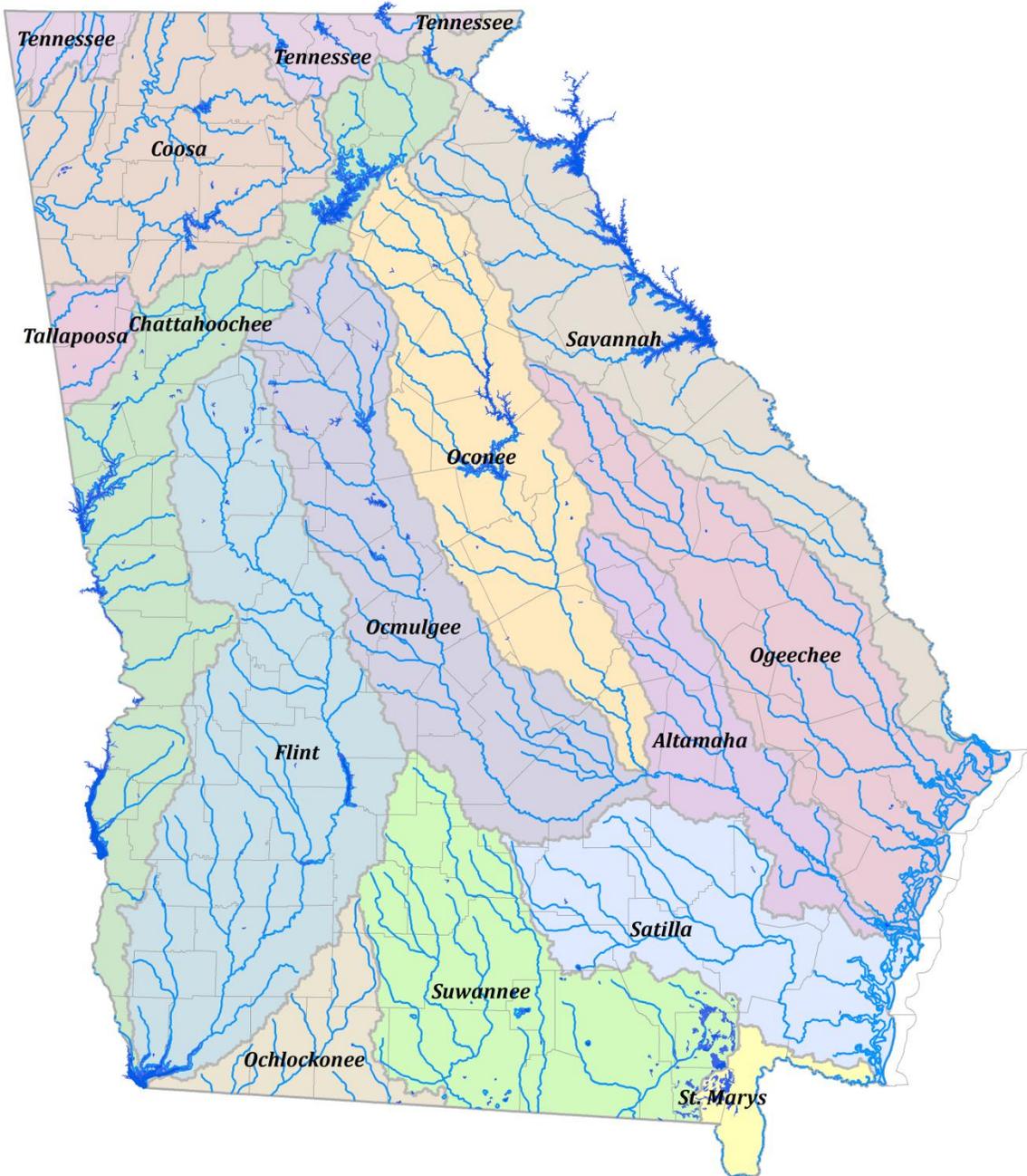


WATERSHED ASSESSMENT AND PROTECTION PLAN GUIDANCE: Watershed Assessments



Georgia Department of Natural Resources
Environmental Protection Division
Watershed Protection Branch

