FENCING IS NOT THE ONLY SOLUTION

Using Off Site Watering Systems to Aid in Riparian Area Protection and Management

By

Arlene Unvoas

Karlah Rae Rudolph

A report submitted to the Saskatchewan Ministry of Agriculture to promote the agriculture and food industry in Saskatchewan.

Swift Current Creek Watershed Stewards Inc.

ABSTRACT

"Using Off Site Watering Systems to Aid in Riparian Area Protection and Management" was implemented approximately 25 km south of Gull Lake, SK on Highway 37 where the highway crosses the Swift Current Creek. This is a location locally referred to as the Rainbow Bridge as it has a decommissioned concrete arch bridge downstream of the current bridge. The project is in the middle of a pasture that the producer uses as a breeding pasture for a short period of time in the summer. The project was initiated as a result of a multi-year bio assessment project that showed evidence of elevated coliform and e coli levels when the cattle were present followed by acceptable limits when the cattle were removed. The Swift Current Creek Watershed Stewards (SCCWS) do not advocate fencing out the creek as the only form of riparian management and it was anticipated that if an off-site watering system was provided the cattle would prefer that source of water and the coliform and e coli levels would be acceptable even when the cattle were present in the pasture. Water samples were collected 5 times throughout the summer for the years of 2011-2013. One sample was taken in June, two in July and two in August. The two parameters were e-coli and total coliforms. An added component was water that was collected was also sent to the University of Regina for DNA extraction from the e coli to determine if the e coli was bovine or ungulate. Federal hydrometric data on water discharge rates and water levels was consulted. A riparian health assessment was accomplished once in 2010 and again in 2013. Our results suggest the E. coli and total coliforms measured at the project site are washing down from seasonal sources deposited higher up in the watershed. Riparian health assessments demonstrate that cattle are spending less time in the riparian area as a result of the off-site watering system and that riparian health is consequently improving. Initiatives towards best management practices higher up in the watershed are currently underway in order to facilitate further improvements in watershed health. An educational event held on October 19th, 2013 attracted 62 current and future cattle producers to view the off-site watering system and learn about riparian health.

Project Identification

1. **Project Title**: *Using Off Site Watering Systems to Aid in Riparian Area Protection and Management*
2. **Project Number:** *20100204*
3. **Producer Group Sponsoring the Project:** *Swift Current Creek Watershed Stewards(SCCWS)*
4. **Project Location(s):** *Mike Lewans - RM Bone Creek #108 - NW 7-11-18 W3*
5. **Project start and end dates (month & year):** *October 2010 – December 2013*
6. **Project contact person & contact details:**

- *Arlene Unvoas (SCCWS Executive Director)*
  306-778-5007
  Arlene.Unvoas@agr.gc.ca

Objectives and Rationale

7. **Project objectives:**
   - *The purpose of this project is to promote awareness of environmental and production benefits achieved by utilizing off-riparian area watering sources for livestock. We would also like to promote the Agri-Environmental Group Plan (AEGP) program that provides funding for projects such as this with hope that more producers may choose to implement best management practices, aiding in the environmental protection of our watersheds.*
8. **Project Rationale:**
   - *By completing this project near a busy highway, not only producers who attend a field day become educated about riparian health and off-site watering, but all of those who drive by the site will become aware as well. This project will continue to promote awareness that cattle will use other watering sources over the creek for the majority of the time, therefore decreasing the necessity to fence the creek. This will also result in healthier riparian areas and water. The producer will also*

be asked for permission to install a sign near the project therefore allowing passers-by to see that the SCCWS and partners completed the project.

Methodology and Results

9. Methodology:

- *The project was set up on 160 acres of pasture which the Swift Current Creek flows through. 250 head of cattle graze this area using the creek as a water source. A watering system was purchased by the producer from a local supplier in November 2010 and was to be installed in the spring of 2011 prior to the grazing season. The system was not installed until the beginning of August 2011 as a result of unavailable parts. Once set up, the watering system was fenced off to prevent any damage from cattle. Cattle, which are usually present from July to August, were only present during the month of August in 2011. Water quality tests were completed five times during the growing season of 2011, 2012 and 2013: once in June, twice in July and twice in August. Circumstances resulted in the second sampling date being missed in 2012. The air temperature along with weather, water and riparian conditions were all noted on each sampling date. Due to the fast flow and a high level of water, the samples were taken within three feet of the bank. Water samples were collected, placed in a cooler with ice packs and shipped directly to Saskatchewan Research Council (SRC) for testing of* e coli *(Most Probable Number per 100 millilitres [MPN/100mL]) and total coliforms(MPN/100mL). When water was collected to send to SRC an extra bottle was collected, frozen and sent to the University of Regina for the DNA testing. In addition to field data and notes, results pertaining to water level (m) and discharge (m^3/s) were obtained from the Government of Canada hydrometric station (Station 05HD036) just upstream from the project site. Finally, a riparian health assessment was completed on the site at the beginning of the project, on September 15th, 2010, and again at the end of 2013, on November 12th, 2013.*

10. Results

- *E. coli and Total Coliform Populations*

In 2011, water samples were drawn on June 7th, July 5th, July 21st, August 9th and August 23rd. The sampling date for which the highest MPN/100mL was reported for both E. coli and total coliforms was July 21, 2011 (Figure1).

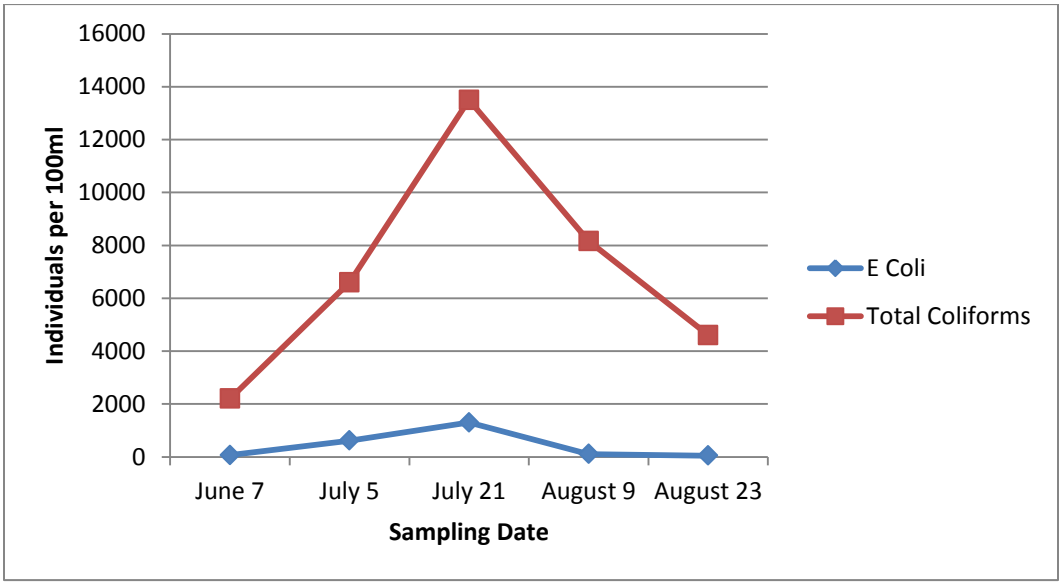

Figure 1: E.coli & Total Coliform in individuals per 100ml for 2011

On this sampling date, E. coli were reported as 1300 individuals per100 mL (1300/100mL) and total coliforms were reported as 13,500/100mL. Field data indicates that cattle were not present on site in 2011 until after this sampling date (Table 1).

