Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

SWAG Final Report

Surface Water Assessment Grant (SWAG)
Appendix C

Doc Type: Grant Application

Instructions on Page 5

Grantee Information

Grantee name: Mille Lacs SWCD Contact name: Susan Shaw
Contact phone number: 320-983-2160 Grant award: $111,111.20
Contact e-mail: susan.shaw@millelacsSWCD.org
Project title: PRJ07932_Rum River Watershed Assessment
Grant budget period: Start date (mm/dd/yyyy): 4/1/2013 End date (mm/dd/yyyy): 6/30/2015
Project time period covered by this report: Start date (mm/dd/yyyy): 4/1/2013 End date (mm/dd/yyyy): 12/31/2014

Section I – Work Plan

1. **Have you worked with Minnesota Pollution Control Agency (MPCA) Environmental Quality Information System (EQuIS) staff to establish all sites listed in your grant work plan?**
   ☒ Yes ☐ No Date submitted (mm/dd/yyyy): 6/6/2013

2. **Was monitoring data for these established sites submitted for storage into EQuIS annually?**
   ☒ Yes ☐ No Last submittal date (mm/dd/yyyy): 11/1/2014

3. **If applicable, were stream photos submitted with this report and labeled according to directions specified in the stream monitoring Standard Operating Procedures (SOP)?**
   ☒ Yes ☐ No Date submitted (mm/dd/yyyy): 10/30/2014

Describe in detail the monitoring that has been conducted during the entire grant period. Please be specific by completing Table 1. The table should reflect all sites in your grant work plan, their site identifications (IDs), the number of samples to be collected according to the work plan and the number of samples actually collected (include Quality Assurance/Quality Control [QA/QC] sampling). If you were not able to meet your sampling obligations, describe in the comments section what sampling was missed and why. Refer to the instructions found at the end of this report for an example of the completed table.

Table 1. Monitoring summary

Waterbody	Site ID#	Planned sampling		Actual sampling		Comments
		Parameter	No.	Parameter	No.	
Rum River Princeton	S004-409	E.coli	16	E.coli	16	**2013** E.coli sample from 6/ 20 analyzed as fecal coliform, exceeded 24 hold. Will make up next June **2014** Extra E coli sample taken 6/12/14, resulting in extra DO, T, pH, conductivity (hereafter referred to as DO etc.)
		TSVS,TSS, N,	11	TSVS,TSS, N,	11	
		TKN,NO2+NO3, TP	17	TKN,NO2+NO3, TP	17	
		Sulfate, Chloride,hardness,	11	Sulfate, Chloride,hardness,	11	
		Temp, ph, secchi, DO, Conductivity	19	Temp, ph, secchi, DO, Conductivity	20	
		Chloro A, pheophytin	14	Chloro A, pheophytin	14	
West Branch Rum River	S002-953	E.coli	16	E.coli	16	**2013** E coli sample for 6/20 and 6/26 analyzed as Fecal coliform, exceeded 24 hour hold. Will make up the two fecal samples next June.
		TSVS,TSS,TP,N,	11	TSVS,TSS,TP,N,	11	
		TKN,NO2+NO3,Sulfate, Chloride,hardness,	11	TKN,NO2+NO3,Sulfate, Chloride,hardness,	11	
		Temp, ph, secchi, DO, Conductivity	19	Temp, ph, secchi, DO, Conductivity	21	

						2014 Extra E coli samples taken 6/16/14 and 7/1/14, resulting in two extra DO etc. readings. E coli samples on 6/4 and 6/16 exceeded 24 hour hold (78 & 47 minutes, respectively)
Stanchfield Creek	S004-980	E.coli TSVS,TSS,TP,N, TKN,NO2+NO3,Sulfate, Chloride,hardness, Temp, ph, secchi, DO, Conductivity	16 11 11 19	E.coli TSVS,TSS,TP,N, TKN,NO2+NO3,Sulfate, Chloride,hardness, Temp, ph, secchi, DO, Conductivity	16 11 11 20	**2013** E.coli sample for 6/20 analyzed as fecal coliform, exceeds 24 hour hold. Will make up the fecal sample next June. **2014** Extra E coli sample taken 6/12/14, resulting in extra DO etc reading.
Rum River CSAH 16	S002-955	E.coli TSVS,TSS, N, TKN,NO2+NO3, TP Sulfate,Chloride,hardness, Temp, ph, secchi, DO, Conductivity Chloro A, pheophytin	17 12 18 12 19 15	E.coli TSVS,TSS, N, TKN,NO2+NO3, TP Sulfate,Chloride,hardness, Temp, ph, secchi, DO, Conductivity Chloro A, pheophytin	17 12 18 12 21 15	**2013** E coli sample for 6/20 and 6/26 analyzed as Fecal coliform, exceeded 24 hour hold. (>24 but < 30 hours). Will make up the two fecal samples next June. Field blank duplicate taken 8/7/13, resulting in one more reading than other Rum River sites (E.coli through hardness +cloro/pheo) **2014** Extra E coli samples taken 6/16/14 and 7/1/14, resulting in two extra DO etc readings.
Estes Brook	S006-104	E.coli TSVS,TSS,TP,N, TKN,NO2+NO3,Sulfate, Chloride,hardness, Temp, ph, secchi, DO, Conductivity	16 11 11 19	E.coli TSVS,TSS,TP,N, TKN,NO2+NO3,Sulfate, Chloride,hardness, Temp, ph, secchi, DO, Conductivity	16 11 11 21	**2013** E coli sample for 6/20 and 6/26 analyzed as Fecal coliform, exceeded 24 hour hold. (>24 but < 30 hours). Will make up the two fecal samples next June. **2014** Extra E coli samples taken 6/16/14 and 7/1/14, resulting in two extra DO etc readings. E coli samples 6/4 & 6/16 exceeded 24 hour hold (52 & 25 minutes respectively.
Tibbetts Brook	S007-553	E.coli TSVS,TSS,TP,N, TKN,NO2+NO3,Sulfate, Chloride,hardness,	17 12 12	E.coli TSVS,TSS,TP,N, TKN,NO2+NO3,Sulfate, Chloride,hardness,	17 12 12	**2013** E coli sample for 6/20 and 6/26 analyzed as Fecal coliform, exceeded 24 hour hold. (>24 but < 30

