperature Monitoring Results

Accurate measurement of Sumner Creek flow at Sites 4 and 6 and documentation of discharges from the Sterling Ponds wet pond at Site 5 were not possible in 2004, using temperature monitoring data alone. Nor was it possible to determine if there were any discharges of storm water from the Sterling Ponds subdivision, with any accompanying thermal impacts carried downstream to the Kinnickinnic River, via Sumner Creek. Adjustments to the temperature monitoring scheme at Sites 4-6 will be made in 2005 to improve this situation. An additional temperature monitoring site at the mouth of Sumner Creek would also be very desirable.

Macroinvertebrate Monitoring:

Information will be available soon

Fisheries Survey:

Information will be available soon