Wisconsin Department of Natural Resources
Bureau of Watershed Management

Sediment TMDL for Snowden Branch

INTRODUCTION

Snowden Branch is a nine-mile stream in Grant County of southwestern Wisconsin (Figure A-1). The Wisconsin Department of Natural Resources (WDNR) placed the first five miles of Snowden Branch on the state's 2004 303(d) impaired waters list as low priority due to degraded habitat caused by excessive sedimentation. The Clean Water Act and United States Environmental Protection Agency (US EPA) regulations require that each state develop Total Maximum Daily Loads (TMDLs) for waters on the Section 303(d) list. The purpose of this TMDL is to identify load allocations and management actions that will help restore the biological integrity of the stream.

Name	WBIC	TMDL ID	Impaired Stream Miles	Total Stream Miles	Existing Use	Potential Use	Codified Use
Snowden Branch	944600	441	0-5	0-9	WWFF	Cold	WWSF

Table 1: Snowden Branch Use Designations

PROBLEM STATEMENT

Due to excessive sedimentation, Snowden Branch is currently not meeting applicable **narrative water quality criterion** as defined in NR 102.04 (1); Wisconsin Administrative Code:

"To preserve and enhance the quality of waters, standards are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development, or other activities shall be controlled so that all waters including mixing zone and effluent channels meet the following conditions at all times and under all flow conditions:

(a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state."

Excessive sedimentation is considered an objectionable deposit.

In addition, Snowden Branch is currently supporting a warm water forage fishery and is not supporting its codified use as a warm water sport fishery or its potential use as a cold water fish community. The designated uses applicable to this stream are as follows:

S. NR 102.04 (3) intro, (a), (b), and (c), Wisconsin Administrative Code:

"FISH AND OTHER AQUATIC LIFE USES. The department shall classify all surface waters into one of the fish and other aquatic life subcategories described in this subsection. Only those use subcategories identified in pars. (a) to (c) shall be considered suitable for the protection and propagation of a balanced fish and other aquatic life community as provided in federal water pollution control act amendments of 1972, P.L. 92-500; 33 USC 1251 et.seq."

> "(a) Cold water communities. This subcategory includes surface waters capable of supporting a community of cold water fish and aquatic life, or serving as a spawning area for cold water species. This subcategory includes, but is not restricted to, surface waters identified as trout waters by the department of natural resources (Wisconsin Trout Streams, publication 6-6300 (80))."
>
> "(b) Warm water sport fish communities. This subcategory includes surface waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish."
>
> "(c) Warm water forage fish communities. This subcategory includes surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life."

SNOWDEN BRANCH

Snowden Branch is a tributary stream that flows southwest into Blockhouse Creek near Dickeyville, Wisconsin. Blockhouse Creek subsequently flows into the Little Platte River. Snowden Branch has an average gradient of 33 feet per mile and drains an area of approximately 17 square miles. It is listed as having the potential to support a coldwater fishery from its mouth upstream for five miles and as a warm water forage fishery for its remaining length. Snowden Branch is currently listed as supporting a warm water forage fishery for its entire length (Table A-1).

Land use in the watershed is dominated by agriculture; however the geography of the area dictates the types of practices employed. (Figure A-1). The upper third of the stream resides in rolling hills and is predominantly used for row cropping. The lower two thirds of the stream lie in lowland valleys and are used for pasturing. In many locations throughout the stream, heavy pasturing along shorelines and agricultural cropping practices adjacent to stream banks are causing sediment runoff to

Land Use	Acres	Percent
Agriculture	6,238	50.69
Forage Crops	3,641	29.58
Grassland	624	5.07
Forest	1,694	13.77
Open Water	10	0.08
Wetland	2	0.02
Barren	97	0.79
Total	12,306	100

Table 2. Snowden Branch Land Use, WISCLAND

the stream. This is especially evident during high precipitation and snowmelt events.

WDNR files dating back to the 1960's note degraded water quality due to runoff from animal feeding operations that carried manure and sediment to the stream. Although the major problem areas have been addressed, concerns with non-point source pollution in the watershed still exist. Water quality data outlining these conditions have been collected by WDNR, the University of Wisconsin-Platteville, and the Southwest Badger Resource Conservation and Development Council as part of a River Planning Grant. Biological data have been collected by WDNR and include fish, habitat, and macroinvertebrate surveys between the years of 1968 and 2000. In addition, local citizens have shown considerable interest in the stream's health. Water Action Volunteers through the WDNR Citizen Monitoring Program have collected stream data related to weather conditions, turbidity, dissolved oxygen, temperature, flow, and biological organisms during the summer months of 2000-2004.

SOURCE ASSESSMENT

Point Sources

There are no point sources located on or discharging to Snowden Branch.

Non-point Sources

Soil erosion for agricultural land uses, the dominant land use in the watershed, was estimated using the USDA universal soil loss equation (USLE) by the University of Wisconsin-Platteville and the Grant County LWCD through a grant funded by the WDNR. The work was completed in 2004 and was conducted on a field by field and farm by farm basis. Results are included in Appendix B-1.

Results indicate that roughly 50% of the acreage within the watershed erodes over the tolerable soil loss value (T), of 5 tons/acre/year with additional acreage significantly above 2T (10 tons/acre/yr). Some fields show erosion rates above 20 tons/acre/year. The value of 5 tons/acre/year is based on a county wide soil survey in which soil loss levels are determined for each soil type. Keeping cropland soil erosion at or below "T" will reduce the sediment load being delivered to surface waters, however, this standard should be thought of primarily in terms of its benefit to protect agricultural productivity, and secondarily in terms of its water quality benefits, as additional erosion control and sediment reduction measures will most likely be needed in order to fully meet water quality needs (DATCP, T-by-2000).

Results of the UW-Platteville study indicates that roughly 52,000 tons of soil erodes in the Snowden Branch watershed each year. While all of this eroded material may not reach the stream, it is not surprising that sedimentation

problems exist within the stream. Over the past 20 years, this watershed, like many in Wisconsin, has undergone a shift in agricultural cropping practices. The small dairy farms that once dominated the state are being replaced with cash crop operations consisting of corn and soybean rotations. This has resulted in a reduction in forage crops and strip cropping which helped stabilize the farmed hillsides of Snowden Branch watershed. Strip crops have been replaced with continuous corn and erosion results from the UW-Platteville study indicate that appropriate conservation measures such as buffers, reduced tillage, no-till, and grass buffer strips have not been successfully utilized throughout the watershed.

LINKAGE ANALYSIS

Establishing a link between watershed characteristics and resulting water quality is a crucial step in TMDL development. By striving to return watershed characteristics closer to natural conditions, improvements in overall stream health can be achieved. The University of Wisconsin-Platteville surveyed the entire length of Snowden Branch and documented areas of riffles, pools, sedimentation, and bank erosion as part of the Snowden Branch River Planning Grant. The study notes that, “although a significant amount of rock bottom streambed exists, the majority of the Snowden Branch has high levels of sedimentation and large erosion banks…High levels of erosion and sedimentation exists throughout most of the stream. There are several areas that have high quality habitat, but these areas are minor when compared to the impaired areas”, and “There are several large tracts of riffle and pool stream sections, but many of the pools are saturated with sediments”. (See attachment for report and maps).

