

SWMPC Agricultural Area Model

Synopsis

The model was constructed by adding numerical ratings for a number of different agricultural related criteria to each quarter-quarter section (QQ – approx. 40 acre square) in the Paw Paw River Watershed (PPRW). Combining the value of each criteria for each QQ section allowed for ranking on the basis of potential agricultural impact to water quality. Table 1 and Figure 1 illustrate the classification and distribution of QQs. Table 2 provides statistics on the distribution of QQs by subwatershed. Table 3 describes the numerical value assigned to each agricultural related criteria.

The following criteria were considered when computing agricultural impact values: 1) agricultural land cover, 2) impaired water bodies, 3) pollutant loading, and 4) lost wetland functionality.

1. Agricultural land cover was characterized using the 2001 IFMAP land cover data. The percentage of row crop (non-vegetated farmland, row crops, forage crops) and orchard (orchards, vineyards, nursery) land cover was calculated for each QQ section.
2. Impaired water values were given based on the presence of MDEQ 303(d) listed water bodies including: 1) category 4c water bodies not attaining water quality standards due to channelization, 2) subwatersheds containing category 4c waters, and 3) subwatersheds containing category 5 water bodies not attaining designated uses which require the establishment of a TMDL for pathogens.
3. Pollutant loading values were given based on the SWAT model pollutant loading estimates given for each of the 36 subwatersheds delineated by the model. Pollutant loading estimates were calculated for sediment, phosphorus, and nitrogen. Pollutant loading values were also influenced by the presence of agricultural insult areas identified by TNC.
4. A dataset of current and historic wetlands with associated functionality developed by the MDEQ was used to determine the extent of lost wetlands. Values were assigned based on the percentage of lost wetland with high or medium rankings for nutrient transformation and/or sediment and other particulate retention within each QQ section.

Table 1. Classification and Distribution of QQs

<i>Agricultural Impact Class*</i>	<i>Value Range</i>	<i>Number of QQs</i>	<i>% of QQs</i>
1 (Highest)	207 - 205	150	2%
2	177 - 206	293	4%
3	161 - 176	373	5%
4	142 - 160	609	8%
5	125 - 141	699	9%
6 (High)	103 - 124	942	12%
7	0 - 102	4539	60%

Classes 1 to 6 contain 40% of all QQs in the PPRW

Total # of QQs = 7605

*A manual classification system was used to create 6 classes which contain an increasing number of QQs in each class and a 7th class containing the remainder of the QQs.