The condition of any particular waterbody is determined by the sum components of its watershed, including climate, geology, and natural and manmade land features. The purpose of the Watershed Assessment (WA) are two-fold: 1) to determine the current condition of the watershed assessment area, consisting of the permittee's sanitary sewer service area and jurisdictional watersheds; and, 2) to evaluate the direct and indirect effects that growth and development have on water quality and associated biological communities. These tasks are accomplished through the review and analysis of historical information obtained from a variety of sources, and evaluation of the monitoring data collected during the field study that is detailed in the Watershed Monitoring Plan (WMP). The WA should include an initial examination of Best Management Practices (BMPs) that may be used to address currently impaired streams and serve to protect waters within the watershed assessment area. The findings of the WA should be presented in a detailed report and submitted to the Georgia Environmental Protection Division (GAEPD) Watershed Planning and Monitoring Program (WPMP) for review and concurrence. Once GAEPD has concurred with the WA report, the permittee can develop a Watershed Protection Plan (WPP) based on the findings described in the WA report. The information provided in these documents is primarily intended for the permittee's use in maintaining and improving water quality and biological integrity within the watershed assessment area.

The WA may include elements common with other environmental investigations that have been performed or are ongoing. For example, the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) program and the Metropolitan North Georgia Water Planning District may have monitoring requirements that can be utilized in the preparation of the WA. The Georgia Planning Act of 1989 requires local governments prepare Comprehensive Plans and update these Plans on a regular basis. These Plans must address Environmental Planning Criteria requirements and can provide valuable information on current and projected future conditions and activities in the watershed. The permittee is encouraged to coordinate efforts with and to draw upon information made available from these and other relevant programs.

The Watershed Assessment report should consist of the following components:

I. Introduction

- A. Explain why the Watershed Assessment is being conducted (i.e., construction of a new, or expansion of an existing water pollution control plant; permit renewal of a plant with a design capacity greater than 1 million gallons per day). Provide the permit numbers of all facilities covered under this process.
- B. State the purpose and objectives of the Watershed Assessment, which may include:
 1. Evaluation of current water quality and health of biological communities in the watershed assessment area and determination whether the waters meet their designated uses.
 2. Determination of the probable cause of any current impairment by identifying major point and non-point pollutant sources within the watershed assessment area watershed.

3. Prediction of the effects future growth will have on current water quality and biological health of the streams.
4. Provide information necessary for the development of watershed management strategies to restore and protect the health of the waterbodies within the watershed assessment area and meet the water quality and biological standards for the waterbodies' designated uses.

II. Watershed Characterization

The physical attributes of the watershed assessment area should be described. An assortment of data should be compiled and used to construct a relatively comprehensive picture of the assessed area. Several sources for information exist, and the following are only a few of the many resources available.

- The GAEPD website (<http://epd.georgia.gov>) gives a listing of information available through the Watershed Protection, Land Protection, and Air Protection Branches, and in many cases includes useful links to downloadable data.
- Information related to 305(b)/303(d) listings of stream segments and TMDLs for these streams can be obtained at GAEPD's website <http://epd.georgia.gov/georgia-305b303d-list-documents>
- The U.S. Environmental Protection Agency (US EPA) "Surf your Watershed" website (<http://cfpub1.epa.gov/surf/locate/index.cfm>) contains information on many water quality indices and links to numerous existing databases with useful data.
- Demographic information can be obtained from the Georgia Department of Community Affairs' internet site (<http://www.georgiaplanning.com/>) and the U.S. Census Bureau website (<http://www.census.gov>).
- The Georgia GIS Clearinghouse is a valuable mapping resource with a number of types of map data available for downloading (<http://data.georgiaspatial.org/>).
- The U.S. Geological Survey serves as a source for geological, topographical and hydrological information (<http://www.usgs.gov>). Water quality data for Georgia can be obtained at GAEPD's website (<http://www1.gadnr.org/dnr/wrdb/homePage.do>).

The following should be included in the WA:

- A. Provide a narrative description of the watershed assessment area, including:
 1. Jurisdictional areas, current and proposed future (10-25 years)
 2. Service areas, current and proposed future (10-25 years)