Fine sediments covering the stream substrate reduce suitable habitat for fish and other biological communities by filling in pools and reducing available cover for juvenile and adult fish. Sedimentation of riffle areas compromises reproductive success of fish communities by covering the gravel substrate necessary for spawning conditions. The filling in of riffle areas also affects some fish communities’ food source, macroinvertebrates, which have difficulty thriving in areas with predominantly sand substrate, as opposed to a substrate composed of clean gravel. In addition, sedimentation can increase turbidity in the water column, causing reduced light penetration necessary for photosynthesis in aquatic plants, reduced feeding efficiency of visual predators and filter feeders, and a lower respiratory capacity of aquatic macroinvertebrates due to clogged gill surfaces. As measures are taken to reduce sedimentation and embeddedness of the substrate, biotic integrity scores for fish and macroinvertebrate communities are expected to increase.

TMDL DEVELOPMENT

A TMDL is a plan to allocate a pollutant load reaching an impaired lake or stream to the extent that water quality standards will be met. As part of a TMDL, the

amount of pollutant that the water can tolerate and still meet water quality standards must be identified. Snowden Branch habitat has been impaired by a combination of bank erosion, runoff from upland agricultural practices, excessive sedimentation of the stream substrate, and flashy flow conditions during runoff events. The goal of this TMDL is to reduce sediment loads throughout the Snowden Branch watershed to a level that narrative water quality standards will be met and the stream's codified use will be restored.

In addition to identification of pollutant loading, a TMDL also identifies critical environmental conditions used when defining allowable pollutant levels. However, in this circumstance there is no critical condition in the sedimentation of this stream. Sediment is a "conservative" pollutant and does not degrade over time or during different critical periods of the year. EPA acknowledges this in its 1999 Protocol for Developing Sediment TMDLs, stating: "The critical flow approach might be less useful for the sediment TMDLs because sediment impacts can occur long after the time of discharge and sediment delivery and transport can occur under many flow conditions". Excessive sedimentation is a year round situation. This is not to say that there is no variation in the sediment carried via run-off to a stream.

ALLOCATIONS

The total annual loading capacity for sediment is the sum of the wasteload allocations for permitted sources, the load allocations for non-point sources, and the margin of safety, as generally expressed in the following equation:

TMDL Load Capacity =	WLA	+	LA	+	MOS
TMDL Load Capacity =	*0*	+	*65.7 tons/day*	+	*0*

WLA = Wasteload Allocation = 0 tons/day (no point sources)
LA = Load Allocation = 65.7 tons/day
MOS = Margin of Safety = 0 (implicit)

WLA

Because there are no point sources in the watershed, the waste load allocation is zero. If a point discharge were proposed[1], one of the following would need to occur:

- An effluent limit of zero sediment load would be included in the WPDES permit

[1] The TMDL should clarify that in such a case, there will be reasonable assurance that nonpoint source controls will be implemented and maintained or that reductions are demonstrated through an effective monitoring program. Also, nonpoint control measures will achieve expected load reductions to allocate a wasteload to a point source with a TMDL that also allocates expected nonpoint source load reductions.

- An offset would need to be created through some means, such as pollutant trading
- A re-allocation of sediment load would need to be developed and approved by EPA
- Any revised WLAs or LAs must result in the attainment of water quality standards.
- Any changes in the WLA would require an opportunity for public participation.

LA

The load allocation, 65.7 tons/day, corresponds to the total load capacity because the waste load allocation is zero and the margin of safety is implicit.

MOS

The margin of safety (MOS) accounts for the uncertainty about the relationship between the sediment loads and the response in the water body. The margin of safety is implicit by not accounting for during the modeling any additional reductions in sediment delivery due to deposition and infiltration loss in the drainage system. The numeric target set for this TMDL represents the worst case scenario in which all sediment eroding from agricultural fields is delivered to the receiving water bodies. During the modeling process, some conservative assumptions were made that justify the implicit margin of safety. These include: 100% of the study area was assumed to be silt-loam, with a low to medium organic content producing a higher and more conservative erosion potential; The selection of fixed acres for soybeans when setting the agricultural rotations resulted in a conservative assumption because the fields under soybeans produce the most erosion; The selection of a fixed percentage for conventional tillage practices when setting the tillage practices, instead of allocating based on the percentage of cropping practices according to countywide data, resulted in a conservative assumption because conventional tillage was found to be the most erosive practice; Simulations didn't account for additional controls of sediment created through riparian vegetative buffers and efforts to stabilize stream banks, which also make this conservative because the model underestimates the load of sediment that will be reduced. The integrity and overall composition of the stream's biological communities represents a combination of the effects of variability in sediment loads to the stream (such as episodic events).

TOTAL LOAD CAPACITY

The estimated soil erosion in the watershed under current land management is approximately 52,000 tons/year. Based on the RUSLE2 model, a target (loading capacity) of 65.7 tons/day will result in meeting narrative water quality standards.

To determine the total loading capacity for Snowden Branch, initially a reference stream approach was examined. Syftestad Creek and German Valley Branch, both located in Dane County, WI, have shown considerable improvement in water quality from similar impaired conditions plaguing Snowden Branch. In the best professional judgment of WDNR water quality staff; these two reference streams are no longer impaired. The results from modeling their improved conditions were used to identify a total load capacity. Specifically, the total load capacity corresponded to a unit area load of 0.9 tons/acre/year.

Non-point sediment sources from agricultural activities in the streams' watersheds were estimated using the NRCS Revised Universal Soil Loss Equation 2 (RUSLE2). RUSLE2 evolved from a series of previous erosion prediction technologies, mainly USLE and RUSLE. The USLE was entirely an empirically based equation and was limited in its application to conditions where experimental data were available for deriving factor values. A major advancement of RUSLE was the use of sub-factor relationships to compute C-factor values from basic features of cover-management systems. While RUSLE retained the basic structure of the USLE, process-based relationships were added where empirical data and relationships were inadequate, such as computing the effect of strip cropping for modern conservation tillage systems. RUSLE2 was developed primarily to guide conservation planning, inventory erosion rates, and estimate sediment delivery. Values computed by RUSLE2 are supported by accepted scientific knowledge and technical judgment, are consistent with sound principles of conservation planning, and result in good conservation plans. RUSLE2 is also based on additional analyses and knowledge that were not available when RUSLE was developed. While RUSLE2 uses the USLE basic foundation of the unit plot, the soils loss calculations of RUSLE2 are performed on a daily basis. The use of RUSLE2 had additional benefits in that implementation of erosion reduction methods in the agricultural areas will be conducted through state and county programs that rely on field scale models. NRCS has adopted RUSLE2 for its programs and as such the results from this study can be directly used by field staff when conducting field scale planning and evaluation of farm plans.

The major inputs to the RUSLE2 model include information on land use, cropping practices, soil, slope, and climate data. This data was compiled using GIS software to help generate discrete input files or conditions for RUSLE2. The WISCLAND grid was combined with the slope grid and soils grid to produce unique combinations of the three variables. This data was then entered into a database and sorted into cropping practices based on local NRCS recommendations representing dominant and typical regional cropping practices. A statistical system was then created to generate the rotations based on the WISCLAND coverage, USDA statistics, and typical cropping rotations as specified by local NRCS and county staff. The WISCLAND coverage distinguishes between corn, forage, pasture, and other row crops. The land use

was combined with the slope grid and resulting distribution of land use and slope was examined for incorporation into rotations.

