

## CHAPTER 2

### METHODOLOGY

The objective of this guidance material is to present stakeholders with control strategies to reduce bacteria loading that can be applied successfully in the state of Georgia. In this chapter, I describe the process and methods used in the search and synthesis of bacteria TMDL implementation programs and control strategies in the following Southeastern piedmont states: South Carolina, North Carolina, Virginia, and Alabama; and factors I used in analyzing which of these might be applicable to Georgia.

The two search and synthesis methods used were a series of interviews with relevant stakeholders and a review of available literature and policy. The research can be divided into two phases:

#### *Scoping*

*Initial scoping* consisted of interviews and literature reviews conducted concurrently to determine what research had or was being conducted and which stakeholders would be valuable to interview. The scoping process determined the initial steps for problem definition and research, such as which states' TMDL programs should be considered and the criteria for selection.

The literature review section of the scoping process helped me understand the issues and research conducted in bacteria TMDL development and implementation. The literature can be divided into two categories: *policy* and *scientific research*. *Policy* includes laws, regulations,

and guidance published by the US Environmental Protection Agency (USEPA), the Georgia Environmental Protection Division (GAEPD) and relevant environmental regulatory agencies in other states. Existing TMDL implementation plans for Fecal coliform impairments in Georgia were also reviewed and are categorized with policy literature reviews. Policy was located through web searches on agency websites and through direct links provided by outreach organizations and professional associations, such as the National Association of Clean Water Agencies' TMDL e-library. *Scientific research* includes published peer-reviewed journal articles and ongoing research at Universities and state and federal agencies, such as gray literature reports. Journal articles were located using academic and scholarly databases. Ongoing research was located through web searches and scoping interviews with academics and state and federal agency employees.

The personal interview section of the scoping process contained the most potential for valuable information-gathering due to the infancy of TMDL implementation research<sup>1</sup>. To determine which TMDL experts and stakeholders to interview, Technical Advisory Group (TAG) meeting minutes were reviewed; and informal interviews conducted with TAG members, Master's thesis advisory committee members and staff at the UGA River Basin Center (RBC)<sup>2</sup>. Through these initial interviews, particular state and federal agency employees and academics were chosen for further scoping questions. These interviewees were chosen because of their experience with TMDL implementation. I attempted to gain information from different perspectives, such as USEPA, GAEPD, academic outreach, and state-based outreach groups such as Regional Development Centers (RDCs) and Resource Conservation and Development Councils (RC&Ds).

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<sup>1</sup> Human Subjects/IRB permission obtained under project: 2006-10536-0.

<sup>2</sup> The UGA River Basin Center in the Institute of Ecology provides a wide range of services, educational opportunities and support on a local, national and international level: <http://www.rivercenter.uga.edu>.

The *BMP* component of *scoping* followed much of the same methodology as that used for *initial scoping*. General BMP background was first obtained through peer-reviewed scholarly journals and informal interviews with academics and agency staff. Existing bacteria TMDL implementation plans were also reviewed to gain knowledge of what was currently being done in the state of Georgia in terms of bacteria control strategies. National and international BMP databases were also reviewed for information on best management practices.

### *Case Studies*

After the compilation of background information on BMPs and other control strategies used in bacteria abatement, selection of state programs began. Subsequent to reviewing literature and interviews from initial scoping, it was decided that state TMDL programs could be divided into two categories of pollution abatement: urban and rural (Hesterlee, personal communication 2006). While some states have successful overall programs, most were found to be particularly strong in either urban or rural bacteria source abatement. Therefore, I integrated this aspect into my scoping interview questions. Instead of asking my interviewee which state was successful with TMDL implementation as a whole, I would specify between successful urban versus rural implementation programs.

James M. Omernik's Level III Ecoregion delineations served as a guide to choose which states would serve as the best examples for Georgia's implementation program. Omernik's Ecoregions are based on perceived patterns of a combination of casual and integrative factors including land use, land surface form, potential natural vegetation, and soils (1987). Based on Omernik's maps (1987), I chose states that were located in similar ecoregions to Georgia, specifically the Southeastern Piedmont and Plains: Virginia, North Carolina, South Carolina, and

Alabama (Figure 1). These states also hold many similarities such as political and socioeconomic status. Population growth trends, for instance, are similar throughout the Southeastern piedmont (Hammer et al. 2004 and Brown et al. 2005), therefore, placing similar pressures on these states.

Throughout the course of my research, especially during the scoping interviews, the U.S. Northwest was constantly referred to as being a region of successful TMDL and water quality programs. In terms of making recommendations that could be immediately implemented in the state of Georgia, however, I hesitated in reviewing these Northwestern states. Depending on the state program, many impediments exist to implementation in Georgia from a level of “mindset” to legislative or legal barriers. I find some of these programs compelling, but want to separate between these and the programs of the Southeast that may have more immediate potential. While the states of the Northwest may differ in many ways from those of the Southeast, they have generally shown great progress and innovation in TMDL development and implementation. These programs should be kept in mind for further research about TMDL implementation strategies in Georgia; and will not be reviewed or recommended in this report.