		Temp, ph, secchi, DO, Conductivity	19	Temp, ph, secchi, DO, Conductivity	21	hours). Will make up the two fecal samples next June. Field blank sample taken 8/7/13, resulting in one more sample than other non-Rum River sites (E.coli through hardness) **2014** Extra E coli samples taken 6/16/14 and 7/1/14, resulting in two extra DO etc readings.
Bradbury Brook	S007-554	E.coli TSVS,TSS,TP,N, TKN,NO2+NO3,Sulfate, Chloride,hardness, Temp, ph, secchi, DO, Conductivity	16 11 11 19	E.coli TSVS,TSS,TP,N, TKN,NO2+NO3,Sulfate, Chloride,hardness, Temp, ph, secchi, DO, Conductivity	16 11 11 21	**2013** E coli sample for 6/20 and 6/26 analyzed as Fecal coliform, exceeded 24 hour hold. (>24 but < 30 hours). Will make up the two fecal samples next June. **2014** Extra E coli samples taken 6/16/14 and 7/1/14, resulting in two extra DO etc readings. E coli sample taken 6/4/14 exceeded 24 hold time (13 minutes).
Rum River 95	S005-326	E.coli TSVS,TSS, N, TKN,NO2+NO3, TP Sulfate, Chloride,hardness, Temp, ph, secchi, DO, Conductivity Chloro A, pheophytin	16 11 17 13 19 14	E.coli TSVS,TSS, N TKN,NO2+NO3, TP Sulfate, Chloride,hardness, Temp, ph, secchi, DO, Conductivity Chloro A, pheophytin	16 11 17 13 20 14	**2013** E coli sample for 6/20 analyzed as Fecal coliform, exceeded 24 hold. Will make up fecal sample next June. **2014** Extra E coli sample taken 6/12/14, resulting in one extra DO etc reading. E coli sample taken on 7/8/14 exceeded 24 hour hold time (2 minutes).
Rum River Sherburne	S007-551	E.coli TSVS,TSS, N, TKN,NO2+NO3, TP Sulfate, Chloride, hardness, Temp, ph, secchi, DO, Conductivity Chloro A, pheophytin	16 11 17 13 19 14	E.coli TSVS,TSS, N, TKN,NO2+NO3, TP Sulfate, Chloride, hardness, Temp, ph, secchi, DO, Conductivity Chloro A, pheophytin	16 11 17 13 20 14	**2103** E coli sample for 6/20 analyzed as Fecal coliform, exceeded 24 hold. Will make up fecal sample next June **2014** Extra E coli sample taken 6/12/14, resulting in one extra DO etc reading. E coli sample 6/3/14 exceeded 24 hour hold time(20 minutes)
Rum River (Oak Circle)	S007-552	E.coli TSVS,TSS, N, TKN,NO2+NO3, TP, Sulfate, Chloride, hardness, Temp, ph, secchi, DO, Conductivity	16 11 17 13 19	E.coli TSVS,TSS, N, TKN,NO2+NO3, TP Sulfate, Chloride, hardness, Temp, ph, secchi, DO, Conductivity	16 11 17 13 19	**2013** E coli sample for 6/20 analyzed as Fecal coliform, exceeded 24 hold. Will make up fecal sample next June.

		Chloro A, pheophytin	14	Chloro A, pheophytin	14	**2014** Extra E coli sample taken 6/12/14, resulting in one extra DO etc reading.
Ogechie Lake	48-0014-00-204	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	
Long Lake	30-0056-00-201	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	
Elizabeth Lake	30-0083-00-201	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	
German Lake	30-0100-00-201	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	
North Stanchfield Lake	30-0143-00-201	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	
Tennyson Lake	30-0113-00-201	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	
Baxter Lake	30-0114-00-201	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	TP, Chloro-A, secchi, DO, Temp, Conductivity, pH	11	

4. Please indicate if there were any noteworthy events or conditions that may have affected the parameter results. Some examples may be upstream construction, drought or low flow conditions, feedlot activity, beaver impoundments, or waterfowl management areas.

