Coastal Stormwater Supplement

to the

Georgia Stormwater Management Manual

First Edition
April 2009


(Source: Georgia Department of Economic Development)


(Source: Center for Watershed Protection)


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Prepared By:
Center for Watershed Protection
8390 Main Street, 2nd Floor
Ellicott City, MD 21043

The development of this Coastal Stormwater Supplement was facilitated by the Chatham County-Savannah Metropolitan Planning Commission. It was funded as a cooperative effort between the Chatham County-Savannah Metropolitan Planning Commission, the Georgia Department of Natural Resources Environmental Protection Division and, through stakeholder outreach and involvement, the cities and counties of coastal Georgia.

This project was financed, in part, through a grant from the U.S. Environmental Protection Agency under the Provisions of Section 319(h) of the Federal Water Pollution Control Act, as amended. This project was also financed, in part, by the Coastal Management and Coastal Nonpoint Source Management Programs of the Georgia Department of Natural Resources and the U.S. Department of Commerce National Oceanic and Atmospheric Administration.

This document was prepared under grant award #NA06NOS4190253 from the Office of Ocean and Coastal Resource Management in the National Oceanic and Atmospheric Administration. The statements, findings, conclusions and recommendations are those of the author(s) and do not necessarily reflect the views of OCRM or NOAA.

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Foreword

Preface

Prior to the 1980s, stormwater management was synonymous with flood control. Post-construction stormwater management systems consisted primarily of pipes designed to convey stormwater runoff directly to rivers, streams and other aquatic resources. Flood control basins were occasionally installed to reduce peak discharge rates and alleviate localized and downstream flooding, but little thought was given to stormwater quality. Although this stormwater management approach worked well to reduce flooding and protect public safety, it did not address the wider range of negative impacts that land development can have on the health of rivers, streams and other aquatic resources.

During the 1980s, communities began to realize that, in order to better protect aquatic resources from the negative impacts of the land development process, both stormwater quantity *and* stormwater quality had to be addressed. With the introduction of Phase I of the National Pollutant Discharge Elimination System (NPDES) Stormwater Program in 1990, and Phase II of the NPDES Stormwater Program in 1999, communities began to revise and expand their local stormwater management programs. The programs that these communities developed focused on *managing* stormwater quantity and quality and tended to rely heavily on traditional stormwater management practices, such as wet and dry ponds, to *mitigate*, rather than *prevent*, the negative impacts of the land development process.

Since then, a number of communities around the country have concluded that "an ounce of prevention is worth a pound of cure." They have been working to shift the focus away from the *mitigation* of the negative impacts of the land development process and place it on their *prevention,* by creating post-construction stormwater management programs that successfully integrate stormwater management and natural resource protection with the site planning and design process. These communities are increasingly using their stormwater management programs to protect and/or restore valuable natural resources, create attractive public and private spaces and engage residents and businesses in environmental stewardship.

Picking up on this national trend, this Coastal Stormwater Supplement (CSS) to the Georgia Stormwater Management Manual (GSMM) provides information that can be used to shift the focus of coastal Georgia's post-construction stormwater management efforts onto the *prevention*, rather than the *mitigation*, of the negative impacts of the land development process. It provides Georgia's coastal communities with comprehensive guidance on an integrated, *green infrastructure*-based approach to natural resource protection, stormwater management and site design that can be used to better protect coastal Georgia's unique and vital natural resources from the negative impacts of land development and nonpoint source pollution.

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The development of this CSS was facilitated by the Chatham County-Savannah Metropolitan Planning Commission. It represents the culmination of a cooperative, collaborative effort between the Chatham County-Savannah Metropolitan Planning Commission, the Georgia Department of Natural Resources Environmental Protection Division and, through stakeholder outreach and involvement, the cities and counties of coastal Georgia, including:

Appling County
Atkinson County
Bacon County
Bryan County
Brantley County
Bulloch County
Camden County
Candler County
Charlton County
Chatham County
Clinch County
Coffee County
Effingham County
Evans County
Glynn County
Jeff Davis County
Liberty County
Long County
McIntosh County
Pierce County
Tattnall County
Toombs County
Ware County
Wayne County
City of Savannah
City of Garden City
City of Richmond Hill
City of Hinesville
City of Jesup
City of Brunswick
City of Darien
City of Kingsland
City of St. Mary's

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- Michael Novotney (Center for Watershed Protection), Project Manager and Lead Author
- Kelly Collins and Greg Hoffman (Center for Watershed Protection)

Tim Carter and the University of Georgia River Basin Center deserve special recognition for their contribution to the development of this CSS. They provided assistance with the creation of the stormwater utility handbook and model post-construction stormwater management ordinance that accompany this document.