Table 1: 2011 Field Data

Sampling Date	ID #	Weather Conditions	Air Temp.	Description of area	E. Coli	Total Coliform
June 7, 2011	A10-JN-2-2011	Drizzle, light wind ESE	11° C	Water is flowing strong and the spring runoff has changed the entrance into the water. Banks are steeply incised about a 2 -3' drop from the grass. Observed a set of animal horns below the surgace of the water but couldn't determine what it was. Water was very deep, went in only 2-3' from edge and already 3' deep. No livestock present.	64/100 mL	2200/100 mL
July 5, 2011	A10-JL-1-2011	Clear skies, no wind	30° C	Slower flowing water. Steep banks. Water is still higher than normal but not as high as last time. No cattle were present.	613/100 mL	6600/100 mL
July 21, 2011	A10-JL-3-2011	Overcast, drizzle, windy	13° C	Water level is the same as July 5/11 and moving quickly. More slumping occurring along banks. No cattle present. Water was warm.	1300/100 mL	13500/100 mL
August 9, 2011	A10-AU-3-2011	Mainly clear skies, few clouds, no wind	18° C	Water level remains the same. Slow moving flow. More slumping occurring along banks. Cattle were present.	108/100 mL	8160/100 mL
Augsut 23, 2011	A10-AU-4-2011	Moderate cloud cover, windy	24° C	Water level remains the same. Slow moving flow. No more slumping but cattle have worked up the edge of the creek. Cattle were present.	43/100 mL	4600/100 mL
		Average Temperature	19.2°			

In 2011, E.coli was lowest on August 23rd, 2011, at 64/100mL. On this date, cattle had been present on the site for approximately three weeks. Total coliforms were lowest at the start of the sampling season (2200/100mL on June 7th, 2011), but were also very low on August 23rd (4600/100mL). The general data trend for both E. coli and total coliforms was to be comparatively low at the beginning of the sampling season in June, to increase to a peak in late July and to decline to a secondary low at the end of the sampling season in late August.

In 2012, water samples were drawn on June 19th, July 17th, August 22nd and August 28th. The first data collection for July was missed therefore Figure 2 shows only 4 sampling dates.

The sampling date for which the highest MPN/100mL was reported for both E. coli and total coliforms was July 17th (Figure 2). E. coli were reported as 870/100mL and total coliforms were reported as 4800/100mL. This date corresponds to the same time period for which high levels of E. coli and total coliforms were reported in 2011. Field data indicates that cattle were not present on the site on any sampling date in 2012 (Table 2).

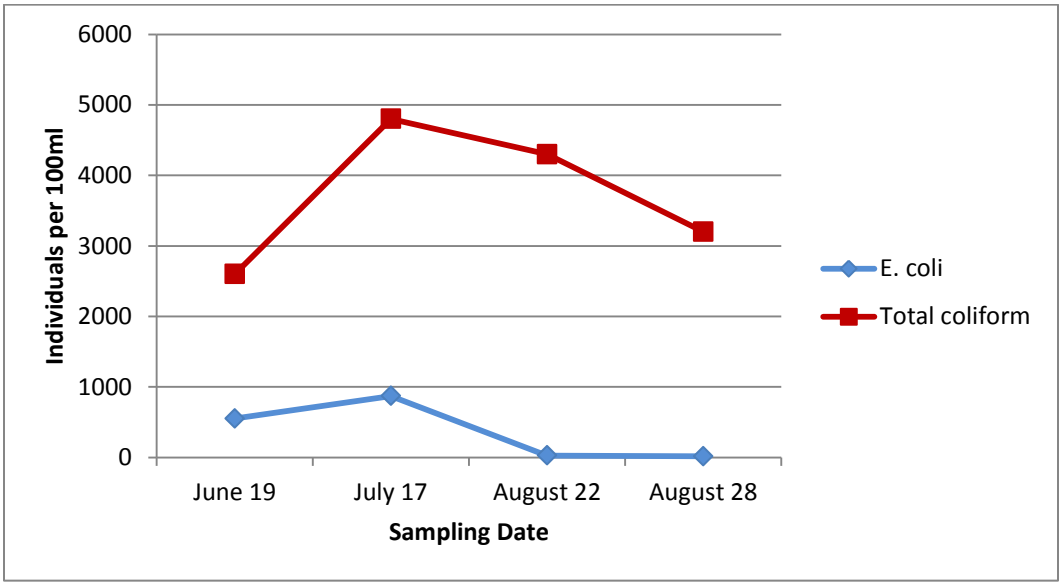

Figure 2: E.coli & Total Coliform in individuals per 100ml for 2012

Table 2: 2012 Field Data

Sampling Date	ID #	Weather Conditions	Air Temp.	Description of area	E. Coli	Total Coliform
June 19, 2012	A10-JN-2-2012	Sunny, breezy	16°C	Cattle are not present.Water levels are normal and the flow ids slow. The banks on the north side are not disturbed so there was little or no flooding in this area. No new slumping has occurred.	550/100mL	2600/100mL
July 17, 2012	A10-JL-3-2012	sunny with cloudy periods, high humidity	26°C	Dead beaver on the far (south) bank.The cattle have been present prior to this date. (NOTE: Mike said they were in for about 10 days from late June to early July. Over the long weekend) Water level is normal, flow is slow and the water is clear. Water was very warm. No cattle are present.	870/mL	4800/mL
August 22, 2012	A10-AU-2-2012	sunny no clouds	26°C	The water level is down from the previous sampling date. Clear and warm to the touch. The beaver is gone and no cattle are present. The gate was open.	26/100mL	4300/100mL
August 28, 2012	A10-AU-4-2012	sunny, no clouds and no wind. Very calm.	32°C	water level is lower than the previous week. Water is very clear. No cattle are present and the gate was open. In 2011 the location we take the samples was in one large clump and in 2012 it is 3 smaller clumps.	14/100mL	3200/100mL
		Average Temperature	25°			

In 2012, E. coli was lowest on August 28th, with 14/100mL. Total coliforms were lowest at the start of the sampling season with 2600/100mL on June 19th, but were also very low on August 28th, with 3200/100mL. A dead beaver was noted near the sampling site on July 17th. The general data trend for both E. coli and total coliforms was to be comparatively low at the beginning of the sampling season in June, to increase to a peak in late July and to decline to a secondary low at the end of the sampling season in late August – the same trend as observed in 2011.

In 2013, water samples were drawn on June 25th, July 3rd, July 23rd, August 13th and August 28th. The sampling date for which the highest MPN/100mL was reported for E. coli was July 3rd, with 920/100mL (Figure 3).

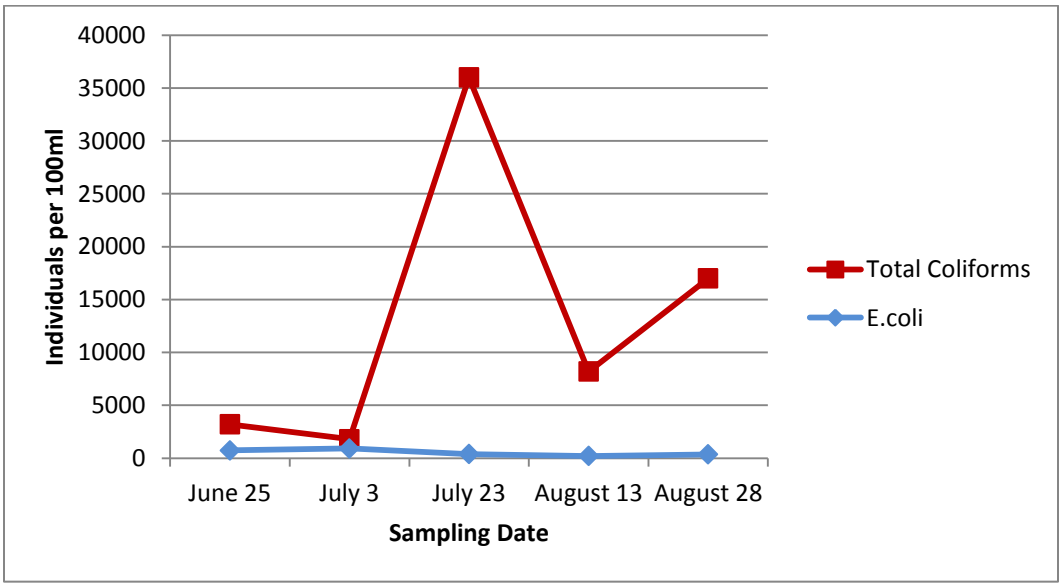

Figure 3: E.coli & Total Coliform in individuals per 100ml for 2012

The sampling date for which the highest MPN/100mL was reported for total coliforms was July 23rd, with 36000/100mL. The peak in total coliforms in 2013 corresponds to the time period for which peak total coliforms were reported in 2011 and 2012, but this peak is dramatically higher than in any other year. Field data indicates that cattle were present on site from June 20th to early August and were therefore present during the peak time periods for both E. coli and total coliforms (Table 3).

