Appendix B: MODEL RESULTS FROM 2003

This Appendix includes estimates of existing and future pollutant loadings that were modeled as part of the 2003 Watershed Management Plan. These results remain valid for this update of the Watershed Management Plan as future forecasts of population and watershed development do not significantly differ from the original analysis, while the current plan's management measures are estimated to offer an equivalent level of watershed protection and improvement.

Point and nonpoint source loadings were estimated using the HSPF components within the BASINS modeling platform. Potential sources of pollution include permitted point sources, septic systems, diffuse nonpoint sources, and instream contributions. BASINS-HSPF simulated information about nonpoint source, point source, and septic system loads along with pollutant exit loads from the watershed. The hydrologic model was built on the 12-digit HUC level to allow for consistent comparison of modeling results across the Metro Water District. The 2003 models calculated instream pollutant contribution using the following equation:

Instream Load = Pollutant Exit Load – Nonpoint Source Load – Septic System Load – Point Source Load

The following are the modeling results excerpted from Section 10 of the 2003 Watershed Management Plan. Figure numbering was changed along with removal of references to other sections of the 2003 Plan.

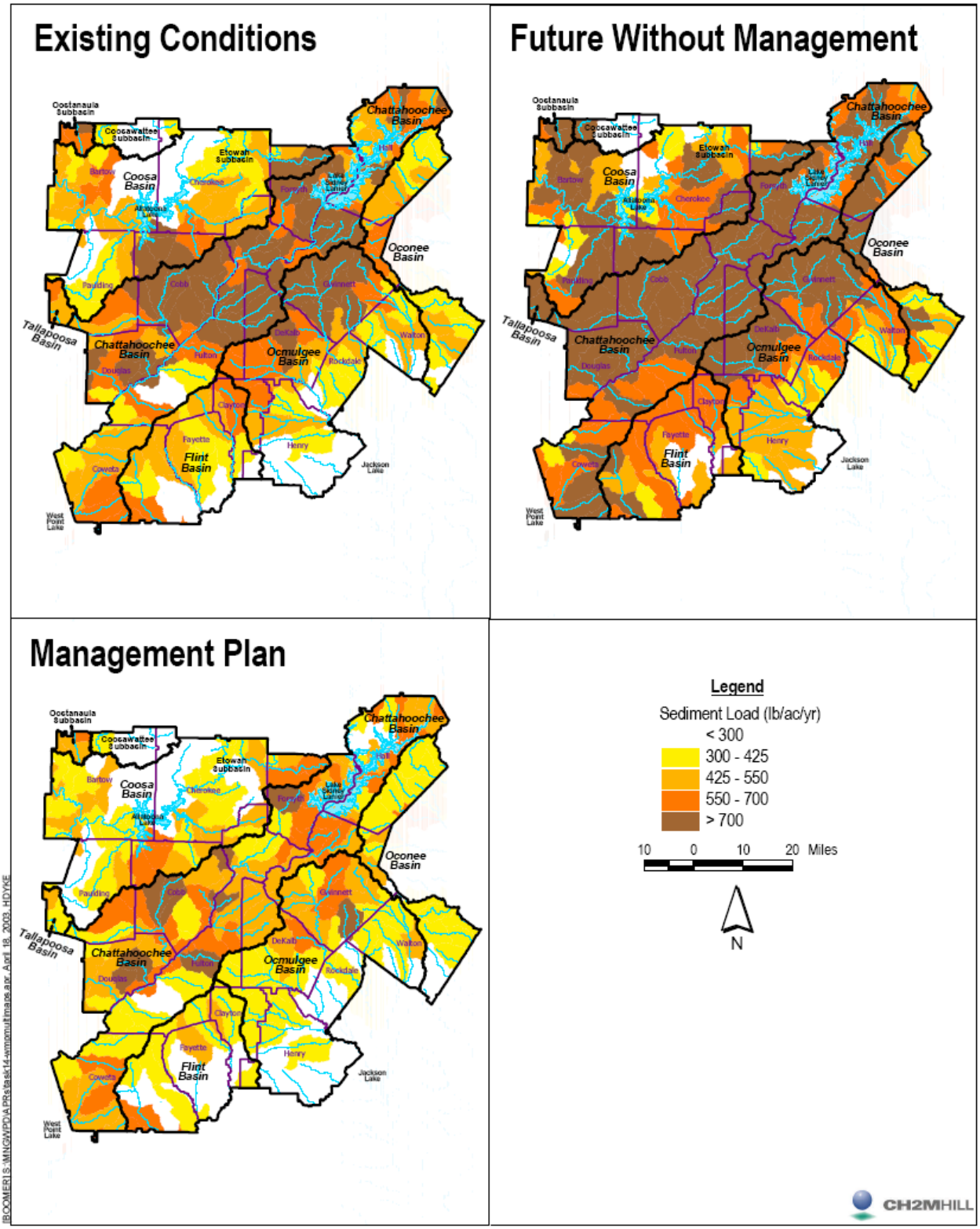
DISTRICT-WIDE RESULTS

TOTAL SUSPENDED SOLIDS

TSS is a good indicator of total nonpoint source pollutant loadings, as many of the key pollutants of concern (i.e., nutrients and metals) are directly related to TSS loadings. Figure B-1 illustrates the estimated TSS loadings under existing conditions, future conditions without additional watershed management measures, and future conditions with such measures.