Attempts to extrapolate this unit area load derived from RUSLE2 to Snowden Branch were hampered by the fact that the analysis for Snowden was conducted using the USLE and both reference streams used RUSLE2. While both models estimate soil erosion, USLE has not been updated since the 1950s and does not accurately simulate current agricultural conservation practices nor does it reflect the numerous improvements in erosion prediction science that have been made since the 1950s. NRCS has mandated that all conservation plans written after January 2004 need to be conducted using RUSLE2. Therefore, as NRCS and county staff update farm plans produced using USLE, numbers that can be compared to the proposed reference streams will be generated.

Another concern with the reference streams is that while both the proposed reference streams and Snowden have similar slopes, soils, and agricultural practices; land use differs. Both Syftestad and German Valley watersheds are comprised roughly of 50% agricultural land use with the remainder is distributed between forested hill slopes and grassland. By comparison, Snowden is comprised of over 80% agricultural land use with many of the highly erodible hill slopes in agriculture instead of forest or permanent grassland. Looking elsewhere in the state, DNR staff was unable to find any watershed that fit as an ideal reference condition for Snowden. For this reason, the WDNR recommends using an alternative target based on implementation of conservation practices followed by additional habitat survey work to quantify the benefit of the reductions and help establish a final goal. An approved TMDL will allow for Grant County to receive additional grant funds to implement a targeted conservation approach.

While the field by field analysis conducted using USLE does not readily equate to previous work on the proposed reference streams using RUSLE2, the field scale work does provide an excellent tool to begin a sediment reduction strategy for Snowden Branch. Table A-8 shows that while on a whole Snowden Branch is impaired by sediment, sections of Snowden Branch remain in a natural condition suggesting that targeted reductions in sediment may have a positive impact on the stream.

Based on watershed-scale modeling using RUSLE2 to update USLE files and looking at targeted implementation of conservation practices, some potential sediment reductions were generated. Table 3 summarizes the reductions for the phased implementation.

> Phase 1: Landowners with fields currently over “T” implement practices to bring all fields at or below “T” of 5 tons/acre/year. This includes shifting cropland currently at 2T (great than 10/tons/acre/year) into the Conservation Reserve Program (CRP). This would require approximately 680 acres needing to be enrolled into CRP.

Phase 2: is a watershed wide estimate of soil loss generated by updating the typical agricultural conditions modeled with USLE to RUSLE2. It assumes that Phase 1 has been implemented. The RUSLE2 model, while not field by field, assumes implementation of generic conservation practices such as reduced tillage systems and contour strip cropping with grass strips placed on hillside in lieu of traditional forage strips historically part of dairy crop rotations.

Scenario	Soil Loss (tons/yr)	Soil Loss (tons/day)	Reduction (tons/yr)	% Reduction From Existing
Existing Conditions	52,000	142.4	0	0
Phase 1: Meet T and Enrolled CRP	35,000	95.8	17,000	33%
Phase 2: Updated plans and Conservation Practices (Loading Capacity)	24,000	65.7	28,000	54%

Table 3: Soil Loss Rates and Erosion Reductions

At this time, Phase 2 represents the loading capacity of Snowden at 24,000 tons per year or 65.7 tons/day. This represents a 54% reduction in the existing sediment load. During implementation of Phase 1 and Phase 2, additional habitat work will be conducted to assess the impact of the erosion reductions and lower the loading capacity if warranted.

SEASONALITY

Sediment enters the water body through rainfall and snowmelt runoff events throughout the year. Most of the sediment enters during spring runoff and intense summer rainstorms, but to some extent it occurs year-round. The majority of sediment enters the stream due to episodic events (storms) rather than “seasonal” events. This temporal variation in the sediment load has been accounted for in the RUSLE2 modeling through the use of average annual conditions. The best management practices that should be implemented to achieve the load allocation (such as grassed waterways, diversions, and terraces) are selected and designed to function for 10-year or 25-year, 24-hour design storms, providing substantial control for the major rainfall events.

MONITORING

The WDNR intends to monitor Snowden Branch based on the participation levels of implementation of the TMDL, including sites where implementation of Targeted Runoff Management (TRM) grants are aimed at removing the stream from the impaired waters list. Supplemental temperature monitoring will also be conducted to better evaluate the thermal regime of this stream. Monitoring will continue until it is deemed that the stream has responded to the point where it is

meeting its codified use or until funding for these studies are discontinued. In addition, the stream will be monitored on a 5 to 6 year interval as part of a baseline monitoring strategy to assess temporary conditions and note trends in overall stream quality. The monitoring will consist of metrics contained in WDNR's baseline protocol for wadeable streams, such as the Index of Biotic Integrity (IBI), the Hilsenhoff Biotic Index (HBI), the current habitat assessment tool, and sampling of water quality parameters at a subset of sites.

REASONABLE ASSURANCE

No new or additional enforcement authorities are provided by an approved TMDL. There are currently no point sources discharging to Snowden Branch. However, future enforcement of non-point source performance standards and prohibitions will likely take place in the watershed. It is also anticipated that regulatory agricultural and non-agricultural performance standards called for in Wisconsin Statutes will be implemented in the watersheds of impaired waters. Currently, enforcement is based on the opportunity to provide cost-share dollars. If money is offered to landowners in the watershed, they are obligated to comply. Administrative rules passed by the Natural Resources Board identify that watersheds with impaired waters will have the highest priority for enforcement if cost-share money is available. In addition to the implementation of enforceable non-point source performance standards, there are a number of voluntary programs that will assist in implementing this TMDL. Therefore, approval of this TMDL will aid in the phased load allocation through increased financial resources.

Farmers will be encouraged to enroll in the Conservation Reserve Enhancement Program (CREP) or similar programs to establish riparian buffers on cropland. Riparian buffers could assist in making CREP a viable program for this impaired stream. A similar program available to farmers is CRP, which takes highly erodible land out of agricultural use.

The Environmental Quality Incentive Program (EQIP) is another option available for landowners in the watershed. EQIP is a federal cost-share program administered by the Natural Resources Conservation Service (NRCS) that provides landowners with technical and financial assistance. Landowners may receive up to seventy-five percent reimbursement for installation and implementation of certain runoff management practices. Projects include, but are not limited to, terraces, waterways, diversions, and contour strips. These practices help manage agricultural waste, promote stream buffers, and control erosion on agricultural lands.

The Grant County Land and Water Conservation Department (LWCD) may also apply for a TRM grant through WDNR. TRM grants are competitive financial awards to support small-scale, short term (24 months) projects, completed by local governments and landowners to reduce runoff pollution. Both urban and

agricultural projects can be funded through a TRM grant; the grants require a local contribution to the project. The state share is capped at $150,000 per grant.

The Grant County LWCD received a TRM grant January 1st, 2005. As of March 24th, 2005, a state share of approximately $38,000.00 and a local share of $118,105.00 (including additional funding sources) have been spent. Practices installed include: grade stabilization structures, waterway systems, cattle crossings, roof runoff systems, underground outlets, and stream bank riprap. The current TRM grant is set to expire December 31st, 2006.

In the event that the Grant County LWCD receives additional TRM grants, substantial improvements to habitat in the impaired section could take place. Installation of stream bank stabilization and cattle restriction practices would greatly benefit habitat in lowland sections of the stream. Riparian buffers and contour planting in upland areas would also benefit stream health and reduce sedimentation.

Additional projects that are not related to runoff management but would improve overall stream health and habitat are: dredging areas of extreme sediment deposition, reconstruction of bridge culverts blocking fish passage upstream (Figure A-7, A-8), and in-stream fish habitat improvements.

