APPENDIX O. COPY OF AGRICULTURAL SURVEYS

This appendix contains copies of the agricultural surveys that were completed by the county conservationist offices. This information, coupled with other sources discussed in the TMDL Report and Appendix C, informed the creation of input files for the SWAT watershed model.

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Adams County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 1. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Wally Sedlar

Organization: Adams County Land and Water Conservation Department

Email: wally.sedlar@co.adams.wi.us

Phone: (608)339-4269

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

1. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
2. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
3. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
4. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

NO

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

NO

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	13%	29%
Dairy	19%	(34)42%
Potato/Vegetable	(20)2%	(20)3%
Pasture/Hay	(9)11%	(17)26%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

NO

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

1) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
2) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
3) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Neenah Lake-Neenah Creek (040302010201)	10	30	60		
Green Creek (040302010202)	10	30	60		
South Branch Neenah Creek (040302010203)	10	40	50		
Neenah Creek (040302010205)	20	30	50		
Westfield Creek (040302010302)	20	30	50		
Klawitter Creek (040302010303)	10	40	50		

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 (if needed, please specify as 6-year rotation) =
Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Neenah Lake-Neenah Creek (040302010201)	FALL	FALL	FALL
Green Creek (040302010202)	FALL	FALL	FALL
South Branch Neenah Creek (040302010203)	FALL	FALL	FALL
Neenah Creek (040302010205)	FALL	FALL	FALL
Westfield Creek (040302010302)	FALL	FALL	FALL
Klawitter Creek (040302010303)	FALL	FALL	FALL

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Neenah Lake-Neenah Creek (040302010201)	Green Creek (040302010202)	South Branch Neenah Creek (040302010203)	Neenah Creek (040302010205)	Westfield Creek (040302010302)	Klawitter Creek (040302010303)
Cash Grain	0%-15%	*85%*	80	80	80	80	80	80
	16%-30%	*0%*	20	20	20	20	20	20
	>30%	*10%*	0	0	0	0	0	0
	No-Till/Zone-Till	*5%*	0	0	0	0	0	0
Dairy	0%-15%	*75%*	70	70	70	70	70	70
	16%-30%	*25%*	30	30	30	30	30	30
	>30%	*0%*	0	0	0	0	0	0
	No-Till/Zone-Till	*0%*	0	0	0	0	0	0
Potato/ Vegetable	0%-15%	*100%*	100	100	100	100	100	100
	16%-30%	*0%*						
	>30%	*0%*						
	No-Till/Zone-Till	*0%*						

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Crop, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Crop	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	Pre & Post	Pre & Post	Pre & Post
Placement (Surface or Injection)	Surface	Surface	Surface
Incorporation Following Application? (Yes or No)	Yes	Yes	Yes

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Crop, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Neenah Lake-Neenah Creek (040302010201)	200-80-300	200-80-300	300-400-300
Green Creek (040302010202)	200-80-300	200-80-300	300-400-300
South Branch Neenah Creek (040302010203)	200-80-300	200-80-300	300-400-300
Neenah Creek (040302010205)	200-80-300	200-80-300	300-400-300
Westfield Creek (040302010302)	200-80-300	200-80-300	300-400-300
Klawitter Creek (040302010303)	200-80-300	200-80-300	300-400-300

Typical N:P:K Ratio =

*Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?3*QuestionS 12 Through 14: Manure Applications

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Neenah Lake-Neenah Creek (040302010201)	5	95
Green Creek (040302010202)	5	95
South Branch Neenah Creek (040302010203)	5	95
Neenah Creek (040302010205)	5	95
Westfield Creek (040302010302)	5	95

Klawitter Creek (040302010303)	5	95

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	2X
Application Timing	Daily	Fall/Spring
Followed by Incorporation? (Yes or No)	NO	YES

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Neenah Lake-Neenah Creek (040302010201)	15 T	Soild	11,000	Liquid
Green Creek (040302010202)	15 T	Soild	11,000	Liquid
South Branch Neenah Creek (040302010203)	15 T	Soild	11,000	Liquid
Neenah Creek (040302010205)	15 T	Soild	11,000	Liquid
Westfield Creek (040302010302)	15 T	Soild	11,000	Liquid
Klawitter Creek (040302010303)	15 T	Soild	11,000	Liquid

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	May - 15	Oct - 20	3-4
Average Temperature/Moisture Year	May - 10	Oct - 20	3-4
Warm/Dry Year	April - 30	Oct - 15	3-4

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Neenah Lake-Neenah Creek (040302010201)	35
Green Creek (040302010202)	35
South Branch Neenah Creek (040302010203)	35
Neenah Creek (040302010205)	35
Westfield Creek (040302010302)	35
Klawitter Creek (040302010303)	35

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

3 %

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	Beef
Number of Animals per Acre	.5
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	Dry - 160 days Normal – 180 days

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Calumet County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 2. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Amanda Kleiber

Organization: Calumet County Resource Management Department

Email: kleiber.amanda@co.calumet.wi.us

Phone: (920) 849-1493 ext. 274

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

5. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
6. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
7. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
8. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

No

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

No

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county? Percentages are within reason

Rotation	% of County Area	% of Agricultural Area
Cash Grain	9%	29%
Dairy	12%	42%
Potato/Vegetable	1%	3%
Pasture/Hay	8%	26%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

No recent transect data to provide

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

4) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
5) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
6) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Pipe Creek-Frontal Lake Winnebago (040302030303)	0%	0%	0%	80%	20%
City of Utowana Beach-Frontal Lake Winnebago (040302030304)	0%	0%	0%	80%	20%

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 (if needed, please specify as 6-year rotation) = corn silage-corn silage-corn grain-Alfalfa-Alfalfa-Alfalfa
Dairy Sequence 5 (if needed, please specify as 6-year rotation) =Corn silage-corn silage-soybean or WW- Alfalfa-Alfalfa-Alfalfa

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

Fall

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Pipe Creek-Frontal Lake Winnebago (040302030303)	Fall	Fall	Fall
City of Utowana Beach-Frontal Lake Winnebago (040302030304)	Fall	Fall	Fall

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Pipe Creek-Frontal Lake Winnebago (040302030303)	City of Utowana Beach-Frontal Lake Winnebago (040302030304)
Cash Grain	0%-15%	*85%*	41	33
	16%-30%	*0%*	35	40
	>30%	*10%*	19	22
	No-Till/Zone-Till	*5%*	5	5
Dairy	0%-15%	*75%*	69	64
	16%-30%	*25%*	25	26
	>30%	*0%*	5	8
	No-Till/Zone-Till	*0%*	1	2
Potato/ Vegetable	0%-15%	*100%*	98	98
	16%-30%	*0%*	2	2
	>30%	*0%*	0	0
	No-Till/Zone-Till	*0%*	0	0

* Calculated by averaging from 4 local crop consultants

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Crop, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Crop	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	50% preplant 50% planting	Pre-Plant	50% preplant 50% planting
Placement (Surface or Injection)	Surface	Surface	surface
Incorporation Following Application? (Yes or No)	80% yes 20% no	Yes	yes

* Calculated by averaging from 4 local crop consultants

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Crop, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Pipe Creek-Frontal Lake Winnebago (040302030303)	See below		
City of Utowana Beach-Frontal Lake Winnebago (040302030304)			

This really varies depending upon crop planted and/or if the field is receiving manure

Alfalfa – 41 lbs P Corn grain – 30 lbs P Corn Silage – 40 lbs P Pasture – 0 lbs P Peas – 2 lbs P

Soybeans – 26 lbs P Winter Wheat – 13 lbs P

*calculated by averaging 140 fields in the Pipe Creek Watershed

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?

Soybeans – 46-55 bu

Winter Wheat 61-80 bu

Corn silage – 18-22 ton

Alfalfa – 4.6 – 5.5 ton

Corn grain-151-170 bu

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Pipe Creek-Frontal Lake Winnebago (040302030303)	25	75
City of Utowana Beach-Frontal Lake Winnebago (040302030304)	25	75

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	Daily-Weekly	
Application Timing	n/a	Fall 75% some also empty 25% in spring
Followed by Incorporation? (Yes or No)	See note below 20% incorporate	See note below 40% incorporate

Incorporation will depend upon the upcoming crop. Quite a few dairy farms like to spread a topdressing on their existing alfalfa crop. Some do this once to three times per year. If the crop is going to be corn then more manure is incorporated.

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Pipe Creek-Frontal Lake Winnebago (040302030303)	17.7 tons	solid	12300	liquid
City of Utowana Beach-Frontal Lake Winnebago (040302030304)	17.7 tons	solid	12300	liquid

Very difficult to answer. This really depends upon several factors: crop rotation, soil fertility, distance to farm.

21 fields out of 140 received liquid manure from a storage facility. The range was 6,000 gallons per acre to 20,000 gallons per acre. The average is 12,300 gallons per acre

10 fields out of 140 received solid manure. The range was 5 tons to 26 tons and the average is 17.7 tons. These 10 fields were all from the same farm operation so maybe be a good representation of the entire watershed but a good estimate.

Looking through some NMPs in the watershed I also noted that some fields are receiving biosolids from municipalities on the cropland also.

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	June 5	Oct 10	4
Average Temperature/Moisture Year	May 20	Sept 20	4
Warm/Dry Year	May 10	Sept 5	4 or 5

*Averaged dates by asking 4 local crop consultants

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Pipe Creek-Frontal Lake Winnebago (040302030303)	41
City of Utowana Beach-Frontal Lake Winnebago (040302030304)	41

* Averaged 140 fields in the Pipe Creek Watershed

* We only have soil sample results for 2 fields in the Utowana Beach watershed so I used the same number from the Pipe Creek Watershed

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

0%

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	n/a
Number of Animals per Acre	n/a
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	n/a

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Green Lake County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 3. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Paul Gunderson

Organization: Green Lake County Land Conservation Department

Email: pgunderson@co.green-lake.wi.us

Phone: 920-294-4051

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

9. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
10. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
11. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
12. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

No.

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

No.

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	20%	33%
Dairy	22%	37%
Potato/Vegetable	6%	9%
Pasture/Hay	12%	21%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Yes.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

Yes. I'm going to be sending the transect survey information that we collected from 2004 – 2013 in separate emails.

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

7) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
8) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
9) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Sand Spring Creek-Fox River (040302010101)	10%	90%	0%	0%	0%
Headwaters Grand River (040302010401)	20%	75%	5%	0%	0%
Little Green Lake-Grand River (040302010402)	10%	90%	0%	0%	0%
Lake Emily (040302010501)	5%	95%	0%	0%	0%
Grand Lake-Grand River (040302010502)	0%	100%	0%	0%	0%
Belle Fountain Creek (040302010503)	2%	98%	0%	0%	0%
Grand River (040302010504)	0%	100%	0%	0%	0%
Puckaway Lake-Fox River (040302010605)	3%	95%	2%	0%	0%
Sucker Creek (040302010805)	0%	100%	0%	0%	0%
White River (040302010806)	0%	100%	0%	0%	0%
Silver Creek (040302010901)	0%	100%	0%	0%	0%
Big Green Lake (040302010902)	5%	90%	5%	0%	0%
Rush Creek (040302011002)	2%	98%	0%	0%	0%
Black Creek (040302011101)	0%	100%	0%	0%	0%
Mill Race-Fox River (040302011102)	5%	95%	0%	0%	0%
Puchyan River (040302011103)	5%	90%	5%	0%	0%
Town Ditch (040302011104)	5%	90%	5%	0%	0%
City of Berlin-Fox River (040302011106)	5%	90%	5%	0%	0%

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 4 (if needed, please specify as 6-year rotation) =

Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

Approximately 50% - 60% Fall tillage.
I'm going to be sending the transect survey information that we collected from 2004 – 2013 for this section.

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	*Potato/ Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Sand Spring Creek-Fox River (040302010101)			
Headwaters Grand River (040302010401)			
Little Green Lake-Grand River (040302010402)			
Lake Emily (040302010501)			
Grand Lake-Grand River (040302010502)			
Belle Fountain Creek (040302010503)			
Grand River (040302010504)			
Puckaway Lake-Fox River (040302010605)			
Sucker Creek (040302010805)			
White River (040302010806)			
Silver Creek (040302010901)			
Big Green Lake (040302010902)			
Rush Creek (040302011002)			
Black Creek (040302011101)			
Mill Race-Fox River (040302011102)			
Puchyan River (040302011103)			
Town Ditch (040302011104)			
City of Berlin-Fox River (040302011106)			

*A lot of vegetable crops have Fall/Summer tillage (August-September) but are then seeded to a cover crop. The cover crop is terminated in the Spring – usually with tillage

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Sand Spring Creek-Fox River (04030201010101)	Headwaters Grand River (04030201040101)	Little Green Lake-Grand River (04030201040102)	Lake Emily (04030201050101)	Grand Lake-Grand River (04030201050102)	Belle Fountain Creek (04030201050103)	Grand River (04030201050104)	Puckaway Lake-Fox River (04030201060105)	Sucker Creek (04030201080105)	White River (04030201080106)	Silver Creek (04030201090101)	Big Green Lake (04030201090102)	Rush Creek (04030201100102)	Black Creek (04030201110101)	Mill Race-Fox River (04030201110102)	Puchyan River (04030201110103)	Town Ditch (04030201110104)	City of Berlin-Fox River (04030201110106)
Cash Grain	0%-15%	*85%*																		
	16%-30%	*0%*																		
	>30%	*10%*																		
	No-Till/Zone-Till	*5%*																		
Dairy	0%-15%	*75%*																		
	16%-30%	*25%*																		
	>30%	*0%*																		
	No-Till/Zone-Till	*0%*																		
Potato/ Vegetable	0%-15%	*100%*																		
	16%-30%	*0%*																		
	>30%	*0%*																		
	No-Till/Zone-Till	*0%*																		

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Crop, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Crop	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	At-Planting: 20 lbs P	At-Planting: 20 lbs P	At-Planting: 20 lbs P
Placement (Surface or Injection)	Injection	Injection	Injection
Incorporation Following Application? (Yes or No)	Yes	Yes	Yes

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Crop, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Sand Spring Creek-Fox River (040302010101)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Headwaters Grand River (040302010401)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Little Green Lake-Grand River (040302010402)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Lake Emily (040302010501)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Grand Lake-Grand River (040302010502)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Belle Fountain Creek (040302010503)	20-30 lb/ac P	Avg 20 lbs/ac P	----------
Grand River (040302010504)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Puckaway Lake-Fox River (040302010605)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Sucker Creek (040302010805)	20-30 lb/ac P	Avg 20 lbs/ac P	----------
White River (040302010806)	20-30 lb/ac P	Avg 20 lbs/ac P	----------
Silver Creek (040302010901)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Big Green Lake (040302010902)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Rush Creek (040302011002)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Black Creek (040302011101)	20-30 lb/ac P	Avg 20 lbs/ac P	----------
Mill Race-Fox River (040302011102)	20-30 lb/ac P	Avg 20 lbs/ac P	----------
Puchyan River (040302011103)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P
Town Ditch (040302011104)	20-30 lb/ac P	Avg 20 lbs/ac P	----------
City of Berlin-Fox River (040302011106)	20-30 lb/ac P	Avg 20 lbs/ac P	20-30 lb/ac P

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?