The estimates of TSS loadings with the recommended management measures would result in only 10 12-digit HUCs exceeding 700 lbs/ac/yr as opposed to 122 HUCs without such management measures. This is a 90 percent reduction in the number of HUCs with TSS loads greater than 700 lbs/ac/yr from future conditions without the recommended watershed management measures. Most importantly, the Metro Water District average TSS loading rate would be reduced from 518 lbs/ac/yr under existing conditions and 676 lb/ac/yr in the future without additional watershed management measures to 406 lbs/ac/year with implementation of such measures. This results in an overall 40 percent District-wide reduction in TSS loadings between future conditions without additional watershed management measures and conditions with such measures in place.

FIGURE B-1
Comparison of TSS Modeling Results



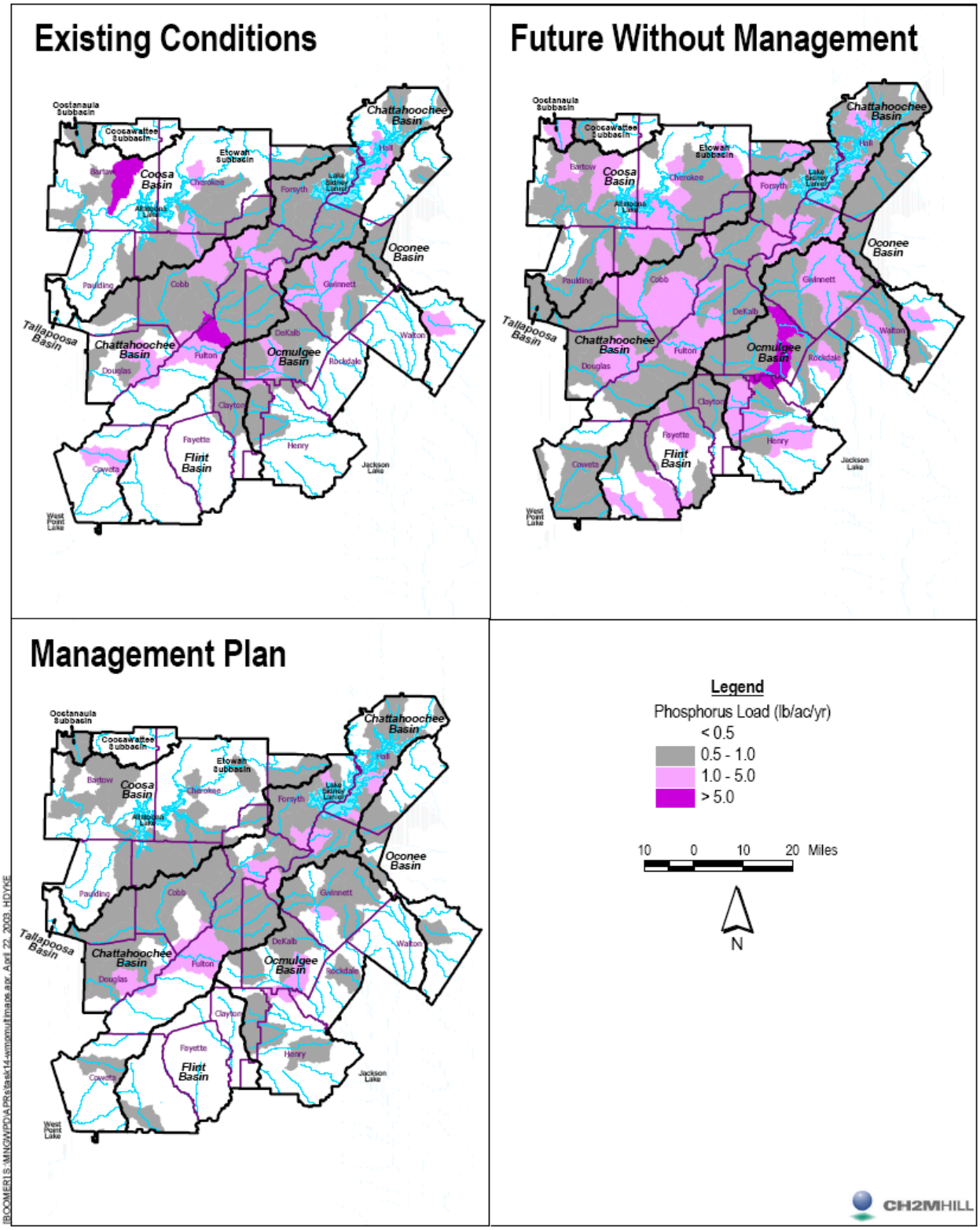
It should be noted that the primary source of TSS loadings is nonpoint source runoff and that point sources do not contribute a significant sediment load within the Metro Water District due the generally high levels of wastewater treatment.

TOTAL PHOSPHORUS

Total phosphorus (TP) is one of the primary nutrients of concern within the Metro Water District due to the potential for eutrophication of downstream lakes. Figure B-2 provides a summary of the estimated TP loads for existing conditions, future conditions without additional watershed management measures, and future conditions with such measures in place.