PUBLIC PARTICIPATION

This TMDL was subject to public review from July 25th, 2006 through August 25th, 2006. On July 25th, 2006 a news release was sent to: newspapers, television stations, radio stations, interest groups, and interested individuals. The new release indicated the public comment period and how to obtain copies of the public notice and the draft TMDL. The news release, public notice, and draft TMDL were also placed on the DNR's website. Twenty one comments were received.

REFERENCES

US EPA, 1999. Protocol for Developing Sediment TMDLs

University of Wisconsin-Platteville, January, 2005. Snowden Branch Planning Grant Final Report

WDATCP, 2001. T-by-2000 A Report on Soil Erosion and Soil Conservation Efforts in Wisconsin

WDNR, 2001. Grant-Platte Rivers State of the Basin Report, Vol. 5. Madison, WI.

APPENDIX A

SECTION A-1. WATERSHED AND SAMPLING MAPS

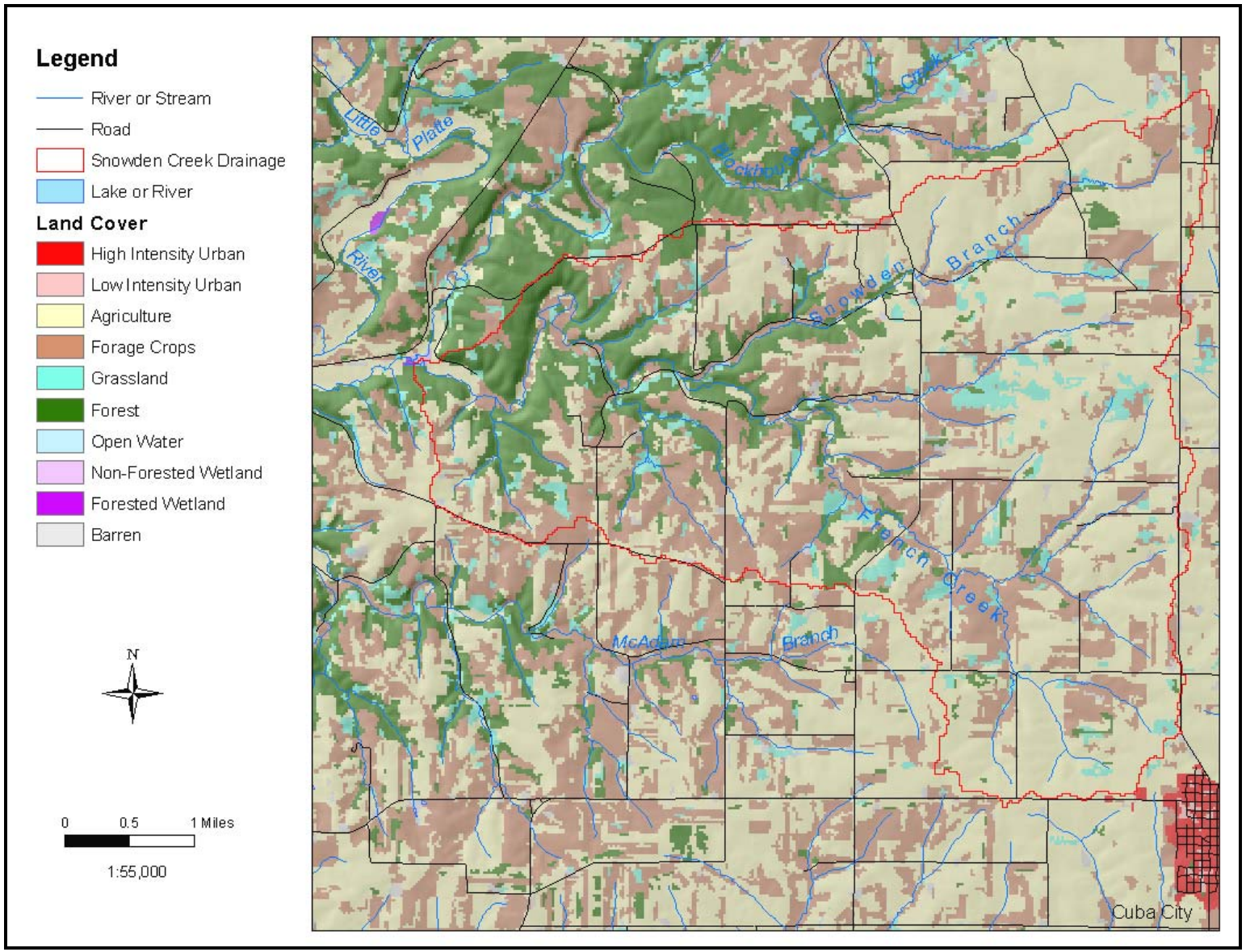

Figure A-1. Snowden Branch watershed and land cover.