Figure 1. PPRW Agricultural Impact Areas

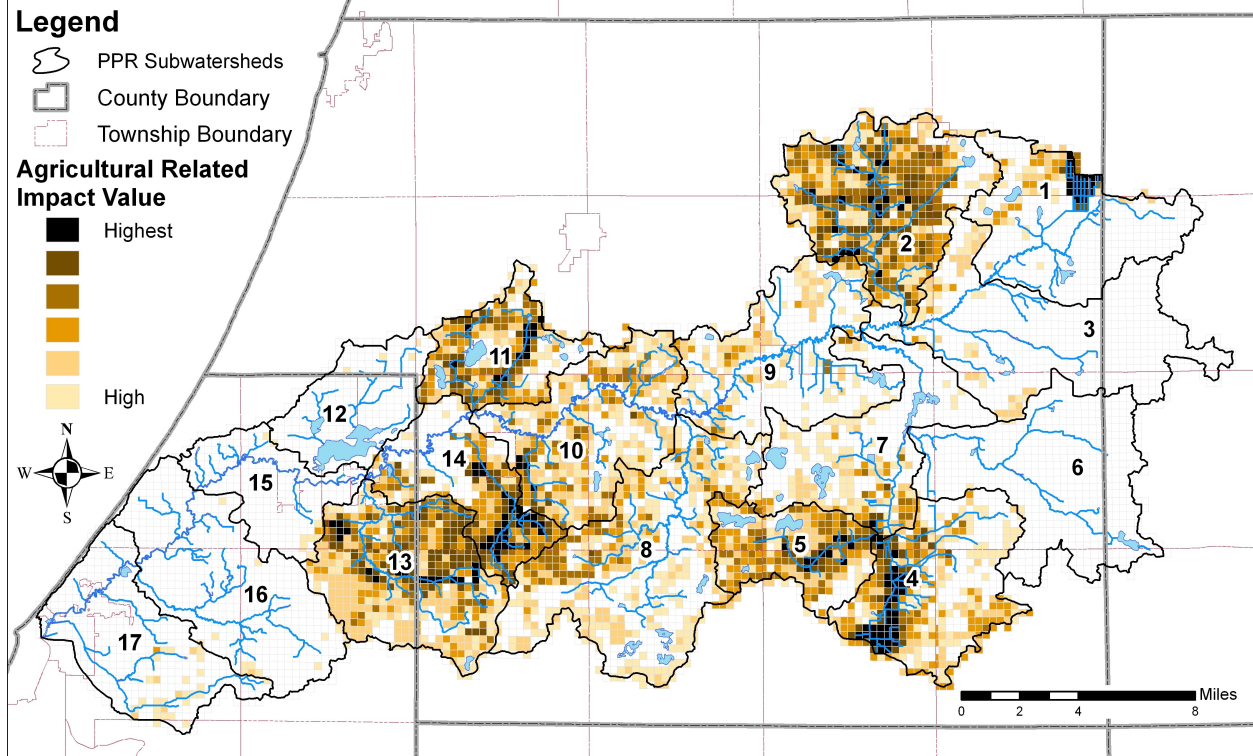


Table 2. Subwatershed QQ Statistics (sorted by Average Score)

<i>SubWS ID#</i>	<i>Ttl QQs</i>	<i>Max Score</i>	<i>Avg Score</i>	<i>% QQs Class 1-6</i>
2	487	256	149	89.12%
13	480	275	146	91.04%
5	246	236	140	82.52%
11	260	249	139	79.23%
14	310	258	130	64.84%
4	426	259	126	65.96%
10	455	221	120	68.35%
8	665	187	104	53.53%
9	480	175	89	34.58%
7	421	246	87	36.34%
1	428	225	62	18.93%
16	528	134	54	2.46%
3	595	157	51	11.09%
17	388	151	48	7.73%
12	263	135	48	2.66%
15	242	152	45	3.72%
6	535	112	33	.56%

Table 3. Criteria Weighting

<u>CRITERIA</u>	<u>WEIGHT</u>
<u>Ag Land Cover (% of QQ)</u>	100 (max)
Row Crop	1 point for each percent
Orchard/Vineyard	½ point for each percent
<u>SWAT Model Results (36 SubBasins)</u>	
<i>Sediment loading estimate</i>	
>.9 ton/acre	30
>.2 ton/acre	25
>.05 ton/acre	15
>.01 ton/acre	7
< .01 ton/acre	0
<i>Nitrogen loading estimate</i>	
> 3 lbs/acre	15
> .5 lbs/acre	10
< .5 lbs/acre	0
<i>Phosphorus loading estimate</i>	
> .9 lbs/acre	15
> .1 lbs/acre	10
< .1 lbs/acre	0
<u>TNC Ag Impact Study</u>	
Present	10
<u>Category 5 Subwatersheds (pathogens)</u>	
Present	15
<u>Category 4c Subwatersheds (channelization)</u>	
Present	10
<u>Category 4c Water Bodies (channelization)</u>	
Present	30
<u>Lost Wetlands (w/ Water Quality Related Functions)</u>	
<i>Nutrient Transformation</i>	35 (max)
High (% of QQ)	.35 point for each percent
Medium (% of QQ)	.25 point for each percent
<i>Sediment and Other Particulate Retention</i>	35 (max)
High (% of QQ)	.35 point for each percent
Medium (% of QQ)	.25 point for each percent
<u>Total Maximum Possible</u>	295
<u>Total Maximum Actual</u>	275