Under existing conditions, the estimated TP load is 0.6 lbs/ac/yr and would increase in the future without additional watershed management measures to 0.85 lbs/ac/yr. With implementation of such measures, including the recommended wastewater treatment levels, the future TP load would be 0.5 lbs/ac/yr, which is a 40 percent reduction compared to future conditions without additional watershed management measures. The District-wide WMP recommendations would result in a 25 percent reduction from nonpoint source contributions compared to future conditions without additional management measures. Due to the recommended improvements in wastewater treatment levels within the Metro Water District, implementation of the wastewater management plan would lead to more than an 85 percent reduction in TP loads from point sources in five basins (Oconee, Ocmulgee, Flint, Coosa, and Oostanaula) and no change in loadings in three basins (Upper Chattahoochee, Coosawattee, and Tallapoosa). However, there would be a 12 percent increase in the Lower Metro Chattahoochee reach, primarily due growth in this portion of the District. The level of growth would lead to greater increases in TP loading, but updated or new treatment facilities (Douglas South Central and new West Coweta Wastewater Treatment Plants [WWTPs]) will limit the projected increase.

FIGURE B-2
Comparison of Total Phosphorus Modeling Results



BASIN-SPECIFIC RESULTS

For each of the six major basins in the Metro Water District, three conditions were examined in the modeling analysis:

- Existing conditions;
- Future conditions without implementation of the additional measures described in the watershed, wastewater, and water supply management plans; and
- Future conditions with the additional measures described in the watershed, wastewater, and water supply management plans.

For conciseness, in the following discussion the terms "without future management" and "with future management" are used to describe the second and third bullet items, respectively, above.

UPPER METRO CHATTAHOOCHEE REACH

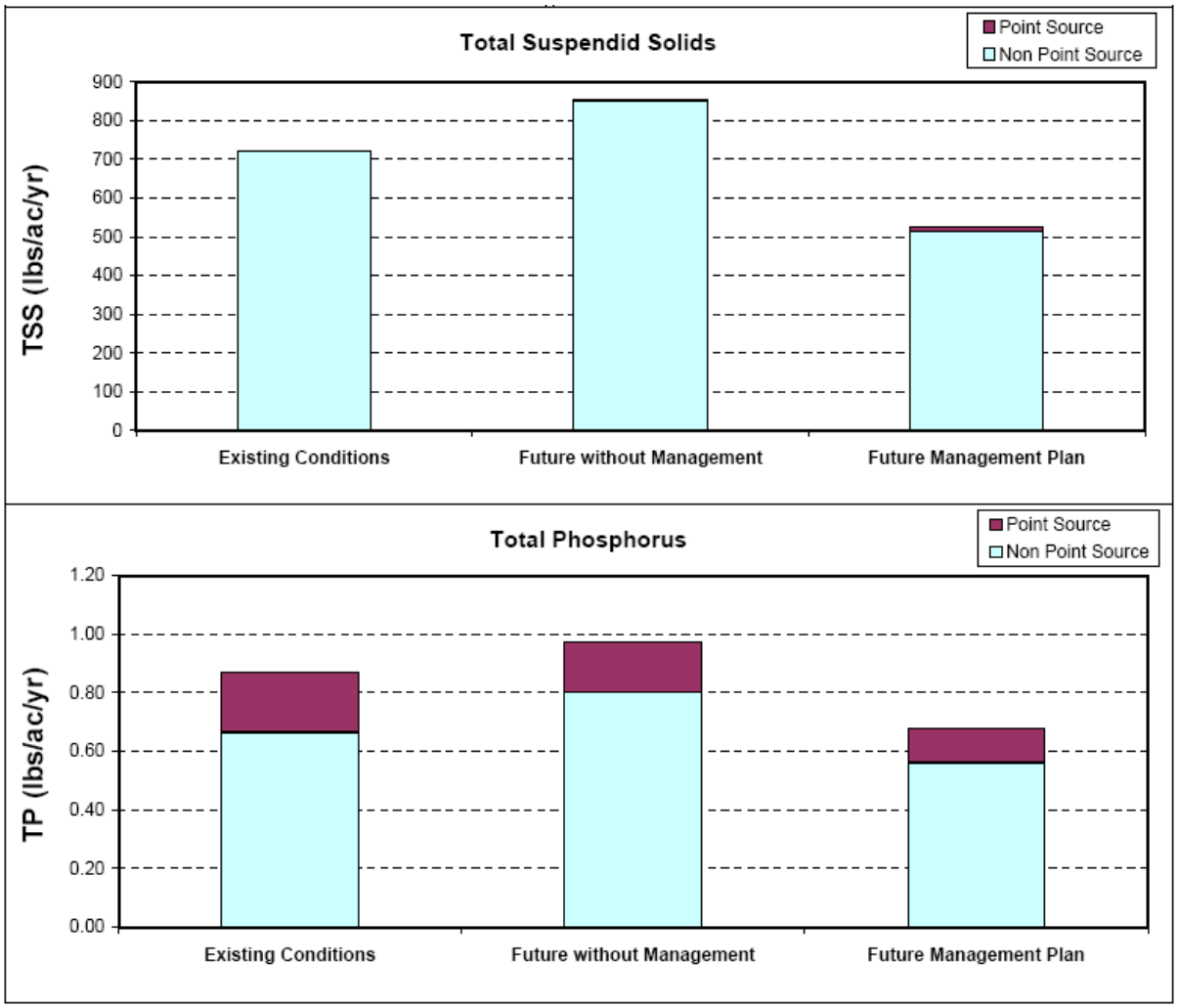
The modeling results are summarized in Figure B-3. Under current conditions, the forested and agricultural land uses comprise more than 50 percent of this watershed. In 2030, these land uses would be reduced to 30 percent of the area. This would result in a significant increase in impervious area without future management. However, with future management, including implementation of the post-development stormwater controls and watershed improvement strategies in the plan, the total EIA would be reduced to less than the existing conditions.