*Corn: 180-200 bushel/ac *Soybeans: 50-60 bushel/ac *Sweetcorn: 8-11 tons/ac

*COUNTYWIDE

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Sand Spring Creek-Fox River (040302010101)	40%	60%
Headwaters Grand River (040302010401)	10%	90%
Little Green Lake-Grand River (040302010402)	40%	60%
Lake Emily (040302010501)	100%	0%
Grand Lake-Grand River (040302010502)	75%	25%
Belle Fountain Creek (040302010503)	90%	10%
Grand River (040302010504)	90%	10%
Puckaway Lake-Fox River (040302010605)	50%	50%
Sucker Creek (040302010805)	100%	0%
White River (040302010806)	100%	0%
Silver Creek (040302010901)	100%	0%
Big Green Lake (040302010902)	60%	40%
Rush Creek (040302011002)	100%	0%
Black Creek (040302011101)	65%	35%
Mill Race-Fox River (040302011102)	100%	0%
Puchyan River (040302011103)	70%	30%
Town Ditch (040302011104)	80%	20%
City of Berlin-Fox River (040302011106)	70%	30%

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	1-2 times/year
Application Timing	Spring, Fall, Winter Stacked when crops on field	Spring, Summer, Fall
Followed by Incorporation? (Yes or No)	No – not immediate	Yes

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Sand Spring Creek-Fox River (040302010101)	10 ton/ac	Solid	10 ton/ac	Solid
Headwaters Grand River (040302010401)	15 ton/ac	Solid	10,000 gal/ac	Liquid
Little Green Lake-Grand River (040302010402)	20 ton/ac	Solid	12,000 gal/ac	Liquid
Lake Emily (040302010501)	20 ton/ac	Solid	----------	----------
Grand Lake-Grand River (040302010502)	25 ton/ac	Solid	15,000 gal/ac	Liquid
Belle Fountain Creek (040302010503)	20 ton/ac	Solid	12,000 gal/ac	Liquid
Grand River (040302010504)	20 ton/ac	Solid	12,000 gal/ac	Liquid
Puckaway Lake-Fox River (040302010605)	20 ton/ac	Solid	12,000 gal/ac	Liquid
Sucker Creek (040302010805)	20 ton/ac	Solid	----------	----------
White River (040302010806)	20 ton/ac	Solid	----------	----------
Silver Creek (040302010901)	20 ton/ac	Solid	----------	----------
Big Green Lake (040302010902)	20 ton/ac	Solid	15,000 gal/ac	Liquid
Rush Creek (040302011002)	20 ton/ac	Solid	----------	----------
Black Creek (040302011101)	20 ton/ac	Solid	12,000 gal/ac	Liquid
Mill Race-Fox River (040302011102)	20 ton/ac	Solid	----------	----------
Puchyan River (040302011103)	20 ton/ac	Solid	10,000 gal/ac	Liquid
Town Ditch (040302011104)	20 ton/ac	Solid	10,000 gal/ac	Liquid
City of Berlin-Fox River (040302011106)	20 ton/ac	Solid	12,000 gal/ac	Liquid

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	May 20	November 9	4
Average Temperature/Moisture Year	May 5	October 15	4
Warm/Dry Year	April 25	October 10	4

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Sand Spring Creek-Fox River (040302010101)	54
Headwaters Grand River (040302010401)	76
Little Green Lake-Grand River (040302010402)	32
Lake Emily (040302010501)	54
Grand Lake-Grand River (040302010502)	38
Belle Fountain Creek (040302010503)	112
Grand River (040302010504)	34
Puckaway Lake-Fox River (040302010605)	64
Sucker Creek (040302010805)	52
White River (040302010806)	56
Silver Creek (040302010901)	42
Big Green Lake (040302010902)	65
Rush Creek (040302011002)	52
Black Creek (040302011101)	56
Mill Race-Fox River (040302011102)	52
Puchyan River (040302011103)	49
Town Ditch (040302011104)	60
City of Berlin-Fox River (040302011106)	49

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

2%

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	Beef
Number of Animals per Acre	1.5
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	Year-Round

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Langlade County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 4. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
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PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Marie Graupner

Organization: Langlade County Land Conservation

Email: mgraupner@co.langlade.wi.us

Phone: 715-627-6292

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

13. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
14. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
15. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and **what about small grains?**
16. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

Farmers do quite a bit of land swamping in our area, potato/vegetable, cash grains, and dairy often swap land(field) with each other for one or two growing seasons.

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

There are more dairies shown on the map than what there really is. Most of the diaries shown on the map are now cash grain.

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county? **NO. Increase potato and decrease dairy. Maybe increase cash grain as there is a lot around the White Lake area.**

Rotation	% of County Area	% of Agricultural Area
Cash Grain	1%	9%
Dairy	7%	51%
Potato/Vegetable	1%	5%
Pasture/Hay	5%	36%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

10) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
11) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
12) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Upper Post Lake-Wolf River (040302020103) **No Dairy**					
Squaw Creek-Swamp Creek (040302020105) **No Dairy**					
Spider Creek-Wolf River (040302020106) **No Dairy**					
Pickerel Creek (040302020201) **No Dairy**					
Hunting River (040302020202) **No Dairy**					
East Branch of the Lily River (040302020205) **No Dairy**					
Squaw Creek-Wolf River (040302020206) **No Dairy**					
Ninemile Creek (040302020301) **No Dairy**					
Slough Gundy Rapids-Wolf River (040302020302) **No Dairy**					
Elton Creek-Evergreen River (040302020303) **1 dairy**	**100%**				
White Lake Creek-Wolf River (040302020305) **No Dairy**					
Little West Branch Wolf River (040302020401) **4 dairies**					
Elma Creek-West Branch Wolf River (040302020402) **No Dairy**					
Mattoon Creek-West Branch Red River (040302020501) **1 dairy**					
Moose Lake-Red River (040302020503) **7 dairies**					
Elmhurst Creek-Middle Branch Embarrass River (040302021004) **3 dairies**					

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 (if needed, please specify as 6-year rotation) =
Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

Missing corn silage – pretty significant in this area compared to corn for grain or winter wheat.

Soybeans have also increased.

Oats are missing from the rotation sequences.

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

There is less fall tillage being done. More no till being done in the spring,

Potatoes/vegetables are typically tilled in the spring.

Cash grains usually tilled in the spring except for fall planted grains.

Dairy will usually fall till ground going from corn to oats/alfalfa seeding.

Mostly spring with exception of winter wheat and late summer/fall seeded alfalfa and pasture.

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Upper Post Lake-Wolf River (040302020103)			
Squaw Creek-Swamp Creek (040302020105)			
Spider Creek-Wolf River (040302020106)			
Pickerel Creek (040302020201)			
Hunting River (040302020202)			
East Branch of the Lily River (040302020205)			
Squaw Creek-Wolf River (040302020206)			
Ninemile Creek (040302020301)			
Slough Gundy Rapids-Wolf River (040302020302)			
Elton Creek-Evergreen River (040302020303)			
White Lake Creek-Wolf River (040302020305)			
Little West Branch Wolf River (040302020401)			
Elma Creek-West Branch Wolf River (040302020402)			
Mattoon Creek-West Branch Red River (040302020501)			
Moose Lake-Red River (040302020503)			
Elmhurst Creek-Middle Branch Embarrass River (040302021004)			

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Cash grain: Residue rates are higher with more no till/zone till being done.

Dairy: Residue rates vary from 0% to no till.

Potato/vegetable: Residue rates are at a minimum. Very low residue, no till, small grains and silage/alfalfa have residue into spring then tilled under. Usually there is very little to no residue at planting.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Upper Post Lake-Wolf River (04030202103)	Squaw Creek-Swamp Creek (04030202105)	Spider Creek-Wolf River (04030202106)	Pickerel Creek (04030202201)	Hunting River (04030202202)	East Branch of the Lily River (04030202205)	Squaw Creek-Wolf River (04030202206)	Ninemile Creek (04030220301)	Slough Gundy Rapids-Wolf River (04030202302)	Elton Creek-Evergreen River (04030202303)	White Lake Creek-Wolf River (04030202305)	Little West Branch Wolf River (04030220401)	Elma Creek-West Branch Wolf River (04030220402)	Mattoon Creek-West Branch Red River (04030220501)	Moose Lake-Red River (04030220503)	Elmhurst Creek-Middle Branch Embarrass River (04030221004)
Cash Grain	0%-15%	*85%*																
	16%-30%	*0%*																
	>30%	*10%*																
	No-Till/Zone-Till	*5%*																
Dairy	0%-15%	*75%*																
	16%-30%	*25%*																
	>30%	*0%*																
	No-Till/Zone-Till	*0%*																
Potato/ Vegetable	0%-15%	*100%*																
	16%-30%	*0%*																
	>30%	*0%*																
	No-Till/Zone-Till	*0%*																

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Grain, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Grain	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	Pre	Pre	At planting
Placement (Surface or Injection)		Both Mostly surface	Inject in hill And surface/broadcast
Incorporation Following Application? (Yes or No)		Yes	Yes

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Grain, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Upper Post Lake-Wolf River (040302020103)			
Squaw Creek-Swamp Creek (040302020105)			
Spider Creek-Wolf River (040302020106)			
Pickerel Creek (040302020201)			
Hunting River (040302020202)			
East Branch of the Lily River (040302020205)			
Squaw Creek-Wolf River (040302020206)			
Ninemile Creek (040302020301)			
Slough Gundy Rapids-Wolf River (040302020302)			
Elton Creek-Evergreen River (040302020303)			
White Lake Creek-Wolf River (040302020305)			
Little West Branch Wolf River (040302020401)			
Elma Creek-West Branch Wolf River (040302020402)			
Mattoon Creek-West Branch Red River (040302020501)			
Moose Lake-Red River (040302020503)			
Elmhurst Creek-Middle Branch Embarrass River (040302021004)			

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?

Potato:450/cwt

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Upper Post Lake-Wolf River (040302020103)		
Squaw Creek-Swamp Creek (040302020105)		
Spider Creek-Wolf River (040302020106)		
Pickerel Creek (040302020201)		
Hunting River (040302020202)		
East Branch of the Lily River (040302020205)		
Squaw Creek-Wolf River (040302020206)		
Ninemile Creek (040302020301)		
Slough Gundy Rapids-Wolf River (040302020302)		
Elton Creek-Evergreen River (040302020303)	**100%**	
White Lake Creek-Wolf River (040302020305)		
Little West Branch Wolf River (040302020401)	**50%**	**50%**
Elma Creek-West Branch Wolf River (040302020402)		
Mattoon Creek-West Branch Red River (040302020501)		**100%**
Moose Lake-Red River (040302020503)	**43%**	**57%**
Elmhurst Creek-Middle Branch Embarrass River (040302021004)	**100%**	

Please note:

Although there are few dairies in this watershed, manure from CAFO's (not located within the HUC12) is spread on quite a bit of the land used for cash grain.

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	**Twice/year**
Application Timing	**Daily**	**Spring/fall**
Followed by Incorporation? (Yes or No)	**No**	**Yes**

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Upper Post Lake-Wolf River (040302020103)				
Squaw Creek-Swamp Creek (040302020105)				
Spider Creek-Wolf River (040302020106)				
Pickerel Creek (040302020201)				
Hunting River (040302020202)				
East Branch of the Lily River (040302020205)				
Squaw Creek-Wolf River (040302020206)				
Ninemile Creek (040302020301)				
Slough Gundy Rapids-Wolf River (040302020302)				
Elton Creek-Evergreen River (040302020303)		Solid		
White Lake Creek-Wolf River (040302020305)				
Little West Branch Wolf River (040302020401)		Solid		Liquid
Elma Creek-West Branch Wolf River (040302020402)				
Mattoon Creek-West Branch Red River (040302020501)				Liquid
Moose Lake-Red River (040302020503)		Solid		Liquid
Elmhurst Creek-Middle Branch Embarrass River (040302021004)		Solid		

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	**April 20 to June 30**	**May 25 to July 31**	**2**
Average Temperature/Moisture Year	**April 20 to June 30**	**May 25 to July 31**	**3**
Warm/Dry Year	**April 20 to June 30**	**May 25 to July 31**	**2**

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Upper Post Lake-Wolf River (040302020103)	
Squaw Creek-Swamp Creek (040302020105)	
Spider Creek-Wolf River (040302020106)	
Pickerel Creek (040302020201)	
Hunting River (040302020202)	
East Branch of the Lily River (040302020205)	
Squaw Creek-Wolf River (040302020206)	
Ninemile Creek (040302020301)	
Slough Gundy Rapids-Wolf River (040302020302)	
Elton Creek-Evergreen River (040302020303)	
White Lake Creek-Wolf River (040302020305)	
Little West Branch Wolf River (040302020401)	
Elma Creek-West Branch Wolf River (040302020402)	
Mattoon Creek-West Branch Red River (040302020501)	
Moose Lake-Red River (040302020503)	
Elmhurst Creek-Middle Branch Embarrass River (040302021004)	

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

There are more small beef herds within the county, grazing of these animals seems to be the trend. Some herds are only grazed for the summer months (growing season) so no winter feed is harvested. We encourage rotational grazing, to provide a feed source later into the season and it also allows hay to be harvested if the animals are kept over winter.

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	**Beef**
Number of Animals per Acre	**NRCS recommends 1-2 animals/acre** **UWEX recommends 1 animal per 2-3 acres**
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	**Growing Season**

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Marathon County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 5. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
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(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Paul Daigle-Land and Water Program Director, Andy Johnson-Environmental Resource Coordinator

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Phone: 715-261-6006, 715-261-6002

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

17. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
18. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
19. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
20. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified? No

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county? Yes, but I did not dig deep into this section.

Rotation	% of County Area	% of Agricultural Area
Cash Grain	6%	16%
Dairy	18%	50%
Potato/Vegetable	4%	10%
Pasture/Hay	9%	24%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project? Yes, see attached information. Transect survey is completed every other year, with the latest information from 2014.

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

13) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
14) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
15) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Spranger Creek-South Branch Embarrass River (040302021001)	5	15	15	65	
Packard Creek-Middle Branch Embarrass River (040302021003)	5	15	15	65	
Holt Creek-Little Wolf River (040302021501)	5	15	15	65	
Flume Creek (040302021502)	5	15	15	65	
Comet Creek (040302021503)	5	15	15	65	
Bradley Creek-Little Wolf River (040302021504)	5	15	15	65	

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 = Corn Silage - Corn Silage - Corn Grain - Oats/Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

BOTH SPRING AND FALL

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Spranger Creek-South Branch Embarrass River (040302021001)	50 Spr/50fall	50 Spr/50 fall	
Packard Creek-Middle Branch Embarrass River (040302021003)	50 Spr/50 fall	50 Spr/50 fall	
Holt Creek-Little Wolf River (040302021501)	50 Spr/50 fall	50 Spr/50 fall	
Flume Creek (040302021502)	50 Spr/50 fall	50 Spr/50 fall	
Comet Creek (040302021503)	50 Spr/50 fall	50 Spr/50 fall	
Bradley Creek-Little Wolf River (040302021504)	50 Spr/50 fall	50 Spr/50 fall	

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Spranger Creek-South Branch Embarrass River (040302021001)	Packard Creek-Middle Branch Embarrass River (040302021003)	Holt Creek-Little Wolf River (040302021501)	Flume Creek (040302021502)	Comet Creek (040302021503)	Bradley Creek-Little Wolf River (040302021504)
Cash Grain	0%-15%	*85%*	90%	90%	90%	90%	90%	90%
	16%-30%	*0%*	0%	0%	0%	0%	0%	0%
	>30%	*10%*	5%	5%	5%	5%	5%	5%
	No-Till/Zone-Till	*5%*	5%	5%	5%	5%	5%	5%
Dairy	0%-15%	*75%*	90%	90%	90%	90%	90%	90%
	16%-30%	*25%*	0%	0%	0%	0%	0%	0%
	>30%	*0%*	5%	5%	5%	5%	5%	5%
	No-Till/Zone-Till	*0%*	5%	5%	5%	5%	5%	5%
Potato/ Vegetable	0%-15%	*100%*	90%	90%	90%	90%	90%	90%
	16%-30%	*0%*	0%	0%	0%	0%	0%	0%
	>30%	*0%*	5%	5%	5%	5%	5%	5%
	No-Till/Zone-Till	*0%*	5%	5%	5%	5%	5%	5%

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Crop, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Crop	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	At-Planting	At-Planting	?
Placement (Surface or Injection)	Solid = subsurface Liquid = Injection Surface	Solid = Subsurface Liquid = Injection Surface	?
Incorporation Following Application? (Yes or No)	N/A	N/A	?NO

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Crop, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Spranger Creek-South Branch Embarrass River (040302021001)	15 #/Ac	15 #/Ac	?
Packard Creek-Middle Branch Embarrass River (040302021003)	P	P	?
Holt Creek-Little Wolf River (040302021501)	P	P	?
Flume Creek (040302021502)	P	P	?
Comet Creek (040302021503)	P	P	?
Bradley Creek-Little Wolf River (040302021504)	P	P	?