Table 3: 2013 Field Data

Sampling Date	Weather Conditions	Air Temp.	Description of area	ID #	E. Coli	Total Coliform
June 25,2013	overcast,calm	18° C	Cattle present as of June 20. Cattle are crossing downstream of the sample location.Evidence of cattle presence at sampling site but majority of cattle at trough. N side of slope looking upstream has considerable bank erosion. Heavy rainfall the night before.	A10-JN-4-2013	730	3200
July 3,2013	windy,hot	29° C	Cattle present. Evidence of cattle in the sample site as hoof plugging. Wind erosion on the N slope looking upstream.	A10-JL-1-2013	920	1800
July 23,2013	calm	21° C	Cattle are present. Moving freely from side to side of the creek. There was rain during the night before.	A10-JL-3-2013	390	36000
August 13,2013	light wind,sunny with a few clouds	26° C	Cattle are not present. Very heavy rainfall the night before.	A10-AU-2-2013	200	8200
August 28,2013	sunny with a few clouds,hot	32° C	Cattle are not present. Cattle crossing is revegetating. Water level is lower than previous sampling times.	A10-AU-4-2013	360	17000
	Average Temperature	25.2				

In 2013 E. coli was lowest on August 13th, with 200/100mL. Total coliforms were lowest on July 3rd, with 1800/100mL. In 2011 and 2012, E. coli and total coliforms declined to secondary lows at the end of the sampling season. In 2013, both parameters actually increase from early to late August, with total coliforms reaching a second unprecedented high for the entire three years of study on August 28th. (Figures 4 and 5)

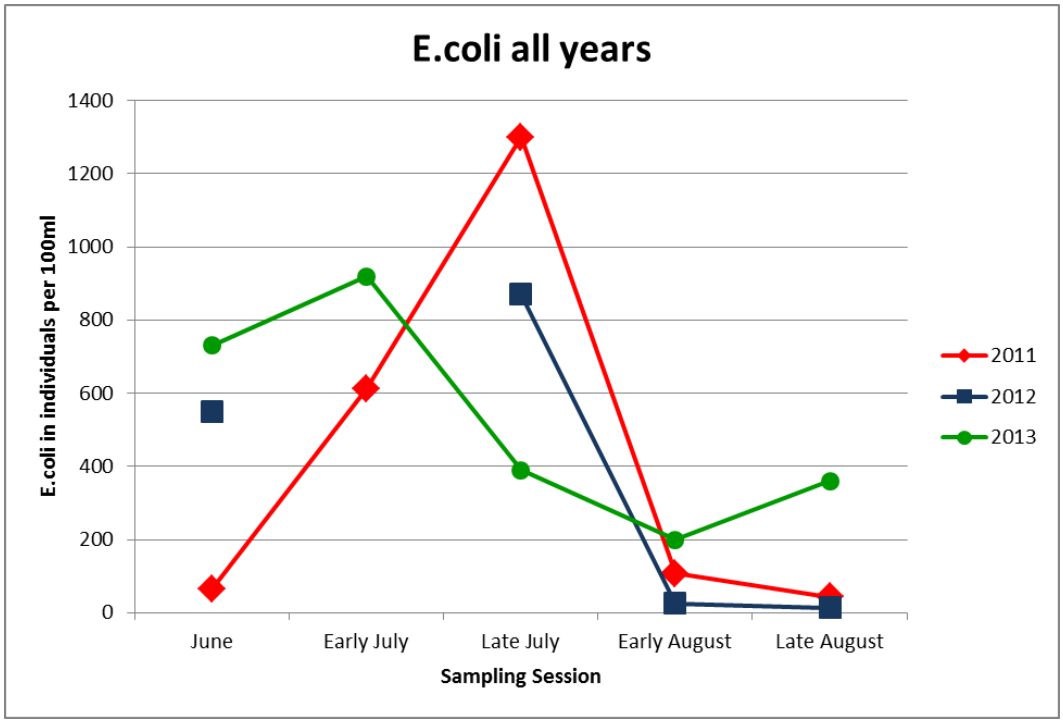

Figure 4: Comparative E.coli for all sampling years

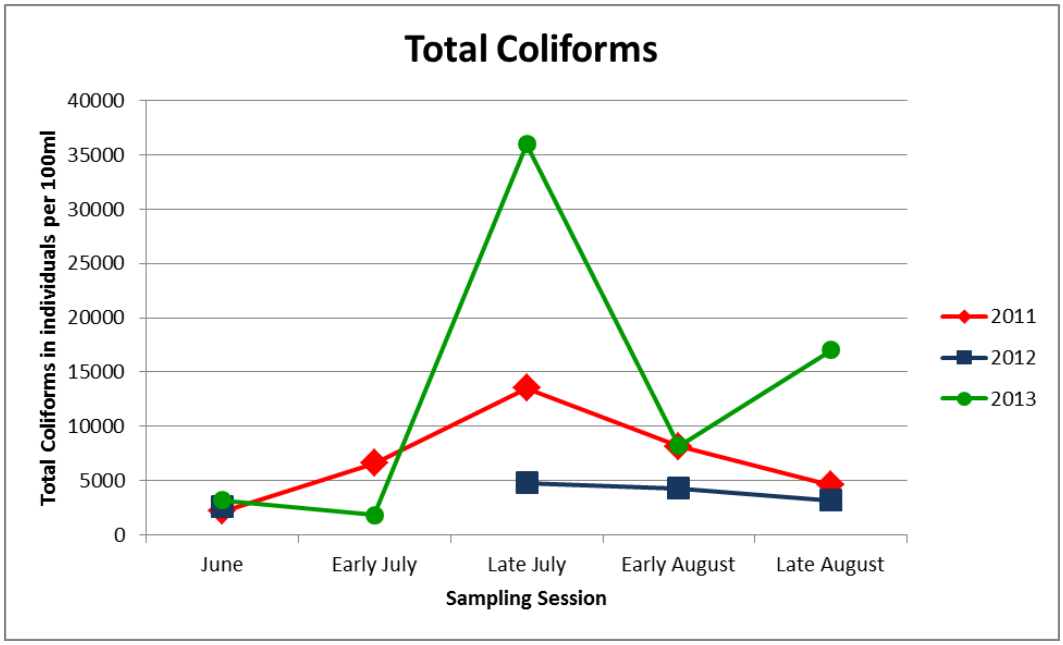

Figure 5: Comparative Total Coliforms for all sampling years

Field records indicate that cattle were not present on site during this second period of increasing E.coli and total coliforms.

- *DNA Results*

Figure 6 indicates that the DNA sample for July 21, 2011 showed positive for ruminant. The figure also shows that the cattle were not present on that day and the e coli levels were the highest of all the sampling periods at 1300/100ml. The only other positive for ruminant was on August 23, 2011 and on that date the cattle were present but the e coli was relatively low at 43/100 ml.