TSS, without future management, would increase significantly. However, with future management, TSS loading rates would be lower than currently estimated within this watershed. This reduction can be directly attributed to the recommended best management practices (BMPs) and watershed restoration activities. The majority of the TSS loadings are associated with nonpoint source runoff, with minimal contributions from point sources due to enhanced treatment technology.

Similar observations can be made for TP loadings. Without future management, including implementation of the wastewater management plan, the TP loading rate would increase by approximately 15 percent. However, with future management, the TP loading rate would be reduced by approximately 14 percent compared to existing conditions. Nonpoint source runoff would still contribute the majority of the TP loadings within this watershed in the future. The effects of the new wastewater treatment technologies (with the higher levels of nutrient removals) would result in an 18 percent point source contribution to the overall TP loads in the future. This is lower than the 25 percent contribution for point sources under existing conditions.

In summary, the combination of watershed and wastewater management activities would result in a significant reduction (approximately 18 percent from existing conditions) in the total TP loadings in the future.

FIGURE B-3
Modeling Results Summary for Upper Metro Chattahoochee Reach



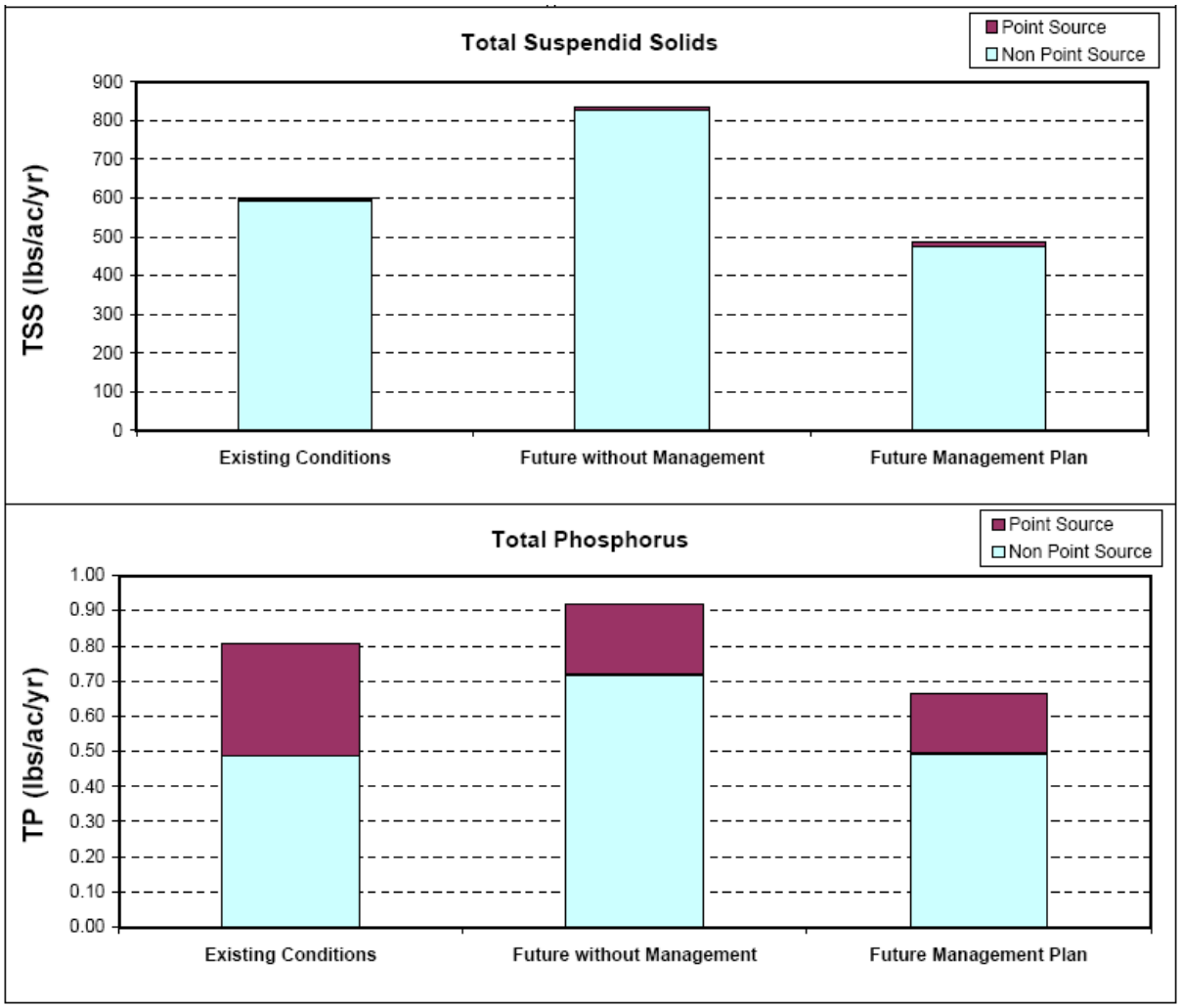
LOWER METRO CHATTAHOOCHEE REACH

