

Swan and Woody

River Fisheries & Aquatic Surveys

Swan Lake Watershed Conservation District

Swan Valley Sport Fishing Enhancement Inc.

2007 - 2009

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1 Introduction

Swan Lake Watershed Conservation District (SLWCD) is located between the Duck Mountains and the Porcupine Mountain, straddling the Manitoba – Saskatchewan border. SLWCD two main rivers; Swan River and Woody River both originate in the Porcupine Hills. All tributaries flow into one of these rivers before reaching their headwaters at Swan Lake.

1.1 Swan River & Woody River

The main objective of the Fisheries & Aquatic Surveys was to obtain important information and coordinate it into the Integrated Watershed Management Plan. Having the opportunity to conduct an aerial assessment of the main tributaries is significant for baseline data. Results oriented programming is important in correctly reaching watershed management goals; using water quality results, habitat assessments, fisheries stock assessments and fish passage data collected during the study period, goals and objectives will be followed realistically.

Swan Lake is a commercially fished lake; it's a valued resource in the valley (Figure 1). In order for proper management, key statistics need to be collected, and habitat assessed. The Swan and Woody River Fisheries & Aquatic Survey will contribute to the description, analysis and management of the fish community and population.

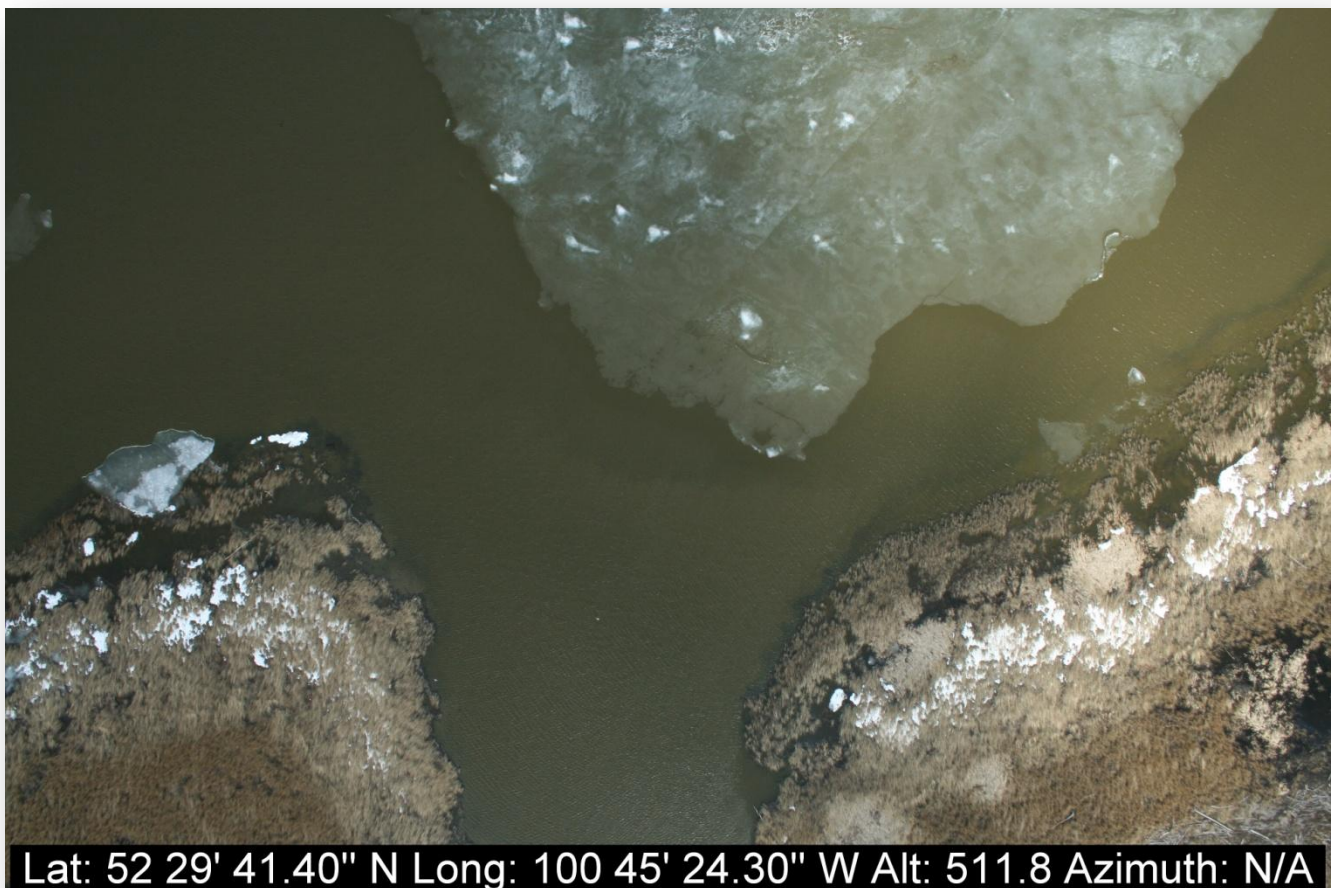


Figure 1 : The mouth of the Swan River entering Swan Lake. (May 6/2008 – Taiga Air Service)

2 Fisheries Research

2.1 Stock Assessment

The main objective of the Fisheries Stock Assessment was to achieve "Community Composition Monitoring".

This type of monitoring assesses the abundance of species composition of large-bodied and small-bodied fish. These surveys are collected to describe the status of fish communities, as well as its component populations and to evaluate specific problems or management problems.



Figure 2 : Fisheries technicians seining Site #7 on the Swan River



Figure 3 : Approaching Site #15 to collect data for the fisheries stock assessment

2.1.1 Swan River