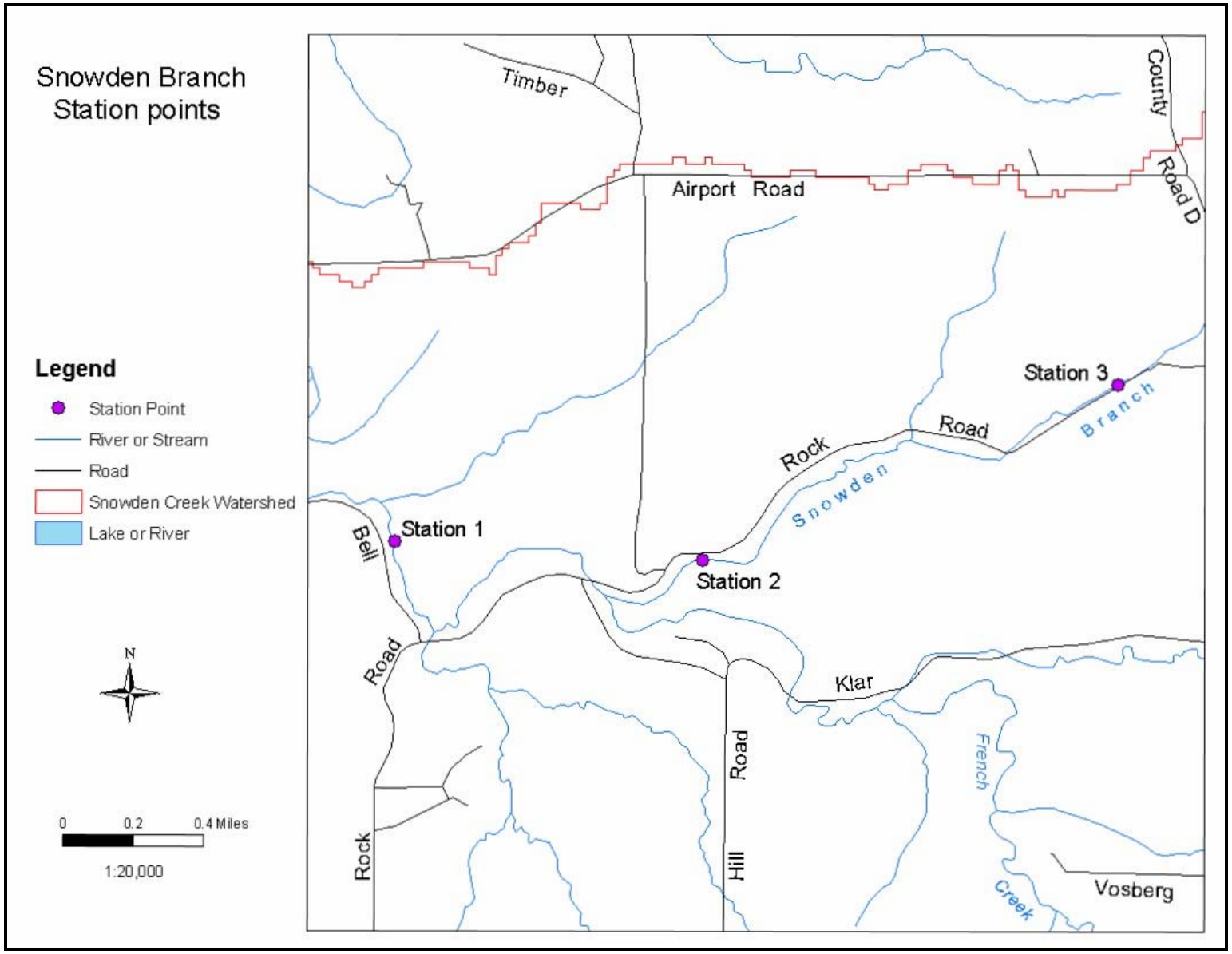

Figure A-2. WDNR fish and habitat survey locations.

SECTION A-2. STREAM CLASSIFICATION AND DESCRIPTION

Stream Use Classification	Description
Cold	Cold water community; includes surface waters that are capable of supporting a cold water fishery and other aquatic life and serving as a spawning area for cold water species. This includes three levels of cold water classification (Class I, II, or III).
WWSF	Warm water sport fish communities; includes surface waters capable of supporting a community of warm water sport fish or serving as a spawning area or nursery for warm water sport fish.
WWFF	Warm water forage fish communities; includes surface waters capable of supporting an abundant and diverse community of forage fish and other aquatic life.
LFF	Limited forage fishery; (intermediate surface waters (INT-D)) includes surface water of limited capacity because of low stream flow, naturally poor water quality or poor habitat. These surface waters are capable of supporting only a limited community of tolerant forage fish and aquatic life.

Table A-1. Stream use classifications. Snowden Branch currently supports a warm water forage fishery.

Trout Stream Classification	Description
Class I	These are high quality trout waters, having sufficient natural reproduction to sustain populations of wild trout at or near carrying capacity. Consequently, streams in this category require no stocking of hatchery trout. These streams or stream sections are often small and may contain small or slow-growing trout, especially in the headwaters.
Class II	Streams having this classification may have some natural reproduction but not enough to utilize available food and space. Therefore, stocking is sometimes required to maintain a desirable sport fishery. These streams show good survival and carryover of adult trout, often producing some fish of better than average size.
Class III	These waters have marginal trout habitat with no natural reproduction occurring. They require annual stocking of legal-size fish to provide trout fishing. Generally, there is no carryover of trout from one year to the next.

Table A-2. Trout stream classifications.

SECTION A-3. WATER QUALITY, FISH, AND HABITAT DATA

Water quality in Snowden Branch has been assessed by WDNR dating back to the 1950's. The stream was stocked with brown and rainbow trout throughout the 1960's and was a popular stream with anglers. A stream survey conducted at four stations throughout the stream in 1968 noted that stabilization of the watershed by means of better land use practices and construction of solids and water retention structures in the headwater sections would protect the stream habitat immeasurably. A fish survey conducted at this time found 28 brown trout, 25 smallmouth bass, 1 rock bass, and a large variety of forage fish species. Throughout the 1970's and 1980's, cattle feeding operations in the watershed were noted as problematic to the stream's fishery. WDNR files note that trout stocking was discontinued in 1976 due to the presence of large cattle feeding operations. Stocking did not resume again until the late 1990's.
A fish survey conducted in July 1976 captured an abundance of forage fish species, 13 smallmouth bass, and 2 brown trout.

Species	Catch
Smallmouth Bass	13
Brown Trout	2
Redside Dace	Abundant
Stoneroller	Abundant
Common Shiner	Abundant
Redbelly Dace	Common
Longnose Dace	Present
White Sucker	Abundant
Creek Chub	Common
Fantail Darter	Common

Table A-3. WNDR 1976 fish survey

In July of 1985, a survey found no sport fish, but a substantial population of forage fish. Stream substrate was noted as consisting of 100 percent rubble and boulders.

Species	Catch
Redbelly Dace	Common
Hornyhead Chub	Abundant
Common Shiner	Abundant
Stoneroller	Present
Fantail Darter	Abundant
White Sucker	Common
Creek Chub	Present
Stonecat	Common

Table A-4. WDNR 1985 fish survey

In 1987, WDNR files noted that the stream “has been destroyed by ag wastes on a continuing basis for many years and it continues to be a problem”. Between 1984 and 1988, notice of discharge documents were sent from the WDNR to landowners south of the Village of Big Patch, citing manure spills and manure runoff from adjacent feedlots and slurry store tanks. Manure runoff management in this area continued to be problematic until the early 1990’s.

WDNR files note that by 1997 the manure problem areas were devoid of cattle and were advertised as for sale. This sparked a renewed interested in restoring a coldwater fishery and resuming trout stocking. Wild trout transfer began in 1997, however, at this time it was noted that “the good habitat downstream is cut off from the rest of the stream by migration blocks at the bridges”, and that there still existed “a significant cattle barnyard problem in the middle of the stream”. It was also noted that the stream had potential to improve with habitat restoration or development, correction of the fish migration blockage, and removal of the downstream barnyard problem.

In 1999, 5 trout redds were observed in a stream section just east of Loeffelholz Road (downstream of Station 2, Figure A-2). The observed redds were of good size, indicating they had been made by large trout, which suggested the fish stocked in 1998 had survived. In 2000, 3 trout redds were observed in the same section, but without actively spawning fish.

A fish survey conducted in August of 2000 at Station 1 (Figure A-2) found no sport fish species or intolerant species, but did find an abundance of forage fish species. The coldwater Index of Biotic Integrity (IBI) score was 0, which is considered very poor, whereas the warmwater IBI scored at 42, which is considered fair.

Species	Catch		Species	Catch
Fantail Darter	656		Hornyhead Chub	149
Bluntnose Minnow	80		Emerald Shiner	5
Stonecat	11		Creek Chub	68
Suckermouth Minnow	19		Central Stoneroller	653
Common Shiner	351		Longnose Dace	56
White Sucker	165		Blacknose Dace	11
Johnny Darter	11		Southern Redbelly Dace	54
Ozark Minnow	1			
Coldwater IBI score=0	**Very Poor**		**Warmwater IBI score=42**	**Fair**

Table A-5. WDNR 2000 fish survey, Station 1

Another survey conducted in 2000 at station 2 (Figure A-2) found 2 brown trout, and an assemblage of forage fish species. Again, the coldwater IBI indicated a poor coldwater fishery, whereas the warmwater IBI indicated a fair warmwater fishery.

Species	Catch		Species	Catch
Fantail Darter	136		Southern Redbelly Dace	29
Creek Chub	63		White Sucker	22
Johnny Darter	19		Common Shiner	9
Blacknose Dace	3		Longnose Dace	8
Central Stoneroller	125		Hornyhead Chub	1
Bluntnose Minnow	5		Brown Trout	2
Coldwater IBI score=10	**Poor**		**Warmwater IBI score=37**	**Fair**

Table A-6. WDNR 2000 fish survey, Station 2

The survey conducted at Station 3 (Figure A-2) near the village of Big Patch found only four fish, all of which were creek chub. Too few individuals were collected during the survey to calculate and IBI.