The modeling results are summarized in Figure B-4. In the future, land use will shift significantly from forested and agricultural (about 70 percent under existing conditions to less than 40 percent) to residential land uses. This change would result in a 75 percent in EIA without future management. With such management, however, EIA would be only 5 percent (an increase of only 16 percent), which is well within the target of less than 10 percent EIA required to maintain a healthy watershed.

This trend is mirrored in the TSS loadings for this watershed, with an increase in loading rate of 36 percent without future management. However, with future management, there would be a decrease from existing conditions of 17 percent. This reduction would be attributable to application of stormwater controls on new development as it occurs.

For TP, the loading rate would increase (13 percent) without future management. However, with such management, the TP loadings would actually decrease. Again, this reduction in TP loadings, despite increases in development and wastewater needs, would be due to the application of BMPs and the additional nutrient removals in the upgraded treatment facilities.

FIGURE B-4
Modeling Results Summary for Lower Metro Chattahoochee Reach



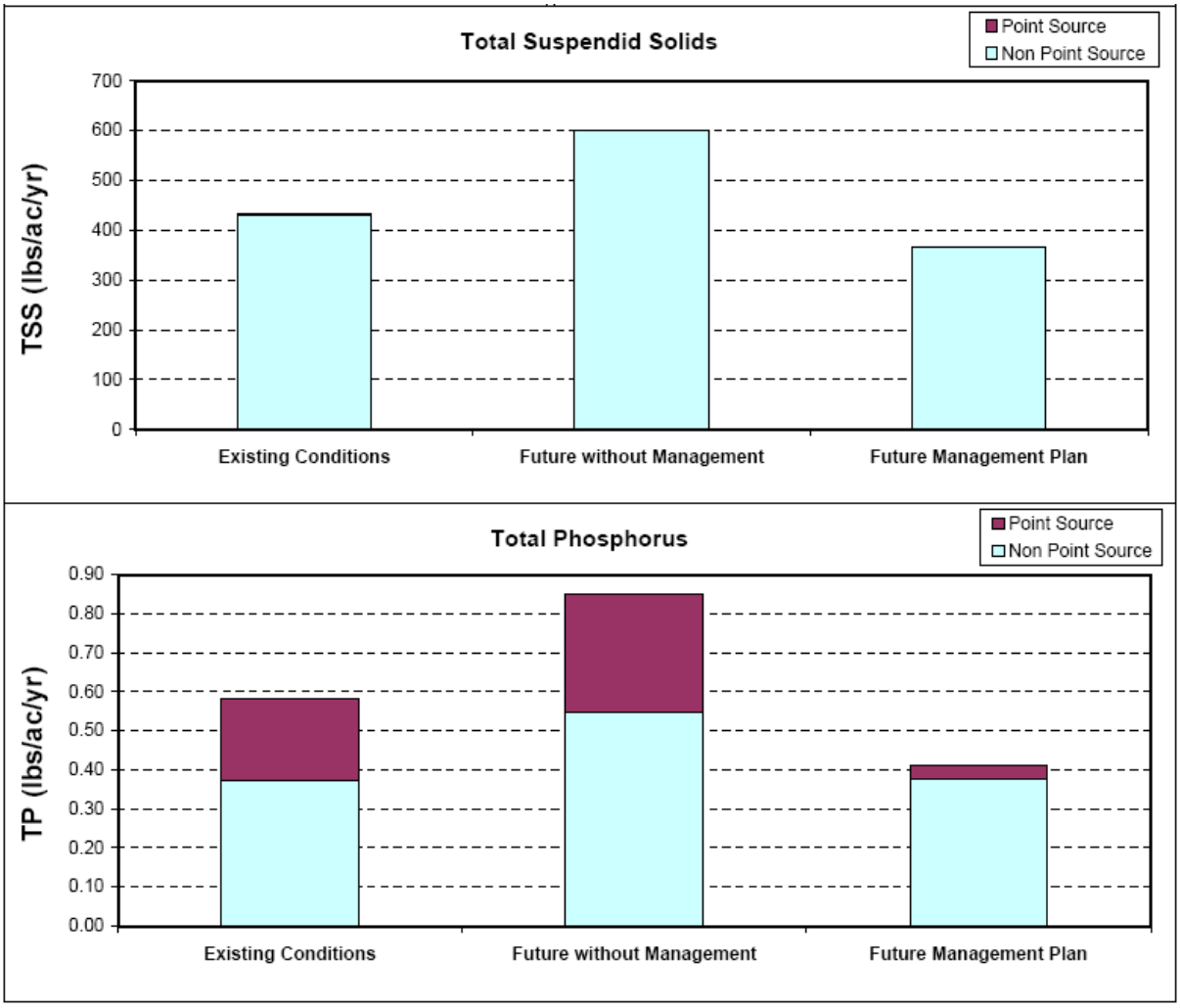
ETOWAH SUB-BASIN

The modeling results are summarized in Figure B-5. This subbasin is currently only about 20 percent developed and, therefore, the EIA is relatively low (about 3 percent). However, the land use will shift from about 60 percent open space to only about 45 percent, resulting in an increase in EIA of 86 percent without future management. This increase in EIA would be reduced to only a 36 percent increase with future management. While this is still a significant increase, the total EIA for the watershed would remain relatively low and well within the target of 10 percent.

