

SWMPC Urban Area Model

Synopsis

The model was constructed by adding numerical ratings for a number of different urban 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 urban 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 urban related criteria.

The following criteria were considered when computing urban impact values: 1) urban land cover, 2) development potential, 3) hydrologic concerns, and 4) accessibility.

1. Urban land cover was characterized using the 2001 IFMAP land cover data. The percentage of high intensity, low intensity, and transportation related land cover was calculated for each Q-Q section. The proximity of this urban land cover to hydrology (lakes/streams) was considered. Analysis of aerial photography (2005) was used to update urban land cover scores.
2. Development potential was based on: 1) the number of parcels in each QQ, 2) large groupings of undeveloped parcels, 3) future land use as described in each municipality's Master Plan, 4) the presence of desirable water bodies, and 5) population trends for each municipality.
3. Hydrologic concerns were based on: 1) MDEQ urban related impaired water body status, 2) groundwater recharge potential, and 3) the presence of historic wetlands with water quality related functions.
4. Accessibility was based on the proximity of important road networks including: 1) limited access highway exits, 2) state highways, 3) Red Arrow Highway, and 4) the state highway junctions.

Table 1. Classification and Distribution of QQs

| <i>Urban Impact Class*</i> | <i>Value Range</i> | <i>Number of QQs</i> | <i>% of QQs</i> |
|-----------------------------------|---------------------------|-----------------------------|------------------------|
| 1 (Highest) | 157 - 213 | 129 | 2 |
| 2 | 117 - 156 | 228 | 3 |
| 3 | 89 - 116 | 312 | 4 |
| 4 | 75 - 88 | 408 | 5 |
| 5 | 61 - 74 | 591 | 8 |
| 6 (High) | 48 - 60 | 887 | 12 |
| 7 | 0 - 47 | 5050 | 66 |

Classes 1 to 6 contain 34% 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 Urban Impact Areas

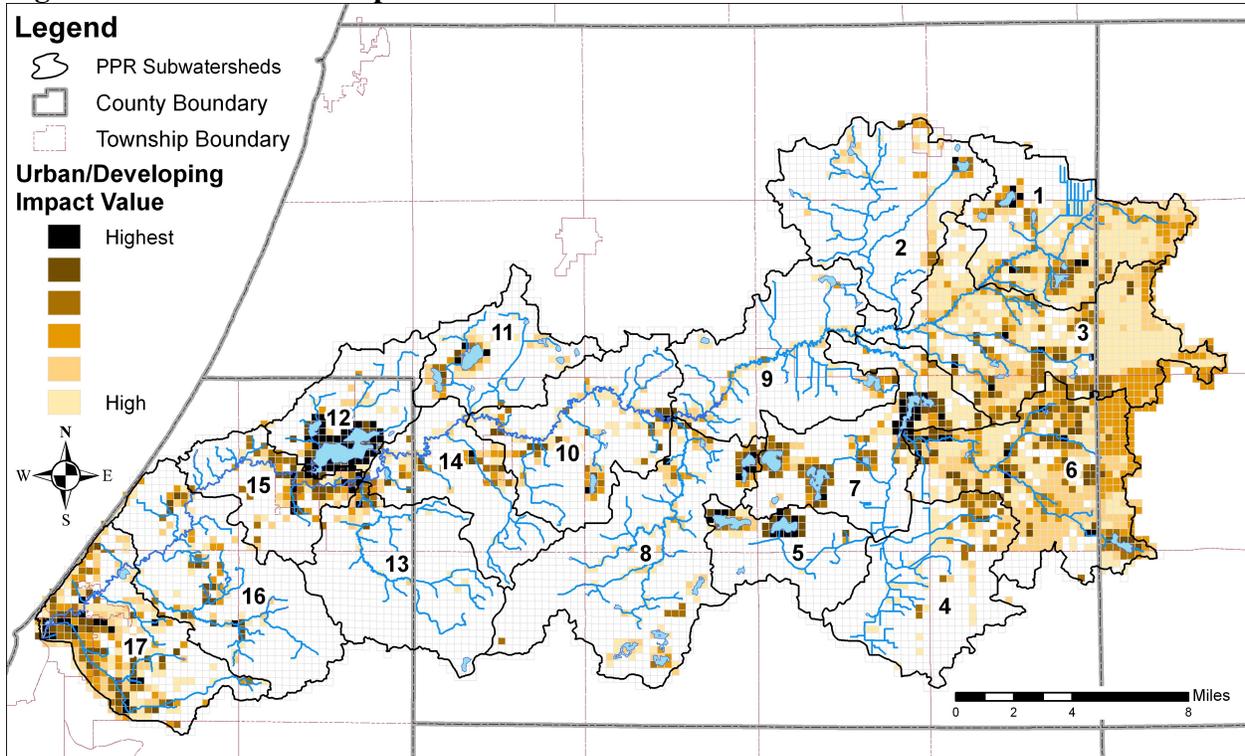


Table 2. Subwatershed QQ Statistics (sorted by Average Score)

