WDNR - Using Snap-Plus to Quantify Phosphorus Trading Credits (10-23-2018)

Purpose

The purpose of this document is to provide technical assistance for using the "P Trade" report in SnapPlus to quantify Phosphorus Trading Credits. This document does not detail data needs for Snap-Plus or how to use the Snap-Plus tool. It is recommended that individuals interested in using the Snap-Plus tool review the Snap-Plus user manual, available at http://snapplus.wisc.edu/users-manual , and attend a Snap-Plus training session to gain additional information about data needs and using this tool. This document also refers to DNR's WQ Trading Program - http://dnr.wisconsin.gov. DNR also has a "Water Quality Trading How-To Manual", or "How-To Manual", which provides more comprehensive guidance regarding trading. This resource is available for download at http://dnr.wi.gov/topic/SurfaceWater/WaterQualityTrading.html.

Background on SnapPlus

SnapPlus (Soil Nutrient Application Planner) is a widely used software program to prepare NRCS 590 standard compliant nutrient management plans. The program helps farmers make the best use of their on-farm nutrients allowing informed and justified commercial fertilizer purchases. Two critical features of this program related to water quality is its ability to generate, by field, a phosphorus index (PI) value and capability to calculate soil erosion, based on the revised universal soil loss equation (RUSLE2). By calculating potential soil and phosphorus runoff losses on a field-by-field basis while assisting in the economic planning of manure and fertilizer applications, Snap-Plus provides Wisconsin farmers with a tool for protecting soil and water quality. Snap-Plus is supported by UW-Madison Department of Soil Science, DATCP, NRCS, UW-Extension, and DNR, and is available for download at http://snapplus.wisc.edu/.

SnapPlus was recently augmented to quantify phosphorus reductions for trading and adaptive management projects. SnapPlus, which has been calibrated using edge of field monitoring, is the preferred tool for trading and adaptive management because it can quantify the amount of phosphorus delivered from a farm field to the nearest surface water both with and without management practices installed. Management practices that can be quantified include whole field management, cover crops, conservation easements, and nutrient management and supporting practices, among other things.

A critical assumption of SnapPlus phosphorus loss calculations is that farm fields do not have ongoing gullies or concentrated flow channel erosion. If fields have gullies or concentrated flow erosional features, the P Trade report phosphorus loss calculation is underestimated and, accordingly, DNR may not accept P Trade reports that contain these fields.

SnapPlus also does not account for tile drains and associated phosphorus loss to surface waters from them. With that said, SnapPlus can still be used for tile drained fields; however, the uncertainty factor for a tile drained field will need to be increased to account for the additional uncertainty associated with the tile drainage. In addition, DNR's guidance for Implementing Water Quality Trading and its "How-To Manual" for Water Quality Trading prohibit application of manure, biosolid or industrial waste on tile

drained fields as a condition for receiving the corresponding uncertainty factor for either whole field or nutrient management practices.

Data Inputs

The P Trade Report is designed to aggregate data in SnapPlus to quantify the annual amount of phosphorus that is delivered to the nearest receiving water from specific farm fields under different management practices. For water quality trades that rely upon cropping practices, all fields owned and operated by the farm should be included in the farm SnapPlus database. For water quality trades that rely upon structural practices, only the fields with structural practices should be included in the farm SnapPlus database. Figure 1 provides examples of structural and cropping practices.

Figure 1 – Examples of Structural and Cropping Practices

Structural Practices	Cropping Practices
Riparian Buffers + Conservation Easements	Nutrient Management
Riparian Filter Strip + Field Border	Tillage + Residue Management
Grassed Waterway Wetland Restoration Sediment Control Basin Heavy Use Area Protection	Cover Crops + Crop Rotation (e.g., increase perennial crops) Contour Farming + Contour Strips Edge of Field Filter Strip Manure Applications – timing, rates, amounts, methods, and manure types Prescribed Grazing Conversion to Prairie

When using cropping practices for water quality trade include all fields owned or rented by farm to demonstrate existing phosphorus losses are not 'shifted' to other fields ensuring an overall net reduction in phosphorus load. If a farm's fields are located in multiple watersheds, a farm database for the fields within each watershed in question should be created.