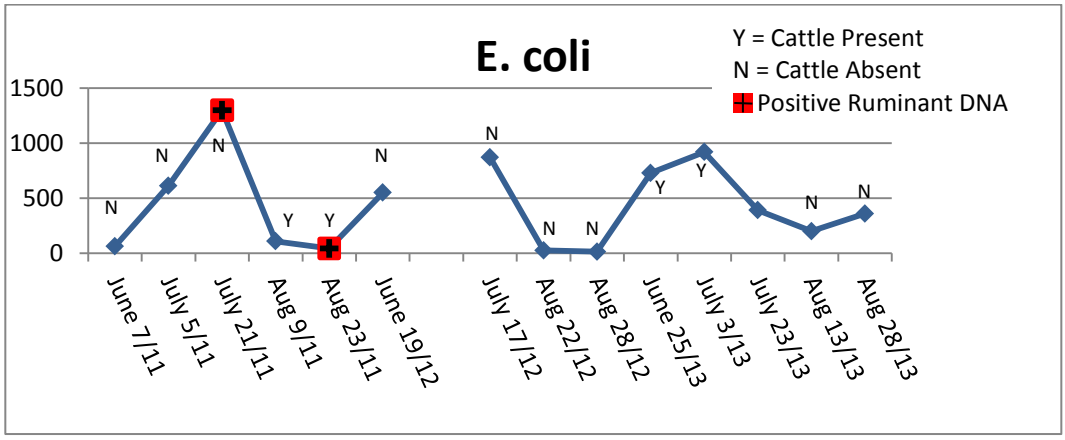

Figure 6: E coli DNA Results with Absence and Presence of Cattle

- *Water Discharge Rates and Water Levels*

Data obtained from a Government of Canada hydrometric station provided information on discharge (m^3/s) and water level (m) at a point located just upstream of the sampling site.

Considering the period of study only (June 1st – September 1st) in 2011, discharge was well above average during the majority of the time period, reaching a peak in the last week of June, when flow was 32m^3/s (Figure 7).

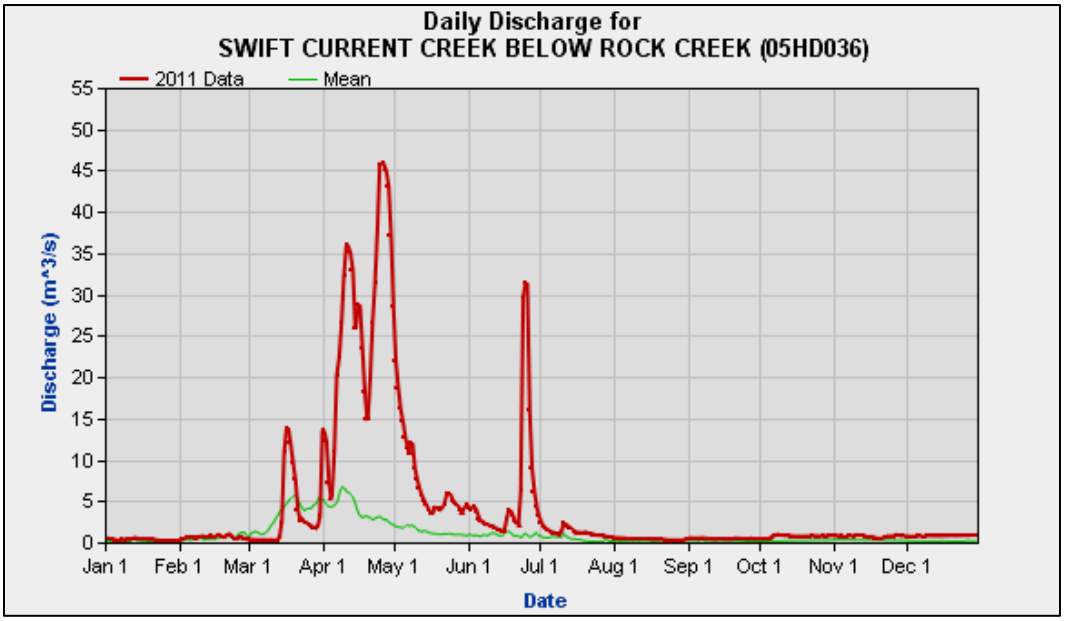

Figure 7: Daily discharge for Swift Current Creek below Rock Creek 2011

The water level was also highest during the last week of June, when it was 3.5m (Figure 8). Discharge was lowest throughout August, when it reached only 1m^3/s. Water level also declined throughout August, reaching a low of 1.8m at the end of the time period.

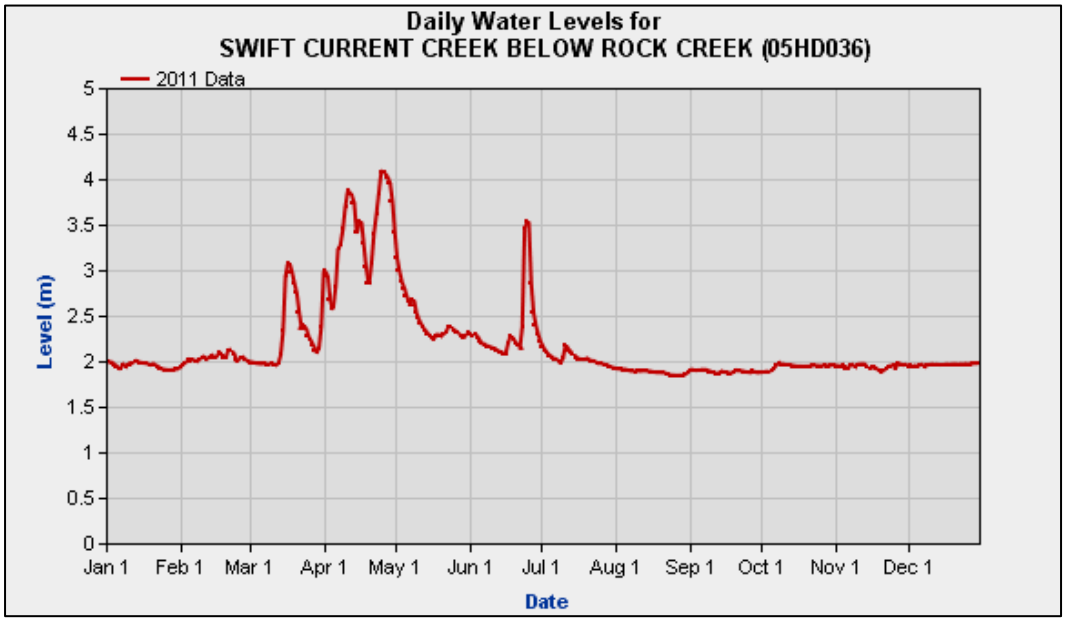

Figure8: Daily water levels for Swift Current Creek below Rock Creek 2011

In 2012, discharge was often close to average, reaching a peak at the very beginning of June, when discharge was approximately 2.5m^3/s (Figure 9).