Table 2. Monitoring conditions

Waterbody	Site ID #	Comments
Rum River	**2013** 4 stations: S004-409; S007-551; S005-326; S007-552	**2013** Significant overbank flooding event late June, resulting in peak flows between 6/24 and 6/27. Rum crested at St Francis recording gage at 4800 cfs (6/29 to 6/30; flow on 6/21 = 800 cfs). Unable to access S007-552 on 6/27 due to flooding, made up sample on 7/2. **2014** Significant overbank flooding in early June, discharge at St. Francis measured at 3100 cfs on 6/3/14 and peaked at ~7000 cfs on 6/8/14, making the peak in Cambridge approx. 6/6/14 and in Princeton approx 6/3/14. Note the 2014 event was significantly higher than the 2013 flood. All samples were made on schedule.
West Branch Rum River	S002-953	**2013** Overbank flooding 6/26 **2014** Overbank flooding 6/4/14
Tennyson Lake	30-0113-00-201	**2013** Very low water levels in August and September made access extremely difficult. Sample site impeded by dense submergent plant growth. **2014** very high water levels in May
All stream sites	S002-953, S004-980, S002-955, S006-104, S007-553, S007-554, S005-326, S007-551, S007-552, S004-409	**2013** Very low flow conditions late August into September
Stanchfield Creek	S004-980	**2013** Bridge at sampling site removed 5/29/13,

		requiring samples to be taken at upstream construction limits until sample for 6/27/13, which was taken from new bridge deck
German Lake	30-0100-00-201	**2013** Wild Rice dense growth at sampling site August and September, difficult to sample with integrated sampler **2014** Wild Rice dense growth at sampling site August and September, difficult to sample with integrated sampler
Rum River (CSAH 16) Tibbetts Brook	S002-955 S007-553	**2013** These two streams (and only these two) had Equipment blank samples taken 8/7/13 in addition to a field duplicate and regular sample. It appears from the lab results that the results for ammonia nitrogen reported for the blanks was switched with the result reported for the field duplicate. Ammonia N is sampled with Phosphorus and the equipment blank is made with deionized water. Therefore, one would expect results to be near 0 on the blank for both TP and Ammonia N. This did not occur with the ammonia nitrogen results for the blank, but were reported near 0 for the field duplicate, the opposite of what was reported for Phosphorus. (See column AF and AG – Equis 2013 data)
Long Lake	30-0056-00-201	**2013** Construction at CR 6 resulted in removal of culvert at inlet to lake on 6/13/13 sampling event, **no** erosion controls present, flow through open channel at culvert site, silt plume visible for extensive area downstream of County road 6. Took sample about ¾ mile downstream. Reported to DNR and County Engineer (it was a county project).Culvert was replaced by 6/15/13.
Nine stream sites	**2013** S002-953, S004-980, S002-955, S006-104, S007-553, S007-554, S005-326, S007-551, S007-552	**2013** The first sample run for E.coli, made on 6/13/2013, resulted in 9 of the ten sites exceeding the 24 hour hold. Hold time for samples ranged from 24.8 to 29 hours
Rum River 95 Cambridge	S005-326	**2014** Bridge replacement started in Spring, Deck removed and sheet piling installed in River around new pier sites in May. Sheet piling overtopped by June flood, though turbidity from that source was indistinguishable due to extremely high and fast current resulting in sediment loading at all Rum stations
Rum River Oak Circle	S007-552	**2014** City of Cambridge reported a raw sewage discharge upstream of this station on 8/6/14 (spill occurred earlier). Sample taken on 8/6/14 bracketed the spill site, upstream (S005-326) and downstream (S007-552). No noticeable E coli increase downstream of the spill site was observed from the sample taken 8/6/14
Rum River Sherburne	S007-551	**2014** Significant bank erosion noted at sampling site due to June flooding, resulting in exposed soils on high banks at site, (photos included in records submitted with data)

5. Please describe progress in successfully carrying out aspects of the grant work plan:

Of the ten stream sites, five are located on the main stem of the Rum River. The Rum is listed on the Aquatic Invasive Species list for zebra mussels, therefore a separate set of sampling equipment was used for these five stations. Ogechie Lake (48-0014-00-204) was sampled with separate equipment from the 6 Isanti Lakes, as it is a flowage on the Rum River and was sampled by staff from the Mille Lacs band. Stream equipment included separate YSI 556 multi probe instruments, weighted sampling bucklets, simple open sampling buckets, telescoping rod samplers (1 liter), and 100 cm transparency tubes. Changes in the sampling schedule were required once E coli sampling started. Because E.coli samples must be processed within 24 hours, the technician began taking samples on two successive evenings, instead of doing all ten streams in one day. By taking samples in the evening, generally after 17:00 hours, the samples could be delivered to the lab courier and transported to the lab in New Ulm the next day in time to be processed within time parameters. For those sampling events when E. coli was not included, all ten streams could be sampled in one day without exceeding holding times. As part of the QA/QC plan, field duplicates were taken on the 9th sampling event (Aug 7/8,2013) at all ten stream stations. Equipment blank samples were taken at Two stations: Rum CSAH16 and Tibbetts Brook, S002-955 and S007-553, respectively. Equipment blank samples consisted of a triple rinse of the equipment using deionized water, followed by a sample blank made with deionized water from the AIS or non-AIS equipment for the lab analytes.