Once the farm database has been created to reflect structural or cropping practices, it is important to verify that all field information is included in the "Fields" tab, particularly the predominant soil type information. The P Trade Report uses the predominant soil type (i.e., the largest soil unit within the field) to quantify the phosphorus loss in lieu of the critical soil type used for calculation of the Wisconsin P-Index. Other tabs in SnapPlus, including "Soil Tests" and "Nutrients", should be filled out the same as they would be when using SnapPlus to calculate a P-Index value.

Predominant soil type information is available from:

- Wisconsin 590 Interactive maps - http://www.manureadvisorysystem.wi.gov/app/interactive
- Web Soil Survey - http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

A minimum of two years of historical data are needed in order to generate the P Trade Report. Historic nutrient management plans and soil test values can be used to create the historic record and identify current rotations and management practices for all fields in the farm database. Although a two-year historic record is required for the P Trade Report, it is recommended the historic data for the full crop rotation be used whenever available. If nutrient management plans are used in water quality trading,

they need to be updated after each crop year to reflect real, rather than planned, management. If historic nutrient management plans are not available:

- Interview County LCD staff to gather additional information and help determine what reasonable assumptions for fields included in the P Trade report
- Use County average cropping yield information. NOTE: Using county yield data with caution; it may over or under-estimate field P losses based upon management
- Soil test all fields (routine agricultural soil test included soil test P and organic matter %) and apply the current data to the historical record

Running the P Trade Report

Once the historic record/cropping practices have been entered into SnapPlus database, run the P Trade report, absent the new practices that will be installed to reduce phosphorus. This report provides field specific annual phosphorus losses from the farm and will serve as the "baseline" for future comparisons. Table 1 is an example "baseline" P Trade Report generated from SnapPlus.

Table 1 - Baseline P Trade Report **Current cropland practices**

Farm	Field	Acres	PTP 2014	PTP 2015	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	80 1	21.0	50	18	18	14	35	175	170
Farm A	80 2	10.0	13	12	7	33	58	59	19
Farm A	80 3	12.0	10	7	5	36	59	66	19
Farm A	80 4	20.0	23	131	89	31	22	18	14
Farm A	80 6	12.0	13	9	7	45	99	78	23
Farm A	HOME 1	22.0	158	41	20	19	14	34	168
Farm A	HOME 2	12.0	19	68	67	25	16	13	10
Farm A	HOME 3	10.0	49	6	26	35	8	6	4
Farm A	HOME 4	9.0	9	43	147	161	44	17	16
Farm A	HOME 5	7.0	20	66	75	23	13	13	10
Farm A	MART 1	2.0	9	3	3	3	2	3	11
Farm A	MART 2	23.0	15	18	14	22	44	80	20
Farm A	MART 3	4.0	1	1	1	1	1	1	1
Farm A	PASTURE East	3.0	45	46	46	47	47	48	48
Farm A	PASTURE West	13.0	16	14	16	21	21	21	21
Farm A	TILLIES 1	13.0	215	51	16	15	10	39	183
Farm A	TILLIES 2	11.0	5	18	66	94	21	10	9
Farm A	TILLIES 3	10.0	81	16	13	14	5	14	76
Farm A	TILLIES 4	16.0	16	15	17	36	114	141	33
Farm A	TILLIES 5	11.0	17	86	92	18	11	8	5
Farm A	TILLIES 6	10.0	5	3	13	48	82	16	7
Total		**251**	**788**	**671**	**757**	**741**	**726**	**859**	**867**

PTP = Potentially Tradeable Phosphorus

Next, make a copy of the database, rename it to indicate it will include management changes, and open

the copied database in SnapPlus. Modify the Cropping inputs for each field to reflect management practices that will be installed or used as part of the water quality trade for the trade contract years. Run the P Trade report again to create a "reduction" report. Table 2 is an example "reduction" P Trade Report generated from SnapPlus. P reduction practices are planned for installation beginning in year 2016.