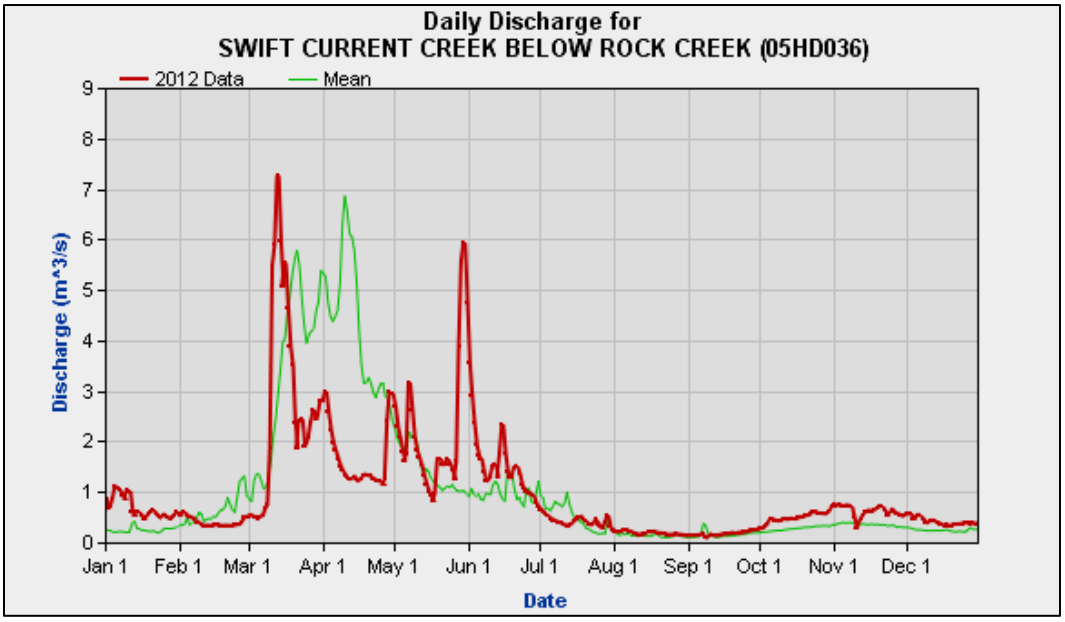

Figure 9: Daily discharge for Swift Current Creek below Rock Creek 2012

Water level was also highest at the beginning of June, when it was 2.4m (Figure 10). Discharge was lowest throughout August, when it was only 0.5m^3/s. Water level also declined throughout August, reaching a low of 1.6m by the end of August.

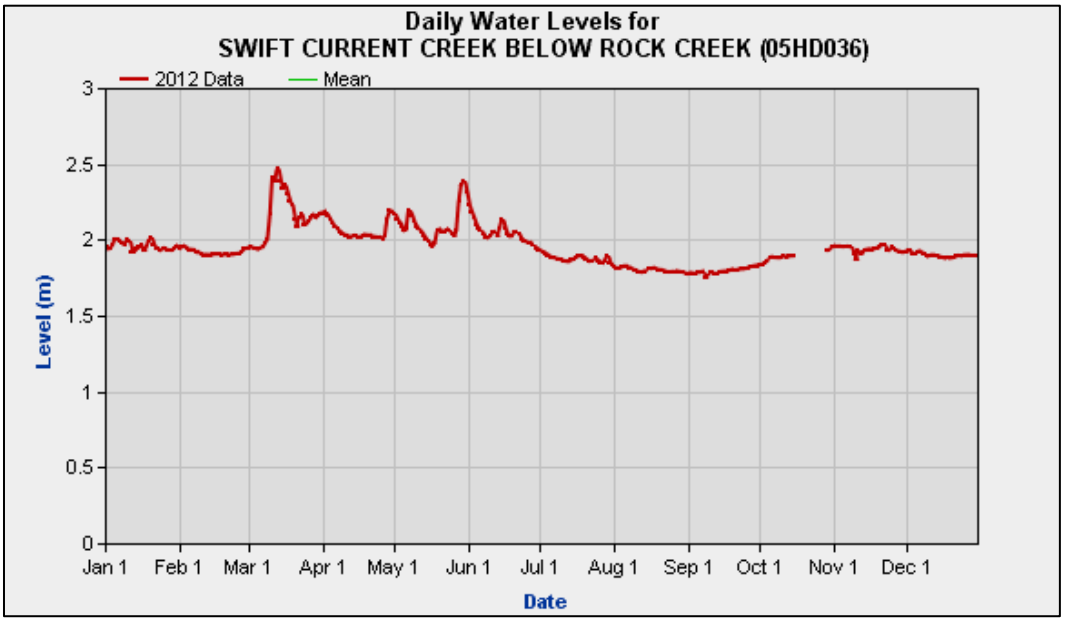

Figure 10: Daily water levels for Swift Current Creek below Rock Creek 2012

In 2013, discharge was close to the mean during the majority of the study period, but exhibited a considerable peak throughout the first two weeks in July of approximately 24m^3/s (Figure 11).

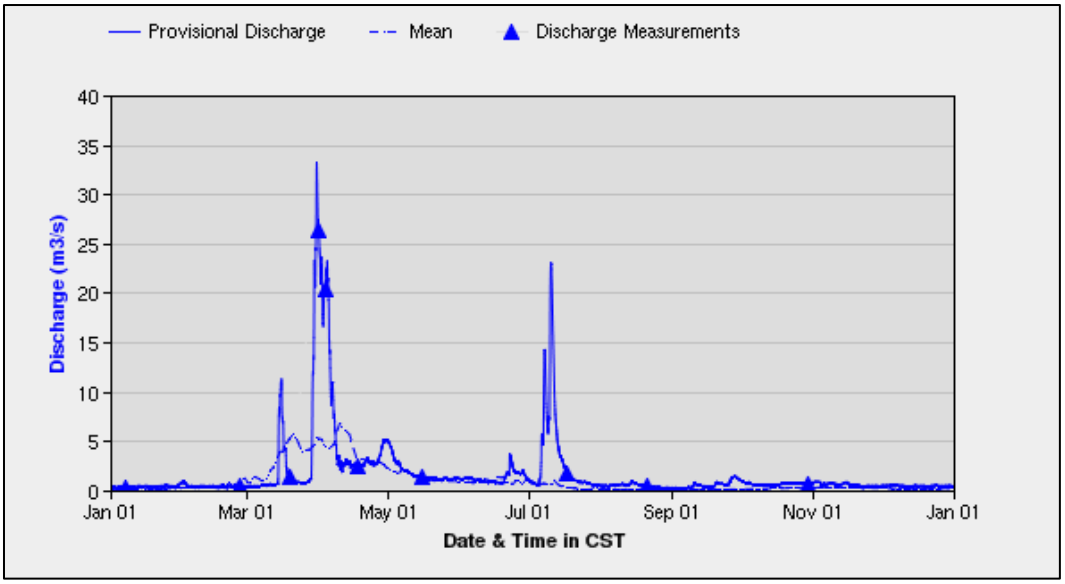

Figure 11: Daily discharge for Swift Current Creek below Rock Creek 2013

The highest water level also occurred in the second week of July, when water was up to 3.3m (Figure 12). Discharge in 2013 was lowest during the last two weeks of August, reaching a low of nearly $1m^3/s$ by the end of August. A low water level of 1.9m was established by the end of August.