6. Describe in detail any problems, delays, or difficulties that have occurred in fulfilling the grant work plan. How did the grantee resolve these problems? Were there any change orders and/or amendments to the grant contract and/or work plan? If yes, list.

Nine of the ten stream stations exceeded the 24 hour hold time for E coli on 6/13/2013, resulting in the sampling schedule changes described in #5 above. The sampling schedule (ie starting after 17:00) was repeated in 2014, however the lab failed to analyze E coli within the 24 hour hold time on 4 different dates, involving 5 (of 10) stream stations. In addition, there were a total of 15 E coli samples taken in June, 2013 that were analyzed for Fecal coliform count, not E coli count. All 15 of these samples were added to the 2014 schedule as extra samples, so that the total number of E coli samples called for in the work plan would be taken. Some of the repeat samples also became samples where the hold time was exceeded. In all, 7 of the scheduled 45 E coli samples taken in June and early July, 2014 exceeded 24 hour holds. The E coli sample results taken on 6/12/14, for five stations (Rum Sherb, Rum Prince, Stanch Ck, Rum 95 and Rum Oak Cir) are significantly above all other results for those stations, leading to the possibility that the samples were not kept cold during transit to the lab, though they were all analyzed within the 24 hour time limit. E.coli samples that exceeded the 24 hour hold time generally did not show an increase in the number of colonies counted.

PH readings taken on 8/13/14 on the 6 Isanti lakes seemed generally high all day. Both of the YSI 556 meters were sent to YSI in Ohio prior to the start of the 2014 sampling season and both had repair or replacement of the pH probe. However, pH calibration became increasingly difficult as the season progressed with drifting of the readings occurring. Due to the time required to send the instruments to Ohio for repair, it was not possible to send them in for repair in August, 2014. Rather, the instruments were calibrated prior to each sampling event and the pH readings were reported in the Equis data verbatim from the instruments. Readings for pH and DO seemed generally high on the September 17, 2014 lake sampling run for the 6 Isanti lakes. The DO membrane for the 556 YSI was replaced two days prior to the lake sampling event, in accordance with normal replacement schedule and the instrument was calibrated prior to the day.

7. Provide an annual quality assurance assessment that includes the following elements.

A. Field meter calibration records (submit only those not previously submitted with an Interim Report).

B. A list of narrative descriptions that highlight specific data points for which adverse field conditions, field meter malfunctions, errors, excess holding time (quantify), lab result qualifiers, or other factors that may have affected the results, and would be beneficial to a data user. *For example,* a description might be included of the cross-section location of sampling chosen on a day when a stream is out of banks, and the main flow is inaccessible due to floating debris.

C. Complete Table 2 presenting quality control sample results with columns showing comparison to lab method detection limit for sampler blanks, and the relative percent difference(RPD) for field duplicates (see the *SWAG Quality Assurance Project Plan*). Please use the "maximum expected relative percent difference" values presented on page 24 in Appendix D of the *Volunteer Surface Water Monitoring Guide* (http://www.pca.state.mn.us/yhiz8f0) to assess RPD on field duplicates. Field duplicates with values in excess of the expected RPD may be an indication of high variability within the stream, which is useful for data interpretation. Use the comment field to note RPD or sampler blank results outside of expectations.

Table 2. Quality control sample results and analysis

			Sampler blanks		Field duplicates			
Date (mm/dd/yyyy)	**Site ID#**	**Analyte**	**Result**	**Detection limit**	**Sample result**	**Duplicate result**	**RPD**	**Comments**
07/10/2013 Long 56	30-0056-00-201	Chloro- A			3.7	3.1	17.6	
		Pheophytin			<1	1.3	26.1	
		phosphorus			0.041ppm	0.038	7.6	
07/10/2013 No Stanch	30-0143-00-201	Chloro-A			43	39.9	7.5	
		Pheophytin			2.93	3.24	10.1	
		Phosphorus			0.169	0.177	4.6	
07/10/2013 Tennyson	30-0113-	Chloro-A			14.2	16.6	15.6	
		Pheophytin			10.5	10.4	0.9	