Years P reduction practices installed

Table 2 - Reduction P Trade Report

Farm	Field	Acres	PTP 2014	PTP 2015	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	80 1	21.0	50	18	18	14	24	154	145
Farm A	80 2	10.0	13	12	7	31	71	57	19
Farm A	80 3	12.0	10	7	5	33	87	64	20
Farm A	80 4	20.0	23	131	89	31	22	18	14
Farm A	80 6	12.0	13	9	7	42	106	76	23
Farm A	HOME 1	22.0	158	41	20	19	14	24	148
Farm A	HOME 2	12.0	19	68	61	24	12	12	10
Farm A	HOME 3	10.0	49	6	25	34	4	4	3
Farm A	HOME 4	9.0	9	43	129	139	42	17	16
Farm A	HOME 5	7.0	20	66	69	23	13	13	10
Farm A	MART 1	2.0	3	2	2	2	2	2	5
Farm A	MART 2	23.0	13	14	12	16	27	54	14
Farm A	MART 3	4.0	1	1	1	1	1	1	1
Farm A	PASTURE East	3.0	45	46	26	23	23	23	23
Farm A	PASTURE West	13.0	16	17	21	21	21	22	22
Farm A	TILLIES 1	13.0	215	51	16	15	10	24	151
Farm A	TILLIES 2	11.0	5	18	60	82	20	10	9
Farm A	TILLIES 3	10.0	81	16	13	14	5	9	65
Farm A	TILLIES 4	16.0	16	15	17	26	90	122	31
Farm A	TILLIES 5	11.0	17	86	84	18	11	8	5
Farm A	TILLIES 6	10.0	5	3	9	40	71	15	7
Total		**251**	**780**	**669**	**691**	**649**	**679**	**729**	**741**

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In order to determine the total phosphorus reduction for each year, subtract the total phosphorus load calculated in the "reduction" report from the total phosphorus load calculated in the "baseline" report for each field.

Snap Plus allows users to create reports using Adobe pdf, MS excel spreadsheet or other applications. Using MS excel to create P Trade Reports can help make a field specific comparison between baseline and reduction loads to calculate the resulting P savings. Table 3 provides a comparison example using SnapPlus MS excel spreadsheet:

Years P reduction practices installed

Table 3 - Comparison of Baseline and Reduction Reports

Farm	Field	Acres		PTP 2014	PTP 2015	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	80 1	21.0	Baseline	50	18	18	14	35	175	170
Farm A	80 1	21.0	Reduction	50	18	18	14	24	154	145
Farm A	**80 1**	**21.0**	**Savings**	**0**	**0**	**0**	**0**	**11**	**21**	**25**
Farm A	80 2	21.0	Baseline	13	12	7	33	58	59	19
Farm A	80 2	21.0	Reduction	13	12	7	31	71	57	19
Farm A	**80 2**	**21.0**	**Savings**	**0**	**0**	**0**	**0**	**-23**	**2**	**0**
Farm A	80 3	12.0	Baseline	10	7	5	36	59	66	19
Farm A	80 3	12.0	Reduction	10	7	5	33	87	64	20
Farm A	**80 3**	**12.0**	**Savings**	**0**	**0**	**0**	**3**	**-28**	**2**	**-1**
Farm A	TILLIES 1	13.0	Baseline	215	51	16	15	10	39	183
Farm A	TILLIES 1	13.0	Reduction	215	51	16	15	10	24	151
Farm A	**TILLIES 1**	**13.0**	**Savings**	**0**	**0**	**0**	**0**	**0**	**15**	**32**
Farm A	TILLIES 2	11.0	Baseline	5	18	66	94	21	10	9
Farm A	TILLIES 2	11.0	Reduction	5	18	60	82	20	10	9
Farm A	**TILLIES 2**	**11.0**	**Savings**	**0**	**0**	**6**	**12**	**1**	**0**	**0**
Farm A	TILLIES 3	10.0	Baseline	81	16	13	14	5	14	76
Farm A	TILLIES 3	10.0	Reduction	81	16	13	14	5	9	65
Farm A	**TILLIES 3**	**10.0**	**Savings**	**0**	**0**	**0**	**0**	**0**	**5**	**10**
Farm A	TILLIES 4	16.0	Baseline	16	15	17	36	114	141	33
Farm A	TILLIES 4	16.0	Reduction	16	15	17	26	90	122	31
Farm A	**TILLIES 4**	**16.0**	**Savings**	**0**	**0**	**0**	**10**	**24**	**19**	**2**
Farm A	TILLIES 5	11.0	Baseline	17	86	92	18	11	8	5
Farm A	TILLIES 5	11.0	Reduction	17	86	84	18	11	8	5
Farm A	**TILLIES 5**	**11.0**	**Savings**	**0**	**0**	**8**	**0**	**0**	**0**	**0**
Farm A	TILLIES 6	10.0	Baseline	5	3	13	48	82	16	7
Farm A	TILLIES 6	10.0	Reduction	5	3	9	40	71	15	7
Farm A	**TILLIES 6**	**10.0**	**Savings**	**0**	**0**	**4**	**8**	**11**	**1**	**0**