Typical N:P:K Ratio = 20:10:18

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?

Cg 151-170 bu/Ac

Cs 21-25 T/Ac

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Spranger Creek-South Branch Embarrass River (040302021001)	60%	40%
Packard Creek-Middle Branch Embarrass River (040302021003)	60%	40%
Holt Creek-Little Wolf River (040302021501)	60%	40%
Flume Creek (040302021502)	60%	40%
Comet Creek (040302021503)	60%	40%
Bradley Creek-Little Wolf River (040302021504)	60%	40%

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	1 -2 PER YEAR
Application Timing	HARVEST TO PLANTING for annual crops Year around on pasture and hay	SPRING AND FALL
Followed by Incorporation? (Yes or No)	NO	YES if spring 50% if fall applied

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Spranger Creek-South Branch Embarrass River (040302021001)	CORN YEARS: 20 TONS/ACRE/YEAR FIRST YEAR OATS/HAY: 7 TONS/ACRE/YEAR	SOLID	CORN YEARS: 10,000 GALLONS/ACRE/YEAR FIRST YEAR OATS/HAY: 3,000 GALLONS/ACRE/YEAR	LIQUID
Packard Creek-Middle Branch Embarrass River (040302021003)				
Holt Creek-Little Wolf River (040302021501)				
Flume Creek (040302021502)				
Comet Creek (040302021503)				
Bradley Creek-Little Wolf River (040302021504)				

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	5/21	10/1 silage 10/21 high moisture	2-3
Average Temperature/Moisture Year	5/10	9/15 silage 10/15 high moisture	3-4
Warm/Dry Year	5/1	9/1 silage 10/15 high moisture	3

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Spranger Creek-South Branch Embarrass River (040302021001)	60 ppm *
Packard Creek-Middle Branch Embarrass River (040302021003)	60 ppm
Holt Creek-Little Wolf River (040302021501)	60 ppm
Flume Creek (040302021502)	60 ppm
Comet Creek (040302021503)	60 ppm
Bradley Creek-Little Wolf River (040302021504)	60 ppm

* All Dairy Farms. Potato Farm higher ??

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	Beef and Dairy
Number of Animals per Acre	1-2
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	180 Days

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Marquette County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 6. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Patrick Kilbey

Organization: Marquette County LWCD

Email: Patrick.kilbey@wi.nacdnet.net

Phone: 608-296-2815

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

21. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
22. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
23. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
24. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

NO

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

YES

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	12%	29%
Dairy	18%	44%
Potato/Vegetable	1%	3%
Pasture/Hay	11%	25%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

YES

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

NO, no recent transect survey data is available

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

16) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
17) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
18) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Neenah Lake-Neenah Creek (040302010201)			10	55	35
Green Creek (040302010202)			30	45	25
South Branch Neenah Creek (040302010203)			30	45	25
Neenah Creek (040302010205)			10	55	35
Tagatz Creek (040302010301)			30	45	25
Westfield Creek (040302010302)			10	55	35
Klawitter Creek (040302010303)			10	55	35
Montello River (040302010304)			30	45	25
Belle Fountain Creek (040302010503)			30	45	25
Grand River (040302010504)			10	55	35
French Creek (040302010602)			30	45	25
Good Earth Creek-Fox River (040302010603)			30	45	25
Buffalo Lake-Fox River (040302010604)			30	45	25
Puckaway Lake-Fox River (040302010605)			30	45	25
Weddle Creek (040302010701)			30	45	25
Chafee Creek (040302010702)			30	45	25
Mecan River (040302010704)			30	45	25
Lunch Creek (040302010803)			30	45	25
White River (040302010806)			30	45	25

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 (if needed, please specify as 6-year rotation) = Corn Silage-Corn Silage-Alfalfa-Alfalfa-Alfalfa
Dairy Sequence 5 (if needed, please specify as 6-year rotation) = Corn Silage-Corn Silage-Oats-Alfalfa-Alfalfa-Alfalfa

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

Fall

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Neenah Lake-Neenah Creek (040302010201)	Fall	Fall	Fall
Green Creek (040302010202)	Fall	Fall	Fall
South Branch Neenah Creek (040302010203)	Fall	Fall	Fall
Neenah Creek (040302010205)	Fall	Fall	Fall
Tagatz Creek (040302010301)	Fall	Fall	Fall
Westfield Creek (040302010302)	Fall	Fall	Fall
Klawitter Creek (040302010303)	Fall	Fall	Fall
Montello River (040302010304)	Fall	Fall	Fall
Belle Fountain Creek (040302010503)	Fall	Fall	Fall
Grand River (040302010504)	Fall	Fall	Fall
French Creek (040302010602)	Fall	Fall	Fall
Good Earth Creek-Fox River (040302010603)	Fall	Fall	Fall
Buffalo Lake-Fox River (040302010604)	Fall	Fall	Fall
Puckaway Lake-Fox River (040302010605)	Fall	Fall	Fall
Weddle Creek (040302010701)	Fall	Fall	Fall
Chafee Creek (040302010702)	Fall	Fall	Fall
Mecan River (040302010704)	Fall	Fall	Fall
Lunch Creek (040302010803)	Fall	Fall	Fall
White River (040302010806)	Fall	Fall	Fall

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Neenah Lake-Neenah Creek (040302010201)	Green Creek (040302010202)	South Branch Neenah Creek (040302010203)	Neenah Creek (040302010205)	Tagatz Creek (040302010301)	Westfield Creek (040302010302)	Klawitter Creek (040302010303)	Montello River (040302010304)	Belle Fountain Creek (040302010503)	Grand River (040302010504)	French Creek (040302010602)	Good Earth Creek-Fox River (040302010603)	Buffalo Lake-Fox River (040302010604)	Puckaway Lake-Fox River (040302010605)	Weddle Creek (040302010701)	Chafee Creek (040302010702)	Mecan River (040302010704)	Lunch Creek (040302010803)	White River (040302010806)
Cash Grain	0%-15%	*85%*	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
	16%-30%	*0%*	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	>30%	*10%*	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	No-Till/Zone-Till	*5%*	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Dairy	0%-15%	*75%*	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
	16%-30%	*25%*	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
	>30%	*0%*	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	No-Till/Zone-Till	*0%*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potato/ Vegetable	0%-15%	*100%*	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
	16%-30%	*0%*	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	>30%	*0%*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	No-Till/Zone-Till	*0%*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Crop, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Crop	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)			
Placement (Surface or Injection)			
Incorporation Following Application? (Yes or No)			

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Crop, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Neenah Lake-Neenah Creek (040302010201)			
Green Creek (040302010202)			
South Branch Neenah Creek (040302010203)			
Neenah Creek (040302010205)			
Tagatz Creek (040302010301)			
Westfield Creek (040302010302)			
Klawitter Creek (040302010303)			
Montello River (040302010304)			
Belle Fountain Creek (040302010503)			
Grand River (040302010504)			
French Creek (040302010602)			
Good Earth Creek-Fox River (040302010603)			
Buffalo Lake-Fox River (040302010604)			
Puckaway Lake-Fox River (040302010605)			
Weddle Creek (040302010701)			
Chafee Creek (040302010702)			
Mecan River (040302010704)			
Lunch Creek (040302010803)			
White River (040302010806)			

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Neenah Lake-Neenah Creek (040302010201)	10	90
Green Creek (040302010202)	90	10
South Branch Neenah Creek (040302010203)	0	0
Neenah Creek (040302010205)	30	70
Tagatz Creek (040302010301)	30	70
Westfield Creek (040302010302)	10	90
Klawitter Creek (040302010303)	10	90
Montello River (040302010304)	30	70
Belle Fountain Creek (040302010503)	60	40
Grand River (040302010504)	30	70
French Creek (040302010602)	60	40
Good Earth Creek-Fox River (040302010603)	60	40
Buffalo Lake-Fox River (040302010604)	60	40
Puckaway Lake-Fox River (040302010605)	60	40
Weddle Creek (040302010701)	0	0
Chafee Creek (040302010702)	65	45
Mecan River (040302010704)	75	25
Lunch Creek (040302010803)	75	25
White River (040302010806)	75	25

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	Spring and Fall
Application Timing		
Followed by Incorporation? (Yes or No)	NO	NO

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Neenah Lake-Neenah Creek (040302010201)		Solid		Liquid
Green Creek (040302010202)				
South Branch Neenah Creek (040302010203)				
Neenah Creek (040302010205)				
Tagatz Creek (040302010301)				
Westfield Creek (040302010302)				
Klawitter Creek (040302010303)				
Montello River (040302010304)				
Belle Fountain Creek (040302010503)				
Grand River (040302010504)				
French Creek (040302010602)				
Good Earth Creek-Fox River (040302010603)				
Buffalo Lake-Fox River (040302010604)				
Puckaway Lake-Fox River (040302010605)				
Weddle Creek (040302010701)				
Chafee Creek (040302010702)				
Mecan River (040302010704)				
Lunch Creek (040302010803)				
White River (040302010806)				

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	May 30th	November 15th	4
Average Temperature/Moisture Year	May 15th	October 30th	4
Warm/Dry Year	May 1	October 15th	3

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Neenah Lake-Neenah Creek (040302010201)	
Green Creek (040302010202)	
South Branch Neenah Creek (040302010203)	
Neenah Creek (040302010205)	
Tagatz Creek (040302010301)	
Westfield Creek (040302010302)	
Klawitter Creek (040302010303)	
Montello River (040302010304)	
Belle Fountain Creek (040302010503)	
Grand River (040302010504)	
French Creek (040302010602)	
Good Earth Creek-Fox River (040302010603)	
Buffalo Lake-Fox River (040302010604)	
Puckaway Lake-Fox River (040302010605)	
Weddle Creek (040302010701)	
Chafee Creek (040302010702)	
Mecan River (040302010704)	
Lunch Creek (040302010803)	
White River (040302010806)	

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

25%

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	
Number of Animals per Acre	
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	

Not a significant practice

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Portage County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 7. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Steve Bradley

Organization: Portage Co. LCD

Email: bradleys@co.portage.wi.us

Phone: 715-346-1334

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

25. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
26. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
27. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
28. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

No but you need to recognize almost all potato/vegetable fields are planted with rye cover crop after harvest.

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

Your map does not identify internally drained areas to closed depressions. These areas do not contribute P surface waters. There are large areas of closed depressions in this glacial moraine.

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county? ***Pasture/Hay should only be 5% of County Area in Upper Fox/Wolf Basin. Dairy should be 25% and Cash Grain should be 13%.***

Rotation	% of County Area	% of Agricultural Area
Cash Grain	8%	16%
Dairy	20%	43%
Potato/Vegetable	5%	10%
Pasture/Hay	15%	31%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project? ***We have not done transect surveys.***

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

19) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
20) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
21) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Flume Creek (040302021502)		95			
Bradley Creek-Little Wolf River (040302021504)		95			
Peterson Creek (040302021601)		95			
Nace Creek-South Branch Little Wolf River (040302021602)		95			
Poncho Creek-Tommorrow River (040302021801)		95			
Lake Emily (040302021802)		95			
Spring Creek (040302021803)		95			
Bear Creek-Waupaca River (040302021804)		95			
Wolf Lake (040302021805)		95			
Emmons Creek (040302021806)		95			
Radley Creek (040302021807)		95			
Crystal River (040302021808)		95			
Mud Lake-Waupaca River (040302021809)		95			

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 (if needed, please specify as 6-year rotation) =
Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

Half spring, half fall.

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below. **You need to recognize almost all potato/vegetable fields are planted with rye cover crop after harvest. Tillage timing does not vary by crop rotation or HUC12.**

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Flume Creek (040302021502)			
Bradley Creek-Little Wolf River (040302021504)			
Peterson Creek (040302021601)			
Nace Creek-South Branch Little Wolf River (040302021602)			
Poncho Creek-Tommorrow River (040302021801)			
Lake Emily (040302021802)			
Spring Creek (040302021803)			
Bear Creek-Waupaca River (040302021804)			
Wolf Lake (040302021805)			
Emmons Creek (040302021806)			
Radley Creek (040302021807)			
Crystal River (040302021808)			
Mud Lake-Waupaca River (040302021809)			

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Flume Creek (040302021502)	Bradley Creek-Little Wolf River (040302021504)	Peterson Creek (040302021601)	Nace Creek-South Branch Little Wolf River (040302021602)	Poncho Creek-Tommorrow River (040302021801)	Lake Emily (040302021802)	Spring Creek (040302021803)	Bear Creek-Waupaca River (040302021804)	Wolf Lake (040302021805)	Emmons Creek (040302021806)	Radley Creek (040302021807)	Crystal River (040302021808)	Mud Lake-Waupaca River (040302021809)
Cash Grain	0%-15%	*85%*	25	25	25	25	25	25	25	25	25	25	25	25	25
	16%-30%	*0%*	70	70	70	70	70	70	70	70	70	70	70	70	70
	>30%	*10%*	5	5	5	5	5	5	5	5	5	5	5	5	5
	No-Till/Zone-Till	*5%*													
Dairy	0%-15%	*75%*	25	25	25	25	25	25	25	25	25	25	25	25	25
	16%-30%	*25%*	70	70	70	70	70	70	70	70	70	70	70	70	70
	>30%	*0%*	5	5	5	5	5	5	5	5	5	5	5	5	5
	No-Till/Zone-Till	*0%*													
Potato/ Vegetable	0%-15%	*100%*	100	100	100	100	100	100	100	100	100	100	100	100	100
	16%-30%	*0%*													
	>30%	*0%*													
	No-Till/Zone-Till	*0%*													

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Crop, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Crop	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	At planting	At planting	At planting
Placement (Surface or Injection)			
Incorporation Following Application? (Yes or No)			

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Crop, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Flume Creek (040302021502)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Bradley Creek-Little Wolf River (040302021504)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Peterson Creek (040302021601)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Nace Creek-South Branch Little Wolf River (040302021602)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Poncho Creek-Tommorrow River (040302021801)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Lake Emily (040302021802)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Spring Creek (040302021803)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Bear Creek-Waupaca River (040302021804)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Wolf Lake (040302021805)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Emmons Creek (040302021806)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Radley Creek (040302021807)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Crystal River (040302021808)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato
Mud Lake-Waupaca River (040302021809)	34#/ac. on corn	20#/ac. on corn	75#/ac. on potato

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed? ***No high yield targets***

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Flume Creek (040302021502)	20	80
Bradley Creek-Little Wolf River (040302021504)	20	80
Peterson Creek (040302021601)	20	80
Nace Creek-South Branch Little Wolf River (040302021602)	20	80
Poncho Creek-Tommorrow River (040302021801)	20	80
Lake Emily (040302021802)	20	80
Spring Creek (040302021803)	20	80
Bear Creek-Waupaca River (040302021804)	20	80
Wolf Lake (040302021805)	20	80
Emmons Creek (040302021806)	20	80
Radley Creek (040302021807)	20	80
Crystal River (040302021808)	20	80
Mud Lake-Waupaca River (040302021809)	20	80

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	Spring and fall
Application Timing	daily	twice/yr.
Followed by Incorporation? (Yes or No)	no	yes