Sampling methods consisted of using a 3" Gill Net, usually set from a canoe. Sample sites started at the closest water sampling site to the Manitoba/Saskatchewan Border (Figure 3). Each gill net was set for 33 minutes on average. There was a success rate of 63% out of the 22 sites with a total of 252 fish caught. Fish community sampled comprised of 11% walleye (*Stizostedion vitreum*), 3% northern pike (*Esox lucius*), 48% shorthead redhorse suckers (*Moxostoma macrolepidotum*), and 38% white suckers (*Catostomus commersonii*). Walleye sampled averaged a length and weight of 381.6 mm and 825.6 g, respectively. Minnow species were sampled by seine nets (Figure 2) (Table 1).

Table 1 : Minnow species and composition found at sample sites throughout the Swan River.

Spottail Shiners 1%	Longnose Dace 2%	Johnny Darter 11%	White Sucker <1%	Trout Perch <1%
Bigmouth Shiners <1%	Blacknose Dace 1%	Blacksided Darter <1%	Bluntnose Minnow <1%	Yellow Perch <1%
Emerald Shiners 32%			Creek Chub <1%	
Common Shiners 54 %				

2.1.2 Woody River

Sample sites on the Woody River were situated primarily at water testing sites (WDYCV, WDYBM, WDYLS, and WDYWS). 3" Gill nets were set for thirty minutes at each sample site. Successful sampling occurred at Site #3 (WDYLS) and Site #5 (WDYBM). Large game fish on the Woody River consisted northern pike, and white suckers with minimal catches. Minnow species were sampled by seine nets



Figure 4 : Sampling with a "THROW NET" to collect minnow species at sampling site WDYCV.

Table 2 : Minnow species and composition found at sample sites throughout the Woody River.

Spottail Shiners <1%	Longnose Dace <1%	Johnny Darter 4%	White Sucker 1%	Trout Perch <1%
Emerald Shiners 1%	Blacknose Dace 2%	Blacksided Darter 1%	Creek Chub 1%	Log Perch <1%
Common Shiners 88%				

2.2 Walleye Telemetry

A total of thirteen walleye were tagged with radio telemetry tags on the Swan River (Table 3). From January 2010 to approximately November of 2010, these walleye will be monitored to understand habitat utilization, fish movement, spawning requirements and any fish passage barriers. This data can be compared with walleye telemetry data that was collected on the Swan River in 1994.