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Different Timelines for P Trade Reports

Practices to reduce P loads may be installed and maintained on agricultural fields as part of a Water Quality Trading proposal prior to the compliance date or reissuance of a permit with phosphorus effluent limits. If this occurs, the SnapPlus databases and P Trade reports may have different years from each other. Tables 4 and 5, the baseline report and reduction report, are set-up to reflect different timelines and Table 6 provides an example comparison calculation to determine the resulting load reduction.

Reminder: A Water Quality Trading agreement plan should be submitted to WDNR before installation of practices. Alternatively, the management practice registration form may also be used.

Years with current practices

Table 4 - Baseline Report

Farm	Field	Acres	PTP 2010	PTP 2011	PTP 2012	PTP 2013	PTP 2014	PTP 2015
Farm X	1	21.0	28	30	28	31	33	35
Farm X	2	10.0	12	15	15	15	17	17
Farm X	3	12.0	10	8	10	9	11	8
Farm X	4	20.0	32	32	32	31	33	37
Total		**63**	**82**	**85**	**85**	**86**	**94**	**97**

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Years P reduction practices installed

Table 5 - Reduction Report

Farm	Field	Acres	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020	PTP 2021
Farm X	1	21.0	16	6	8	16	10	13
Farm X	2	10.0	10	7	7	10	7	7
Farm X	3	12.0	5	6	7	9	10	8
Farm X	4	20.0	13	14	11	13	9	11
Total		**63**	**44**	**33**	**33**	**48**	**36**	**39**

PTP = Potentially Tradeable Phosphorus

As before, complete a field specific comparison between baseline (table 4) and reduction loads (table 5) to calculate the resulting P savings. Table 6 provides an example of this comparison:

Table 6 - Comparison Example

Farm	Field	Acres		PTP	PTP	PTP	PTP	PTP	PTP
Farm X	1	21.0	Baseline 2010-2015	28	30	28	31	33	35
			Reduction 2016-2021	16	6	8	16	10	13
			Savings	**12**	**24**	**20**	**15**	**23**	**22**
Farm X	2	10.0	Baseline 2010-2015	12	15	15	15	17	17
			Reduction 2016-2021	10	7	7	10	7	7
			Savings	**2**	**8**	**8**	**5**	**10**	**10**
Farm X	3	12.0	Baseline 2010-2015	10	8	10	9	11	8
			Reduction 2016-2021	5	6	7	9	10	8
			Savings	**5**	**2**	**3**	**0**	**1**	**0**
Farm X	4	20.0	Baseline 2010-2015	32	32	32	31	33	37
			Reduction 2016-2021	13	14	11	13	9	11
			Savings	**19**	**18**	**21**	**18**	**24**	**26**

Converting to Credit

Apply trade ratios to the calculated total P reduction to convert pounds into phosphorus credits. As described in the Water Quality Trading Manual (http://dnr.wi.gov/topic/SurfaceWater/WaterQualityTrading.html), trade ratios are designed to account for the uncertainties associated with trading (see Table).

Table 7. Types of uncertainty associated with trading and credit generation.