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Flume Creek (040302021502)	30 ton/ac.	solid	10000 gal./ac.	liquid
Bradley Creek-Little Wolf River (040302021504)	30 ton/ac.	solid	10000 gal./ac.	liquid
Peterson Creek (040302021601)	30 ton/ac.	solid	10000 gal./ac.	liquid
Nace Creek-South Branch Little Wolf River (040302021602)	30 ton/ac.	solid	10000 gal./ac.	liquid
Poncho Creek-Tommorrow River (040302021801)	30 ton/ac.	solid	10000 gal./ac.	liquid
Lake Emily (040302021802)	30 ton/ac.	solid	10000 gal./ac.	liquid
Spring Creek (040302021803)	30 ton/ac.	solid	10000 gal./ac.	liquid
Bear Creek-Waupaca River (040302021804)	30 ton/ac.	solid	10000 gal./ac.	liquid
Wolf Lake (040302021805)	30 ton/ac.	solid	10000 gal./ac.	liquid
Emmons Creek (040302021806)	30 ton/ac.	solid	10000 gal./ac.	liquid
Radley Creek (040302021807)	30 ton/ac.	solid	10000 gal./ac.	liquid
Crystal River (040302021808)	30 ton/ac.	solid	10000 gal./ac.	liquid
Mud Lake-Waupaca River (040302021809)	30 ton/ac.	solid	10000 gal./ac.	liquid

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	5/1	10/30	3
Average Temperature/Moisture Year	5/1	10/30	3
Warm/Dry Year	5/1	10/30	3

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Flume Creek (040302021502)	50
Bradley Creek-Little Wolf River (040302021504)	50
Peterson Creek (040302021601)	50
Nace Creek-South Branch Little Wolf River (040302021602)	50
Poncho Creek-Tommorrow River (040302021801)	50
Lake Emily (040302021802)	50
Spring Creek (040302021803)	50
Bear Creek-Waupaca River (040302021804)	50
Wolf Lake (040302021805)	50
Emmons Creek (040302021806)	50
Radley Creek (040302021807)	50
Crystal River (040302021808)	50
Mud Lake-Waupaca River (040302021809)	50

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

20

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Not significant

Characteristic	Typical Practice
Animal Type	
Number of Animals per Acre	
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Shawano County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 8. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Scott M. Frank

Organization: Shawano County Land Conservation Division

Email: scott.frank@co.shawano.wi.us

Phone: (715) 526-4632

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

29. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
30. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
31. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
32. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

I would also include Winter Wheat in both cash grain and dairy rotations.

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

Where did the initial information come from to make these crop rotation maps?

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county? Yes, they appear to be accurate. Is the % of County Area just the Wolf Basin Area or is it the entire County?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	8%	22%
Dairy	19%	49%
Potato/Vegetable	<1%	1%
Pasture/Hay	11%	28%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project? We have annual transect survey data from 2000 to 2012 that we can share. What format is preferred? WI DATCP should also have this data.

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

22) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
23) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
24) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table on the following page, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Neopit Millpond 108-West Branch Wolf River (040302020404)					
Mattoon Creek-West Branch Red River (040302020501)					
Silver Creek-West Branch Red River (040302020502)					
Moose Lake-Red River (040302020503)					
Miller Creek (040302020504)					
Red Lakes-Red River (040302020505)					
Pickerel Creek (040302020601)					
Loon Creek (040302020602)					
Shawano Lake (040302020603)					
Legend Lake-Wolf River (040302020702)					
East Branch Shioc River (040302020801)					
White Lake-Shioc River (040302020802)					
Herman Creek (040302020803)					
Upper Black Creek (040302020805)					
Mink Creek-Shioc River (040302020807)					
School Section Creek-Wolf River (040302020901)					
Schoenick Creek (040302020902)					
Navarino Marsh-Wolf River (040302020903)					
Spranger Creek-South Branch Embarrass River (040302021001)					
Tiger Creek-South Branch Embarrass River (040302021002)					
Packard Creek-Middle Branch Embarrass River (040302021003)					
Elmhurst Creek-Middle Branch Embarrass River (040302021004)					
Dent Creek-Middle Branch Embarrass River (040302021005)					
Logemanns Creek-Middle Branch Embarrass River (040302021006)					
Municipality of Caroline-S. Branch Embarrass River (040302021007)					
North Branch Pigeon River (040302021101)					
South Branch Pigeon River (040302021102)					
Strassburg Creek-North Branch Embarrass River (040302021201)					
Pony Creek-North Branch Embarrass River (040302021202)					
Mill Creek (040302021203)					
Pine Lake-Embarrass River (040302021204)					
Comet Creek (040302021503)					
Bradley Creek-Little Wolf River (040302021504)					

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 4 (if needed, please specify as 6-year rotation) =

Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county? Fall tillage is real common but can shift to spring due to late harvest years and frozen conditions prior to mid/late November.

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below. To do this table justice it would take much time to research possible differences per HUC 12. It cannot be done by my staff at this time.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing
EXAMPLE	*FALL*	*SPRING*
Neopit Millpond 108-West Branch Wolf River (040302020404)		
Mattoon Creek-West Branch Red River (040302020501)		
Silver Creek-West Branch Red River (040302020502)		
Moose Lake-Red River (040302020503)		
Miller Creek (040302020504)		
Red Lakes-Red River (040302020505)		
Pickerel Creek (040302020601)		
Loon Creek (040302020602)		
Shawano Lake (040302020603)		
Legend Lake-Wolf River (040302020702)		
East Branch Shioc River (040302020801)		
White Lake-Shioc River (040302020802)		
Herman Creek (040302020803)		
Upper Black Creek (040302020805)		
Mink Creek-Shioc River (040302020807)		
School Section Creek-Wolf River (040302020901)		
Schoenick Creek (040302020902)		
Navarino Marsh-Wolf River (040302020903)		
Spranger Creek-South Branch Embarrass River (040302021001)		
Tiger Creek-South Branch Embarrass River (040302021002)		
Packard Creek-Middle Branch Embarrass River (040302021003)		
Elmhurst Creek-Middle Branch Embarrass River (040302021004)		
Dent Creek-Middle Branch Embarrass River (040302021005)		
Logemanns Creek-Middle Branch Embarrass River (040302021006)		
Municipality of Caroline-S. Branch Embarrass River (040302021007)		
North Branch Pigeon River (040302021101)		
South Branch Pigeon River (040302021102)		
Strassburg Creek-North Branch Embarrass River (040302021201)		
Pony Creek-North Branch Embarrass River (040302021202)		
Mill Creek (040302021203)		
Pine Lake-Embarrass River (040302021204)		
Comet Creek (040302021503)		
Bradley Creek-Little Wolf River (040302021504)		

Question 8. In the tables below, please estimate the percentage of your county's Cash Grain and Dairy acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed. Hopefully the tillage transect data can help with this data. It cannot be done by my staff at this time.
This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Neopit Millpond 108-W Branch Wolf River (040302020404)	Mattoon Creek-W Branch Red River (040302020501)	Silver Creek-W Branch Red River (040302020502)	Moose Lake-Red River (040302020503)	Miller Creek (040302020504)	Red Lakes-Red River (040302020505)	Pickerel Creek (040302020601)	Loon Creek (040302020602)	Shawano Lake (040302020603)	Legend Lake-Wolf River (040302020702)	E Branch Shioc River (040302020801)	White Lake-Shioc River (040302020802)	Herman Creek (040302020803)	Upper Black Creek (040302020805)	Mink Creek-Shioc River (040302020807)	School Section Creek-Wolf River (040302020901)
Cash Grain	0%-15%	*85%*																
	16%-30%	*0%*																
	>30%	*10%*																
	No-Till/Zone-Till	*5%*																
Dairy	0%-15%	*75%*																
	16%-30%	*25%*																
	>30%	*0%*																
	No-Till/Zone-Till	*0%*																

Crop Rotation	**Crop Residue Class**	Schoenick Creek (040302020902)	Navarino Marsh-Wolf River (040302020903)	Spranger Creek-S Branch Embarrass River (040302021001)	Tiger Creek-S Branch Embarrass River (040302021002)	Packard Creek-M Branch Embarrass River (040302021003)	Elmhurst Creek-M Branch Embarrass River (040302021004)	Dent Creek-M Branch Embarrass River (040302021005)	Logemanns Creek-M Branch Embarrass River (040302021006)	Municipality of Caroline-S Branch Embarrass River (040302021007)	N Branch Pigeon River (040302021101)	S Branch Pigeon River (040302021102)	Strassburg Creek-N Branch Embarrass River (040302021201)	Pony Creek-N Branch Embarrass River (040302021202)	Mill Creek (040302021203)	Pine Lake-Embarrass River (040302021204)	Comet Creek (040302021503)	Bradley Creek-Little Wolf River (040302021504)
Cash Grain	0%-15%																	
	16%-30%																	
	>30%																	
	No-Till/Zone-Till																	
Dairy	0%-15%																	
	16%-30%																	
	>30%																	
	No-Till/Zone-Till																	

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy and Cash Grain rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Grain and Dairy rotations in your county.

Characteristic	Cash Grain	Dairy
Application Timing (Pre-Planting or At-Planting)		
Placement (Surface or Injection)		
Incorporation Following Application? (Yes or No)		

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Grain and Dairy rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.* To do this table justice it would take much time to research possible differences per HUC 12. It cannot be done by my staff at this time.

HUC12	Cash Grain Application Rate	Dairy Application Rate
Neopit Millpond 108-West Branch Wolf River (040302020404)		
Mattoon Creek-West Branch Red River (040302020501)		
Silver Creek-West Branch Red River (040302020502)		
Moose Lake-Red River (040302020503)		
Miller Creek (040302020504)		
Red Lakes-Red River (040302020505)		
Pickerel Creek (040302020601)		
Loon Creek (040302020602)		
Shawano Lake (040302020603)		
Legend Lake-Wolf River (040302020702)		
East Branch Shioc River (040302020801)		
White Lake-Shioc River (040302020802)		
Herman Creek (040302020803)		
Upper Black Creek (040302020805)		
Mink Creek-Shioc River (040302020807)		
School Section Creek-Wolf River (040302020901)		
Schoenick Creek (040302020902)		
Navarino Marsh-Wolf River (040302020903)		
Spranger Creek-South Branch Embarrass River (040302021001)		
Tiger Creek-South Branch Embarrass River (040302021002)		
Packard Creek-Middle Branch Embarrass River (040302021003)		
Elmhurst Creek-Middle Branch Embarrass River (040302021004)		
Dent Creek-Middle Branch Embarrass River (040302021005)		
Logemanns Creek-Middle Branch Embarrass River (040302021006)		
Municipality of Caroline-S. Branch Embarrass River (040302021007)		
North Branch Pigeon River (040302021101)		
South Branch Pigeon River (040302021102)		
Strassburg Creek-North Branch Embarrass River (040302021201)		
Pony Creek-North Branch Embarrass River (040302021202)		
Mill Creek (040302021203)		
Pine Lake-Embarrass River (040302021204)		
Comet Creek (040302021503)		
Bradley Creek-Little Wolf River (040302021504)		

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed? To be accurate it would take much time to research possible differences per HUC 12. It cannot be done at this time.

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed. Unable to do this at this time.

HUC12	% Daily Haul	% Storage
Neopit Millpond 108-West Branch Wolf River (040302020404)		
Mattoon Creek-West Branch Red River (040302020501)		
Silver Creek-West Branch Red River (040302020502)		
Moose Lake-Red River (040302020503)		
Miller Creek (040302020504)		
Red Lakes-Red River (040302020505)		
Pickerel Creek (040302020601)		
Loon Creek (040302020602)		
Shawano Lake (040302020603)		
Legend Lake-Wolf River (040302020702)		
East Branch Shioc River (040302020801)		
White Lake-Shioc River (040302020802)		
Herman Creek (040302020803)		
Upper Black Creek (040302020805)		
Mink Creek-Shioc River (040302020807)		
School Section Creek-Wolf River (040302020901)		
Schoenick Creek (040302020902)		
Navarino Marsh-Wolf River (040302020903)		
Spranger Creek-South Branch Embarrass River (040302021001)		
Tiger Creek-South Branch Embarrass River (040302021002)		
Packard Creek-Middle Branch Embarrass River (040302021003)		
Elmhurst Creek-Middle Branch Embarrass River (040302021004)		
Dent Creek-Middle Branch Embarrass River (040302021005)		
Logemanns Creek-Middle Branch Embarrass River (040302021006)		
Municipality of Caroline-S. Branch Embarrass River (040302021007)		
North Branch Pigeon River (040302021101)		
South Branch Pigeon River (040302021102)		
Strassburg Creek-North Branch Embarrass River (040302021201)		
Pony Creek-North Branch Embarrass River (040302021202)		
Mill Creek (040302021203)		
Pine Lake-Embarrass River (040302021204)		
Comet Creek (040302021503)		
Bradley Creek-Little Wolf River (040302021504)		

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	Spring Summer Fall
Application Timing	Not sure what you are looking for?	Injected in spring and fall; topdress on alfalfa in summer
Followed by Incorporation? (Yes or No)	Yes, in spring and fall.	No

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Neopit Millpond 108-West Branch Wolf River (040302020404)				
Mattoon Creek-West Branch Red River (040302020501)				
Silver Creek-West Branch Red River (040302020502)				
Moose Lake-Red River (040302020503)				
Miller Creek (040302020504)				
Red Lakes-Red River (040302020505)				
Pickerel Creek (040302020601)				
Loon Creek (040302020602)				
Shawano Lake (040302020603)				
Legend Lake-Wolf River (040302020702)				
East Branch Shioc River (040302020801)				
White Lake-Shioc River (040302020802)				
Herman Creek (040302020803)				
Upper Black Creek (040302020805)				
Mink Creek-Shioc River (040302020807)				
School Section Creek-Wolf River (040302020901)				
Schoenick Creek (040302020902)				
Navarino Marsh-Wolf River (040302020903)				
Spranger Creek-South Branch Embarrass River (040302021001)				
Tiger Creek-South Branch Embarrass River (040302021002)				
Packard Creek-Middle Branch Embarrass River (040302021003)				
Elmhurst Creek-Middle Branch Embarrass River (040302021004)				
Dent Creek-Middle Branch Embarrass River (040302021005)				
Logemanns Creek-Middle Branch Embarrass River (040302021006)				
Municipality of Caroline-S. Branch Embarrass River (040302021007)				
North Branch Pigeon River (040302021101)				
South Branch Pigeon River (040302021102)				
Strassburg Creek-North Branch Embarrass River (040302021201)				
Pony Creek-North Branch Embarrass River (040302021202)				
Mill Creek (040302021203)				
Pine Lake-Embarrass River (040302021204)				
Comet Creek (040302021503)				
Bradley Creek-Little Wolf River (040302021504)				

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year			
Average Temperature/Moisture Year			
Warm/Dry Year			

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Neopit Millpond 108-West Branch Wolf River (040302020404)	
Mattoon Creek-West Branch Red River (040302020501)	
Silver Creek-West Branch Red River (040302020502)	
Moose Lake-Red River (040302020503)	
Miller Creek (040302020504)	
Red Lakes-Red River (040302020505)	
Pickerel Creek (040302020601)	
Loon Creek (040302020602)	
Shawano Lake (040302020603)	
Legend Lake-Wolf River (040302020702)	
East Branch Shioc River (040302020801)	
White Lake-Shioc River (040302020802)	
Herman Creek (040302020803)	
Upper Black Creek (040302020805)	
Mink Creek-Shioc River (040302020807)	
School Section Creek-Wolf River (040302020901)	
Schoenick Creek (040302020902)	
Navarino Marsh-Wolf River (040302020903)	
Spranger Creek-South Branch Embarrass River (040302021001)	
Tiger Creek-South Branch Embarrass River (040302021002)	
Packard Creek-Middle Branch Embarrass River (040302021003)	
Elmhurst Creek-Middle Branch Embarrass River (040302021004)	
Dent Creek-Middle Branch Embarrass River (040302021005)	
Logemanns Creek-Middle Branch Embarrass River (040302021006)	
Municipality of Caroline-S. Branch Embarrass River (040302021007)	
North Branch Pigeon River (040302021101)	
South Branch Pigeon River (040302021102)	
Strassburg Creek-North Branch Embarrass River (040302021201)	
Pony Creek-North Branch Embarrass River (040302021202)	
Mill Creek (040302021203)	
Pine Lake-Embarrass River (040302021204)	
Comet Creek (040302021503)	
Bradley Creek-Little Wolf River (040302021504)	

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	
Number of Animals per Acre	
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Waupaca County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 9. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are

displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Brian Haase, County Conservationist

Organization: Waupaca County Land & Water Conservation Dept.