Figure 5 : Fisheries Technician holding a walleye too small to tag.

Table 3 : All walleye sampled on the Swan River, including thirteen tagged with radio telemetry tags.

Date	Site #	Location	Species	Length (mm)	Weight (g)	Tag #
September 21/09	Site #1	Gust's Field	Walleye	449	1125	49.071
September 21/09	Site #1	Gust's Field	Walleye	348	475	49.134
September 21/09	Site #1	Gust's Field	Walleye	380	625	49.05
September 21/09	Site #1	Gust's Field	Walleye	426	1000	49.114
September 21/09	Site #1	Gust's Field	Walleye	351	575	-
September 21/09	Site #1	Gust's Field	Walleye	345	500	-
September 21/09	Site #1	Gust's Field	Walleye	560	2250	49.041
September 21/09	Site #1	Gust's Field	Walleye	2 Walleye - No Data		
October 14/2009	Site #10	Hussy's	Walleye	317	400	49.104
October 14/2009	Site #10	Hussy's	Walleye	307	325	
October 14/2009	Site #10	Hussy's	Walleye	305	340	49.153
October 14/2009	Site #10	Hussy's	Walleye	304	400	
October 15/2009	Site #13	River Road	Walleye	300	350	
October 15/2009	Site #13	River Road	Walleye	292	325	
October 16/2009	Site #14	Vopni Hole #1	Walleye	342	475	49.161
October 16/2009	Site #14	Vopni Hole #1	Walleye	320	400	
October 16/2009	Site #14	Vopni Hole #1	Walleye	300	350	
October 30/2009	Site #1	Gust's Field	Walleye	366	650	
October 30/2009	Site #1	Gust's Field	Walleye	462	1700	49.271
October 30/2009	Site #1	Gust's Field	Walleye	432	1050	48.151
October 30/2009	Site #1	Gust's Field	Walleye	372	700	48.831
October 30/2009	Site #1	Gust's Field	Walleye	573	2700	48.211
October 30/2009	Site #1	Gust's Field	Walleye	467	1400	48.561
October 30/2009	Site #1	Gust's Field	Walleye	475	1450	
October 30/2009	Site #1	Gust's Field	Walleye	372	650	
October 30/2009	Site #1	Gust's Field	Walleye	370	550	
October 30/2009	Site #1	Gust's Field	Walleye	387	700	

2.3 Benthic Sampling

Sampling and identifying existing the benthic invertebrate community allows for long-term monitoring information as reference for any future regional change. Invertebrates were sampled using the kick sampling method (Table 4 & 5). Invertebrates were also noted and identified when found in gill nets or seine nets. In the Swan River, several macro invertebrates collected consisted of species found in both poor to good quality environments. One order more commonly found; *Diptera* can display a range of tolerance to stress, and are typically able to withstand less ideal or deteriorating environmental conditions. In the Woody River, composition was more diverse with high occurrences of order *Ephemeroptera*. Although this species represent many genera with a range of tolerance for environmental conditions, they tend to have a lower tolerance for deteriorated environmental conditions therefore their presence indicating good water quality.

Table 4: A summary of macro invertebrates found in the Swan River in 2009

Species	Decapoda (crayfish)	Odonata a. (Dragonflies)	Coleoptera (water boatman)	Ephemeroptera (mayflies)	Plecoptera (stoneflies)	Trichoptera (caddisflies)	Diptera (true flies)
#	2	2	18	45	13	10	50 +

Table 5: A summary of macro macro invertebrates found in the Woody River in 2009

Species	Hirudinea (Leech)	Ephemeroptera (mayflies)	Odonata a. (Dragonflies)	Plecoptera (stoneflies)	Trichoptera (caddisflies)	Coleoptera (Boatman)
#	1	69	1	3	3	1