Delivery	•Accounts for the distance between the credit generator and the credit user, and the impact that this distance can have on fate and transport of the pollutant.
Downstream	•Adjusts for local water quality impacts if the credit user is upstream of the credit generator.
Equivalency[1]	•Accounts for situations where trading partners discharge different forms of the traded pollutant. Example: Total Nitrogen vs. Nitrate-Nitrogen
Uncertainty	•Accounts for modeling inaccuracies used to quantify load reductions, ease of verification of the practice, and the reliability of the practice to reduce loads.
Habitat Adjustment	•Used to capture ancillary benefits from select practices that benefit habitat in addition to capturing the pollutant of concern. Only applies to wetland creation, resoration, and stream improvements.

1- *Equivalency is not applicable for phosphorus or TSS trades. It is included in Table 2 for completeness, but is not relevant to the reductions quantified using the P Trade Report.*

Each component of the trade ratio can be determined if you:

A. Know the practices that are generating the phosphorus reductions (i.e. the ones you added in the "reduction" report), and
B. Know the location of the farm, or credit generator, in relation to the credit user.

Know the practices

There are two components of the trade ratio that directly relate to the phosphorus-reducing practices themselves: uncertainty and habitat adjustment. The uncertainty factor is a practice-specific value that can be looked-up in the How-To Manual, or at http://dnr.wi.gov/topic/surfacewater/documents/wqtradingtoolstable_2014.pdf. Contact your regional water quality trading coordinator to determine the appropriate uncertainty factor for practices not currently listed in this table.

The habitat adjustment factor only applies to a handful of practices including wetland creation, wetland restoration, and stream habitat and improvement and management. If you select one of these practices, contact your regional water quality trading coordinator to determine the appropriate adjustment factor for this project.

Know the location

A map may be helpful in evaluating components of the trade ratio. Wisconsin's surface water data viewer, among other GIS-based mapping tools- http://dnr.wi.gov/topic/surfacewater/swdv/ (see Figure 1), can be used to generate such maps. These maps do not need to be submitted to DNR in a water quality trading plan so long as management practice registration forms are completed for the practices in question. All water quality trading forms are available at http://dnr.wi.gov/topic/SurfaceWater/WaterQualityTrading.html.

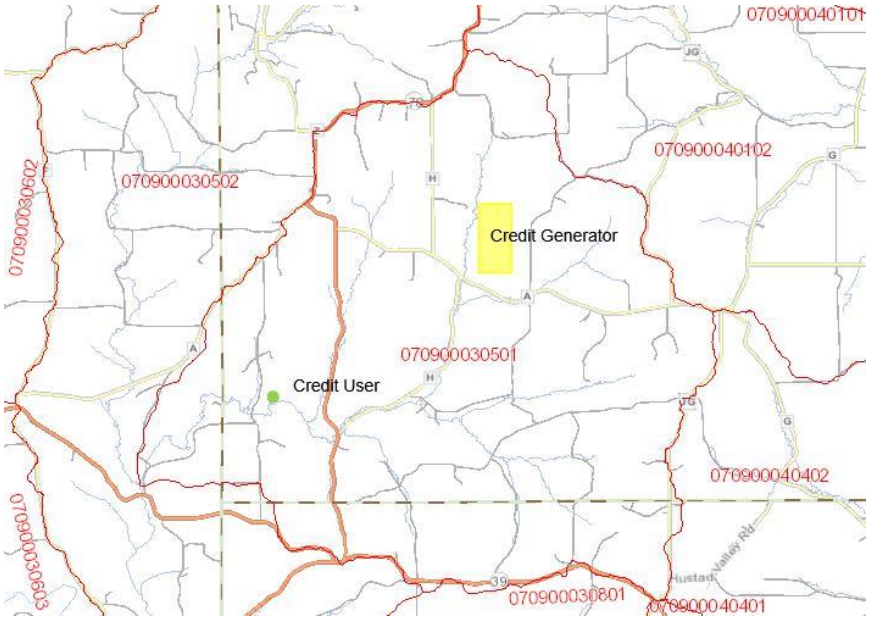

Figure 1. Illustration of simple map that can be created using the surface water data viewer to display the location of credit user and credit generator in a watershed.

