



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
GRAND RAPIDS DISTRICT OFFICE



DAN WYANT
DIRECTOR

July 30, 2013

Ms. Kelly Goward
Watershed Coordinator
Macatawa Area Coordinating Council
301 Douglas Avenue
Holland, Michigan 49424

Dear Ms. Goward:

Thank you for requesting approval from the Department of Environmental Quality (DEQ) for your watershed management plan addendum. The efforts and support of your organization and partners to preserve and protect our surface water resources is appreciated.

DEQ staff have reviewed the addendum "Appendix V Sediment Studies" dated July 26, 2013, with respect to the nine required elements as described in the United States Environmental Protection Agency's (USEPA's) document entitled, "Nonpoint Source Program and Grants Guidelines for States and Territories (Oct. 23, 2003)." The review indicates that the addendum as submitted does meet these criteria.

Thank you for your efforts in the development of this watershed management plan addendum. The DEQ looks forward to assisting your organization with future efforts to implement this plan.

Sincerely,

Michael J. Worm
Assistant District Supervisor
Grand Rapids District Office
Water Resources Division
616-356-0037

mls/ljr

cc: Mr. Peter Vincent, Water Resources Division – DEQ (via email)
Mr. Robert Day, Water Resources Division – DEQ (via email)
Ms. Michelle Storey, Water Resources Division – DEQ (via email)

APPENDIX V

SUMMARY OF SUSPENDED SEDIMENT STUDIES

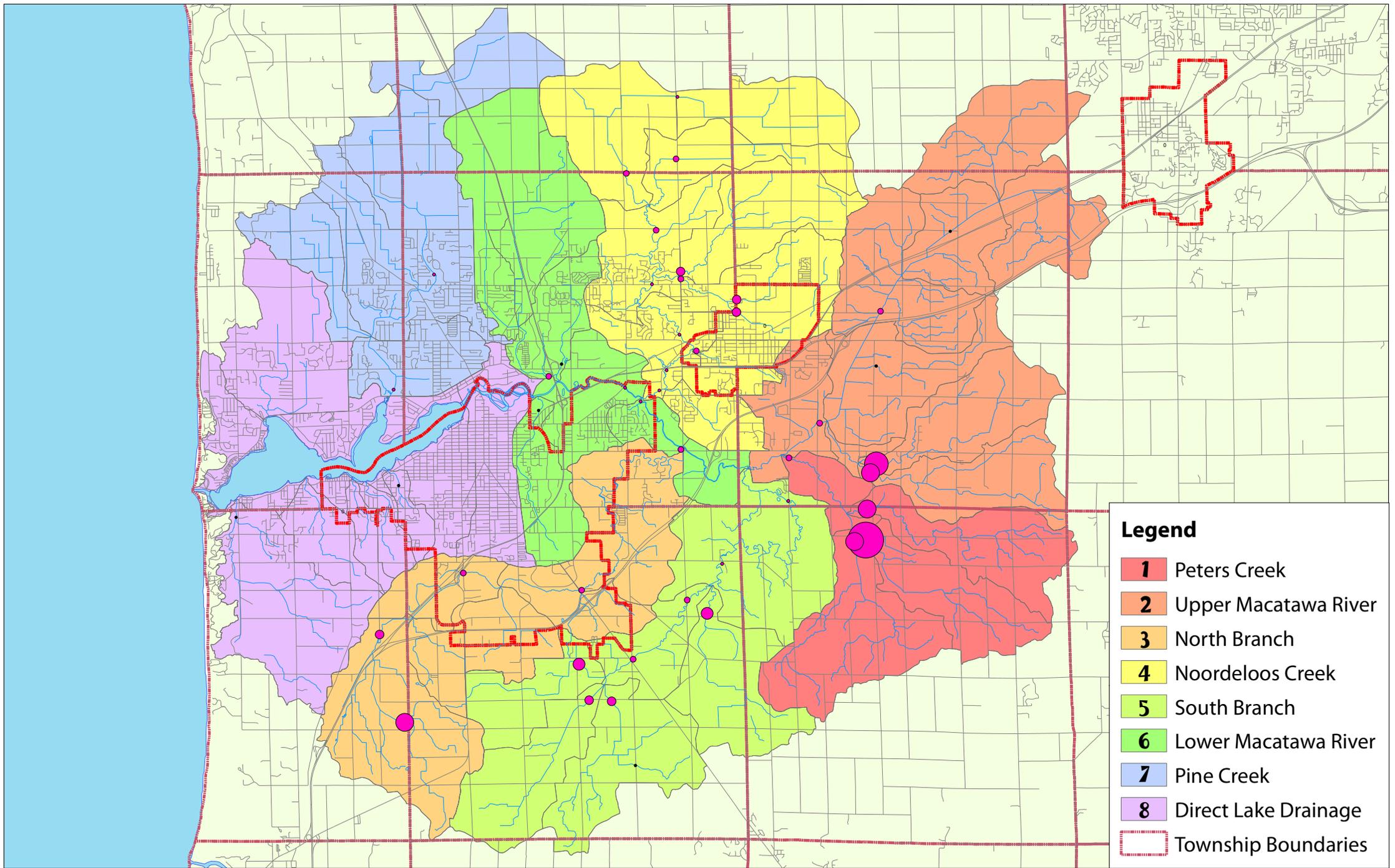
Summary of Suspended Sediment Studies in the Macatawa Watershed