Species	Odonata z. (damselfly)	Decapoda (crayfish)	Diptera (true flies)	Coleoptera (riffle Beetle)	Diptera (true flies)	Amphipoda (Scud)
#	2	2	1	1	2	1

2.4 Habitat Assessment

The objective of the habitat assessment was to collect aquatic and riparian habitat information where benthic invertebrate and/or fish community investigations have been conducted to support biological assessments. In order to do a complete habitat assessment along the Swan River and the Woody River, low level aerial photography was flown on May 5 & 6/2008. Taiga Air Services flew the Swan River and the Woody Rivers from the headwaters to Swan Lake.



Figure 6 : Example of different types of habitat surrounding the Swan River.

2.4.1 Swan River

Initial assessment of the imagery has been completed using individual image coordinates linked to ArcMap I.D. Land classification categories included; crop, pasture/grazing, forested, marsh/wet meadow, prairie/grassland, intensive land use (feedlots), residential/urban/rural, and other. Land was classified within a 100 meter buffer of the river. In addition, any identified concerns were distinguished.



Figure 7 : Riparian habitat along the Swan River

2.4.2 Woody River

Assessment of the Woody River's aerial photos was completed similar to the Swan River's - only without ArcMap I.D linking the assessment to ArcMap. Land was classified into; crop, pasture/grazing, forested, marsh/wet meadow, prairie/grassland, intensive land use (feedlots), residential/urban/rural, and other.

2.5 Measurement of Basic Water Chemistry

Water quality sampling was done at four sites from the Manitoba/Saskatchewan border to Swan Lake for each tributary (Figures 8 - 15). Sites were sampled once a month from May to late August in 2008 and 2009. Water sampling equipment consisted of a sampling iron (2L Nalgene[®] bottle) with approximately 25 meters of rope and a Hanna Meter (HI 98129). Samples were collected in the centre of the channel by dropping the sampling iron into the water from a bridge/crossing. Prior to collecting water at each site, the Nalgene[®] bottle was rinsed three times with river water to ensure an suitable sample. Sample bottles, each unique to the type or series of test requested, were provided by CANTEST and samples were submitted to the CANTEST Laboratories for analysis. Water temperature, pH, weather, time of day, and the location were recorded for each testing site. These details were collected to aid in interpreting analysis.



Figure 8: Water Sampling Site #2 SWGC, seining, benthic sampling, and community composition sampling conducted



Figure 9: Water Sampling Site #1 SWHA, furthest upstream. Community Composition Sampling conducted

Water samples were analyzed for the following parameters: total dissolved solids (TDS), total suspended solids (TSS), ammonia nitrogen, total Kjeldahl nitrogen (TKN), total phosphorus (TP), total soluble phosphorus, pH, conductivity, turbidity and fecal coliforms. Although these results provide the SLWCD with a basic understanding of the water quality in the Swan and Woody rivers, over long term monitoring would allow any conclusions concerning ambient water quality to be drawn.



Figure 11: Water Sampling Site #4 SWLS, Fisheries Stock Assessment was completed here.



Figure 10: Water Sampling Site #3 SWJC, Fisheries Stock Assessment was also completed here.

Parameters from testing sites on the Woody River and Swan River were summarized for each year (Tables 4 – 7). Total phosphorus ranged from 0.011 to 0.158 mg/L on the Swan River and 0.01 to 0.544 on the Woody River. The Province of Manitoba has recommended that in an effort to control nuisance aquatic plants and toxic algae, total phosphorus should not exceed 0.05 mg/L in a stream or river. Total phosphorus exceeds the guideline at times on both the Swan and woody Rivers. The exceedance of this guideline is not uncommon in other streams in Manitoba. Although the Province of Manitoba does not have a guideline or objective for total nitrogen, the concentrations of this nutrient in its various forms is commonly measured in our watercourses. Nitrate is the form of nitrogen that comes into a freshwater environment from the drainage basin. So, trends in this form of nitrogen can be used to determine the influence of the watershed in a system. The concentration of nitrate and nitrite in the Swan River ranges from 0.01 to 0.23 mg/L. These values are not uncommon in Manitoba watercourses, particularly during the spring months or after a heavy rainfall when runoff from adjacent lands results in increased concentrations. The Government of Manitoba is currently in the process of developing site specific guidelines for phosphorus and nitrogen. Since considerable variation exists between aquatic environments, it is not practical that a single numeric objective for each nutrient could be applied to all the rivers and streams in southern Manitoba, therefore values recommended by the Province described above should be interpreted with discretion (Havelock, 2010).