Once there is a clear understanding of the location of the credit user and generator, answer the following questions.

Is the credit generator and credit user in the same HUC 12?	If yes, deliver factor=0; If no, see How-To Manual to quantify deliver factor
Is the credit user downstream of the credit generator?	If yes, downstream factor=0; If no, see How-To Manual to quantify downstream factor

Reminder: Review flexibility in TMDL Watersheds (below) when developing proposals for trading within approved TMDL watersheds

Example Calculation using one practice:

Assume that the credit generator highlighted in yellow in Figure 1 is a 240-acre farm and plans to generate phosphorus credits for 2014 by installing edge of field filter strips on five fields. Edge of field filter strips has an uncertainty factor of 2:1. The total phosphorus reduction calculated using Snap-Plus P Trade report for the five fields is 114 lbs. in 2014. Therefore, the final phosphorus credit for 2014 is:

Final Credit= 114 lbs. / 2 = 57 lbs. of TP credit in 2014

Example Calculation using multiple practices:

Some trades may utilize a variety of phosphorus-reducing practices to generate phosphorus credits. In these instances, a variety of uncertainty factors may apply. Applying a trade ratio to each field is recommended to calculate field specific credits. In the case multiple practices (e.g., reduced tillage, filter strips, nutrient management, grassed waterways) are installed on the same field, it is recommended that a weighted trade ratio be used to calculate a composite trade ratio for each individual field.

$$Field\ Weighted\ Trade\ Ratio = \frac{\sum\ (Practice\ specific\ trade\ ratio * \#of\ acres/practice)}{\sum\ (acres\ with\ trading\ practices\ )}$$

For example, let's assume that the same 240-acre farm illustrated in Figure 1 generates credits by:

- Installing of edge of field filter strip serving a 20-acre field and the filter strip is 0.25 acres in size;
- Planting cover crops on a 15-acre field;
- Implementing conservation tillage (no till) practice within the same 20 and 15-acre fields

Because the nonpoint source fields are upstream and within the same watershed as the point source, and trading for phosphorus, the trade ratio is equal to the uncertainty factor for the specific practices. According to Appendix A of the Water Quality Trading How-To Manual, http://dnr.wi.gov/topic/SurfaceWater/WaterQualityTrading.html, the uncertainty factor for filter strips, cover crops and conservation tillage is 2:1, provided the fields are under an approved Nutrient Management Plan. Applying a field specific trade ratio for each field results in the following:

20-acre field with conservation tillage and filter strip (0.25 acres) = 2.1:1 Trade Ratio
15-acre field with conservation tillage and cover crops = 2:1 Trade Ratio

Final credits are calculated by applying the field weighted trade ratio to the field specific total phosphorus reduction created from the Snap-Plus P Trade Report.
Note: Contact your local AM/WQT regional coordinator if you would like to pursue an alternative method for deriving a trade ratio in a multiple practice scenario.

Reminder: As stated in the How-To Manual, the minimum trade ratio for point source to nonpoint source trades in 1.2:1.

Using the P Trade Report within Approved TMDL Watersheds

Using the P Trade Report within Approved TMDL watersheds requires an additional step (from the process described above) to determine final water quality trading credits. This step requires identifying the credit threshold for a TMDL watershed, applying the threshold to Snap-Plus P Trade report results and then using applicable trade ratios.

According to DNR's "Water Quality Trading How-To Manual", a credit threshold refers to the amount of pollutant reduction that needs to be achieved before credits are generated. In watersheds with an approved TMDL, the credit threshold is set equal to the TMDL load allocation. If a credit user works with a nonpoint source credit generator to comply with a TMDL load allocation, "interim" credit is generated, meaning the point source will receive credit for these reductions for up to five years. "Long Term" credit is given for reductions that go above and beyond the load allocation in approved TMDL areas. Approved TMDL load allocations are determined by calculating how much reduction below baseline load conditions is needed so an impaired waterbody can meet water quality standards.