	00-201	Phosphorus			0.201	0.205	2	
07/10/2013 Baxter	30-0114-00-201	Chloro-A Pheophytin Phosphorus			7.3 <1 0.051	9.5 <1 0.050	26.2 0 2	Chlorophyll A exceeds 20% threshold on duplicate.
07/10/2013 German	30-0100-00-201	Chloro-a Pheophytin Phosphorus			<1 <1 0.028	<1 <1 0.033	0 0 16	
07/10/2013 Elizabeth	30-0083-00-201	Chloro-A Pheophytin Phosphorus			1.8 <1 0.017	1.4 <1 0.018	25 0 5.7	Chlorophyll A exceeds 20% threshold on duplicate
07/31/2013 Ogechie	48-0014-00-204	Chloro-A Pheophytin Phosphorus			1.8 0.9 17 ppb	1.3 0.6 19 ppb	32.2 40 11	Chlorophyll A exceeds 20% threshold on duplicate
8/7/2013 Bradbury	S007-554	TP Ammonia N TKN NO2+NO3 TSS TSVS E.coli Chloride Sulfate Hardness			0.028 0.23 1.1 <0.2 2 2 248.9 7.7 <12 133	0.028 0.37 1.6 <0.2 2 2 313 8 <12 131	0 46 37 0 0 0 22.7 3.8 0 1.5	Ammonia N exceeds 10%threshold. TKN exceeds 30% threshold
8/7/2013 RumCSAH16	S002-955	Chloro-A Pheophytin TP Ammonia N TKN NO2+NO3 TSS TSVS E.coli Chloride Sulfate Hardness	1.4 <1 <0.005 0.23 0.6 <0.2 <2 <2 <1 <3 <12* <3.3		<1 1.5 0.21 0.23 0.9 <0.2 6 5 6.3 4.5 <12* 72.9	<1 <1 0.21 <0.16 1 <0.2 3 3 8.5 5.4 <12* 80.9	0 40 0 12.5 10.5 0 66 50 29.7 18 0 10.4	*Sulfate limit due to instrument performance at lab Ammonia N exceeds 10% threshold on duplicate. Result for blank and duplicate may have been switched by lab. See comment in Table 2 and narrative for 7B. TSS exceeds 30% threshold for duplicate
8/7/2013 Tibbetts Brook	S007-553	TP Ammonia N TKN NO2+NO3 TSS TSVS E.coli Chloride Sulfate Hardness	<0.005 0.23 0.4 <0.2 <2 <2 <1 <3 <12* <3.3		0.079 0.23 1 0.2 2 2 95.9 3.7 <12* 138	0.078 <0.16 1.1 0.2 3 3 55.4 3.5 <12* 135	1.3 12.5 9.5 0 40 40 53 5.5 0 2	*Sulfate limit due to instrument performance at lab Ammonia N exceeds 10% threshold on duplicate. Result for blank and duplicate may have been switched by lab. See comment in Table 2 and narrative for 7B. E coli exceeds 30% threshold for duplicate
8/7/2013 Estes Brook	S006-104	TP Ammonia N TKN			0.056 0.23 0.9	0.057 0.23 0.9	1.7 0 0	E coli exceeds 30% threshold for duplicate

		NO2+NO3			0.62	0.67	7.8	
		TSS			4	4	0	
		TSVS			4	3	28.6	
		E.coli			435.2	613.1	33.9	
		Chloride			19.8	20.4	3	
		Sulfate			22.6	23	1.7	
		Hardness			198	205	3.5	
8/7/2013 West Branch Rum River	S002-953	TP			0.062	0.073	16.3	TSS exceeds 30% threshold for duplicate
		Ammonia N			<0.16	<0.16	0	
		TKN			1	0.9	10.5	E coli exceeds 30% threshold for duplicate
		NO2+NO3			0.63	0.66	4.6	
		TSS			3	6	66	
		TSVS			3	5	50	
		E.coli			228.2	613.1	91.6	
		Chloride			17.1	17.4	1.7	
		Sulfate			19.7	16.8	15.9	
		Hardness			184	183	0.5	
8/8/2013 Rum River Sherburne	S007-551	Chloro-A			<1	<1	0	TKN exceeds 30% threshold for duplicate
		Pheophytin			<1	<1	0	
		TP			0.041*	0.043*	4.8	*reporting limit for TP and sulfate elevated due to instrument performance at lab
		Ammonia N			<0.16	<0.16	0	
		TKN			0.9	0.6	40	
		NO2+NO3			<0.2	<0.2	0	
		TSS			8	8	0	
		TSVS			4	4	0	
		E.coli			16.1	13.4	18.3	
		Chloride			7.3	7.3	0	
		Sulfate			<12*	<12*	0	
		Hardness			97	94.8	2.3	
8/8/2013 Rum River Princeton	S004-409	Chloro-A			1.1	<1	9.5	
		Pheophytin			<1	<1	0	
		TP			0.034*	0.033*	3	
		Ammonia N			<0.16	<0.16	0	*reporting limit for TP and sulfate elevated due to instrument performance at lab
		TKN			0.9	1	10.5	
		NO2+NO3			<0.2	<0.2	0	
		TSS			5	6	18	E coli exceeds 30% threshold for duplicate
		TSVS			3	4	28.6	
		E.coli			27.5	15.3	57	
		Chloride			5.3	5.3	0	
		Sulfate			<12*	<12*	0	
		Hardness			88.9	89.9	1.1	
8/8/2013 Stanchfield Creek	S004-980	TP			0.143*	0.141*	1.4	
		Ammonia N			<0.16	<0.16	0	
		TKN			1.3	1.4	7.4	TSS exceeds 30% threshold for duplicate
		NO2+NO3			<0.2	<0.2	0	
		TSS			2	3	40	*reporting limit for TP and sulfate elevated due to instrument performance at lab
		TSVS			2	3	40	
		E.coli			9.8	10.9	10.6	
		Chloride			8.4	8.3	1.2	
		Sulfate			<12*	<12*	0	
		Hardness			206	201	2.5	