Species	Catch
Creek Chub	4

Table A-7. WDNR 2000 fish survey, Station 3

According to the warmwater IBI scores, it appears that the thermal regime of this stream supports a classic hard bottom warm water species assemblage rather than a cold water species fishery.

Habitat assessments were conducted using WDNR's current habitat assessment tool for wadeable streams at all three stations (Figure A-2). Substrate composition is listed below:

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Bottom Substrate - Percent Composition								
Station #	**% Gravel**	**% Rubble/Cobble**	**% Boulder**	**% Bedrock**	**% Sand**	**% Silt**	**% Clay**	**% Detritus**
Station 1	21.88	61.15	11.46	0	3.65	1.66	0.20	0
Station 2	23.65	46.35	12.29	11.00	1.25	4.83	0.21	0.42
Station 3	23.65	44.52	9.62	10.00	0.86	5.48	5.87	0

Table A-8. WDNR Habitat Assessment average substrate composition

Macroinvertebrate samples were collected and analyzed using the Hilsenhoff Biotic Index (HBI) in July 1992 and November 2000. This index represents the average weighted pollution tolerance value of all arthropods present in the stream sample.

HBI Value	Water Quality Rating	Degree of Organic Pollution
≤ 3.50	Excellent	None Apparent
3.51-4.50	Very Good	Possible Slight
4.51-5.50	Good	Some
5.51-6.50	Fair	Fairly Significant
6.51-7.50	Fairly Poor	Significant
7.51-8.50	Poor	Very Significant
8.51-10.00	Very Poor	Severe

Table A-9. Water quality ratings for HBI

The sample taken in 1992 received an HBI score of 4.664 (Good). Samples that were taken in November of 2000 at Stations 1, 2, and 3 received scores of 6.945(Fairly Poor), 5.311(Good), and 5.085(Good), respectively.

SECTION A-4. PHOTOGRAPHS OF SNOWDEN BRANCH

Figure A-3. Snowden Branch at Rock Road (downstream from Station 2)

Figure A-4. Snowden Branch at Rock Road (downstream from Station 2)

Figure A-5. Pasturing along Snowden Branch stream corridor

Figure A-6. Typical bank erosion in Snowden Branch (approximately 1m high)

Figure A-7.Oversized culvert at confluence of Snowden Branch and French Creek

Figure A-8. Oversized bridge culvert on Snowden Branch near Station 2

APPENDIX B

SECTION B-1. NRCS SOIL EROSION

Landowner	Township	Section	Acreage	Soil Type	Soil Loss (tons/acre /yr)	Target (tons/ acre/yr)	Soil Loss (tons/year)	Target (ton/yr)
Landowner A	Smelser	26	39.4	TaB2	1.32	5	52.01	52.01
			9.3	TaB2	1.08	5	10.04	10.04
			11.8	TaC2	3.74	5	44.13	44.13
			34.3	TaB2	6.55	5	224.67	171.5
			7.7	TaC2	4.36	5	33.57	33.57
			19.2	TaC2	3.52	5	67.58	67.58
			140.0	TaB2	3.66	5	512.40	512.40
Landowner B	Smelser	26, 27	7.4	FaC2	14.01	5	103.67	37.0
			21.7	TaB2	3.63	5	78.77	78.77
			67.0	TaB2	9.27	5	621.09	335.0
Landowner C	Smelser	22	63.8	FaC2	3.55	5	226.49	226.49
			14.9	FaB2	4.28	5	63.77	63.77
			60.8	DoC2	8.20	5	498.56	304.0
Landowner D	Platteville & Smelser	35, 36, 2	54.2	TaB2	1.37	5	74.25	74.25
			36.2	TaB2	3.52	5	127.42	127.42
			8.3	TaB2	2.12	5	17.60	17.60
			4.3	TaB2	3.27	5	14.06	14.06
			19.5	TaB2	1.78	5	34.71	34.71
			60.0	TaB2	2.77	5	166.20	166.20
			40.2	TaB2	1.22	5	49.04	49.04
Landowner E	Smelser	14	33.9	TaB2	1.90	5	64.41	64.41
			28.4	DoB2	3.49	5	99.12	99.12
Landowner F	Smelser	26, 27	38.8	TaB2	7.50	5	291.00	194.0
Landowner G	Smelser	4, 8, 9, 17, 18	48.0	FaC3	3.83	4	183.84	183.84
			31.1	FaC2	4.90	5	152.39	152.39
			16.3	DvD3	2.31	5	37.65	37.65
			17.3	FaD3	2.72	5	47.06	47.06
			7.4	Ar	12.85	5	95.09	37.0
			10.2	FaC2	6.43	5	65.59	51.0
			10.0	FaC3	3.54	4	35.40	35.40
			54.0	FaB2	2.18	5	117.72	117.72
			1.4	FaC2	7.41	5	10.37	7.0
			14.4	FaC3	10.54	4	151.78	57.6
			4.4	Ar	40.29	5	177.28	22.0
Landowner H	Smelser	1	135.9	TaC2	5.70	5	774.63	679.5
			21.4	TaC2	7.59	5	162.43	107.0
Landowner I	Smelser	6	19.3	FaC	1.48	5	28.56	28.56
Landowner J	Smelser	27	32.6	FaC2	3.06	5	99.76	99.76
			9.1	FaC2	6.59	5	60.17	45.7
Landowner K	Smelser	25	34.5	TaB2	5.79	5	199.76	172.5
			18.1	TaC2	2.99	5	54.12	54.12
			10.0	TaC2	2.74	5	27.40	27.40
			3.9	TaB2	2.24		8.74	8.74
			62.9	TaB2/ MuA	1.18	5	74.22	74.22
			15.5	MuA	3.30	5	51.15	51.15