| <i>SubWS ID#</i> | <i>Ttl QQs</i> | <i>Max Score</i> | <i>Avg Score</i> | <i>% QQs Class 1-6</i> |
|------------------|----------------|------------------|------------------|------------------------|
| 6 | 535 | 207 | 73 | 83.18% |
| 17 | 388 | 213 | 65 | 57.73% |
| 3 | 595 | 166 | 63 | 79.33% |
| 1 | 428 | 193 | 58 | 68.22% |
| 12 | 263 | 197 | 56 | 31.18% |
| 7 | 421 | 195 | 51 | 37.53% |
| 15 | 242 | 197 | 49 | 33.47% |
| 4 | 426 | 144 | 39 | 21.13% |
| 5 | 246 | 211 | 39 | 17.48% |
| 11 | 260 | 177 | 37 | 21.54% |
| 10 | 455 | 173 | 36 | 21.54% |
| 14 | 310 | 167 | 35 | 20.65% |
| 8 | 665 | 179 | 32 | 17.29% |
| 16 | 528 | 157 | 32 | 14.58% |
| 2 | 487 | 165 | 30 | 12.73% |
| 9 | 480 | 128 | 27 | 14.58% |
| 13 | 480 | 161 | 24 | 6.67% |

Table 3. Criteria Weighting

Urban Land Cover

| <u>ATTRIBUTE</u> | <u>POINTS</u> |
|--|---------------------------|
| <u>2001 IFMAP Land Cover (% of QQ)</u> | <i>40 (max possible)</i> |
| High Intensity Urban | .5 for each percent |
| Low Intensity Urban | .35 for each percent |
| Transportation | .4 for each percent |
| New Urban QQ (Aerial Photo Analysis) <i>2001 Urban LC < 25%</i> | 35 |
| <u>Urban Hydrology Buffer</u> | <i>100 (max possible)</i> |
| <i>River/Stream – 200m Buffer</i> | |
| Urban Acres in buffer per QQ | 10 for each acre |
| <i>Large Lakes (> 25acre) – 150m Buffer</i> | |
| > 20 (% Urban) | 100 |
| > 15 and < 20 (% Urban) | 60 |
| > 7 and < 15 (% Urban) | 30 |
| < 7 (% Urban) | 10 |
| New Urban QQ (Aerial Photo Analysis) <i>2001 Urban LC < 25% w/ Hydro</i> | 35 |

Max Total: 140 (actual)

| Hydrologic Concerns | |
|--|------------------------|
| <u>ATTRIBUTE</u> | <u>POINTS</u> |
| <u>Urban TMDL Subwatershed</u> | |
| Present | 15 |
| <u>Groundwater Recharge Potential</u> | |
| Very High | 25 |
| High | 20 |
| Medium | 5 |
| <u>Historic Wetlands (w/ Water Quality Related Functions)</u> | <i>16 (max actual)</i> |
| <i>Surface Water Detention</i> | |
| High | 8 |
| Medium | 5 |
| <i>Shoreline Stabilization</i> | |
| High | 8 |
| Medium | 5 |

Max Total: 36 (actual)

Table 3. Criteria Weighting (continued)

| Development Potential | |
|---|---------------------------|
| <u>ATTRIBUTE</u> | <u>POINTS</u> |
| # of Parcels per QQ | |
| | <i>15 (max actual)</i> |
| > 20 | 15 |
| 10 – 20 | 10 |
| < 10 | 0 |
| No Data (Kalamazoo County) | 10 |
| Undeveloped Subdivision | |
| | <i>50 (max actual)</i> |
| Present | 50 |
| Planned Future Land Use | |
| | <i>20 (max actual)</i> |
| Industrial | 20 |
| Commercial | 20 |
| High Density Residential | 20 |
| Medium Density Residential | 15 |
| Low Density Residential | 15 |
| Rural Residential | 10 |
| Agricultural | 10 |
| Open Space | 0 |
| No Master Plan | 15 |
| Waterfront Development | |
| | <i>35 (max actual)</i> |
| Large Lakes (> 25acre) | 20 |
| Mainstem | 20 |
| High Quality Tributaries | 15 |
| 2000 – 05 Population Change (% change) | |
| | <i>32 (max actual)</i> |
| Growth | 2 points for each percent |
| Loss | 1 point for each percent |
| | Max Total: 112 (actual) |

| Accessibility | |
|-------------------------------|------------------------|
| <u>ATTRIBUTE</u> | <u>POINTS</u> |
| Interstate Exit | |
| Present | 20 |
| Red Arrow Highway | |
| Present | 8 |
| State Highway | |
| Present | 8 |
| State Highway Junction | |
| Present | 15 |
| | Max Total: 31 (actual) |
| Total Maximum Possible | 319 |
| Total Maximum Actual | 213 |