Fecal coliforms is a measure of the bacteria in the water. These bacteria can come from various sources including agricultural, as well as human. The provincial guideline for fecal coliforms is 200 colony forming units per 100 mL. For the most part the measured values of fecal coliforms fell below this objective. Only on one occasion, each in 2009 did the Woody and Swan Rivers exceed this objective. A single high measured value for fecal coliforms is not a cause for concern in surface water and is not uncommon. Continued, persistent high concentrations would warrant further investigation.



Lat: 52 13' 35.93" N Long: 101 12' 8.45" W Alt: 576.8 Azimuth: N/A

Figure 13: Water Sampling Site – WDYBM. Seining and invertebrate sampling was completed here.



Lat: 52 8' 34.66" N Long: 101 35' 27.39" W Alt: 693.5 Azimuth: N/A

Figure 12: Water Sampling Site – WDYCV. Seining and Invertebrate samples were conducted.



Lat: 52 22' 36.29" N Long: 100 58' 23.58" W Alt: 421.5 Azimuth: N/A

Figure 15: Water Sampling Site WDYLS. Sampling consisted of; Fisheries Stock Assessment, Invertebrate Sampling and Seining.



Lat: 52 30' 34.22" N Long: 100 51' 20.01" W Alt: 495.7 Azimuth: N/A

Figure 14: Water Sampling Site WDYWS. Only benthic samples collected at site.

Summary of Water Testing Results – Swan River and Woody River 2008 & 2009

Swan River 2008	Detection Limit	Average	Minimum	Maximum
Total Dissolved Solids (mg/L)	10	374	277	550
Total Suspended Solids (mg/L)	1	18.2	4	50
Nitrate and Nitrite (mg/L)	0.01	0.053333333	0.01	0.18
Ammonia Nitrogen(mg/L)	0.01	0.045789474	0.02	0.22
Total Phosphorus (mg/L as P)	0.001	0.0643	0.027	0.106
pH (pH Units)	-	8.362	8.12	8.62
Conductivity (µS/cm)	1	567.65	426	907
Turbidity	0.1	12.48125	2.9	27.3
Fecal Coliform (Col./100 mL)	1	34.25	3	135

Table 6 : Summary of water test results for the Swan River in 2008.

Swan River 2009	Detection Limit	Average	Minimum	Maximum
Total Dissolved Solids (mg/L)	10	359.75	291	460
Total Suspended Solids (mg/L)	1	28.375	4	115
Nitrate and Nitrite (mg/L)	0.01	0.062857143	0.03	0.11
Ammonia Nitrogen(mg/L)	0.01	0.076666667	0.01	0.43
Total Phosphorus (mg/L as P)	0.001	0.070125	0.011	0.158
pH (pH Units)	-	8.299375	8.01	8.53
Conductivity (µS/cm)	1	564.75	464	701
Turbidity	0.1	15.85	3	64.8
Fecal Coliform (Col./100 mL)	1	45.75	2	240

Table 7 : Summary of water test results for the Swan River in 2009.