3. Watersheds (USGS HUC 12 level) encompassed by jurisdictional boundaries and service areas
 4. Population densities, current and projected future (10-25 years)
 5. Land uses, current and proposed future (10-25 years)
 6. Impervious cover, including evaluation and discussion of percentage of impervious cover in each subwatershed that contains a monitoring site
 7. Environmentally sensitive areas, including but not limited to wetlands, water supplies, groundwater recharge areas, areas containing endangered, threatened, or protected species, and recreational assets such as lakes, national forest, and public greenspaces
 8. Presence of 305(b)/303(d) streams not meeting their designated uses within the watershed assessment area; if none exist, include a statement to the fact
- B. Provide general information about the natural features of the watershed assessment area including:
1. Ecoregions – briefly describe the Level III & Level IV ecoregion(s) in which the watershed assessment area is located, as this will broadly define the expected compositions of the macroinvertebrate and fish communities
 2. Climate - Provide the following:
 - Historical mean monthly temperatures
 - Historical mean monthly precipitation
 - Annual average precipitation
 - Compare last two years of climatic conditions with historical averages
 3. Geology, including soils types – briefly discuss the geology and types of soils that characterize the watershed assessment area, as this information is often useful in explaining stream morphology, stream bed characteristics, and certain water quality properties
 4. Topography – describe the general topography that characterizes the watershed assessment area.
 5. Hydrology – describe hydrologic features, including the major river basin(s) (USGS HUC 8 level) in which the watershed assessment area is located, and the subwatersheds and significant waterbodies located within or potentially affected by the watershed assessment area.
- C. Potential Pollutant Sources - Confirm the presence or note the absence of the following within the assessed watersheds, and include a brief discussion of each:
1. NPDES permitted discharges, including municipal and industrial wastewater facilities, private institutional developments (PIDs) (schools, hospitals, etc.),

and areas/facilities covered by municipal (MS4 Stormwater Permits) and industrial stormwater permits. A listing of wastewater and stormwater permittees is available on the GAEPD website at:
<http://epd.georgia.gov/watershed-protection-branch-lists>

2. Landfills, type and status
 3. Surface mining operations, type and status
 4. Resource Conservation and Recovery Act (RCRA) sites and/or facilities
 5. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Superfund) sites and/or facilities
 6. Facilities covered by the GAEPD Hazardous Site Inventory
 7. Large community wastewater treatment systems greater than 10,000 gallons per day that are permitted by GAEPD
 8. Land application systems (LAS)
 9. Storm water management structures under political jurisdiction, such as detention or retention basins
 10. Areas covered by land disturbing permits. This includes NPDES Stormwater Construction Permits and Land Disturbing Activity permits. It is important to get the latest available information because these areas are frequently changing, especially in areas where growth is expected.
 11. Areas served by septic tanks
 12. Confined Animal Feeding Operations (CAFOs)
 13. Commercial forestry harvesting sites
 14. Other significant facilities that may impact water quality, including their absence
- D. Stream Walks - If conducted as part of the Watershed Monitoring, then summarize observations gathered from these walks including:
1. Predominant adjacent land uses
 2. Condition of the stream channel and bottom substrate (i.e., sinuous, braided, channelized, substrate embeddedness and bar formation)
 3. Appearance of water (e.g., clear, turbid, algal blooms, color, oils. etc.)
 4. Amount and nature of flow (e.g., fast, slow, pooling) and impediments to flow (e.g., beaver dams, sediment retention ponds, culverts, etc.)

5. Amount and extent of macrophytes and riparian vegetation
 6. Amount of tree canopy
 7. Stability of the stream banks (i.e., erosion and bank failure)
 8. Evidence of bank disturbance (i.e., vehicular crossings)
 9. Presence of outfalls
 10. Evidence of illicit discharges
 11. Observations including the presence of animals, dry weather runoff from parking lots, leaking pipes, oil spills, condition of waterbody such as odors, foam, discoloration, iron bacteria, algal blooms, etc.
- E. Maps - The following items should be shown on clear and legible maps. Please provide Geographic Information System (GIS) datasets electronically when they are available.
1. Political boundary
 2. Service area (present and predicted future)
 3. Streams and tributaries, lakes (preferably US Geologic Survey National Hydrography Dataset High Resolution)
 4. Watershed boundaries (HUC 12 level)
 5. Location of permitted wastewater treatment facility existing and/or proposed discharge points
 6. Major road intersections
 7. 305(b)/303(d) streams not meeting designated uses
 8. Land uses (present and predicted future)
 9. Environmentally sensitive areas (i.e., wetlands, groundwater recharge areas, lakes, etc.)
 10. Topography
 11. Potential pollutant sources (i.e., permitted discharges, LASs, landfills, RCRA sites, hazardous waste sites, CSOs, surface mining sites, NOI sites, CAFOs)
 12. Areas covered by NPDES MS4 storm water permits
 13. Water quality and bioassessment monitoring sites (Site IDs and locations)

III. Water Quality and Biological Assessment

A. Historical Data

Conduct a search for historical data and present a brief analysis of these data. Historical data can provide further insight into the nature of the watershed assessment area. Types of historical information may include:

1. Stream discharge data
2. Water quality data
3. Macroinvertebrate and fish bioassessments
4. Discharge monitoring reports (DMRs) from permitted facilities

B. Assessment of 305(b)/303(d) Streams Not Meeting the Designated Use(s)

For each listed segment:

1. Provide the name, location, length, water use classification, and criterion violated. This information may be provided in table format.
2. If available, summarize the current Total Maximum Daily Load (TMDL), including listed parameter, water quality standard, TMDL, WLA, LA, and needed reduction. This information may be provided in tabular format.
3. Summarize and assess available data (historical and current) for the listed segment.