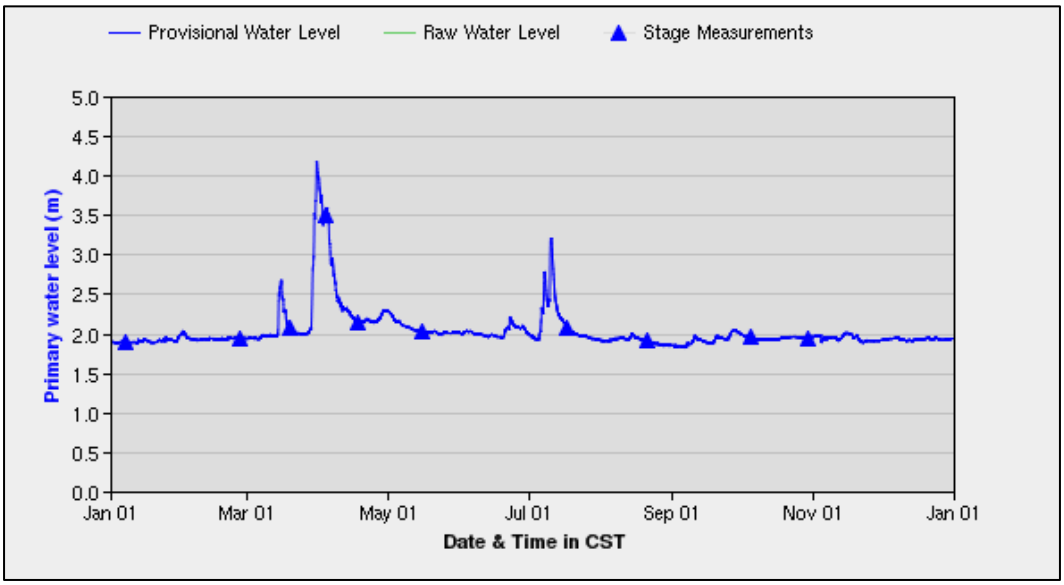

Figure 12: Daily water levels for Swift Current Creek below Rock Creek 2013

- *Riparian Health Assessment*

A riparian health assessment was conducted on site in 2010 and again in 2013 using the Riparian Health Assessment for Streams and Small Rivers Field Workbook (PCAP 2008). Results for the 2010 assessment and the 2013 assessment are provided in Appendix 1 and 2, respectively. In 2010 the riparian health score was 67%, which is *healthy with problems*. This rating means that many riparian functions are still being performed, but there are signs of stress on the system. In 2010, this score was attributed to issues with undesirable herbaceous vegetation, including invasive species and increaser disturbance-caused species, excess grazing and poor establishment of desirable woody perennials and an excess of bare ground attributed to human-caused impact,

namely trailing, hoof sheer and pugging from livestock in proximity to the creek. In 2013, the riparian health score was 81%, which is *healthy*. This improved score was due to better bank protection via deep-rooted vegetation, reduced utilization of desirable woody perennials and a vast reduction in bare ground attributed to human-caused impact.

11. Conclusions and Recommendations

One overarching pattern of E. coli and total coliform populations is apparent from our results. Typically, E. coli and total coliforms are at lower levels at the start of the sampling season, increase to a peak in late July and decline again after the July peak. The year 2013 was an exception to this pattern, in that E. coli and total coliforms increased in population again in late August.

Our results indicate that E. coli and total coliforms on site are not linked to the presence of cattle on site. For example, in 2011, both E. coli and total coliform populations peaked before cattle were ever present on site and these populations actually declined once cattle were present. In 2013, cattle *were* present during the dramatic peak in total coliforms. However, both E. coli and total coliform populations were also recorded as very low during cattle presence. In addition, E. coli and total coliforms increased again in late August 2013, after the cattle herd had left the site for the season. From these observations, we have drawn the conclusion that the E. coli and total coliforms measured at the study site are actually sourced from higher up in the watershed - a logical conclusion considering creek water is constantly flowing downstream.

An added component to the project was the offer from the University of Regina to collect and analyse DNA from the e coli samples to determine whether they were bovine or ungulate. The results did show that the two positive ruminant results were at a time when cattle were both present and not present.

In July 2011 when the e coli was at the highest level it had ever been, the DNA results indicated a positive ruminant result and the cattle were not present. Thusly, when the e coli was at the second lowest level it had been the cattle were present and the DNA again showed that there was a positive for ruminant. We can expect the positive ruminant when the cattle are present but when they are not we could determine that the ecoli are from upstream practices.

Our investigations of water discharge rates and water levels were puzzling. Simply put, water discharge and water levels both tend to be at a high in June and at a low in late August. In order for E. coli and total coliforms to flourish, there first needs to be a source of these bacteria, and then ideal conditions for growth, which would include warm, slow moving water and available organic carbon as an energy source. If E. coli and total coliforms are first washed down from upstream sources in June, it would be logical for their populations to grow as the creek water slows and warms into late July. However, this explanation does not provide for the fact that the populations typically decline after late July, rather than continuing to increase throughout August, when the creek is slower and temperatures continue to be high. One possibility is that our results are recording a flush of bacterial growth that is followed by a die-off as these bacteria exhaust their food source.

An interesting exception to typical discharge rates and water levels occurred in 2013. There was a singular peak discharge event in early July in a year that was otherwise very average for both water discharge and water levels. If our earlier postulations are correct (firstly that E.coli and total coliforms are washed down from higher up in the watershed, and secondly, that they then flourish at the study site for a period of time as water slows and warms and while a food source is available), then the extreme peak of total coliforms on July 23rd of 2013 (36000/100mL) could arguably be attributed to the sudden increase in discharge in early July. The peak discharge in 2013 occurred later in the season than in 2011 or 2012, potentially during a time when more sources of fecal coliforms, both livestock and wildlife, were present or had accumulated on sites throughout the headwaters of the Swift Current Creek. To reiterate, in 2011 and 2012, peak discharge occurred much earlier in the season, potentially before livestock were turned into native

prairie pastures, and before wildlife congregated in greater numbers in close proximity to the creek. We do not currently have knowledge of livestock pasturing practices or wildlife numbers and habits upstream of the study site and consequently cannot form any conclusions beyond those postulated here. In addition, these postulations are unable to account for the increase in E. coli and total coliforms observed at the very end of the study period in 2013.

On the whole, there are numerous interacting factors that can affect E. coli and total coliform populations at the study site. For example, a rainfall event and associated increase in discharge upstream of the site arguably increases E. coli and coliform populations if a source is present and conditions for bacterial growth are favourable. Conversely, if a source is not present and conditions for growth are unfavourable, a rainfall event might instead dilute existing coliform populations, reducing measured levels. We would require more data and a much longer-term study to fully account for the population patterns observed. In particular, a weather station recording precipitation in the headwaters of the Swift Current Creek would have been a very useful source of data for this study.

A significant benefit to this project was the riparian health assessments accomplished in 2010 and again in 2013. The improved riparian health score in 2013 can be attributed to the off-site watering system, as it was clear that livestock impact, especially bare ground resulting from trailing, hoof sheer and pugging, was dramatically reduced. The improved woody regrowth and decreased browsing of preferred woody vegetation also lends itself to the conclusion that cattle are spending much less time in the riparian area now that an off-site watering system is available. From this information, we would submit that riparian health assessments are a more reliable method of assessing improvements in riparian health that are anticipated by the introduction of an off-site watering system as riparian health assessments are the only indicator not influenced by upstream practices.

More action towards best management practices upstream of the study site is necessary in order to make a measurable contribution towards watershed health and improved water quality index standards. For this reason, we are now initiating a multi-producer pasture pipeline project that will see upwards of 5 producers cooperating to establish a multi-user water pipeline that bridges the interface of the native prairie pastures bordering the Swift Current Creek and the upland agricultural fields. With multiple water outlets available to both the pasture lands and the agricultural fields, participating land owners will be able to draw livestock to upland locations during the growing season and also practice more extended and extensive late fall and winter grazing. These practices should arguably reduce livestock impact in the Swift Current Creek and its source waters.

An important benefit to this project was that it drew attention to ways in which off-site watering systems can be used to improve producer stewardship of riparian areas. The project is visible from the #37 highway and signage erected by the SCCWS attracted attention to the site as vehicles drove by.

On October 19th, 2013, SCCWS held a day-long educational program at the site, which attracted 60 local participants involved in cattle production. SCCWS partnered with Ag Canada staff to deliver information on riparian health and functioning and range management. Our producer partner shared his experiences with the off-site watering system. Participants were then guided through an activity developed by SCCWS called "How Would You Graze It?" which asked them to develop a grazing management plan for a pasture containing a creek while following range management principles and taking riparian health into consideration. The event was considered a tremendous success by all involved.