Email: brian.haase@co.waupaca.wi.us

Phone: 715-258-6482

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

33. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
34. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
35. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
36. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

No.

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

In general, this map looks fairly accurate. It would take a more detailed map/data set to really say otherwise. I am a bit surprised at the large amount designated as hay/pasture after the recent spike in commodity cropping.

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	11%	23%
Dairy	20%	43%
Potato/Vegetable	1%	3%
Pasture/Hay	15%	31%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Again, I will not disagree but I would have anecdotally guessed that Cash Grain/Dairy would be a bit higher and Hay/Pasture a bit lower.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

See attached files. We have transect data for Waupaca County for all years since transect was started except 2011.

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

25) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
26) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
27) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa – Alfalfa

We believe that additional rotations should be included that feature primarily corn sileage instead of corn grain or an even mix of both. (Ex. Corn Sileage - Corn Sileage - Winter Wheat - Alfalfa - Alfalfa – Alfalfa) With increasingly smaller land bases per dairy farm we see an emphasis on corn sileage.

Question 5. In the table on the next page, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Navarino Marsh-Wolf River (040302020903)					
North Branch Pigeon River (040302021101)	50			25	25
South Branch Pigeon River (040302021102)	50			25	25
Pigeon Lake-Pigeon River (040302021103)	50			25	25
Pine Lake-Embarrass River (040302021204)					
Township of Deer Creek-Embarrass River (040302021301)	50			25	25
Maple Creek (040302021302)	50			25	25
Bear Creek (040302021303)					
Flume Creek (040302021502)	50				50
Comet Creek (040302021503)					
Bradley Creek-Little Wolf River (040302021504)					
Peterson Creek (040302021601)	50		50		
Nace Creek-South Branch Little Wolf River (040302021602)					
North Branch Little Wolf River (040302021603)					
Nichol Creek-South Branch Little Wolf River (040302021604)					
White Lake-South Branch Little Wolf River (040302021605)			10	90	
Whitcomb Creek (040302021701)	50			25	25
Blake Creek (040302021702)			10	90	
Shaw Creek-Little Wolf River (040302021703)			10	90	
Bear Lake-Little Wolf River (040302021704)			10	90	
Mouse Creek-Little Wolf River (040302021705)	15		10	70	5
Emmons Creek (040302021806)					
Radley Creek (040302021807)					
Crystal River (040302021808)					
Mud Lake-Waupaca River (040302021809)					
Weyauwega Lake-Waupaca River (040302021810)					
Potters Creek (040302021901)	50			25	25
Partridge Crop Lake-Wolf River (040302021902)					
Hatton Creek (040302021903)					
Walla Walla Creek (040302021904)			15	75	15
Mosquito Creek (040302021905)					
Partridge Lake-Wolf River (040302021906)					
Humphrey Creek-Pine River (040302022001)					
Lake Poygan (040302022106)					

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 4 (if needed, please specify as 6-year rotation) = Corn Grain - Corn Silage – Alfalfa x 4 years

Dairy Sequence 5 (if needed, please specify as 6-year rotation) = Corn Silage – Corn Silage – Alfalfa x 4 years

Data not provided for smaller, fringe watersheds.

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county? Typically fall, except on some sandier soils.

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below. See transect data

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing
EXAMPLE	*FALL*	*SPRING*
Navarino Marsh-Wolf River (040302020903)		
North Branch Pigeon River (040302021101)		
South Branch Pigeon River (040302021102)		
Pigeon Lake-Pigeon River (040302021103)		
Pine Lake-Embarrass River (040302021204)		
Township of Deer Creek-Embarrass River (040302021301)		
Maple Creek (040302021302)		
Bear Creek (040302021303)		
Flume Creek (040302021502)		
Comet Creek (040302021503)		
Bradley Creek-Little Wolf River (040302021504)		
Peterson Creek (040302021601)		
Nace Creek-South Branch Little Wolf River (040302021602)		
North Branch Little Wolf River (040302021603)		
Nichol Creek-South Branch Little Wolf River (040302021604)		
White Lake-South Branch Little Wolf River (040302021605)		
Whitcomb Creek (040302021701)		
Blake Creek (040302021702)		
Shaw Creek-Little Wolf River (040302021703)		
Bear Lake-Little Wolf River (040302021704)		
Mouse Creek-Little Wolf River (040302021705)		
Emmons Creek (040302021806)		
Radley Creek (040302021807)		
Crystal River (040302021808)		
Mud Lake-Waupaca River (040302021809)		
Weyauwega Lake-Waupaca River (040302021810)		
Potters Creek (040302021901)		
Partridge Crop Lake-Wolf River (040302021902)		
Hatton Creek (040302021903)		
Walla Walla Creek (040302021904)		
Mosquito Creek (040302021905)		
Partridge Lake-Wolf River (040302021906)		
Humphrey Creek-Pine River (040302022001)		
Lake Poygan (040302022106)		

Question 8. In the tables below, please estimate the percentage of your county's Cash Grain and Dairy acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed. See transect data.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Navarino Marsh-Wolf River (040302020902)	N Branch Pigeon River (040302021101)	S Branch Pigeon River (040302021102)	Pigeon Lake-Pigeon River (040302021103)	Pine Lake-Embarrass River (040302021204)	Twnshp. of Deer Creek-Embarrass River (040302021201)	Maple Creek (040302021302)	Bear Creek (040302021303)	Flume Creek (040302021502)	Comet Creek (040302021503)	Bradley Creek-Little Wolf River (040302021504)	Peterson Creek (040302021601)	Nace Creek-S Br Little Wolf River (040302021602)	North Branch Little Wolf River (040302021603)	Nichol Creek-S Br Little Wolf River (040302021604)	White Lake-S Br Little Wolf River (040302021605)	Whitcomb Creek (040302021701)
Cash Grain	0%-15%	*85%*																	
	16%-30%	*0%*																	
	>30%	*10%*																	
	No-Till/Zone-Till	*5%*																	
Dairy	0%-15%	*75%*																	
	16%-30%	*25%*																	
	>30%	*0%*																	
	No-Till/Zone-Till	*0%*																	

Crop Rotation	**Crop Residue Class**	Blake Creek (040302021702)	Shaw Creek-Little Wolf River (040302021703)	Bear Lake-Little Wolf River (040302021704)	Mouse Creek-Little Wolf River (040302021705)	Emmons Creek (040302021806)	Radley Creek (040302021807)	Crystal River (040302021808)	Mud Lake-Waupaca River (040302021809)	Weyauwega Lake-Waupaca River (040302021810)	Potters Creek (040302021901)	Partridge Crop Lake-Wolf River (040302021902)	Hatton Creek (040302021903)	Walla Walla Creek (040302021904)	Mosquito Creek (040302021905)	Partridge Lake-Wolf River (040302021906)	Humphrey Creek-Pine River (040302022001)	Lake Poygan (040302022106)
Cash Grain	0%-15%																	
	16%-30%																	
	>30%																	
	No-Till/Zone-Till																	
Dairy	0%-15%																	
	16%-30%																	
	>30%																	
	No-Till/Zone-Till																	

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy and Cash Grain rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Grain and Dairy rotations in your county.

Characteristic	Cash Grain	Dairy
Application Timing (Pre-Planting or At-Planting)	AT PLANTING	AT PLANTING
Placement (Surface or Injection)	Surface	Surface
Incorporation Following Application? (Yes or No)	Yes	Yes

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Grain and Dairy rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.* We are unable to estimate this at this time.

HUC12	Cash Grain Application Rate	Dairy Application Rate
Navarino Marsh-Wolf River (040302020903)		
North Branch Pigeon River (040302021101)		
South Branch Pigeon River (040302021102)		
Pigeon Lake-Pigeon River (040302021103)		
Pine Lake-Embarrass River (040302021204)		
Township of Deer Creek-Embarrass River (040302021301)		
Maple Creek (040302021302)		
Bear Creek (040302021303)		
Flume Creek (040302021502)		
Comet Creek (040302021503)		
Bradley Creek-Little Wolf River (040302021504)		
Peterson Creek (040302021601)		
Nace Creek-South Branch Little Wolf River (040302021602)		
North Branch Little Wolf River (040302021603)		
Nichol Creek-South Branch Little Wolf River (040302021604)		
White Lake-South Branch Little Wolf River (040302021605)		
Whitcomb Creek (040302021701)		
Blake Creek (040302021702)		
Shaw Creek-Little Wolf River (040302021703)		
Bear Lake-Little Wolf River (040302021704)		
Mouse Creek-Little Wolf River (040302021705)		
Emmons Creek (040302021806)		
Radley Creek (040302021807)		
Crystal River (040302021808)		
Mud Lake-Waupaca River (040302021809)		
Weyauwega Lake-Waupaca River (040302021810)		
Potters Creek (040302021901)		
Partridge Crop Lake-Wolf River (040302021902)		
Hatton Creek (040302021903)		
Walla Walla Creek (040302021904)		
Mosquito Creek (040302021905)		
Partridge Lake-Wolf River (040302021906)		
Humphrey Creek-Pine River (040302022001)		
Lake Poygan (040302022106)		

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed. Without further time for analysis we estimate 50/50 for all watersheds.

HUC12	% Daily Haul	% Storage
Navarino Marsh-Wolf River (040302020903)		
North Branch Pigeon River (040302021101)		
South Branch Pigeon River (040302021102)		
Pigeon Lake-Pigeon River (040302021103)		
Pine Lake-Embarrass River (040302021204)		
Township of Deer Creek-Embarrass River (040302021301)		
Maple Creek (040302021302)		
Bear Creek (040302021303)		
Flume Creek (040302021502)		
Comet Creek (040302021503)		
Bradley Creek-Little Wolf River (040302021504)		
Peterson Creek (040302021601)		
Nace Creek-South Branch Little Wolf River (040302021602)		
North Branch Little Wolf River (040302021603)		
Nichol Creek-South Branch Little Wolf River (040302021604)		
White Lake-South Branch Little Wolf River (040302021605)		
Whitcomb Creek (040302021701)		
Blake Creek (040302021702)		
Shaw Creek-Little Wolf River (040302021703)		
Bear Lake-Little Wolf River (040302021704)		
Mouse Creek-Little Wolf River (040302021705)		
Emmons Creek (040302021806)		
Radley Creek (040302021807)		
Crystal River (040302021808)		
Mud Lake-Waupaca River (040302021809)		
Weyauwega Lake-Waupaca River (040302021810)		
Potters Creek (040302021901)		
Partridge Crop Lake-Wolf River (040302021902)		
Hatton Creek (040302021903)		
Walla Walla Creek (040302021904)		
Mosquito Creek (040302021905)		
Partridge Lake-Wolf River (040302021906)		
Humphrey Creek-Pine River (040302022001)		
Lake Poygan (040302022106)		

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	2/YEAR
Application Timing	Daily	Spring/Fall
Followed by Incorporation? (Yes or No)	NO	YES

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Navarino Marsh-Wolf River (040302020903)	10 TONS/AC	SOLID	12,000 GAL/AC	LIQUID
North Branch Pigeon River (040302021101)				
South Branch Pigeon River (040302021102)				
Pigeon Lake-Pigeon River (040302021103)				
Pine Lake-Embarrass River (040302021204)				
Township of Deer Creek-Embarrass River (040302021301)				
Maple Creek (040302021302)			15,000	
Bear Creek (040302021303)			12,000	
Flume Creek (040302021502)				
Comet Creek (040302021503)				
Bradley Creek-Little Wolf River (040302021504)				
Peterson Creek (040302021601)				
Nace Creek-South Branch Little Wolf River (040302021602)				
North Branch Little Wolf River (040302021603)				
Nichol Creek-South Branch Little Wolf River (040302021604)				
White Lake-South Branch Little Wolf River (040302021605)				
Whitcomb Creek (040302021701)				
Blake Creek (040302021702)				
Shaw Creek-Little Wolf River (040302021703)			15000	
Bear Lake-Little Wolf River (040302021704)			15000	
Mouse Creek-Little Wolf River (040302021705)			12000	
Emmons Creek (040302021806)				
Radley Creek (040302021807)				
Crystal River (040302021808)				
Mud Lake-Waupaca River (040302021809)				
Weyauwega Lake-Waupaca River (040302021810)				
Potters Creek (040302021901)				
Partridge Crop Lake-Wolf River (040302021902)				
Hatton Creek (040302021903)				
Walla Walla Creek (040302021904)			15000	
Mosquito Creek (040302021905)			12,000	
Partridge Lake-Wolf River (040302021906)				
Humphrey Creek-Pine River (040302022001)				
Lake Poygan (040302022106)				

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	June 1	November 20	4
Average Temperature/Moisture Year	May 15	November 10	4
Warm/Dry Year	May 10	November 5	3

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12. We are unable to estimate this at this time.

HUC12	Average Soil P (parts per million)
Navarino Marsh-Wolf River (040302020903)	
North Branch Pigeon River (040302021101)	
South Branch Pigeon River (040302021102)	
Pigeon Lake-Pigeon River (040302021103)	
Pine Lake-Embarrass River (040302021204)	
Township of Deer Creek-Embarrass River (040302021301)	
Maple Creek (040302021302)	
Bear Creek (040302021303)	
Flume Creek (040302021502)	
Comet Creek (040302021503)	
Bradley Creek-Little Wolf River (040302021504)	
Peterson Creek (040302021601)	
Nace Creek-South Branch Little Wolf River (040302021602)	
North Branch Little Wolf River (040302021603)	
Nichol Creek-South Branch Little Wolf River (040302021604)	
White Lake-South Branch Little Wolf River (040302021605)	
Whitcomb Creek (040302021701)	
Blake Creek (040302021702)	
Shaw Creek-Little Wolf River (040302021703)	
Bear Lake-Little Wolf River (040302021704)	
Mouse Creek-Little Wolf River (040302021705)	
Emmons Creek (040302021806)	
Radley Creek (040302021807)	
Crystal River (040302021808)	
Mud Lake-Waupaca River (040302021809)	
Weyauwega Lake-Waupaca River (040302021810)	
Potters Creek (040302021901)	
Partridge Crop Lake-Wolf River (040302021902)	
Hatton Creek (040302021903)	
Walla Walla Creek (040302021904)	
Mosquito Creek (040302021905)	
Partridge Lake-Wolf River (040302021906)	
Humphrey Creek-Pine River (040302022001)	
Lake Poygan (040302022106)	

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

Less than 10-15%

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	Beef
Number of Animals per Acre	1
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	Growing season

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Waushara County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 10. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Josh Saykally

Organization: Waushara County LCD

Email: joshS.courthouse@co.waushara.wi.us

Phone: 920-787-0443

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

37. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
38. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
39. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
40. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

NO

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

Fields Labeled Vegetables in the Redgranite, Auroraville and Berlin area should probably be labeled cash grain or dairy.