C. Current Data

1. Summarize the purpose and type of monitoring performed as described in the WMP (i.e., water quality, bioassessments).
2. Provide in tabular format a brief summary of the monitoring site locations including:
 - Site ID
 - Site name
 - Latitude and longitude coordinates
 - Level III and Level IV Ecoregions
 - Brief description of the location
 - Reason the site location was chosen
 - If the site was used for water quality sampling, biological assessments, or both.

3. Water Quality Monitoring - Provide details of the water quality monitoring performed including:
 - a. Number of dry-weather, wet-weather, and bacteriological sampling events performed
 - b. Table of Parameters Monitored
 - 1) *In situ* parameters monitored, methods of measurement, method detection limits
 - 2) Chemical parameters monitored, analytical methods, method detection limits
 - 3) Bacteriological parameters monitored, analytical methods, method detection limits
 - c. Evaluation of the Water Quality Data
 - 1) Discuss in detail the results of the water quality monitoring for each site. Provide a brief assessment of the observed range of values for each of the monitored parameters, and what they indicate regarding water quality of the sampled waterbody. Determine whether the water quality standards are currently being met. For parameters where standards don't exist, compare to EPA guidance criteria, if available. Summarize the overall water quality for each monitoring site, and call attention to water quality issues revealed by the data
 - 2) As part of the discussion of the water quality data, present the monitoring data in organized tables. Include in these tables the dates the samples were collected, whether the samples were taken during a dry-weather or wet-weather sampling event, and the results for each parameter. For results less than laboratory reporting limits, report as less than the laboratory reporting limit (e.g., <0.1) in the results tables. For wet-weather events, include the amount of accumulated precipitation for the event.
 - d. Identify and discuss potential sources of any water quality violations for each sampled stream.
4. Biological Monitoring - Provide details of the biological monitoring performed including:
 - a. Macroinvertebrates
 - 1) Brief summary of all procedures and methods used in conducting the macroinvertebrate bioassessments.

2) Evaluation of the Macroinvertebrate Assessments

- a) Evaluate and discuss the results of the macroinvertebrate bioassessments for each of the monitoring sites. Include an evaluation of the physical and habitat components, water quality, and how these factors might affect macroinvertebrate community health. Provide conclusions as to the condition of the macroinvertebrate communities based on the number of specimens present, diversity of the species (taxa), presence of intolerant and tolerant species (taxa), and the overall Macroinvertebrate Multimetric Index (MMI) scores. Identify and evaluate the potential sources that may impact the health of macroinvertebrate communities
- b) To supplement the discussions, present in tabular format the physical data, chemical data, precipitation data, biological data, and MMI scores.

b. Fish

- 1) Brief summary of all procedures and methods used in conducting the fish bioassessments.

2) Evaluation of the Fish Assessments

- a) Evaluate and discuss the results of the fish bioassessments for each of the monitoring sites. Include an evaluation of the physical and habitat components, water quality, and how these factors might affect fish community health. Provide conclusions as to the condition of the fish communities based on number of specimens present; diversity of the species (taxa); presence of intolerant and tolerant species (taxa); and species showing deformities, erosion, lesions, and tumors. Include a discussion of the resulting Index of Biotic Integrity (IBI) scores. Identify and evaluate the potential sources that may impact the health of fish communities in each stream monitored.
- b) To supplement the discussions, present the physical data, chemical data, precipitation data, biological data, and IBI scores in organized tables.

5. Summary of Current Water Quality and Biological Health for the Watershed Assessment Area - Provide an overall summary of the current condition of the watershed assessment area watersheds. Describe the significant water quality and biological issues that were identified, and the potential sources that may be causing these issues.

