

7. RECOMMENDATIONS FOR TMDL – YEAR 4

Now that the Year 3 model calibration, confirmation, and application work has been completed, much additional analysis will be required to fully develop a TMDL for the UMR-LP system. Specific tasks that should be undertaken in the near-term to facilitate progress on the TMDLs for the system include:

- Use existing UMR-LP model results to develop 1) a summer average total phosphorus – chlorophyll *a* relationship in Lake Pepin, and 2) a flow – turbidity relationship at Lock and Dam No. 3 for the 10th, 50th, and 90th percentile summer (June-September) flow conditions.
- Review existing model scenario results to develop an understanding of how solids and total phosphorus (TP) load reduction scenarios translate into long-term changes in TP concentrations in the upper sediment layer of Lake Pepin.
- Implement enhancements to the UMR-LP Management Analysis Tool (MAT) based on feedback received from MPCA, SAP, and other stakeholders. This could include incorporating results from additional load reduction scenarios and/or adjusting water quality targets represented in the tool.
- Coordinate with the Minnesota River HSPF and CE-QUAL-W2 modeling efforts to better define Minnesota River load reduction management scenarios in order to further inform the TMDLs for the UMR-LP system.
- Develop delivery ratios of phosphorus for Upper Mississippi River reaches between Brainerd and Lock and Dam No. 1 (based on the UMR phosphorus model developed by LTI).
- Develop and run additional scenarios that are requested by MPCA in consultation with technical experts (e.g., SAP) and the stakeholder groups. For example, additional scenarios might include future population/land use projections, individual tributary load reductions, and investigation of differing load reductions for the nutrient, suspended solids, and algal components of tributary loadings.

In addition to the near-term tasks described above, the UMR-LP model can provide long-term support to the TMDL process in several ways, including:

- As more detailed scenario assessments are completed for the Minnesota and UMR watersheds, additional scenarios should be run with the UMR-LP model to better reflect the timing and magnitude of sediments, nutrients, and chlorophyll *a* load reductions at the mouths of the tributary systems.
- The UMR-LP model can provide insight to the TMDL process by considering potential alternatives to load reduction, such as evaluating the impact of

alternative lock and dam operations on water quality/clarify and the growth of submerged aquatic vegetation.

The eventual completion of the TMDL analysis will also require an assessment of the margin of safety (MOS) to be used. The model-data statistical comparisons presented in Chapter 5 can be used to inform this step in the process. Ultimately, the full model framework, including the UMR-LP model and tributary watershed models for the Minnesota River and the Upper Mississippi River above Lock and Dam No. 1, should be exercised to conduct a TMDL load allocation process that equitably and optimally allocates the TMDL among the non-point and point source loadings to the system.