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	11%	35%
Dairy	17%	31%
Potato/Vegetable	3%	8%
Pasture/Hay	11%	26%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

No

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

28) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
29) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
30) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Weddle Creek (040302010701)	25	25	10	40	0
Chafee Creek (040302010702)	25	25	10	40	0
Little Pine Creek-Mecan River (040302010703)	25	25	10	40	0
West Branch White River (040302010801)	25	25	10	40	0
Soules Creek-White River (040302010802)	25	25	10	40	0
Lunch Creek (040302010803)	25	25	10	40	0
Little Lunch Creek-White River (040302010804)	25	25	10	40	0
Sucker Creek (040302010805)	25	25	10	40	0
Town Ditch (040302011104)	25	25	10	40	0
Barnes Creek (040302011105)	25	25	10	40	0
Hogars Bayou-Fox River (040302011107)	25	25	10	40	0
Radley Creek (040302021807)	25	25	10	40	0
Hatton Creek (040302021903)	20	20	10	50	0
Mosquito Creek (040302021905)	25	25	10	40	0
Humphrey Creek-Pine River (040302022001)	25	25	10	40	0
Carpenter Creek-Pine River (040302022002)	20	20	10	50	0
Pine River-Frontal Lake Poygan (040302022003)	25	25	10	40	0
Bruce Creek-Willow Creek (040302022004)	25	25	10	40	0
Cedar Springs Creek-Willow Creek (040302022005)	25	25	10	40	0
Willow Creek (040302022006)	20	20	10	50	0
Alder Creek (040302022103)	25	25	10	40	0

0

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Dairy Sequence 4 (if needed, please specify as 6-year rotation) = Corn Silage - Corn Silage - Alfalfa – Alfalfa - Alfalfa

Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

Typically both Spring and Fall

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Weddle Creek (040302010701)	Fall/Spring	Fall/Spring	Fall/Spring
Chafee Creek (040302010702)	Fall/Spring	Fall/Spring	Fall/Spring
Little Pine Creek-Mecan River (040302010703)	Fall/Spring	Fall/Spring	Fall/Spring
West Branch White River (040302010801)	Fall/Spring	Fall/Spring	Fall/Spring
Soules Creek-White River (040302010802)	Fall/Spring	Fall/Spring	Fall/Spring
Lunch Creek (040302010803)	Fall/Spring	Fall/Spring	Fall/Spring
Little Lunch Creek-White River (040302010804)	Fall/Spring	Fall/Spring	Fall/Spring
Sucker Creek (040302010805)	Fall/Spring	Fall/Spring	Fall/Spring
Town Ditch (040302011104)	Fall/Spring	Fall/Spring	Fall/Spring
Barnes Creek (040302011105)	Fall/Spring	Fall/Spring	Fall/Spring
Hogars Bayou-Fox River (040302011107)	Fall/Spring	Fall/Spring	Fall/Spring
Radley Creek (040302021807)	Fall/Spring	Fall/Spring	Fall/Spring
Hatton Creek (040302021903)	Fall/Spring	Fall/Spring	Fall/Spring
Mosquito Creek (040302021905)	Fall/Spring	Fall/Spring	Fall/Spring
Humphrey Creek-Pine River (040302022001)	Fall/Spring	Fall/Spring	Fall/Spring
Carpenter Creek-Pine River (040302022002)	Fall/Spring	Fall/Spring	Fall/Spring
Pine River-Frontal Lake Poygan (040302022003)	Fall/Spring	Fall/Spring	Fall/Spring
Bruce Creek-Willow Creek (040302022004)	Fall/Spring	Fall/Spring	Fall/Spring
Cedar Springs Creek-Willow Creek (040302022005)	Fall/Spring	Fall/Spring	Fall/Spring
Willow Creek (040302022006)	Fall/Spring	Fall/Spring	Fall/Spring
Alder Creek (040302022103)	Fall/Spring	Fall/Spring	Fall/Spring

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Weddle Creek (040302010701)	Chafee Creek (040302010702)	Little Pine Creek-Mecan River (040302010703)	West Branch White River (040302010801)	Soules Creek-White River (040302010802)	Lunch Creek (040302010803)	Little Lunch Creek-White River (040302010804)	Sucker Creek (040302010805)	Town Ditch (040302011104)	Barnes Creek (040302011105)	Hogars Bayou-Fox River (040302011107)	Radley Creek (040302021807)	Hatton Creek (040302021903)	Mosquito Creek (040302021905)	Humphrey Creek-Pine River (040302022001)	Carpenter Creek-Pine River (040302022002)	Pine River-Frontal Lake Poygan (040302022003)	Bruce Creek-Willow Creek (040302022004)	Cedar Springs Creek-Willow Creek (040302022005)	Willow Creek (040302022006)	Alder Creek (040302022103)
Cash Grain	0%-15%	*85%*	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
	16%-30%	*0%*	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
	>30%	*10%*	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	No-Till/Zone-Till	*5%*	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Dairy	0%-15%	*75%*	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	16%-30%	*25%*	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60	70	70	70	70	70
	>30%	*0%*	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	10	5	5	5	5	5
	No-Till/Zone-Till	*0%*	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	10	5	5	5	5	5
Potato/ Vegetable	0%-15%	*100%*	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	16%-30%	*0%*																					
	>30%	*0%*																					
	No-Till/Zone-Till	*0%*																					

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Crop, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Crop	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	N-P-K Pre-Plant/Starter N - Sidedress	N-P-K Pre-Plant/Starter N - Sidedress	P-K Pre-plant/Starter N-K - Sidedress
Placement (Surface or Injection)	Both	Both	Both
Incorporation Following Application? (Yes or No)	Both	Both	Both

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Crop, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Weddle Creek (040302010701)	250	200	250-350
Chafee Creek (040302010702)	250	200	250-350
Little Pine Creek-Mecan River (040302010703)	250	200	250-350
West Branch White River (040302010801)	250	200	250-350
Soules Creek-White River (040302010802)	250	200	250-350
Lunch Creek (040302010803)	250	200	250-350
Little Lunch Creek-White River (040302010804)	250	200	250-350
Sucker Creek (040302010805)	250	200	250-350
Town Ditch (040302011104)	250	200	250-350
Barnes Creek (040302011105)	250	200	250-350
Hogars Bayou-Fox River (040302011107)	250	200	250-350
Radley Creek (040302021807)	250	200	250-350
Hatton Creek (040302021903)	250	200	250-350
Mosquito Creek (040302021905)	250	200	250-350
Humphrey Creek-Pine River (040302022001)	250	200	250-350
Carpenter Creek-Pine River (040302022002)	250	200	250-350
Pine River-Frontal Lake Poygan (040302022003)	250	200	250-350
Bruce Creek-Willow Creek (040302022004)	250	200	250-350
Cedar Springs Creek-Willow Creek (040302022005)	250	200	250-350
Willow Creek (040302022006)	250	200	250-350
Alder Creek (040302022103)	250	200	250-350

Typical N:P:K Ratio =
Cash Grain - 44-24-61
Dairy - 45-29-61
Vegetable/Potato - 67-50-61

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?

Pine River – Frontal lake Poygan
Willow Creek
Hogars Bayou – Fox River
Barnes Creek
Ceder Springs – Willow Creek
Carpenter Creek – Pine River
Town Ditch

Cg – 131-150 bu/ac
Csl – 20-25 tns/ac
Beans – 36-45 bu/ac
WW – 81-100 bu/ac
Alfalfa – 4.6-5.5 tns/ac

Radley Creek
Humphrey Creek – Pine River
Bruce Creek – Willow Creek
Soules Creek – White River
Little Lunch Creek – White River
Little Pine Creek – Mecan River
Wedde Creek
Chafee Creek
Lunch Creek
Sucker Creek
Hatton Creek

Cg - 100-130 bu/ac
Csl - 15-20 bu/ac
Beans - 25-40 bu/ac
WW – 40-65 bu/ac
Alfalfa – 3.6-4.5

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Weddle Creek (040302010701)	60	40
Chafee Creek (040302010702)	60	40
Little Pine Creek-Mecan River (040302010703)	60	40
West Branch White River (040302010801)	60	40
Soules Creek-White River (040302010802)	60	40
Lunch Creek (040302010803)	60	40
Little Lunch Creek-White River (040302010804)	60	40
Sucker Creek (040302010805)	60	40
Town Ditch (040302011104)	60	40
Barnes Creek (040302011105)	60	40
Hogars Bayou-Fox River (040302011107)	60	40
Radley Creek (040302021807)	60	40
Hatton Creek (040302021903)	60	40
Mosquito Creek (040302021905)	60	40
Humphrey Creek-Pine River (040302022001)	60	40
Carpenter Creek-Pine River (040302022002)	60	40
Pine River-Frontal Lake Poygan (040302022003)	60	40
Bruce Creek-Willow Creek (040302022004)	60	40
Cedar Springs Creek-Willow Creek (040302022005)	60	40
Willow Creek (040302022006)	60	40
Alder Creek (040302022103)	60	40

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	Spring/Fall/Summer
Application Timing	All season	Pre-Plant/Post harvest/Side-dress
Followed by Incorporation? (Yes or No)	Yes and No	Yes and No

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Weddle Creek (040302010701)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Chafee Creek (040302010702)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Little Pine Creek-Mecan River (040302010703)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
West Branch White River (040302010801)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Soules Creek-White River (040302010802)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Lunch Creek (040302010803)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Little Lunch Creek-White River (040302010804)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Sucker Creek (040302010805)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Town Ditch (040302011104)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Barnes Creek (040302011105)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Hogars Bayou-Fox River (040302011107)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Radley Creek (040302021807)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Hatton Creek (040302021903)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Mosquito Creek (040302021905)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Humphrey Creek-Pine River (040302022001)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Carpenter Creek-Pine River (040302022002)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Pine River-Frontal Lake Poygan (040302022003)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Bruce Creek-Willow Creek (040302022004)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Cedar Springs Creek-Willow Creek (040302022005)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Willow Creek (040302022006)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid
Alder Creek (040302022103)	5000-10000gal/ac 5-30 tns/ac	Liquid/Semi-solid/Solid	5000-12000 gal/ac	Liquid

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

East side of County (Silt/Clay soils)

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	6-1	10-25	2
Average Temperature/Moisture Year	5-15	10-7	3
Warm/Dry Year	5-5	10-1	4

West side of County (Sandy soils)

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	5-15	10-20	2
Average Temperature/Moisture Year	5-7	10-1	3
Warm/Dry Year	5-1	9-25	3

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Weddle Creek (040302010701)	80
Chafee Creek (040302010702)	80
Little Pine Creek-Mecan River (040302010703)	80
West Branch White River (040302010801)	80
Soules Creek-White River (040302010802)	50
Lunch Creek (040302010803)	80
Little Lunch Creek-White River (040302010804)	70
Sucker Creek (040302010805)	35
Town Ditch (040302011104)	45
Barnes Creek (040302011105)	60
Hogars Bayou-Fox River (040302011107)	40
Radley Creek (040302021807)	45
Hatton Creek (040302021903)	50
Mosquito Creek (040302021905)	70
Humphrey Creek-Pine River (040302022001)	65
Carpenter Creek-Pine River (040302022002)	80
Pine River-Frontal Lake Poygan (040302022003)	50
Bruce Creek-Willow Creek (040302022004)	60
Cedar Springs Creek-Willow Creek (040302022005)	125
Willow Creek (040302022006)	40
Alder Creek (040302022103)	45

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	Beef
Number of Animals per Acre	5
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	Entire Growing Season

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Winnebago County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 11. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: Sheila Kiddy

Organization: Winnebago Co. LWCD

Email: skiddy@co.winnebago.wi.us

Phone: (920) 232-1950

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

41. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
42. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
43. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
44. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

Cash crops: alternating corn-soybeans-wheat

Dairy: Corn-soybeans-wheat-alfalfa Using corn silage mainly for dairy. Big difference in residue left.

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

OK overall.

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	19%	34%
Dairy	20%	37%
Potato/Vegetable	1%	2%
Pasture/Hay	14%	26%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

OK overall.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

Not conducted since 2002.

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

31) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
32) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
33) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Eightmile Creek (040302011001)		75	15	5	
Rush Creek (040302011002)	10	60	15	15	
Hogars Bayou-Fox River (040302011107)	25	45	15	15	
Spring Brook (040302011201)	10	20	35	35	
Daggetts Creek (040302011202)		40		60	
Brooks Cemetary (040302011203)	100				
Sawyer Creek (040302011204)		40	30	30	
Lake Butte des Mortes-Fox River (040302011205)	30	40	10	20	
Partridge Lake-Wolf River (040302021906)		100			
Medina Junction-Rat River (040302022101)	20	20	40	20	
Town of Dale-Rat River (040302022102)	10	30	40	20	
Alder Creek (040302022103)	50	50			
Pumpkinseed Creek (040302022104)		35	15	50	
Arrowhead River (040302022105)	25	25	50		
Lake Poygan (040302022106)	20	40	20	20	
City of Oshkosh-Frontal Lake Winnebago (040302030101)		90	10		
Willow Harbor-Frontal Lake Winnebago (040302030102)	15	45	40		
Van Dyne Creek-Frontal Lake Winnebago (040302030103)		100			

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 (if needed, please specify as 6-year rotation) = Corn-soybeans-wheat-alfalfa-alfalfa-alfalfa
Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

Fall

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Eightmile Creek (040302011001)	FALL	FALL	
Rush Creek (040302011002)	SPRING	FALL	SPRING
Hogars Bayou-Fox River (040302011107)	FALL	FALL	SPRING
Spring Brook (040302011201)	SPRING	FALL	
Daggetts Creek (040302011202)	FALL	FALL	
Brooks Cemetary (040302011203)	FALL	FALL	
Sawyer Creek (040302011204)	FALL	FALL	
Lake Butte des Mortes-Fox River (040302011205)	FALL	FALL	
Partridge Lake-Wolf River (040302021906)	FALL	FALL	
Medina Junction-Rat River (040302022101)	FALL	FALL	
Town of Dale-Rat River (040302022102)	FALL	FALL	
Alder Creek (040302022103)	FALL	FALL	
Pumpkinseed Creek (040302022104)	FALL	FALL	
Arrowhead River (040302022105)	FALL	FALL	
Lake Poygan (040302022106)	FALL	FALL	
City of Oshkosh-Frontal Lake Winnebago (040302030101)	FALL	FALL	
Willow Harbor-Frontal Lake Winnebago (040302030102)	FALL	FALL	
Van Dyne Creek-Frontal Lake Winnebago (040302030103)	FALL	FALL	

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	**Crop Residue Class**	***EXAMPLE***	Eightmile Creek (040302011001)	Rush Creek (040302011002)	Hogars Bayou-Fox River (040302011107)	Spring Brook 040302011201)	Daggetts Creek (040302011202)	Brooks Cemetary (040302011203)	Sawyer Creek (040302011204)	Lake Butte des Mortes-Fox River (040302011205)	Partridge Lake-Wolf River (040302021906)	Medina Junction-Rat River (040302022101)	Town of Dale-Rat River (040302022102)	Alder Creek (040302022103)	Pumpkinseed Creek (040302022104)	Arrowhead River (040302022105)	Lake Poygan (040302022106)	City of Oshkosh-Frontal Lake Winnebago (040302030101)	Willow Harbor-Frontal Lake Winnebago (040302030102)	Van Dyne Creek-Frontal Lake Winnebago (040302030103)
Cash Grain	0%-15%	*85%*										25	20			10	10		25	
	16%-30%	*0%*	25	25		50	75	60		100	75	75	70	80	25	75	80			
	>30%	*10%*																		
	No-Till/Zone-Till	*5%*	75	75	100	50	25	40			25		10	20	75	15	10		75	100
Dairy	0%-15%	*75%*	25	15	25	25	10		20			25	20	30	25	10	20	50	25	10
	16%-30%	*25%*	75	65	65	75	65	50	80	100	100	75	70	50	50	80	60	50	75	70
	>30%	*0%*			10															20
	No-Till/Zone-Till	*0%*		10			25	50					10	20	25	10	20			
Potato/ Vegetable	0%-15%	*100%*			100															
	16%-30%	*0%*		50																
	>30%	*0%*																		
	No-Till/Zone-Till	*0%*	100	50				100												