TSS loadings would increase by 40 percent without future management; however, with future management, there would be a 13 percent decrease from existing conditions. As noted for the other basins, nonpoint source contributions make up most of the TSS loadings.

Similar trends are estimated for TP, i.e., a 47 percent increase in loadings without future management and a 28 percent decrease with future management. With implementation of the higher wastewater treatment controls and other recommendations of the District-wide plans, point sources would contribute only 10 percent of the total TP loads in the future compared to about 40 percent without the plans.

FIGURE B-5
Modeling Results Summary For Etowah (Coosa) Sub-basin



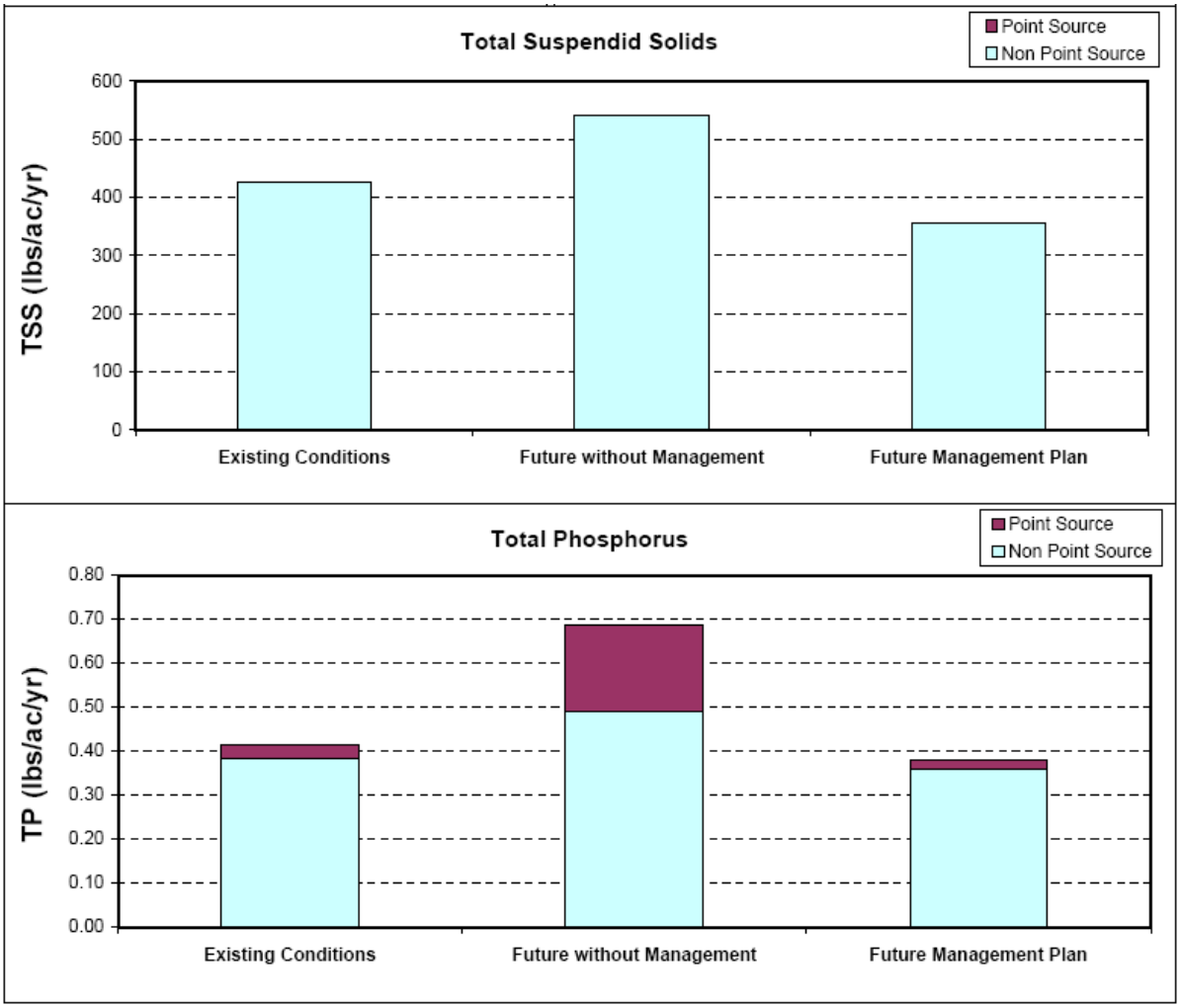
FLINT BASIN

The modeling results are summarized in Figure B-6. The trends in land use changes within the Flint basin are similar to those predicted for the other basins, with decreases in open space (forested and agricultural land uses) and significant increases in residential land use. With management, future impervious levels would be maintained at about 10 percent overall. However, there are portions of this basin, particularly in the headwaters below Hartsfield-Jackson Atlanta International Airport, that are highly impervious and would require significant retrofit to meet the watershed management goals.