8/8/13 Rum River CambTH95	S005-326	Chloro-A Pheophytin TP Ammonia N TKN NO2+NO3 TSS TSVS E.coli Chloride Sulfate Hardness			3.1 <1 0.59* <0.16 0.9 <0.2 6 4 4.1 8.3 <12* 117 258	1.6 2.1 0.59* 0.23 0.9 <0.2 6 5 12.1 8.3 <12* 117 259	63.8 71 0 35.9 0 0 0 22 98.7 0 0 0 0.4	*reporting limit for TP and sulfate elevated due to instrument performance at lab Ammonia N exceeds 10% threshold on duplicate E coli exceeds 30% threshold for duplicate
8/8/2013 Rum River OakCircle	S007-552	Chloro-A Pheophytin TP Ammonia N TKN NO2+NO3 TSS TSVS E.coli Chloride Sulfate Hardness			2.5 <1 0.092* <0.16 0.9 0.27 3 3 16 10.3 <12* 111	2.3 <1 0.092* 0.22 0.7 0.22 4 4 40.4 10.4 <12* 121	8.3 0 0 31.6 25 20.4 28.6 28.6 86.5 1 0 8.6	*reporting limit for TP and sulfate elevated due to instrument performance at lab Ammonia N exceeds 10% threshold on duplicate NO2/NO3 exceeds 10% threshold for duplicate E coli exceeds 30% threshold for duplicate

Section II – Participants in Project

8. Have there been any changes in project staff or contractors or has participation by companies or units of government changed? How many volunteers participated in monitoring activities during this project? Complete Table 3 by listing the contact information for your volunteers. Once your grant ends, the MPCA Citizen Lake/Stream Monitoring Program coordinators plan to contact these volunteers to see if they are interested in continuing to collect transparency data at their assigned sites.

No staff or contractor changes from the work plan have occurred. No volunteers were utilized.

Note: *You do not need to complete the volunteer table below if your volunteers have not changed from those you identified on your last interim report.*

Table 3. Volunteer contact information

Tennessen warning: Pursuant to Minn. Stat. § 13.43, some of the information that you are being asked to provide in the above table is classified as private data on individuals as described in Minn. R. 1205.0200, subp. 9, Minn. R. 1205.0400 and Minn. Stat. § 13.02, subd. 12 (home contact information). You are not legally required to provide this private data, but if you do the MPCA plans to use this information to invite volunteers to join their Citizen Lake/Stream Monitoring Programs (CMPs) after your grant project has ended. All private volunteer information is kept in a secure location and is never released to anyone outside of our SWAG or CMPs.

Organization name: _____

Grantee contact: _____ Telephone number: _____

Waterbody	Site ID#	Contact name	Address	Telephone	E-mail address

9. Please describe training that you and/or an outside trainer provided to your project participants throughout the course of this grant. Include details on what the training covered, who administered this training and when it was offered (i.e., at the start of the grant, at the beginning of each field season, etc.).

Aaron Onsrud (MPCA) provided stream site training to Mike Mueller, Water Technician for Isanti and Mille Lacs, on May 1, 2013. All ten stream sites were evaluated for sampling procedures and protocols. Tiffany Determan, Sherburne County Water Planner, provided Lake sampling training on May 16, 2013. All six Isanti County lakes were visited and sampling protocols were established. Tiffany Determan also provided in office training on 7/2/13 in setting up the project Equis spreadsheet and via phone/email on subsequent occasions involving questions about QA/QC sampling procedures.

Section III – Evaluation Plan Results

10. Was the project a success? Did you achieve your goals?

The project resulted in compiling a broad set of chemical and physical measurements of the Rum River in Mille Lacs, Sherburne and Isanti counties. Monitoring occurred upstream and downstream of the the Cities of Milaca, Princeton and Cambridge on the main stem of the Rum River. Monitoring of tributary streams will provide important insight regarding the contribution of nutrient and sediment loading from mixed forested and agricultural watersheds.

11. What would you recommend to others interested in attempting a project like yours?

anticipate the difficulties in getting E coli samples to the lab in 24 hours. Equipment issues.