Dan Callam, Outdoor Discovery Center Macatawa Greenway

For the past three years (2010-12), Hope College, in partnership with the Macatawa Area Coordinating Council (MACC) and Outdoor Discovery Center Macatawa Greenway (ODCMG), has undertaken an unprecedented study of the Macatawa Watershed to investigate its nonpoint pollution sources. Suspended sediment and nutrient levels are among the highest in the state, and have led to severely degraded, hypereutrophic conditions in both Lake Macatawa and all of its major tributaries. While there have been several studies and models used to prioritize areas and estimate pollutant loads (2009 MDEQ Hydrology Study, Appendix I; 2009 MDEQ Pollutant Loading Report, Appendix J), research and monitoring data represent the best means to quantitatively understand the conditions and pinpoint the worst areas. This data will allow us to more effectively focus our efforts to reach the phosphorus goal of 50ppb placed on the watershed through the total maximum daily load developed in 1999. The suspended sediment studies were supported through generous private funding and Michigan Department of Environmental Quality grants #481141/09 (Developing A Method for Suspended Sediment Sampling in the Macatawa Watershed) and #481141-10 (Sediment Fingerprinting in the Macatawa Watershed). The preliminary findings of this research are referenced on pages 71-75 of the management plan narrative.

Suspended sediment samplers were constructed and modified based on the design of Phillips et al. (2000) and Huisman (2010). They were designed to passively collect a known proportion of suspended sediment during flood events, when the majority of the discharge and suspended sediment is delivered. Fourteen, 43, and 46 sediment samplers were deployed for the 2010-12 seasons, respectively. Sediment was harvested from the sampling equipment upon the river returning to baseflow. Samplers that were damaged, misaligned, or not properly functioning were not included in the final dataset. These sediment totals for a known portion of the stream, along with stream gauge data, transects, and drainage areas, allowed for an estimate of the suspended sediment load at each sampling location. Phosphate analysis was also completed, which confirmed that the majority of the nutrients are bound to the sediment, verifying the overlapping of priority areas. Further work performed by Hope College analyzed the sediment content using a variety of forensic techniques to attempt to develop a fingerprint of the sediment for further source identification. Some techniques have worked better than others, and the resulting “fingerprints” have shown that while one edge of the watershed may look significantly different from the other, we are currently unable to produce a unique fingerprint for each site. Results have shown through radioisotopic measurements that a majority of the suspended sediment is originating from surface runoff rather than bank erosion, although both are sources of concern. Final reports for both grant funded projects (sediment sampling and sediment fingerprinting) are available upon request from the Macatawa Area Coordinating Council, Outdoor Discovery Center Macatawa Greenway and Hope College.

Based on the sediment sampling and analysis, new critical areas for suspended sediment and nutrient pollution have been determined at both the 12-digit and 14-digit subbasin levels (see attached maps). In particular, this prioritization is a better estimate of critical agricultural areas compared to the modeled areas as shown in Figure 41 (page 101). This new prioritization does not in any way attempt to replace the critical urban areas (Figure 42, page 103), in-stream best management practices (Appendix L) or wetland restoration prioritization (Appendix Q and pages 111-112). As shown in first the attached map, the 12-digit subbasins from worst to least polluted are: Peters Creek, the Upper Macatawa River, North Branch of the Macatawa, Noordeloos Creek, South Branch of the Macatawa, the Lower Macatawa River, Pine Creek, and direct lake tributaries. The pink circles on the map represent the approximation of relative suspended sediment loads at each location. The second attached map ranks and prioritizes the top fifteen 14-digit basins, with 1 being the most sediment burdened. While these have been prioritized and ranked, each of these basins will need improvements to help clean up Lake Macatawa, with particular emphasis necessary in the top five basins. Due to the scope of the problem that exists in the watershed, it will require a broad and extensive effort in each of these areas to begin to have an impact.



Legend

- 1** Peters Creek
- 2** Upper Macatawa River
- 3** North Branch
- 4** Noordeloos Creek
- 5** South Branch
- 6** Lower Macatawa River
- 7** Pine Creek
- 8** Direct Lake Drainage
- Township Boundaries

Data Source: Michigan Geographic Data Library

Macatawa Watershed Priority Areas