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Grain, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Grain	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	At Planting	At Planting	Pre-plant
Placement (Surface or Injection)	Surface	Injected	Surface
Incorporation Following Application? (Yes or No)	Yes	No	Yes

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Grain, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Eightmile Creek (040302011001)	40	35	20
Rush Creek (040302011002)	30	30	20
Hogars Bayou-Fox River (040302011107)	30	35	20
Spring Brook (040302011201)	30	30	
Daggetts Creek (040302011202)	60	30	
Brooks Cemetary (040302011203)	25	40	20
Sawyer Creek (040302011204)	0	20	
Lake Butte des Mortes-Fox River (040302011205)	40	25	
Partridge Lake-Wolf River (040302021906)	25	30	
Medina Junction-Rat River (040302022101)	60	30	
Town of Dale-Rat River (040302022102)	18	25	
Alder Creek (040302022103)	40	20	
Pumpkinseed Creek (040302022104)	40	20	
Arrowhead River (040302022105)	40	20	
Lake Poygan (040302022106)	40	20	
City of Oshkosh-Frontal Lake Winnebago (040302030101)	0	50	
Willow Harbor-Frontal Lake Winnebago (040302030102)	70	40	
Van Dyne Creek-Frontal Lake Winnebago (040302030103)	50	20	

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed? Average corn 150-170bu, corn silage 15-20 tons, soybeans 56-65bu, Alfalfa 4.6-5.5 ton

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Eightmile Creek (040302011001)	35	65
Rush Creek (040302011002)	25	75
Hogars Bayou-Fox River (040302011107)	20	80
Spring Brook (040302011201)	0	100
Daggetts Creek (040302011202)	40	60
Brooks Cemetary (040302011203)	10	90
Sawyer Creek (040302011204)	35	65
Lake Butte des Mortes-Fox River (040302011205)	40	60
Partridge Lake-Wolf River (040302021906)	100	0
Medina Junction-Rat River (040302022101)	100	0
Town of Dale-Rat River (040302022102)	20	80
Alder Creek (040302022103)	75	25
Pumpkinseed Creek (040302022104)	35	65
Arrowhead River (040302022105)	30	70
Lake Poygan (040302022106)	40	60
City of Oshkosh-Frontal Lake Winnebago (040302030101)	100	0
Willow Harbor-Frontal Lake Winnebago (040302030102)	40	60
Van Dyne Creek-Frontal Lake Winnebago (040302030103)	10	90

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	Spring & Fall
Application Timing	Daily to every 5 days	Spring & Fall
Followed by Incorporation? (Yes or No)	No	Yes

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Eightmile Creek (040302011001)	20	Solid	12500	Liquid
Rush Creek (040302011002)	20	Solid	13000	Liquid
Hogars Bayou-Fox River (040302011107)	15	Solid	13000	Liquid
Spring Brook (040302011201)			12000	Liquid
Daggetts Creek (040302011202)	20	Solid	12000	Liquid
Brooks Cemetary (040302011203)	20	Solid	13000	Liquid
Sawyer Creek (040302011204)	20	Solid	10000	Liquid
Lake Butte des Mortes-Fox River (040302011205)	15	Solid	12000	Liquid
Partridge Lake-Wolf River (040302021906)	20	Solid		
Medina Junction-Rat River (040302022101)	20	Solid		
Town of Dale-Rat River (040302022102)	25	Solid	14000	Liquid
Alder Creek (040302022103)	25	Solid	9000	Liquid
Pumpkinseed Creek (040302022104)	10	Solid	12500	Liquid
Arrowhead River (040302022105)	15	Solid	12000	Liquid
Lake Poygan (040302022106)	20	Solid	13000	Liquid
City of Oshkosh-Frontal Lake Winnebago (040302030101)	6	Solid		
Willow Harbor-Frontal Lake Winnebago (040302030102)	15	Solid	14000	Liquid
Van Dyne Creek-Frontal Lake Winnebago (040302030103)	15	Solid	13000	Liquid

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date Silage vs Grain		Number of Hay Cuttings
Cool/Wet Year	May 20	Sept 20	Oct 27	3
Average Temperature/Moisture Year	May 1	Aug 30	Oct 15	4
Warm/Dry Year	April 20	Aug 15	Sept 30	3

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Eightmile Creek (040302011001)	32
Rush Creek (040302011002)	34
Hogars Bayou-Fox River (040302011107)	30
Spring Brook (040302011201)	29
Daggetts Creek (040302011202)	22
Brooks Cemetary (040302011203)	27
Sawyer Creek (040302011204)	27
Lake Butte des Mortes-Fox River (040302011205)	29
Partridge Lake-Wolf River (040302021906)	41
Medina Junction-Rat River (040302022101)	15
Town of Dale-Rat River (040302022102)	41
Alder Creek (040302022103)	37
Pumpkinseed Creek (040302022104)	24
Arrowhead River (040302022105)	26
Lake Poygan (040302022106)	35
City of Oshkosh-Frontal Lake Winnebago (040302030101)	34
Willow Harbor-Frontal Lake Winnebago (040302030102)	28
Van Dyne Creek-Frontal Lake Winnebago (040302030103)	20

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

2-3%

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	Dry cows & heifers
Number of Animals per Acre	15
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	Growing season

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Outagamie County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 1. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: KEVIN JAREK /

Organization: UW-EXTENSION /

Email: Kevin.jarek@outagamie.org /

Phone: 920-832-5119 /

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

1. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
2. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
3. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
4. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

No, but the dairy rotation does include a winter wheat component on many of our larger dairies in Outagamie for summer manure applications.

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified? not sure which way to answer this other than to say that it appears to be generally correct... maybe more green for dairies in some areas, but so cannot say that for certain because we don't collect that

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	25%	37%
Dairy	25%	37%
Potato/Vegetable	1%	1%
Pasture/Hay	16%	24%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

I know we have a growing number of cash grain acres but I wouldn't have guessed they were tied w/ dairy.

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

Don't know.

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

1) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
2) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
3) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

- where is the corn silage (CS) in these rotations?

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Herman Creek (040302020803)					
Toad Creek (040302020804)					
Upper Black Creek (040302020805)					
Lower Black Creek (040302020806)					
Mink Creek-Shioc River (040302020807)					
Outagamie State Wildlife Area-Wolf River (040302020904)					
Township of Deer Creek-Embarrass River (040302021301)					
Maple Creek (040302021302)					
Bear Creek (040302021303)					
Turney Hill-Bear Creek (040302021304)					
Town of Greenville-Bear Creek (040302021401)					
Municipality of Stephensville-Bear Creek (040302021402)					
Village of Shiocton-Wolf River (040302021403)					
Black Otter Lake-Wolf River (040302021404)					
Potters Creek (040302021901)					
Medina Junction-Rat River (040302022101)					
Town of Dale-Rat River (040302022102)					

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 (if needed, please specify as 6-year rotation) = CS-CS-WW-ALFALFA-ALFALFA-ALFALFA
Dairy Sequence 5 (if needed, please specify as 6-year rotation) = ALFALFA-ALFALFA-ALFALFA-ALFALFA-CS-CS

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

I haven't done this!

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below. * see answer below

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Herman Creek (040302020803)			
Toad Creek (040302020804)			
Upper Black Creek (040302020805)			
Lower Black Creek (040302020806)			
Mink Creek-Shioc River (040302020807)			
Outagamie State Wildlife Area-Wolf River (040302020904)			
Township of Deer Creek-Embarrass River (040302021301)			
Maple Creek (040302021302)			
Bear Creek (040302021303)			
Turney Hill-Bear Creek (040302021304)			
Town of Greenville-Bear Creek (040302021401)			
Municipality of Stephensville-Bear Creek (040302021402)			
Village of Shiocton-Wolf River (040302021403)			
Black Otter Lake-Wolf River (040302021404)			
Potters Creek (040302021901)			
Medina Junction-Rat River (040302022101)			
Town of Dale-Rat River (040302022102)			

Producers will fall till as much as they can regardless of whether they are cash grain or dairy. Both of the 1ST two columns contain a different % based on the particular growing season and condition. The answer is both Fall and Spring for Cash grain & dairy.

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	Crop Residue Class	*EXAMPLE*	Herman Creek (040302020803)	Toad Creek (040302020804)	Upper Black Creek (040302020805)	Lower Black Creek (040302020806)	Mink Creek-Shioc River (040302020807)	Outagamie SWA-Wolf River (040302020904)	Twshp. Deer Creek-Embarrass Riv. (040302021301)	Maple Creek (040302021302)	Bear Creek (040302021303)	Turney Hill-Bear Creek (040302021304)	Town of Greenville-Bear Creek (040302021401)	Munic. of Stephensville-Bear Creek (040302021402)	Village of Shiocton-Wolf River (040302021403)	Black Otter Lake-Wolf River (040302021404)	Potters Creek (040302021901)	Medina Junction-Rat River (040302022101)	Town of Dale-Rat River (040302022102)
Cash Grain	0%-15%	*85%*																	
	16%-30%	*0%*																	
	>30%	*10%*																	
	No-Till/Zone-Till	*5%*																	
Dairy	0%-15%	*75%*																	
	16%-30%	*25%*																	
	>30%	*0%*																	
	No-Till/Zone-Till	*0%*																	
Potato/ Vegetable	0%-15%	*100%*																	
	16%-30%	*0%*																	
	>30%	*0%*																	
	No-Till/Zone-Till	*0%*																	

I don't regularly do residue checks.

QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Grain, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Grain	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	Pre -60% at 40%	50% 50%	
Placement (Surface or Injection)	Surface 30% Injected 70%	30% 70%	
Incorporation Following Application? (Yes or No)	50% Y 50% N	40% 60%	

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Grain, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Herman Creek (040302020803)			
Toad Creek (040302020804)			
Upper Black Creek (040302020805)			
Lower Black Creek (040302020806)			
Mink Creek-Shioc River (040302020807)			
Outagamie State Wildlife Area-Wolf River (040302020904)			
Township of Deer Creek-Embarrass River (040302021301)			
Maple Creek (040302021302)			
Bear Creek (040302021303)			
Turney Hill-Bear Creek (040302021304)			
Town of Greenville-Bear Creek (040302021401)			
Municipality of Stephensville-Bear Creek (040302021402)			
Village of Shiocton-Wolf River (040302021403)			
Black Otter Lake-Wolf River (040302021404)			
Potters Creek (040302021901)			
Medina Junction-Rat River (040302022101)			
Town of Dale-Rat River (040302022102)			

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed?

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Herman Creek (040302020803)		
Toad Creek (040302020804)		
Upper Black Creek (040302020805)		
Lower Black Creek (040302020806)		
Mink Creek-Shioc River (040302020807)		
Outagamie State Wildlife Area-Wolf River (040302020904)		
Township of Deer Creek-Embarrass River (040302021301)		
Maple Creek (040302021302)		
Bear Creek (040302021303)		
Turney Hill-Bear Creek (040302021304)		
Town of Greenville-Bear Creek (040302021401)		
Municipality of Stephensville-Bear Creek (040302021402)		
Village of Shiocton-Wolf River (040302021403)		
Black Otter Lake-Wolf River (040302021404)		
Potters Creek (040302021901)		
Medina Junction-Rat River (040302022101)		
Town of Dale-Rat River (040302022102)		

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	
Application Timing		
Followed by Incorporation? (Yes or No)		

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Herman Creek (040302020803)				
Toad Creek (040302020804)				
Upper Black Creek (040302020805)				
Lower Black Creek (040302020806)				
Mink Creek-Shioc River (040302020807)				
Outagamie State Wildlife Area-Wolf River (040302020904)				
Township of Deer Creek-Embarrass River (040302021301)				
Maple Creek (040302021302)				
Bear Creek (040302021303)				
Turney Hill-Bear Creek (040302021304)				
Town of Greenville-Bear Creek (040302021401)				
Municipality of Stephensville-Bear Creek (040302021402)				
Village of Shiocton-Wolf River (040302021403)				
Black Otter Lake-Wolf River (040302021404)				
Potters Creek (040302021901)				
Medina Junction-Rat River (040302022101)				
Town of Dale-Rat River (040302022102)				

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year			
Average Temperature/Moisture Year			
Warm/Dry Year			

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Herman Creek (040302020803)	
Toad Creek (040302020804)	
Upper Black Creek (040302020805)	
Lower Black Creek (040302020806)	
Mink Creek-Shioc River (040302020807)	
Outagamie State Wildlife Area-Wolf River (040302020904)	
Township of Deer Creek-Embarrass River (040302021301)	
Maple Creek (040302021302)	
Bear Creek (040302021303)	
Turney Hill-Bear Creek (040302021304)	
Town of Greenville-Bear Creek (040302021401)	
Municipality of Stephensville-Bear Creek (040302021402)	
Village of Shiocton-Wolf River (040302021403)	
Black Otter Lake-Wolf River (040302021404)	
Potters Creek (040302021901)	
Medina Junction-Rat River (040302022101)	
Town of Dale-Rat River (040302022102)	

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	
Number of Animals per Acre	
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	

Upper Fox-Wolf Basins TMDL:
Agricultural Land Management Questionnaire for Columbia County

The Wisconsin Department of Natural Resources, with support from the U.S. Environmental Protection Agency, has initiated a Total Maximum Daily Load (TMDL) study for nutrient and sediment impaired waters in the Upper Fox and Wolf River Basins (UFWB). As part of this effort, the Soil and Water Assessment Tool (SWAT) watershed model will be used to simulate runoff volumes and phosphorus and sediment loading to surface waters from nonpoint sources, including runoff from agricultural lands.

Inputs for SWAT model setup include estimates of variables describing the agricultural land management practices used throughout the modeled area. Practices are defined in *management tables*. A management table describes one specific combination of planting, tillage, fertilizer/manure application, and harvest practices applied to a portion of the modeled area (see Table 1). For the UFWB SWAT model, several different management tables will be prepared to capture variation in agricultural practices across the UFWB.

Table 1. Example SWAT agricultural land management table.

Year	Month	Day	Operation	Type	Amount
1	May	3	Till	Disk Plow	-
1	May	15	Fertilizer	9:23:30	200 lbs/ac
1	May	15	Plant	Corn Grain	-
1	October	15	Harvest	Corn Grain	-
1	October	30	Till	Chisel Plow	-
2	May	3	Till	Disk Plow	-
2	May	15	Fertilizer	9:23:30	200 lbs/ac
2	May	15	Plant	Soybean	-
2	October	15	Harvest	Soybean	-
2	October	30	Till	Chisel Plow	-

This document contains 18 questions on agricultural management practices in your county. Your responses will be used to guide SWAT model setup. SWAT model output will be used to calculate TMDL load allocations and reductions needed to meet water quality standards. Accurate inputs for SWAT modeling are therefore critical for generating realistic estimates of phosphorus/sediment load reductions. **For this phase of the TMDL study, we are not requesting information on agricultural management down to the scale of individual farms or fields. Most questions in this survey ask for a description of average practices for your county's 12-digit hydrologic units (HUC12s).** HUC12 boundaries generally correspond to the subwatersheds defined in the UFWB SWAT model and are displayed in Attachment A for reference. More detailed information may be requested at a later time for site-scale TMDL implementation planning.