Loadings for TSS would increase about 30 percent without future management; however, the TSS loadings would decrease by 12 percent with future management. Significant watershed improvement (retrofit and restoration) would be required to meet this goal, especially in the more developed headwaters.

Total phosphorus loadings would increase approximately 70 percent without future management. Much of the reduction in total loadings would result from the improved treatment technologies.

FIGURE B-6
Modeling Results Summary for Flint Basin



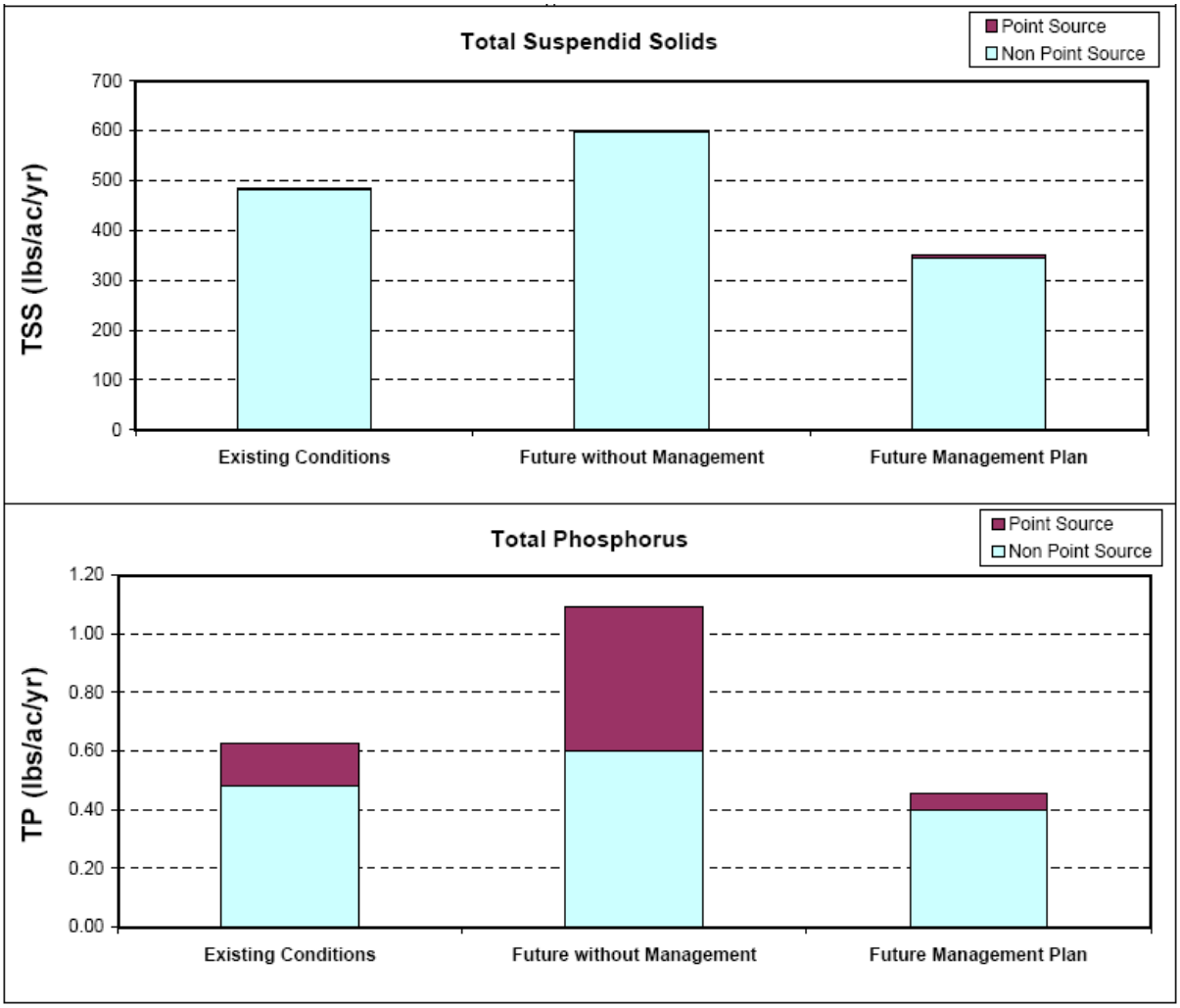
OCMULGEE BASIN

The modeling results are summarized in Figure B-7. The headwaters of the Ocmulgee (the Yellow River and South River in particular) are relatively highly developed (in portions of DeKalb and Gwinnett Counties). However, there is still significant land available for development, with approximately 45 percent of the land in forested and agricultural land uses. This could decrease to less than 35 percent in the future.

The TSS loadings in this basin would increase 25 percent without future management, but would decrease by 28 percent with future management. Much of this decrease would be associated with the watershed improvement plans for the South River watershed.