Supporting Information

12. Acknowledgements

The Swift Current Creek Watershed Stewards (SCCWS) would like to acknowledge and thank the following people and organizations that helped to bring this project to completion. Firstly all the people that helped to collect water samples throughout the years. Karlah Rudolph, Dallas Peters, Karli Wong, Adam Unvoas, Shannon Garchinski, Shelby DeMars, Helen Hanbidge and Arlene Unvoas.

Agrologist Stacey Spenst, who was inspired by the SCCWS philosophy that fencing the creek is not the only option to improving the health of the creek where cattle are concerned and created this project proposal. She searched out and was successful in attaining the funding to implement the project.

Thanks to Dr. Dena McMartin who offered to add an element to the project by testing the DNA in the fecal coliforms to determine whether the fecal coliforms were bovine or ungulate. This gave us a valuable insight into the results of this project.

Saskatchewan Research Council for giving us an in kind rate to lower the cost of water sampling. Your ongoing support of the SCCWS is much appreciated.

A big thanks to Mike Lewans. Without permission to access his land and his willingness to work with us and make changes as they were needed this project would surely not have been a success.

13. Appendices

Appendix 1- Riparian Health Assessment 2010

Appendix 2 - Riparian Health Assessment 2013

14. Abstract/Summary

This project was completed to create awareness on the use of off-site watering systems to improve riparian health on watercourses where cattle are present. Our organization also wished to promote the Agri-Environmental Group Plans as a funding source for Beneficial Management Practices (BMP). The Swift Current Creek Watershed Stewards (SCCWS) have worked to overcome negative perceptions about being a "fence the creek group". Therefore, this project was developed to demonstrate that other BMPs, when implemented, can improve riparian health to the extent that exclusion fencing becomes unnecessary.

SCCWS partnered with a local producer to purchase and set up an off-site watering system on the Swift Current Creek in a 160 acre pasture in August of 2011. Water samples were collected 5 times during the growing seasons from 2011 to 2013. These samples were tested for *e. coli* (MPN/100mL) and total coliforms (MPN/100mL). DNA was extracted to determine if coliforms were from a bovine source. Two of the samples contained bovine DNA and the results were not correlated to cattle presence. *E. coli* and total coliforms were likely sourced from higher up in the watershed and populations of *e. coli* and total coliforms exhibited a cyclical, seasonal pattern.

A riparian health assessment was completed twice: on September 15th, 2010 and again on November 12th, 2013. The site scored 67% for riparian health in 2010, which is "healthy with problems" and 81% in 2013, which is "healthy". Riparian health improved significantly throughout the study period, giving credence to the use of off-site watering systems and thus was a more relevant indicator of changes to watershed health.

There is a need to implement more BMPs upstream of the project site. The information collected during this project will serve as valuable background data once such projects are complete.

On October 19th of 2013, SCCWS partnered with Ag Canada staff to deliver information on riparian health and range management. This event showcased the project and was attended by 62 regional cattle producers and received very positive reviews.

The funding received for this project was instrumental in moving Agri-Environmental initiatives forward in this region.

Finances

15. Expenditure Statement

Categories	Total approved Budget. Appendix 'B' of Contract.	Actual Spent on Project to date	
Salaries and Benefits			
· Students	$0.00	$0.00	n/a
· Postdoctoral / Research Associates	$0.00	$0.00	n/a
· Technical / professional assistants	$0.00	$0.00	n/a
Consultant Fees & Contractual Services	$1,150.00	$898.68	$251.32
Rental Costs	$0.00	$0.00	n/a
Material and Supplies	$0.00	$0.00	n/a
Project Travel			
· Field Work/Mileage	$1,071.00	$1,295.08	-$224.08
· Collaborations / consultations	$0.00	$0.00	n/a
Other			
· Field Day	$820.00	$965.00	-$145.00
· Administration	$200.00	$181.59	$18.41
· Miscellaneous	$953.00	$852.44	$100.56
TOTAL	**$4,194.00**	**$4,192.79**	**$1.21**

Swift Current Creek Watershed Stewards

ADOPT

Riparian Assessment

2010

2010 Riparian Health Assessment

Site: Rainbow Bridge, Highway 37
Landowner: Michael Lewans
Land Location: NW 7 11 18 w3
Stream/River: Swift Current Creek
Date: September 15, 2010

Species List

Species

Gramanoids	
Sedge spp.	Carex spp.
Foxtail Barley	Hordeum jubatum
Common Reed Grass	Phragmites communis
Sea-side Arrow Grass	Triglochin maritima
Kentucky Blue Grass	Poa pratensis
Smooth Brome Grass	Bromus inermis
Quack Grass	Agropyron repens
Forbs	
Wild Mint	Mentha arvensis
Wild Licorice	Glycyrrhiza lepidota
Field Dock	Rumex pseudonatronatus
Silverweed	Potentilla anserina
Common Plantain	Plantago major
Aster spp.	Aster spp.
Canadian Anemone	Anemone canadensis
Goldenrod	Solidago canadensis
Shrubs/Trees	
Willow	Salix spp.
Western Snowberry	Symphoricarpos occidentalis
Chokecherry	Prunus virginiana
Saskatoon	Amelanchier alnifolia

2010 Field Sheet Information

1) Vegetative Cover of Floodplain and Streambanks
   6
2) Invasive Plant Species
   2
   2
3) Disturbance-increaser Undesirable Herbaceous Species
   1
4) Preferred Tree and Shrub Establishment and Regeneration
   2
5) Utilization of Preferred Trees and Shrubs
   1
6) Standing Decadent and Dead Woody material
   3
7) Streambank Root Mass Protection
   4
8) Human-Caused Bare Ground
   4
9) Streambank Structurally Altered by Human Activity
   2
10) Streambank Subject to Active Lateral Cutting (erosion)
   6
11) Reach Structurally Altered by Human Activity (excl.banks)
   2
12) Stream Channel Incisement (vertical stability)
   3

Total = 38 – Healthy with Problems

Score out Total	17	23	29	32	34	37	40	46	52
%	30	40	51	56	60	65	70	80	91

Unhealthy | *Healthy with Problems* | *Healthy*

67%

Notes:

1) Vegetative Cover of Floodplain and Streambanks

- Lush vegetation on much of the riparian and reach, majority Snowberry/Buckbrush, Licorice, Quackgrass, Rose spp., Kentucky Blue Grass

2) Invasive Plant Species

- Smooth Brome, Canada Thistle

3) Disturbance-Increaser Undesirable Herbaceous Species

- Quackgrass, Foxtail Barley, Kentucky Blue Grass, Silverweed, Snowberry

4) Preferred Tree and Shrub Establishment and Regeneration

- Mostly Snowberry, hardly any willows establishing (North bank) No Red Osier Dog Wood

5) Utilization of Preferred Trees and Shrubs

- Any of the willows that are present have been browsed heavily on the North Bank, may be caused by the fence that is present. South Bank appears to be browsed less.

6) Standing Decadent and Dead Woody Material

- Very little to no killing of woody species

7) Streambank Root Mass Protection

- Although lots of Quackgrass and Kentucky Blue Grass are present, at the water's edge mostly all Sedge spp. And Rushes. More Chokecherry/Saskatoon would be preferable and less Snowberry.

8) Human-Caused Bare Ground

- 1-5%, North Bank – Hummocky and Pugging occurring at waters edge by cattle, hot spot where watering occurs near the Bridge area; this not taking into account cattle trailing occurring above the riparian area, significant bare ground occurring for animal presence.