When using the P Trade Report within approved TMDL watersheds, implement the following:

STEP 1 - Run P Trade Baseline and Reduction reports to determine farm total and field specific P reductions as shown in figures 2 and 3 below

Years P reduction practices installed

Figure 2 – Total P reductions for all farm fields

Farm		Acres	PTP 2014	PTP 2015	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	**Baseline**	**251**	**788**	**671**	**757**	**741**	**726**	**859**	**867**
	Reduction	**251**	**780**	**669**	**691**	**649**	**679**	**729**	**741**
	Savings	**251**	**8**	**2**	**66**	**92**	**47**	**130**	**126**

PTP = Potentially Tradeable Phosphorus

Figure 3 – Field specific P savings

Farm	Field	Acres		PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	1	21.0	Baseline	18	14	35	40	48
Farm A	1	21.0	Reduction	18	14	24	34	39
Farm A	**1**	**21.0**	**Savings**	**0**	**0**	**11**	**6**	**8**
Farm A	2	20.0	Baseline	7	33	38	57	47
Farm A	2	20.0	Reduction	7	31	32	34	31
Farm A	**2**	**20.0**	**Savings**	**0**	**2**	**6**	**21**	**16**
Farm A	TILL 1	13.0	Baseline	16	15	28	37	42
Farm A	TILL 1	13.0	Reduction	16	15	12	18	20
Farm A	**TILL 1**	**13.0**	**Savings**	**0**	**0**	**14**	**19**	**22**
Farm A	TILL 2	21.0	Baseline	66	94	21	22	29
Farm A	TILL 2	21.0	Reduction	39	46	11	10	15
Farm A	**TILL 2**	**21.0**	**Savings**	**10**	**12**	**10**	**12**	**14**

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STEP 2 - For each field with P savings, complete the following as shown in figure 4:

a. **Obtain TMDL Credit Threshold* (lbs/ac) from DNR for the field location(s) and insert into P Trade Report for comparison**
b. **Convert Baseline and Reduction annual P loss to lbs/acre ratio by dividing annual P loss by field total acres**
c. **Subtract Reduction (lbs/ac) from either Baseline or TMDL credit threshold values; if Baseline (lbs/ac) for field is greater than TMDL credit threshold (lbs/ac), use the TMDL Credit Threshold – see columns with green and yellow below in figure 4**
d. **Multiply difference values (lbs/ac) by acres on field to get P savings for year (lbs)**
e. **Convert P savings into Final Credits using appropriate trade ratio(s)**

**** = The TMDL credit threshold may vary by field location within a watershed. Please consult with DNR to determine TMDL credit threshold for fields in approved TMDL watersheds.***

Figure 4 – Compare Field Baseline and Reduction PTP (lbs/ac) to TMDL credit threshold (lbs/ac)

Farm	Field	Acres		PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020	
Farm A	1	21.0	Baseline	18	14	35	40	48	
Farm A	1	21.0	Reduction	18	14	24	34	39	
Farm A	**1**	**21.0**	**Savings**	**0**	**0**	**11**	**6**	**9**	
Step 2.a	TMDL credit Threshold	lbs/ac		2.0	2.0	2.0	2.0	2.0	
Step 2.b	Baseline	lbs/ac		0.9	0.7	1.7	1.9	2.3	
Step 2.b	Reduction	lbs/ac		0.9	0.7	1.1	1.6	1.9	
Step 2.c	Difference	lbs/ac		0	0	0.6	0.3	0.1	
Step 2.d	Difference x field acres	lbs		0	0	11.8	6.3	2.1	
Step 2.e			Trade Ratio	2:1	2:1	2:1	2:1	2:1	
			Final Credit	**0**	**0**	**5.9**	**3.1**	**1.1**	
Farm A	2	20.0	Baseline	7	33	38	57	47	
Farm A	2	20.0	Baseline	7	33	38	57	47	
Farm A	2	20.0	Reduction	7	31	32	34	31	
Farm A	**2**	**20.0**	**Savings**	**0**	**2**	**6**	**21**	**16**	
Step 2.a	TMDL credit Threshold	lbs/ac		2.0	2.0	2.0	2.0	2.0	
Step 2.b	Baseline	lbs/ac		0.4	1.7	1.9	2.9	2.3	
Step 2.b	Reduction	lbs/ac		0.4	1.6	1.6	1.7	1.6	
Step 2.c	Difference	lbs/ac		0	0.1	0.3	0.3	0.4	
Step 2.d	Difference x field acres	lbs		0	2	6	6	8	
Step 2.e			Trade Ratio	2:1	2:1	2:1	2:1	2:1	
			Final Credit	**0**	**1**	**3**	**3**	**4**	