Please prepare responses directly in this file and deliver in electronic format (Word or PDF) via email to:

Andy Somor
Hydrologist
The Cadmus Group, Inc.
andrew.somor@cadmusgroup.com
(503) 467-7194

PLEASE ENTER YOUR NAME AND CONTACT INFORMATION IN THE SPACE BELOW

Respondent Name: **Kurt Calkins**

Organization: Columbia County LWCD

Email: kurt.calkins@co.columbia.wi.us

Phone: 608-742-9670

QUESTIONS 1 THROUGH 4: CROP ROTATIONS

Four general crop rotations have been identified in the UFWB and mapped from USDA Cropland Data Layers for the years 2008-2012:

1. Cash Grain – Areas with continuous corn, continuous soybean, or alternating corn-soybean plantings;
2. Dairy – Dairy farms with various rotations of corn and alfalfa plantings;
3. Continuous Potato/Vegetable – Areas with continuous potato or vegetable plantings; and
4. Continuous Pasture/Hay – Areas with continuous pasture/hay cover.

The crop rotation map shown in Attachment A will be used to determine the rotation acreages in model subwatersheds. Modeled acreages and yields will be verified using estimates of acres harvested and crop yields reported by USDA National Agricultural Statistics Service by county. Your input is needed to further verify rotation definitions and maps.

Question 1. Based on your knowledge of crop rotations in your county, would you add any rotations to the four listed above?

No

Question 2. Attachment A displays a map of the four general crop rotations in your county. Do any areas stand out as being misclassified?

No

Question 3. The table below displays the area of each rotation as a percentage of total county area and agricultural area. Do these percentages seem to accurately represent the area of each rotation in your county?

Rotation	% of County Area	% of Agricultural Area
Cash Grain	18%	32%
Dairy	21%	38%
Potato/Vegetable	1%	2%
Pasture/Hay	16%	29%

Note: Areas outside the Upper Fox-Wolf Basin were excluded from percent area calculations.

Yes

Question 4. Rotation maps can also be verified using Cropland Transect Survey data. We have acquired 2004 transect data from the Conservation Technology Information Center (CTIC). Has your county conducted crop and tillage transect surveys since 2004? If yes, can you share recently collected transect data for this project?

No

QUESTION 5: DAIRY CROP SEQUENCES

The Dairy rotation will be modeled as a 6-year rotation of corn and alfalfa plantings. Winter wheat and soybeans are also known to be included in Dairy rotations in portions of the UFWB. Your input is needed to refine the sequence of crops planted in each year of the Dairy rotation. Several potential crop sequences have been identified from USDA Cropland Data Layers, including:

1) Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
2) Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
3) Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa

Question 5. In the table below, please estimate the percentage of your county's Dairy acres using the crop sequences listed above by HUC12 subwatershed. ***Other sequences can be entered in columns 4 and 5, but please focus on sequences with significant acreage (at least 10% the total dairy acres in a HUC12).***

This table will be used to determine if the Dairy rotation should be modeled using one single crop sequence or if multiple Dairy rotations should be defined. If multiple Dairy rotations are modeled, this table will also be used to determine the proportion of each rotation per model subwatershed.

HUC12	% Dairy Sequence 1	% Dairy Sequence 2	% Dairy Sequence 3	% Dairy Sequence 4	% Dairy Sequence 5
EXAMPLE	*90%*	*10%*	*0%*	*0%*	*0%*
Sand Spring Creek-Fox River (HUC 040302010101)	10	10	10	90	
Swan Lake-Fox River (HUC 040302010102)	10	10	10	90	
South Branch Neenah Creek (HUC 040302010203)	10	10	10	90	
Big Slough (HUC 040302010204)	10	10	10	90	
Neenah Creek (HUC 040302010205)	10	10	10	90	
Lake Emily (HUC 040302010501)	10	10	10	90	
Belle Fountain Creek (HUC 040302010503)	10	10	10	90	
Portage Canal-Fox River (HUC 040302010601)	10	10	10	90	
French Creek (HUC 040302010602)	10	10	10	90	
Good Earth Creek-Fox River (HUC 040302010603)	10	10	10	90	

Dairy Sequence 1 = Corn Grain - Corn Grain - Winter Wheat - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 2 = Corn Grain - Corn Grain - Alfalfa - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 3 = Corn Grain - Corn Grain - Soybean - Alfalfa - Alfalfa - Alfalfa
Dairy Sequence 4 (if needed, please specify as 6-year rotation) = Corn Grain-Corn Silage-Alfalfa-Alfalfa-Alfalfa-Alfalfa
Dairy Sequence 5 (if needed, please specify as 6-year rotation) =

QUESTIONS 6 THROUGH 8: TILLAGE AND CROP RESIDUE

When defining tillage practices in SWAT management tables, key variables are the timing of tillage and amount of protective crop residue remaining on the surface following tillage. Your input is needed to determine appropriate tillage timing and residue levels for each crop rotation. Tillage settings will also be informed by Cropland Transect Survey data. If you have conducted transect surveys since 2004, please provide the transect data for this project (see question 4).

Question 6. Are fields typically tilled in the spring or fall in your county?

60% fall 40% spring

Question 7. If tillage timing varies by crop rotation and/or HUC12 subwatershed, please specify whether spring or fall tillage is used in the table below.

HUC12	Cash Grain Tillage Timing	Dairy Tillage Timing	Potato/Vegetable Tillage Timing
EXAMPLE	*FALL*	*SPRING*	*FALL*
Sand Spring Creek-Fox River (HUC 040302010101)	Fall	Spring	Fall
Swan Lake-Fox River (HUC 040302010102)	Fall	Spring	Fall
South Branch Neenah Creek (HUC 040302010203)	Fall	Spring	Fall
Big Slough (HUC 040302010204)	Fall	Spring	Fall
Neenah Creek (HUC 040302010205)	Fall	Spring	Fall
Lake Emily (HUC 040302010501)	Fall	Spring	Fall
Belle Fountain Creek (HUC 040302010503)	Fall	Spring	Fall
Portage Canal-Fox River (HUC 040302010601)	Fall	Spring	Fall
French Creek (HUC 040302010602)	Fall	Spring	Fall
Good Earth Creek-Fox River (HUC 040302010603)	Fall	Spring	Fall

Question 8. In the table below, please estimate the percentage of your county's Cash Grain, Dairy, and Potato/Vegetable acreage with crop residue levels of 0%-15%, 16%-30%, >30%, and percentage under No-Till/Zone-Till by HUC12 subwatershed.

This table will be used to determine the number of tillage classes to model for each crop rotation and the relative area of each tillage class per model subwatershed.

Crop Rotation	Crop Residue Class	*EXAMPLE*	Sand Spring Creek-Fox River (HUC 040302010101)	Swan Lake-Fox River (HUC 040302010102)	South Branch Neenah Creek (HUC 040302010203)	Big Slough (HUC 040302010204)	Neenah Creek (HUC 040302010205)	Lake Emily (HUC 040302010501)	Belle Fountain Creek (HUC 040302010503)	Portage Canal - Fox River (HUC 040302010601)	French Creek (HUC 040302010602)	Good Earth Creek-Fox River (HUC 040302010603)
Cash Grain	0%-15%	*85%*	40	40	40	40	40	40	40	40	40	40
	16%-30%	*0%*	40	40	40	40	40	40	40	40	40	40
	>30%	*10%*	10	10	10	10	10	10	10	10	10	10
	No-Till/Zone-Till	*5%*	10	10	10	10	10	10	10	10	10	10
Dairy	0%-15%	*75%*	50	50	50	50	50	50	50	50	50	50
	16%-30%	*25%*	30	30	30	30	30	30	30	30	30	30
	>30%	*0%*	10	10	10	10	10	10	10	10	10	10
	No-Till/Zone-Till	*0%*	10	10	10	10	10	10	10	10	10	10
Potato/ Vegetable	0%-15%	*100%*	100	100	100	100	100	100	100	100	100	100
	16%-30%	*0%*										
	>30%	*0%*										
	No-Till/Zone-Till	*0%*										

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QUESTIONS 9 THROUGH 11: CHEMICAL FERTILIZER APPLICATIONS

Chemical fertilizer applications will be modeled for the Dairy, Cash Grain, and Potato/Vegetable rotations. Important settings for chemical fertilizer applications include application rate, placement, and whether application is followed by incorporation. Note that when defining fertilizer application rates, our focus is on the amount of **phosphorus** applied. Application rates for nitrogen and potassium are less relevant for this project. Your input is needed to determine appropriate chemical fertilizer application settings for the Dairy, Cash Grain, and Potato/Vegetable rotations.

Question 9. Using the table below, please describe a typical chemical fertilizer application for Cash Grain, Dairy, and Potato/Vegetable rotations in your county.

Characteristic	Cash Grain	Dairy	Potato/Vegetable
Application Timing (Pre-Planting or At-Planting)	Pre Plant	Pre Plant	
Placement (Surface or Injection)	Surface	Surface	
Incorporation Following Application? (Yes or No)	Yes	Yes	

*Question 10. Using the table below, please estimate typical chemical fertilizer application rates for Cash Grain, Dairy, and Potato/Vegetable rotations in your county by HUC12 subwatershed. If possible, please express rates in pounds of **phosphorus** applied per acre. If expressing as pounds of **fertilizer** applied per acre, please note the typical N:P:K ratio for your county.*

HUC12	Cash Grain Application Rate	Dairy Application Rate	Potato/Vegetable Application Rate
Sand Spring Creek-Fox River (HUC 040302010101)	250# 9-23-30	100# 9-13-28	300# 9-23-30
Swan Lake-Fox River (HUC 040302010102)	250# 9-23-30	100# 9-13-28	300# 9-23-30
South Branch Neenah Creek (HUC 040302010203)	250# 9-23-30	100# 9-13-28	300# 9-23-30
Big Slough (HUC 040302010204)	250# 9-23-30	100# 9-13-28	300# 9-23-30
Neenah Creek (HUC 040302010205)	250# 9-23-30	100# 9-13-28	300# 9-23-30
Lake Emily (HUC 040302010501)	250# 9-23-30	100# 9-13-28	300# 9-23-30
Belle Fountain Creek (HUC 040302010503)	250# 9-23-30	100# 9-13-28	300# 9-23-30
Portage Canal-Fox River (HUC 040302010601)	250# 9-23-30	100# 9-13-28	300# 9-23-30
French Creek (HUC 040302010602)	250# 9-23-30	100# 9-13-28	300# 9-23-30
Good Earth Creek-Fox River (HUC 040302010603)	250# 9-23-30	100# 9-13-28	300# 9-23-30

Typical N:P:K Ratio =

Question 11. Crop yield targets could also inform the selection of appropriate fertilizer application rates. For example, areas with high yield targets may also be receiving high rates of fertilizer application. Can you provide estimates of crop yield targets by HUC12 subwatershed? Corn 160Bu/A Soybeans 50Bu/A Alfalfa 4-6 tons /A

QUESTIONS 12 THROUGH 14: MANURE APPLICATIONS

Manure applications will be modeled for the Dairy rotation. Important settings for manure applications include application frequency, rate, timing, and whether application is followed by incorporation. Your input is needed to determine appropriate manure application settings.

Question 12. In the table below, please estimate the percentage of your county's Dairy acreage practicing daily haul of manure versus manure storage by HUC12 subwatershed.

HUC12	% Daily Haul	% Storage
Sand Spring Creek-Fox River (HUC 040302010101)	80	20
Swan Lake-Fox River (HUC 040302010102)	80	20
South Branch Neenah Creek (HUC 040302010203)	80	20
Big Slough (HUC 040302010204)	80	20
Neenah Creek (HUC 040302010205)	80	20
Lake Emily (HUC 040302010501)	80	20
Belle Fountain Creek (HUC 040302010503)	80	20
Portage Canal-Fox River (HUC 040302010601)	80	20
French Creek (HUC 040302010602)	80	20
Good Earth Creek-Fox River (HUC 040302010603)	80	20

Question 13. Using the table below, please describe typical manure application practices for a daily haul farm and a manure storage farm in your county.

Characteristic	Typical Practice for Daily Haul Farm	Typical Practice for Storage Farm
Application Frequency	DAILY	2-4 times/year
Application Timing	Year round	Every 1-3 months
Followed by Incorporation? (Yes or No)	No	Yes

Question 14. In the table below, please estimate typical manure application rates and form (liquid or solid) for a daily haul farm and a manure storage farm in your county by HUC12.

HUC12	DAILY HAUL		STORAGE	
	Application Rate	Manure Form	Application Rate	Manure Form
Sand Spring Creek-Fox River (HUC 040302010101)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
Swan Lake-Fox River (HUC 040302010102)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
South Branch Neenah Creek (HUC 040302010203)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
Big Slough (HUC 040302010204)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
Neenah Creek (HUC 040302010205)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
Lake Emily (HUC 040302010501)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
Belle Fountain Creek (HUC 040302010503)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
Portage Canal-Fox River (HUC 040302010601)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
French Creek (HUC 040302010602)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid
Good Earth Creek-Fox River (HUC 040302010603)	20T/Acre/yr	Solid	Up to 10,000 gal/yr	Liquid

QUESTION 15: PLANTINGS AND HARVESTS

SWAT management tables ask for planting and harvest dates for each crop planted. For the UFWB SWAT model, management tables will initially be setup using average planting and harvest dates for the Basin. We recognize that dates can vary widely from year-to-year depending on temperature and moisture conditions. The initial planting dates will be varied as part of model sensitivity analysis to evaluate how much of an effect they have on modeled runoff and phosphorus/sediment loads. Your input is needed to determine average, early, and late planting and harvest dates in the UFWB and to determine an appropriate number of hay cuttings per year for the alfalfa phase of the Dairy rotation and for the Continuous Pasture/Hay rotation.

Question 15.In the table below, please estimate average planting dates (50% of crop planted) in in your county in cool/wet, average, and warm/dry years. Please also estimate the typical number of cuttings on alfalfa and other hay fields in your county.

Temperature/Moisture Condition	Average Planting Date	Average Harvest Date	Number of Hay Cuttings
Cool/Wet Year	April 20	June 1	3
Average Temperature/Moisture Year	April15	May 25	3
Warm/Dry Year	April 5	May 203	3

QUESTION 16: SOIL PHOSPHORUS

An important parameter for SWAT modeling is the initial phosphorus content of soils throughout the modeled area. We have acquired average soil phosphorus by county based on 2005-2009 soil testing from the UW Soil Testing Lab (http://uwlab.soils.wisc.edu/files/soilsummary/2009/currentP.pdf). Your input is needed to estimate finer-scale soil phosphorus values. Estimates of average soil P per HUC12 can be generated by averaging values from a group of representative Nutrient Management Plans for farms in each HUC12.

Question 16. In the table below, please estimate average soil phosphorus per HUC12. Estimates can be derived from a review of representative Nutrient Management Plans for each HUC12.

HUC12	Average Soil P (parts per million)
Sand Spring Creek-Fox River (HUC 040302010101)	50
Swan Lake-Fox River (HUC 040302010102)	50
South Branch Neenah Creek (HUC 040302010203)	50
Big Slough (HUC 040302010204)	50
Neenah Creek (HUC 040302010205)	50
Lake Emily (HUC 040302010501)	50
Belle Fountain Creek (HUC 040302010503)	50
Portage Canal-Fox River (HUC 040302010601)	50
French Creek (HUC 040302010602)	50
Good Earth Creek-Fox River (HUC 040302010603)	50

QUESTIONS 17 & 18: GRAZING

SWAT management tables can be setup to model animal grazing on pastured lands. Required inputs include the animal type and count, timing of the start of grazing, and number of grazing days. Your input is needed to determine the prevalence of managed grazing in areas classified as Continuous Pasture/Hay and, if grazing is significant, to determine appropriate grazing settings.

Question 17. What percentage of your county's Continuous Pasture/Hay acreage is grazed?

3%

Question 18 .If managed grazing is a significant practice, what are the typical practices of a grazing operation?

Characteristic	Typical Practice
Animal Type	
Number of Animals per Acre	
Grazing Timing & Duration (Entire Growing Season, Year-Round, Spring Only, etc.)	

Not a significant practice