9) Streambank Structurally Altered by Human Activity

- Hummocks prevalent at waters edge on North Side

10) Streambank Subject to Active Lateral Cutting

- Very little to no lateral cutting, some natural draw down on Southside bank

11) Pugging, Hummocking and/or Rutting

- Obvious pugging from cattle movement on Northbank, upper riparian area has large cattle trailing occurring, very hot spot where cattle water near bridge, severe erosion occurring at the watering location. Cattle filter through two metal panels, trailing occurring there as well

12) Stream Channel Incisement (vertical stability)

- Stage 1b (see page 68 Streams and Small Rivers Riparian Health Assessment)

ADOPT Mike Lewan Project – Rough [illegible] 2010.

Rainbow Bridge

Smooth Brome
Bluegrass
Snowberry

Narrow – [illegible]
mint
licorice
willow
Curly dock
Sedges
Aster
reed grass.

Sandy soil throughout
- very confined flood plain
- pugging & hummocky
- very little bare soil
- little willow, too much snowberry
- lots of bluegrass
- many willows browsed
- North side less browsed than South

- South side cattle trails
- hot spot where crossings occur.

- Asters
- snow berry mainstay
- Rose / Buckbrush
- Need more Chokecherry / Saskatoon
- Kentucky Blue Grass

RIPARIAN HEALTH ASSESSMENT - FIELD SHEET

Landowner/lessee: _____ Date: _____ Reach No: _____

Stream/River: _____

Site Description: _____

	Scores or N/A	
	Actual	*Possible*
1. Vegetative Cover of Floodplain and Streambanks (6) 4 2 0	6	
2. Invasive Plant Species 3 (2) 1 0 (cover); 3 (2) 1 0 (density)	2 / 2	
3. Disturbance-increaser Undesirable Herbaceous Species 3 2 (1) 0 – Kentucky bluegrass, quackgrass	1	
4. Preferred Tree and Shrub Establishment and Regeneration 6 4 (2) 0 – nearly any dogwood/willow	2	
5. Utilization of Preferred Trees and Shrubs 3 2 (1) 0 – willows are browsed.	1	
6. Standing Decadent and Dead Woody Material (3) 2 1 0 – no killing occurring	3	
7. Streambank Root Mass Protection 6 (4) 2 0 – rush / sedges @ waters edge	4	
8. Human-Caused Bare Ground 6 (4) 2 0 – 1-5% – not counting trails	4	
9. Streambank Structurally Altered by Human Activity 6 4 (2) 0 – hummocks Southside	2	
10. Streambank Subject to Active Lateral Cutting (erosion) (6) 4 2 0 – natural draw down	6	
11. Reach Structurally Altered by Human Activity (excl. banks) 3 (2) 1 0 – including path	2	
12. Stream Channel Incisement (vertical stability) 9 6 (3) 0	3	
TOTAL	38	

Score out total	17	23	29	32	34	37	40	46	52
%	30	40	51	56	60	65	70	80	91

← Unhealthy → ← Healthy With Problems → ← Healthy →

Swift Current Creek Watershed Stewards

ADOPT

Riparian Assessment

2013

2013 Field Sheet Information

1) Vegetative Cover of Floodplain and Streambanks
   4
2) Invasive Plant Species
   0
   0
3) Disturbance-increaser Undesirable Herbaceous Species
   3
4) Preferred Tree and Shrub Establishment and Regeneration
   2
5) Utilization of Preferred Trees and Shrubs
   3
6) Standing Decadent and Dead Woody material
   3
7) Streambank Root Mass Protection
   6
8) Human-Caused Bare Ground
   6
9) Streambank Structurally Altered by Human Activity
   6
10) Streambank Subject to Active Lateral Cutting (erosion)
   6
11) Reach Structurally Altered by Human Activity (excl.banks)
   3
12) Stream Channel Incisement (vertical stability)
   3

Total = 51 – Healthy

Score out Total	17	23	29	32	34	37	40	46	52
%	30	40	51	56	60	65	70	80	91

Unhealthy | *Healthy with Problems* | *Healthy*

81%

Lewans Riparian Health Assessment

November 12, 2013

Photo 1: Looking West at start of polygon

Photo 2: Looking East at start of polygon

Photo 3: Down cutting and bare ground

Photo 4: Bare ground visible at tip of photo #3

Photo 5: Looking west from mid-polygon

Photo 6: Good streambank protection

Photo 7: Off-site water system

Photo 8: Intake

Photo 9: Willow saplings

Photo 10: More young shrubs

Photo 11: Looking East from end of polygon

Photo 12: Looking West from end of polygon

Krista Connick Todd
NH 7-11-18-W3

RIPARIAN HEALTH ASSESSMENT - FIELD SHEET

12U 0688844 UTM 5530047 to 12U 0688933 UTM 5530416.

Landowner/lessee: Mike Lewans Date: Nov 2013 Reach No: 1

Stream/River: Swift Current Creek

Site Description: Rainbow Bridge Cwater sampling / off site watering system)

	Scores or N/A Actual	Possible
1. Vegetative Cover of Floodplain and Streambanks 6 (4) 2 0	4	6
2. Invasive Plant Species 3 2 1 (0) (cover)	0	3
3 2 1 (0) (density)	0	3
3. Disturbance-increaser Undesirable Herbaceous Species (3) 2 1 0	3	3
4. Preferred Tree and Shrub Establishment and Regeneration 6 4 (2) 0	2	6
5. Utilization of Preferred Trees and Shrubs (3) 2 1 0	3	3
6. Standing Decadent and Dead Woody Material (3) 2 1 0	3	3
7. Streambank Root Mass Protection (6) 4 2 0	6	6
8. Human-Caused Bare Ground (6) 4 2 0	6	6
9. Streambank Structurally Altered by Human Activity (6) 4 2 0	6	6
10. Streambank Subject to Active Lateral Cutting (erosion) (6) 4 2 0	6	6
11. Reach Structurally Altered by Human Activity (excl. banks) (3) 2 1 0	3	3
12. Stream Channel Incisement (vertical stability) (9) 6 3 0	9	9
TOTAL	51	63

Score out total	17	23	29	32	34	37	40	46	52
%	30	40	51	56	60	65	70	80	91

← Unhealthy → ← Healthy With Problems → ← Healthy →

8190

- Lots of good veg cover.
- Smooth brome in abundance - class 12 distribution.
- almost all the willows are young saplings - aspen north bank. Half willow is a range of ages.
- some bare ground at old water sites but looks good thru rest of the reach.
- some cutting one bad spot at first meander east of the bridge
- small amount of bare ground at old watering site and downcutting.
- some poa - not much for disturbance weed
- not much browse noticed.
- looks good.
- lots of good cover on water's edge.
- water site is still bare, but not pugged. some trailing, but not bare as arable
- one side is steep, but south side is flatter. stage 1b.

RIPARIAN HEALTH ASSESSMENT - FIELD SHEET

Comments

1. Vegetative Cover of Floodplain and Streambanks
-Reed canary, rushes, willow, snowberry, wolfwillow, licorise, poa, sedges, baltic rush, dock, rose, awned WG, Reed grass (Narrow or Northern)

2. Invasive Plant Species -smooth brome

3. Disturbance-Increaser Undesirable Herbaceous Species
• poa.

4. Preferred Tree and Shrub Establishment and Regeneration
-lots of willow shoots along water's edge

Preffered: willow, wolfwillow

5. Utilization of Preferred Trees and Shrubs
- not much browse.

6. Standing Decadent and Dead Woody Material
- not much dead.

7. Streambank Root Mass Protection
-sedge, rush, reed grass.

8. Human-Caused Bare Ground

9. Streambank Structurally Altered by Human Activity

10. Streambank Subject to Active Lateral Cutting (erosion)
-one bad spot at first curve downstream of bridge - maybe dc to increase in speed thru culvert there at highway

11. Pugging, Hummocking and/or Rutting

12. Stream Channel Incisement (vertical stability)
stage 1b. Has space to flood, but surranded by hills.

Sketch stream reach here	*Show photo locations*