PTP = Potentially Tradeable Phosphorus

Figure 4 - continued

Farm	Field	Acres		PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020	
Farm A	TILL 1	13.0	Baseline	16	15	28	37	42	
Farm A	TILL 1	13.0	Reduction	16	15	12	18	20	
Farm A	**TILL 1**	**13.0**	**Savings**	**0**	**0**	**14**	**19**	**22**	
Step 2.a	TMDL credit Threshold	lbs/ac		2.0	2.0	2.0	2.0	2.0	
Step 2.b	Baseline	lbs/ac		1.2	1.2	2.2	2.8	3.2	
Step 2.b	Reduction	lbs/ac		1.2	1.2	0.9	1.4	1.5	
Step 2.c	Difference	lbs/ac		0	0	1.1	0.6	0.5	
Step 2.d	Difference x field acres	lbs		0	0	14.3	7.8	6.5	
Step 2.e			Trade Ratio	2:1	2:1	2:1	2:1	2:1	
			Final Credit	**0**	**1**	**7.1**	**3.9**	**3.3**	
Farm A	TILL 2	21.0	Baseline	66	94	21	22	29	
Farm A	TILL 2	21.0	Reduction	39	46	11	10	15	
Farm A	**TILL 2**	**21.0**	**Savings**	**10**	**12**	**10**	**12**	**14**	
Step 2.a	TMDL credit Threshold	lbs/ac		2.0	2.0	2.0	2.0	2.0	
Step 2.b	Baseline	lbs/ac		3.1	4.5	1.0	1.0	1.4	
Step 2.b	Reduction	lbs/ac		1.9	2.2	0.5	0.5	0.7	
Step 2.c	Difference	lbs/ac		0.1	-0.2	0.5	0.6	0.7	
Step 2.d	Difference x field acres	lbs		2.1	0	10.5	7.8	14.7	
Step 2.e			Trade Ratio	2:1	2:1	2:1	2:1	2:1	
			Final Credit	**1**	**0**	**5.3**	**3.9**	**7.4**	

PTP = Potentially Tradeable Phosphorus

Narrative Example

Using the P Trade report, a farm has two fields with a baseline P loss of 4 lb/acre/yr under current management practices. The farm's fields are all located within a TMDL approved watershed and the TMDL load allocation/credit threshold for agriculture in the watershed is 2 lb/ac/year.

In order to sell credits to a point source discharge, the farm implements additional conservation practices on the two fields to reduce their annual P loss from a 4 to 1 lb/ac/year. Because the TMDL load allocation is 2 lb/ac/year for the field's location, there is 1 lb/ac/year available for trading as long-term credit. Because the practices reduce annual P loss below the TMDL load allocation, the 3 lb/ac/year reduction is also available for trading, but only for the first five years and as an interim credit. P credits are determined by applying applicable trade ratios on a field specific basis to the corresponding P reductions calculated using the P Trade report.

Reminder: Review Flexibility in TMDL Watersheds (below) when developing proposals for trading within approved TMDL watersheds

Flexibility in TMDL Watersheds

A "TMDL reach" is a waterbody segment used to calculate pollutant allocations for point and nonpoint sources in a TMDL. Typically, TMDL reaches are either impaired themselves or located upstream of an impaired water. Because of how TMDL reaches are delineated TMDL reaches may overlap with HUC 12 watershed boundaries allowing TMDL reaches to be used in lieu of or in addition to the HUC 12 boundary. When trading to meet allocations from a TMDL the trade locations must be hydraulically connected and located upstream of the impaired segment.

To search for approved TMDLs in Wisconsin visit http://dnr.wi.gov/topic/tmdls/tmdlreports.html.