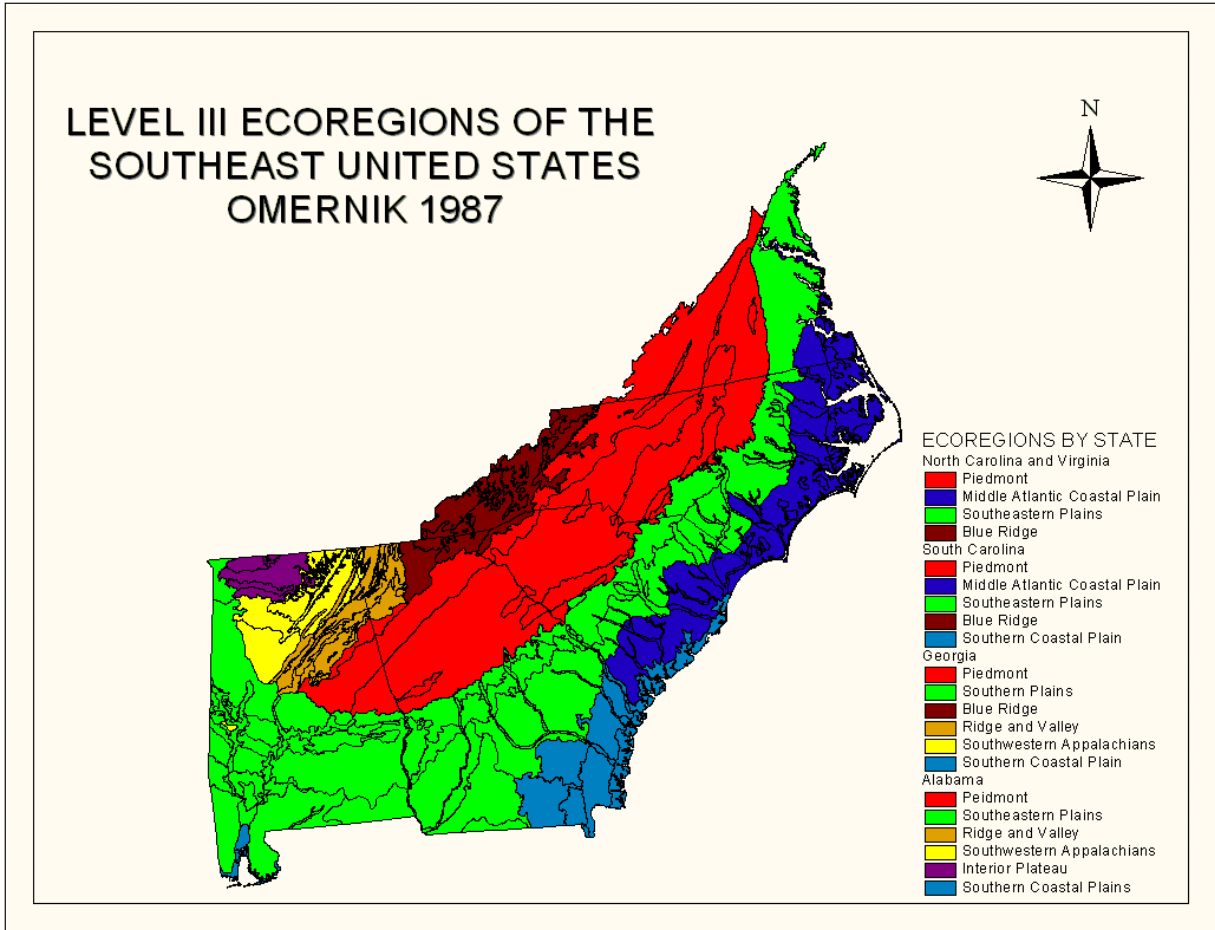
After initial scoping of state TMDL programs was completed, contacts within each state program were selected for the interview process. State program interviews were heavily tailored to the individual state program. Many states, including Georgia, contract with private consultants, university researchers, or other state agencies for the development and/or implementation of TMDLs. Therefore, many of the “best” contacts for information about bacteria control strategies were not state environmental agency employees, but academic researchers or community members.

After state interviews began, it became apparent that an excellent source for innovative best management practices and similar water quality improvement projects would be found under 319 NPS programs and grants. Therefore, representatives of both the TMDL and 319 program were interviewed in each state. Through state agency and other initial interviews, “on-the-ground” contacts were made such as 319 project leaders, cooperative extension agents, or other stakeholders. Some states were more receptive in general to my project and therefore provided more information and assistance. From each state, three or four projects were identified as being innovative or useful to the State of Georgia’s TMDL implementation program. These projects were investigated in-depth and constitute the main body of this project. Response to the project differed in each state, therefore, data and results are not necessarily equal. Oftentimes the amount of information collected depended solely upon the willingness of the interviewee to share. This report should therefore not be viewed as a comparison of state programs, but rather a synthesis of what information is available.

Recommendations are made in regard to what could be immediately implemented in Georgia as bacteria BMP strategies and then what might be implemented in the future. Therefore this project is essentially looking at what needs to be done in Georgia to show measurable success with bacteria TMDLs.

To meet goals of stakeholder outreach, education, and information-sharing a website was created to describe the results of the project. A website is the most useful outreach tool in this case to reach a diverse audience of TMDL stakeholders. A benefit is that a website can also be updated as information and needs change in terms of bacteria TMDL implementation in the State of Georgia. Not only does the website contain descriptions of the control strategies and programs implemented in other states, it provides contact information and appropriate links for

further investigation by Georgia stakeholders. In such a growing field and with the ever-changing nature of information, this is the most appropriate approach for increasing awareness, education and communication on issues of bacteria TMDL implementation.



**Figure 1: Level III Ecoregions of the Southeast United States, Omernik 1987**