Due to the anticipated growth and increases in wastewater needs in this basin, the TP loading rates would increase by approximately 80 percent without future management. With such management, on the other hand, TP loadings would decrease by 18 percent. Much of this reduction would come from improvements in nutrient removals at the treatment facilities.

FIGURE B-7
Modeling Results Summary for Ocmulgee Basin



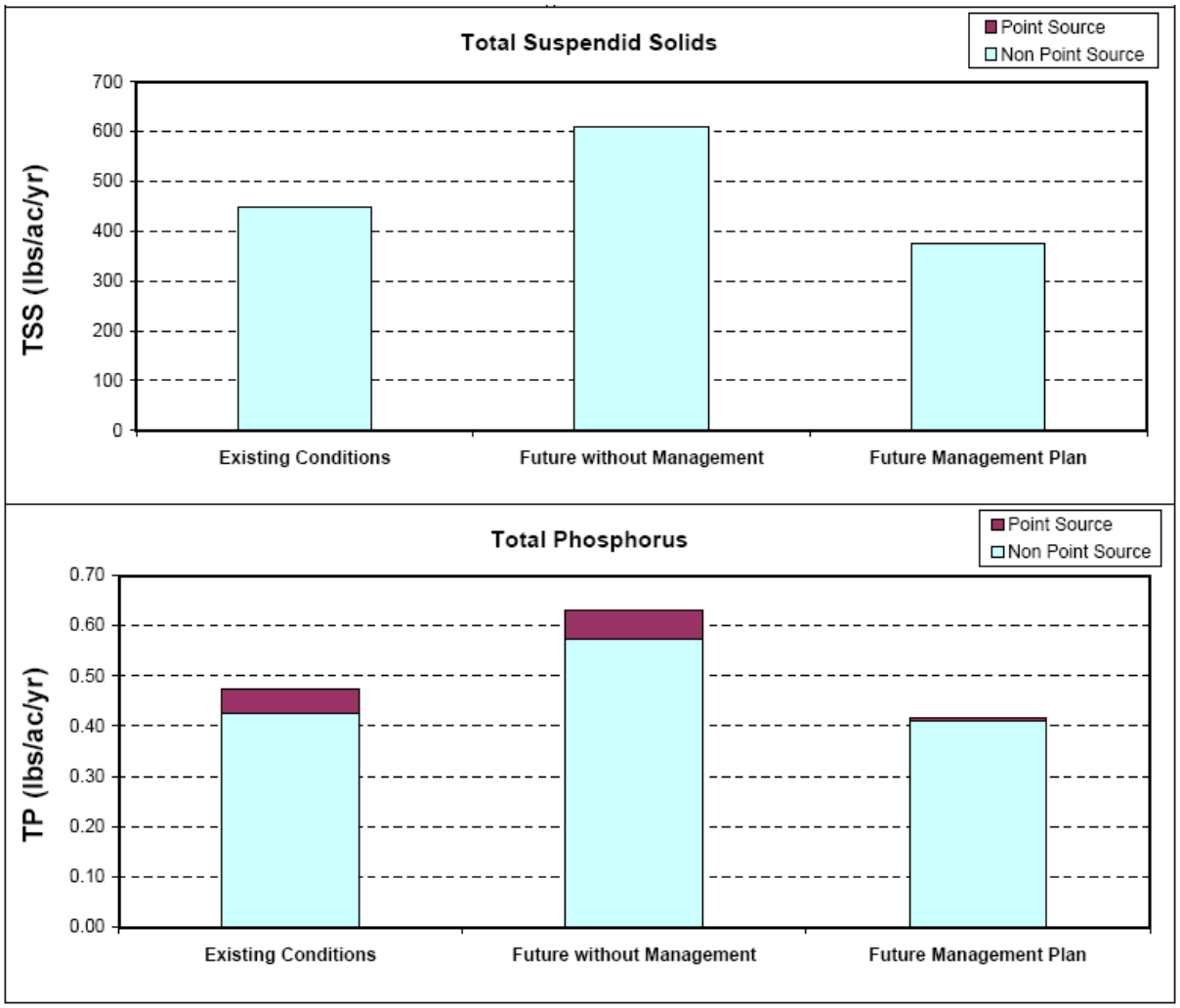
OCONEE BASIN

The modeling results are summarized in Figure B-8. Most of the upper Oconee basin within the Metro Water District is relatively undeveloped, i.e., approximately 90 percent of the existing land use is agricultural and forested. This land use is likely to decrease to about 65 percent of the basin in the future, primarily due to increases in residential land use. Without future management, the amount of EIA would more than double from 1.6 to 4.6 percent basin-wide. Future management, however, would result in an increase of EIA to only 3 percent.

TSS loadings would increase by 35 percent without future management but would decrease by 16 percent with future management. Most of the reduction would be provided by implementation of BMPs as new development is constructed.

The rate of TP loading would also increase significantly, an estimated 33 percent increase over existing conditions, without future management. However, with future management, TP loadings would decrease by 7 percent. Similar to other basins, the wastewater management plan and the associated higher nutrient removals would provide much of the TP loading reductions.

FIGURE B-8
Modeling Results Summary for Oconee Basin



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