12. Distribution of the project information is a legislative requirement for all SWAGs. How do you plan to distribute project information to interested parties (the media, businesses, Local Unit of Government [LUGs] etc.)? Is this information to be posted on your Web site? Is so, please supply the link to your Web site.

www.millelacsswcd.org

Section IV – Budget

13. Fill in Table 4. List below and identify any time extensions or any additional dollars incorporated into your project budget through an amendment and/or any dollars reallocated from one task to another through a change order after the original grant award.

The contract was revised in 2014 to reflect a change from staff #1 hours

No. of hours 960 @ Hourly rate 17.24 x 2 years

to No. of hours 576.1 @ Hourly rate 28.73 x 2 years

Table 4. Project expenditures

Project budget	MPCA grant funds available	Total MPCA funds expended	Total remaining balance	Percent of budget expended
Objective 1: (Title) Prepare and plan monitoring				

Project budget	MPCA grant funds available	Total MPCA funds expended	Total remaining balance	Percent of budget expended
of 10 streams and 7 lakes				
Task: Staff	$11,224.80	$9,938.36	$1,286.44	89 %
Task: Travel	$542.40	$253.18	$ 289.22	47 %
Task:			$ 0.00	%
Task:			$ 0.00	%
Objective 2: (Title) Monitoring of lakes and streams				
Task: Staff	$53,576.00	$29,897.65	$23,678.35	56 %
Task: Travel/recognition event	$2,852.40	$2,203.17	$ 649.23	79 %
Task: Monitoring supplies	$5,762.00	$4,773.27	$ 988.73	83 %
Task: NRRI samples/2014 River Nutrients	$2,942.50	$2,942.50	$ 0.00	100 %
Objective 3: (Title) Lab Analysis				
Task: Lab Analysis	$19,755.00	$19,737.40	$ 17.60	100 %
Task: Lab QA/QC	$3,736.10	$2,113.75	$1,622.35	57 %
Task: Shipping	$720.00	$585.00	$ 135.00	81 %
Task:			$ 0.00	%
Objective 4: (Title) Fiscal management, progress reporting and planning				
Task: Staff	$10,000.00	$10,000.00	$ 0.00	100 %
Task:			$ 0.00	%
Task:			$ 0.00	%
Task:			$ 0.00	%
Objective 5: (Title)				
Task:			$ 0.00	%
Task:			$ 0.00	%
Task:			$ 0.00	%
Task:			$ 0.00	%
Objective 6: (Title)				
Task:			$ 0.00	%
Task:			$ 0.00	%
Task:			$ 0.00	%
Task:			$ 0.00	%
Column Total	$111,111.20	$82,444.28	$28,666.92	74 %

PRJ 07932 Rum River Final Report – Narrative for Question 7: annual quality assurance assessment

7 B : adverse field conditions – All ten stream stations included in the study experienced high flow conditions in June of 2013 and June of 2014. Flooding was more significant in the southern streams (downstream locations) particularly the Rum River at Princeton (S004-409), Rum River Sherburne (S007-551), Rum River 95 in Cambridge (S005-326), Rum River Oak Circle(S007-552), and West Branch of Rum River (S002-953). Flooding overbank in June 2013 resulted in a missed reading at S007-552 (RR Oak Circle) on 06/27/2103. That sample was made up on 7/2/2013. Sampling in 2014 was not prevented by flooding due to the timing of the flood peak and the timing of sampling; however it was noted that transparencies were down and there was a marked increase in floating debris observed on the water. Bank erosion at S007-551 just downstream of Princeton, was significant, and documented in field notes and by photos in

June 2014. The sampling site at this station is on an outside bend of the river and taken from the shoreline of a private residence. Bridge removal over the Rum River on Highway 95 at Cambridge (S005-326) began in the spring of 2014, prior to the beginning of sampling. The process resulted in the construction of two sheet piling coffer dams around the instream piers of the old bridge. The coffer dams were subsequently inundated by the June 2014 flood, resulting in the flooding of soil materials placed inside the coffer dams and against the exposed soils of the banks, beneath the old bridge.

Some streams also experienced low flow conditions in August/Sept 2013, particularly Tibbetts Brook, S007-553. Low flow caused rocks beneath the bridge at this station to be exposed, creating some difficulty with the sampling equipment on 8/21/2013. Low water levels also created access problems on Tennyson Lake, 30-0113-00-201 on 9/4/2013. Dense stands of emergent aquatics (rice) created difficulty getting to the sampling location and taking a water sample with the two meter integrated sampler on German Lake, 30-0100-00-201, in August and September of both years.

The bridge at Stanchfield Creek, S004-980, was removed on 5/29/2013. Sampling needed to be taken from shore at the upstream limits of construction until the new bridge deck was accessible on 6/27/2013.