Woody River 2008	Detection Limit	Average	Minimum	Maximum
Total Dissolved Solids (mg/L)	10	274.25	172	359
Total Suspended Solids (mg/L)	1	17	3	51
Nitrate and Nitrite (mg/L)	0.01	0.015	0.01	0.03
Ammonia Nitrogen(mg/L)	0.01	0.044210526	0.01	0.11
Total Phosphorus (mg/L as P)	0.001	0.0571	0.018	0.204
pH (pH Units)	-	8.206	7.95	8.5
Conductivity (µS/cm)	1	418.55	253	552
Turbidity	0.1	8.31	1.8	20.2
Fecal Coliform (Col./100 mL)	1	59.66666667	2	166

Table 8 : Summary of Water Test Results for the Woody River in 2008.

Woody River 2009	Detection Limit	Average	Minimum	Maximum
Total Dissolved Solids (mg/L)	10	245.125	167	378
Total Suspended Solids (mg/L)	1	21.1875	3	50
Nitrate and Nitrite (mg/L)	0.01	<	0	0
Ammonia Nitrogen(mg/L)	0.01	0.06375	0.01	0.23
Total Phosphorus (mg/L as P)	0.001	0.1386875	0.01	0.544
pH (pH Units)	-	8.208125	8.06	8.41
Conductivity (µS/cm)	1	388.125	272	580
Turbidity	0.1	13.80625	3.6	29.7
Fecal Coliform (Col./100 mL)	1	65.5	2	330

Table 9 : Summary of Water Test Results for the Woody River in 2009.

3 Publicity on Project

3.1 Swan River & Woody River

The project has been recognized at the Swan Lake Watershed Conservation Districts Banquet in 2008 (Swan River & Woody River), and at the Swan Valley Sport Fishing Enhancement's Annual Banquet (Swan River & Woody River). An article was submitted to the local newspaper; Swan Valley Star & Times explaining the Walleye Telemetry aspect (Swan River). Results of this project will be publicized in the future through the Conservation Districts Integrated Watershed Management Plan (Swan River & Woody River) and SLWCD website.

Release tagged walleye

Derek Holtom
SWAN VALLEY STAR AND TIMES

Swan Valley Sport Fish Enhancement, Swan Lake Watershed Conservation District, Fisheries Enhancement Fund (FEF), Manitoba Conservation and Manitoba Water Stewardship have partnered to do a project titled Swan River Fisheries and Aquatic Survey. The project has consisted of collecting baseline data including water quality testing at various locations and as high resolution aerial photography.

The next step of the project is to place radio telemetry tags on 10 walleye. Within the next couple of weeks technicians and our local fisheries biologist will be attempting to capture walleye in various locations along the Swan River. The telemetry tags are black in colour with a trailing antenna, and are placed adjacent the dorsal spine. Each tag has an individual frequency which enables the location of the fish to be tracked for about one year. It would be appreciated that if tagged walleye are caught to please inform Manitoba Water Stewardship at 734-6814 and explain the date, location, and tag number. Release of any tagged walleye would be beneficial towards the success of this study.

The purpose of the information that will be obtained from the walleye tags will help us better understand fish passage/barriers and habitat requirements.

In the long term this will aid in better fisheries management and habitat rehabilitation for improved angling opportunities in the Swan River Valley as a whole.



Ten walleye will be tagged.

Submitted photo

Sept 29, 2009

4 Budget Summary

See attached; *SR and WR Budget.pdf*

5 Discussion / Management

The low level imagery, aquatic assessment and water quality data collected to date along with riparian classification underway from the Swan River Fisheries & Aquatic Survey (08-002) and Woody River Fisheries & Aquatic Survey (08-001) funding has provided valuable base data for the District. This information along with further land-use classification will assist greatly with various aspects in the development of our Integrated Watershed Management Plan.

Furthermore, our partners including the Swan Valley Sport Fishing Enhancement group and Water Stewardship will gain from these projects to better manage and sustain fishing opportunities within the watershed. Species Community Composition will be periodically monitored for both tributaries for a more accurate status of the fish community. Walleye telemetry data collect throughout the following year will provide exceptional information on behavior and habitat requirements, barriers and improve management decisions for the future. This information will become the basis for future works and management objectives within the watershed and provide the baseline to assess the efforts of our practices.