Landowner L	Smelser	5	39.2	RoC2	4.22	5	165.42	165.42
			10.0	DtD2	3.50	4	35.00	35.00
Landowner M	Smelser	2, 11	40.3	TaB2	6.59	5	265.58	201.5
			7.8	TaC2	6.18	5	48.20	39.0
			8.3	TaC2	7.42	5	61.59	41.5
			8.5	TaB2	3.46	5	29.41	29.41
			21.1	TaB2	12.36	5	260.80	105.5
			12.6	TaC2	6.59	5	83.03	63.0
			37.4	TaC2	3.83	5	143.24	143.24
			52.3	TaB2	2.39	5	125.00	125.00
Landowner N	Smelser	16, 24	49.5	FaC2	6.05	5	299.48	247.5
			11.5	FaB2/FaC2	6.57	5	75.56	57.5
			18.5	TaC2	6.81	5	125.99	92.5
			26.3	MuB	4.42	5	116.25	116.25
Landowner O	Smelser	14	7.9	TaB2	4.39	5	34.68	34.68
			50.0	DoC2	9.05	5	452.50	250.0
Landowner P	Smelser	13, 14	74.7	TaB2	4.16	5	310.75	310.75
			24.9	TaB2	4.27	5	106.32	106.32
			23.7	TaB2	4.27	5	101.20	101.20
			19.4	TaB2	4.10	5	79.54	79.54
			10.5	TaC2	5.38	5	56.49	52.5
Landowner Q	Smelser	27	13.0	TaB2	6.18	5	80.34	65.0
Landowner R	Smelser	10, 22	19.0	DoC2	4.02	5	76.38	76.38
			36.0	FaC2	5.48	5	197.28	180.0
			16.8	FaD3	8.83	4	148.34	67.2
			7.2	FaC2	9.06	5	65.23	36.0
Landowner S	Smelser	7, 17, 18	8.0	FaC2	13.18	5	105.44	40.0
			50.0	FaC2	8.65	5	432.50	250.0
			19.8	FaC2	9.81	5	194.24	99.0
			8.8	FaC2	3.63	5	31.94	31.94
			31.1	FaC2	2.43	5	75.57	75.57
Landowner T	Smelser	11, 12	115.3	TaB2	4.14	5	477.34	477.34
Landowner U	Smelser	26, 27	85.2	DoC2	8.15	5	694.38	426.0
			15.8	DoC2	5.75	5	90.85	79.0
			3.6	DoC2	5.75	5	20.70	18.0
			11.2	DoC2	5.75	5	64.40	56.0
			25.1	DoC2	5.99	5	150.35	125.5
Landowner V	Smelser	9	10.9	FaC2	7.98	5	86.98	54.5
			90.7	FaC3	3.69	5	334.68	334.68
Landowner W	Smelser	13, 14	173.0	TaB2	4.14	5	716.22	716.22
			25.0	TaC3	4.36	4	109.00	100.0
Landowner X	Smelser	18	18.3	FaD2	7.0	5	128.10	91.5
			32.9	FaC2	3.96	5	130.28	130.28
			17.3	FaB2	5.27	5	91.17	86.5
			22.5	FaC2	9.89	5	222.53	112.5
Landowner Y	Smelser	18	13.2	FaC2	3.79	5	50.03	50.03
			30.2	FaD2	3.05	5	92.11	92.11
			10.8	FaC2	3.13	5	33.80	33.80
Landowner Z	Smelser	2, 10	16.8	TaC2	2.74	5	46.03	46.03
			20.0	TaB2	4.99	5	99.80	99.80
			82.6	TaB2	3.37	5	278.36	278.36

			13.5	DoD2	2.85	5	38.48	38.48
			15.2	DoD2	1.89	5	28.73	28.73
			13.4	DoB3/TaB3	1.65	5	22.11	22.11
			15.1	DoD2	3.74	5	56.47	56.47
			28.1	TaB2	1.71	5	48.05	48.05
			15.2	TaB2	1.71	5	25.99	25.99
Landowner A1	Smelser	18	77.3	FaC2	3.76	5	290.65	290.65
			7.0	FaC2	7.75	5	54.25	35.0
			35.0	FaC2	3.49	5	122.15	122.15
			9.0	DtD2	6.26	4	56.34	36.0
			23.0	FaC2	5.28	5	121.44	115.0
			10.0	FaC2	5.28	5	52.80	50.0
			11.0	FaC2	3.80	5	41.80	41.80
			3.0	FaC2	5.28	5	15.84	15.0
			4.0	FaC2	5.28	5	21.12	20.0
Landowner B1	Smelser	11, 12	15.2	TaB2	2.10	5	31.92	31.92
			18.6	TaB2	4.02	5	74.77	74.77
			37.1	TaB2	1.29	5	47.86	47.86
			40.0	TaB2	1.03	5	41.20	41.20
			37.1	TaC2	1.29	5	47.86	47.86
			37.1	TaC2	1.29	5	47.86	47.86
Landowner C1	Smelser	12, 13	14.9	TaB2	2.56	5	38.14	38.14
			14.5	TaB2	2.18	5	31.61	31.61
			9.9	TaC3	3.36	4	33.26	33.26
			8.6	TaB2	6.86	5	59.00	43.0
			30.7	TaB2	6.24	5	191.57	153.5
			13.5	TaC2	2.37	5	32.00	32.00
			15.0	TaC2	1.62	5	24.30	24.30
Landowner D1	Smelser	15	65.3	FaC2	6.26	5	408.78	326.5
Landowner E1	Smelser	10, 15	37.2	FaC2	5.18	5	192.70	186.0
			28.0	FaC2	5.34	5	149.52	140.0
			54.3	FaC3	4.01	4	217.74	217.20
			7.0	DsB2	3.30	4	23.10	23.10
			80.2	FaC2	4.67	5	374.53	374.53
			37.2	FaC2	8.80	5	327.36	186.0
			28.7	FaC2	9.47	5	271.79	143.5
			54.3	FaC3	7.66	4	415.94	217.2
Landowner F1	Smelser	24, 17, 20	1.4	TaB	3.19	5	4.47	4.47
			6.1	TaC2	5.17	5	31.54	30.5
			30.4	Various	2.31	5	70.22	70.22
			32.7	Various	2.18	5	71.29	71.29
			26.2	Various	1.98	5	51.88	51.88
Landowner G1	Smelser	5, 7, 8	62.2	FaD2	5.00	5	311.00	311.00
			5.0	FaC2	4.93	5	24.65	24.65
			47.6	FaD2	5.0	5	238.00	238.00
			3.0	FaC	5.0	5	15.00	15.0
			4.7	FaC	5.0	5	23.50	23.5
			31.1	FaB2	4.79	5	148.97	148.97
			11.9	FaC2	6.48	5	77.11	59.5
			44.2	FaC	5.01	5	221.44	221.44
			3.4	FaC3	4.89	4	16.63	13.6

Landowner H1	Smelser	4, 9	6.3	DtD2	5.00	4	31.50	25.2
			83.8	FaB2	4.81	5	403.08	403.08
			10.0	FaD2	5.60	5	56.00	50.0
Landowner I1	Smelser	11, 12	60.0	TaC2	5.44	5	326.40	300.0
			52.4	TaB2	7.30	5	382.52	262.0
			42.9	TaB2	7.31	5	313.60	214.5
Landowner J1	Smelser	23	29.4	DoB2	4.46	5	131.12	131.12
			18.0	DoC2	5.67	5	102.06	90.0
			31.1	DoB2	3.13	5	97.34	97.34
			55.5	TaC2	8.22	5	456.21	277.5
Landowner K1	Smelser	4	18.6	RoC2	2.27	5	42.22	42.22
			29.5	FaB2	3.09	5	91.16	91.16
			23.1	SyB2	3.74	5	86.39	86.39
			3.1	FaB2	2.80	5	8.68	8.68
Landowner L1	Smelser	10, 15	19.4	FaC2	7.06	5	136.96	97.0
			12.7	FaC2	7.06	5	89.66	63.5
			187.0	TaC2	6.90	5	1290.30	935.0
Landowner M1	Smelser	1	1.6	Cl	6.72	5	10.75	8.0
Landowner N1	Smelser	3, 4, 9, 10	75.0	SyB2	18.13	5	1359.75	375.0
			35.6	DtD2/FaC3	5.18	4	220.01	142.4
			18.5	FaC2	28.00	5	518.00	92.5
			3.0	Ar	19.78	5	59.34	15.0
			16.5	DoC2	10.69	5	176.39	82.5
			20.7	DoC2	7.84	5	162.29	103.5
			19.2	DoC2	6.06	5	116.35	96.0
			36.2	DoC2	3.14	5	113.67	113.67
			23.4	DoD3	5.61	3	131.27	70.2
			33.4	DoC2	9.59	5	320.31	167.0
			122.8	FaB2	4.53	5	556.28	556.28
			16.9	FaB2	5.69	5	96.16	84.5
			63.6	FaB2	5.93	5	377.15	318.0
Landowner O1	Paris	12, 13	115.0	FaC2	2.97	5	341.55	341.55
			18.0	FaC2	4.00	5	72.0	72.0
Landowner P1	Smelser	1	156.0	TaB2/TaC3	9.09	4.5	1418.04	702.0
Landowner Q1	Smelser	9	12.5	FaC3	3.46	4	43.25	60.0
			34.1	FaC2	3.71	5	126.51	126.51
			6.7	FaC2	3.63	5	24.32	24.32
Landowner R1	Smelser	3	73.2	DoB2	6.06	5	443.59	366.0
Landowner S1	Paris	12	28.2	Ar	10.71	5	302.02	141.0
Landowner T1	Smelser	3,2	50.7	FaB2	6.34	5	321.44	253.5
			11.3	TaC2	6.85	5	77.41	56.5
			57.3	TaB2/TaC2	3.96	5	226.91	226.91
Landowner U1	Smelser	16, 21	40.0	DtD2	1.23	5	49.20	49.20
			40.0	FaC2	0.33	5	13.20	13.20
			4.5	FaB2	6.18	5	27.81	22.5
			4.5	FaB2	10.30	5	46.35	22.5
			11.7	FaB2	9.48	5	110.92	58.5
Landowner V1	Smelser	26	9.0	TaB2	3.00	5	27.00	27.00
			10.1	AuC2	7.27	5	73.43	50.5