D. Future Growth Impacts on Water Quality and Biological Communities

Based on predictions of future population growth and changes in land use, discuss the potential effects of growth on water quality and the biological

communities for the waterbodies within the watershed assessment area. In particular, provide a narrative description of how growth is expected to affect the following:

1. Stream discharge – consider increased impervious surfaces and storm water runoff, water withdrawals, and wastewater discharges
2. Temperature
3. Sediment
4. Dissolved oxygen
5. Nutrients
6. Fecal coliform, E. coli, Enterococci
7. Stream habitat
8. Macroinvertebrate and fish communities

E. Water Quality Modeling (Optional)

Watershed models can be valuable tools in predicting the effects of various factors on water quality for waterbodies located within the modeled watershed. The impacts of changing land uses and implementing various BMPs can be evaluated using these models. These models can be complicated, and the permittee must weigh the benefits of developing such a model. If a watershed model is used, please provide the following information:

1. The purpose of using modeling predictions (i.e., sediments, toxicity, DO, etc.)
2. Reasons for model selection
3. Input data, model calibrations, and predictive model runs
4. Provide interpretations of the model results for review
5. A copy of the model, model inputs, and model outputs may be requested for review

V. Watershed Assessment Submittals

The WA report and supporting documents should be submitted to the WPMP for review and concurrence. The WA report should be submitted as a paper copy and electronically on CD/DVD. The following supporting documents should be included with the WA report on CD/DVD:

- A. Water Quality Monitoring Data using GAEPD’s Excel Watershed Assessment

and Protection Plan Data Submittal Form, available on GAEPD's website at: <http://epd.georgia.gov/watershed-assessment-and-protection-plan-guidance-documents>.

Include in the Comments field any observations recorded at the time of the water quality and biological sampling events (e.g., weather conditions, presence of outfalls, presence of leaking pipes, odors, water discoloration, etc.).

The format of the spreadsheet should not be altered in any manner when entering water quality data. It is specifically designed to allow direct uploading into GAEPD's water quality database. If questions arise about utilizing the Data Submittal Form, contact WPMP at (404)-463-1511.

B. Macroinvertebrate Assessment Data

1. Macroinvertebrate Field and Laboratory sheets, including:

- Macroinvertebrate Reconnaissance Form
- Habitat Assessment Forms (for each investigator)
- Habitat Assessment Average Form
- Physical Characterization and Water Quality Data Sheet
- Biological *In Situ* and Grab Sample Water Chemistry Field Sheet
- Benthic Macroinvertebrate Collection Field Data Sheet
- Discharge/Cross Section Field Sheet
- Substrate Particle Count Field Sheet
- Macroinvertebrate Level of Effort Subsampling Sheet
- QA/QC sheets/entry log if QA/QC is conducted (required for plans with 10 or more sites)

2. Macroinvertebrate Taxa list, which includes:

- Site name
- Site ID
- Latitude and longitude
- Date of collection
- Lowest possible/practicable identification
- Number of specimens
- Habit
- Functional feeding group
- Tolerance values
- North Carolina Tolerance Values (NCTV, when applicable)

Use the Habit and FFG abbreviations found in the GAEPD taxa list.

3. Macroinvertebrate assessment water quality data – include these results in GAEPD's Excel Watershed Assessment and Protection Plan Data Submittal Form, mentioned above, and indicate in the Comments field that this data was collected as part of a macroinvertebrate assessment event.

4. Excel Macroinvertebrate Multimetric Index workbook used to calculate MMI scores.

5. Sample site photos for day of sampling (i.e., upstream, downstream, left bank, right bank, bench marks, etc.) should be provided in Word or Powerpoint with each photo labeled.

C. Fish Assessment Data

1. Fish field sheets, including:
 - Stream Reconnaissance Report
 - Stream Collection Report
 - Habitat Assessment
 - Biological *In Situ* and Grab Sample Water Chemistry Field Sheet
 - QA/QC sheets/entry log if QA/QC is conducted (plans with 10 or more sites)
2. Fish Taxa list, which includes:
 - Site name
 - Latitude and longitude
 - Date of collection
 - Lowest possible identification
 - Number of specimens
 - Number of anomalies or deformities, erosion, lesions, tumors (DELTs)
 - Common names.
3. Fish assessment water quality data – include these results in GAEPD's Excel Watershed Assessment and Protection Plan Data Submittal Form, mentioned above, and indicate in the Comments field that this data was collected as part of a fish assessment event.
4. Excel spreadsheets used to calculate IBI scores
5. Sample site photos for day of sampling (i.e., upstream, downstream, left bank, right bank, etc.), and fish specimens should be provided in Word or Powerpoint with each photo labeled.

D. WRD Scientific Collecting Permit

Scientific Collecting Permits issued by the Wildlife Resources Division (WRD) are required for the collection of macroinvertebrates and fish. Provide a copy of the Collecting Permit.

Required documentation that is not submitted will cause a delay in review of the WA report. Failure to follow field and laboratory procedures as described in guidance documents and SOPs may cause certain data to be invalid, and depending on the extent of the discrepancies, could require that certain parts or all of the water quality monitoring or bioassessments to be repeated.