7B: field meter malfunctions There were two YSI 556 meters used in the study areas for Isanti and Mille Lacs counties (6 lakes, 10 stream stations, not Ogechie Lake). One meter, #100477, was used on the lakes and the 5 tributary streams. The other meter, #100459, was used on the 5 Rum River stations. The meter used for the Rum River stations would not calibrate for pH on 8/18/2014, and was taken offline for the remainder of the project (ie the last sample event). Subsequent sampling of the Rum River sites on 8/18/2014 and 8/20/2014 used the meter originally slated for non infested waters only, #100477 (Rum River designated impaired for zebra mussels). Decontamination procedures were used in accordance with S.O.P. for AIS infested waters. In addition, the other meter, #100477, began to show elevated readings for pH, in the opinion of the technician, on lake sampling for 8/13/2014 and 9/17/2014. Both meters had been shipped to Ohio for repair and maintenance in April 2014, and both had repair or replacement of the pH probes. It was not feasible to take the remaining meter out of use in order to return it to Ohio during the field sampling season, so the meter was used for the last two lake runs and the last stream runs: 8/13, 8/18/ 8/20/ 9/17. Dissolved oxygen readings seemed elevated on the lake run on 9/17/2014 on meter #100477, in the opinion of the technician. On the last lake station sampled that day, Long Lake #30-0056-00-201, the DO sensor was uncalibrated , then recalibrated, prior to taking the readings. The initial reading dropped from 9.3 to 8.4 as a result of the recalibration for Long Lake and the subsequent oxygen readings on that lake reflect that process. Oxygen readings for the other lakes sampled on 9/17 are reported from the meter based on the in-office calibration that occurred on 9/15/2014.

7B: errors: During the stream sampling runs on 6/20/2013 and 6/26/2013, samples sent to MVTL (one of two labs used) requested fecal coliform counts, instead of the E.coli counts required. As a result the lab reported fecal coliform counts for all 10 stream stations on 6/20/2013 and for 5 stream stations (half) on 6/26/2013. Fecal coliform counts cannot be substituted for E. coli counts, therefore replacement samplings (a total of 15 samples) were added to the 2014 schedule on June 12, June 16 and July 1, 2014 (5 stations sampled each day). Conductivity readings were reported both from instrument readings taken in the field and by lab analysis in 2013. The duplication of readings was not required as part of the study. The first

nutrient sample (Chlorophyll A/ pheophytin fraction) required for the five Rum River stations was missed in early June, 2013. A makeup sample was taken 9/18/13.

7B excess holding time: Nine of the ten stream stations sampled on 6/13/2013 exceeded the 24 hold time for E. Coli. Time overage ranged from 0.8 hours to 5 hours over (i.e. 24.8 to 29 hours from sampling to analysis). The sampling protocol was changed after that from ten stations per day to five, starting after 17:00 in the evening to allow for adequate transportation time to the lab in New Ulm the next day. Despite the change in sampling protocols, there were excess holding times reported in 2014, ranging from 2 minutes to 78 minutes beyond the 24 hour limit. Excess holding times were reported on 6/3/2014 at Rum Sherburne (S007-551 – 20 minutes). Excess holding times were reported on 6/4/2014 and 6/16/2014 at West Branch (S002-953 – 78 and 47 minutes) and at Estes Brook (52 and 25 minutes). Excess holding time was reported on 6/4/2014 at Bradbury Brook (S007-554 -13 minutes). Excess holding time reported on 7/8/2014 at Rum 95 (S005-326 – 2 minutes). Some of these overages were the makeup samples taken in 2014 due to the fecal coliform error from 2013.

7B lab result qualifiers: All five stations (Rum Princeton S004-409, Rum Sherburne S007-551, Stanchfield Creek S004-980, Rum 95 S005-326, and Rum Oak Circle S007-552) sampled on 6/12/2014 had E coli readings that were excessively high, far higher than a normal distribution range of readings for those stations. It is likely that the samples did not remain cold prior to analysis, resulting in errant results.

The sample for Ogechie Lake (48-0014-00-204) taken 8-26-2014 was reported to be warm upon arrival at the NRRI lab in Duluth. This lake sample analyzed Chlorophyll A, pheophytin and phosphorus. The phosphorus sample for RumCSAH16 (S002-955) taken 6/4/2014 was diluted by the lab, MVTL, due to "result above calibration of linear range". The result reported is considerably higher than any other phosphorus readings reported at this station.

Sulfate results taken on 8/7/2013 were elevated due to instrument performance at the lab (MVTL). Phosphorus samples taken on 8/8/2013 were elevated due to instrument performance at the lab (MVTL).

A field duplicate and an equipment blank sample were taken from Rum CSAH16 (S002-955) and Tibbetts Brook (S007-553) on 8/7/2013. Field duplicates analyze water from the stream whereas the equipment blanks analyze deionized water that is placed into the sampling equipment. For both of these stations, the water that was analyzed for phosphorus and ammonia nitrogen was placed into the same bottle and sent to the lab. Accordingly, one would expect "normal" readings for the stream water (duplicate) and "near zero" readings for the deionized water (blank). However, the lab reported "near zero" results for the field duplicate (stream water) on Ammonia nitrogen, but "normal" readings for ammonia N in the blank (deionized water). The phosphorus readings were as expected, "normal" for the duplicates and "near zero" for the blanks. Since ammonia and phosphorus analytes came from the same bottle, it appears that the readings for ammonia N were transposed from the duplicate to the equipment blank by the lab, though this was never corroborated.