			21.0	AuC2	6.72	5	141.12	105.0
			8.0	MuB2	6.40	5	51.20	40.0
			8.6	MuB2	3.00	5	25.80	25.80
			9.8	TaA	2.71	5	26.56	26.56
Landowner W1	Smelser	23	25.0	FaC2	1.94	5	48.50	48.50
			74.8	DoC2	7.65	5	572.22	374.0
			32.9	TaB2	3.75	5	123.38	123.38
			23.9	TaC2	5.87	5	140.29	119.5
			9.2	DoC2	6.28	5	57.78	46.0
Landowner X1	Smelser	22, 23	89.2	DoC2	6.34	5	565.53	446.0
			5.8	DoC2	7.62	5	44.20	29.0
			6.8	FaD2	7.62	5	51.62	34.0
			6.5	DoC2	6.58	5	42.77	32.5
			17.0	DoC2	5.27	5	89.69	85.0
Landowner Y1	Smelser	3, 11	38.1	TaC2	5.63	5	214.50	190.5
			68.2	TaC2	3.19	5	217.56	217.56
			12.6	DoD3	8.79	5	110.75	63.0
Landowner Z1	Smelser	8, 17	4.0	Ar	5.26	5	21.04	20.0
			4.0	Ar	4.55	5	18.20	18.20
			7.6	FaC2	9.09	5	69.08	38.0
			38.0	FaC2	4.09	5	155.42	155.42
			91.5	FaC2	5.50	5	503.25	457.5
Landowner A2	Smelser	7	5.3	Pl	2.65	5	13.91	13.91
Landowner B2	Smelser	10, 11	185.0	TaC2	18.26	5	3378.10	925.0
Landowner C2	Smelser	14	74.6	TaB2	3.93	5	293.18	293.18
			106.5	TaB2	3.82	5	406.83	406.83
			38.2	TaB2	3.94	5	150.51	150.51
			2.0	TaC2	5.27	5	10.54	10.0
			7.7	TaB2	4.61	5	35.50	35.50
Landowner D2	Smelser	10	6.3	DoC2	8.86	5	55.82	31.5
Landowner E2	Smelser	22, 23	22.7	FaD2/FaC2	7.42	5	168.43	113.5
			8.4	FaC2	14.01	5	117.68	42.0
Landowner F2	Smelser	15, 22, 23	6.6	Cl	5.58	5	36.55	32.8
			2.8	Cl	5.29	5	14.81	14.0
			9.0	Cl	18.07	5	162.63	45.0
			5.8	Cl	10.05	5	58.29	29.0
			6.0	Cl	13.89	5	83.34	30.0
			30.6	Cl	5.42	5	165.85	153.0
			72.1	Pl	2.58	5	186.02	186.02
Landowner G2	Smelser	17, 18, 20	9.7	FaC2	3.46	5	33.56	33.56
			12.5	FaC2	6.18	5	77.25	62.5
			10.8	FaB2	3.46	5	37.37	37.37
			14.7	FaC3	9.89	4	145.38	58.8
			17.3	FaB2	6.18	5	106.91	86.5
			27.1	FaC2	3.13	5	84.82	84.82
			14.7	FaC2	10.30	5	151.41	73.5
			33.2	FaC2	3.13	5	103.92	103.92
			17.9	FaC2	5.11	5	91.47	89.5
			22.2	FaD3	7.66	5	170.05	111.0
Landowner H2	Smelser	3	75.0	FaC2/FaB	10.96	5	822.00	375.0

				2				
Landowner I2	Smelser	1	5.2	TaB2	3.63	5	18.88	18.88
			39.0	TaB2	4.37	5	170.43	170.43
Landowner J2	Platteville	36	70.4	TaB2	3.53	5	248.51	248.51
Landowner K2	Smelser	15, 16	18.0	FaC2	6.59	5	118.62	90.0
			5.1	FaC2	18.87	5	96.24	25.5
			16.3	FaC2	19.45	5	317.04	81.5
			53.4	FaC2	4.90	5	261.66	261.66
			73.3	FaC2	5.64	5	413.41	366.5
Landowner L2	Smelser	22, 24, 26	98.3	TaB2	6.92	5	680.24	491.5
			8.1	TaB2	4.71	5	38.15	38.15
			63.5	TaC2	10.82	5	687.07	317.5
			24.9	FaB2	5.66	5	140.93	124.5
Landowner M2	Smelser	24	152.0	TaB2/TaC2	4.49	5	682.48	682.48
Landowner N2	Smelser	2	18.9	TaB2	3.87	5	73.14	73.14
			18.9	TaB2	2.81	5	53.11	53.11
Landowner O2	Smelser	22, 23	80.0	FaB2	1.13	5	90.40	90.40
Landowner P2	Smelser	16, 21	90.2	FaC2	4.28	5	386.06	386.06
			21.9	FaD2	5.63	5	123.30	109.5
			13.1	FaC2	4.81	5	63.01	63.01
			6.6	FaC2	7.40	5	48.84	33.0
			109.0	TaC2	6.11	5	665.99	545.0
			3.0	TaB2	3.41	5	10.23	10.23
			55.1	FaC3	4.10	4	225.91	220.4
			113.5	FaC2	10.00	5	1135.00	567.5
			115.0	TaC2	5.95	5	684.25	575.0
			35.0	FaC2	10.00	5	350.00	175.0
			9.0	FaC3	8.21	4	73.89	36.0
Landowner Q2	Smelser	25	75.8	TaC2	13.29	5	1007.38	379.0
Landowner R2	Smelser	23	3.3	FaC2	5.33	5	17.59	16.5
			42.2	FaB2	5.71	5	240.96	211.0
			10.7	FaC2	8.91	5	95.34	53.5
			75.7	TaC2	1.57	5	118.85	118.85
			42.2	FaB2	4.37	5	184.41	184.41
			10.7	FaC2	4.45	5	47.62	47.62
TOTALS							**51,804.27**	**37,493.60**

_____ = soil loss amounts above target