A special thank you is also extended to the following individuals, whose thoughtful comments and insights on this document greatly improved its organization and utility:

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Laura Barrett
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Conn Cole
Sam Collier
James Collins
Teresa Concannon
Lynette Cook
Luther Cosner
Christopher Cox
Darrell Crosby
Downer Davis
Mike Davis
John Day
Mike DeMell
Deatre Denion
Travis Douce
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Ron Feldner
Dan Fischer
Janice Flory
Bill Foster Jr.
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Denise Grabowski
Suzie Grams
Randall Griffin
Nicole Grissett
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Tom Havens
Dan Hawthorne
Rachael Hodge
Katie Hoover Alvarado
Nate Hunt
Dennis Hutton
Loretta Hylton
Larry Jones
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Bob Joyner
Jeff King
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David Kyler
Christine Laporte
Wayne Lee
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Christine McKay
Neil McKenzie
Charles McMillian
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Alec Metzger
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Ebrahim Nadji
David Nash
Mark Nelson
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Kelly O'Rourke
Brannen Parcel
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George Peters
Nate Pierce
Bill Piper
Raymond Pittman
Luke Potts
Adam Ragsdale
Chris Rains
Butch Register
Courtney Reich
Tricia Reynolds
Ray Richard
Gordon Rogers
Marcus Rubenstein
Bill Sapp
Polly Sattler
Matt Saxon
Bill Shanahan
Pete Shonka
Lonny Shook
Bill Shuman
Gary Shuman
Paul Simonton
Luther Smart
Dick Smith
Kelly Spratt
Stuart Stevens
Kirk Tatum
Jennifer Taylor
Bob Thomson
Tom Thomson
Susan Todd
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Suzanne Van Parreren
Alice Vick
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Megan Williams
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Joe Wilson
Steve Wohlfeil
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John Wynne

Finally, a special thank you is extended to the many communities, agencies and individuals who worked so hard to create and publish the GSMM back in 2001. Those of you that are familiar with the GSMM will quickly realize that this CSS builds on the valuable information that is presented within that document. Without the GSMM, this CSS would have required much more time, money and effort to create.

This document was prepared under grant award #NA06NOS4190253 from the Office of Ocean and Coastal Resource Management in the National Oceanic and Atmospheric Administration. The statements, findings, conclusions and recommendations are those of the author(s) and do not necessarily reflect the views of OCRM or NOAA.

Table of Contents

List of Tables

7.0 Green Infrastructure Practices

9.0 Local Post-Construction Stormwater Management Programs

List of Figures

1.0 Introduction

2.0 Coastal Natural Resources

3.0 The Need for Natural Resource Protection and Stormwater Management

7.0 Green Infrastructure Practices

List of Text Boxes

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1.0 Introduction

1.1 Background

Nearly two decades ago, the U.S. Congress recognized that land development and nonpoint source pollution were negatively impacting our nation's coastal waters (US EPA, 1993). These valuable aquatic resources provide habitat, food and shelter for many important aquatic and terrestrial organisms and contribute greatly to the natural beauty, economic well-being and quality of life found in our nation's coastal areas (Figure 1.1).

Figure 1.1: Natural Beauty of Coastal Georgia
(Source: Jeannie Lewis Rhodes, Georgia Department of Natural Resources)

Members of Congress recognized that a comprehensive effort was needed to control and minimize the negative impacts that land development and nonpoint source pollution were having on these important natural resources. Without one, they believed, these impacts, which include changes in hydrology, decreased water quality, due to increased levels of sediment, nutrients, metals, hydrocarbons, bacteria and other pollutants, increased water temperatures, reduced dissolved oxygen levels, degradation of habitat and an overall decline in wildlife abundance and diversity (US EPA, 2005), would be felt not only by the aquatic and terrestrial organisms that depend on them for survival, but by the general public as well.

With the passage of Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), the U.S. Congress required states and territories with approved coastal management programs to develop comprehensive coastal nonpoint source pollution management programs. Shortly after Georgia's Coastal Management Program received approval from the National Oceanic and Atmospheric Administration (NOAA) in 1998, the Georgia Department of Natural Resources Environmental Protection Division (GA EPD), in conjunction with the Coastal Resources Division (CRD), began developing the state's Coastal Nonpoint Source (NPS) Management Program.

Figure 1.2: Coastal Marshlands are One of Coastal Georgia's Most Valuable Natural Resources
(Source: Jeannie Lewis Rhodes, Georgia Department of Natural Resources)

In 2002, the State's Coastal NPS Management Program was reviewed by the United States Environmental Protection Agency (US EPA) and NOAA and received conditional approval. In order to receive final approval, the state must provide for the implementation of several additional "management measures," which are intended to help balance land development and economic growth with the protection of coastal Georgia's valuable terrestrial and aquatic resources (Figure 1.2).

This Coastal Stormwater Supplement (CSS) represents the culmination of the state's efforts to provide for the implementation of the federally-established "management measures" related to

new development, watershed protection and site development (US EPA, 1993). Specifically, it provides guidance on using environmentally sensitive better site planning and design techniques, small-scale, low impact development practices and traditional stormwater management techniques (e.g., detention) to:

- Reduce the total suspended solids (TSS) loads contained in post-construction stormwater runoff by 80 percent, as measured on an average annual basis
- Maintain pre-development site hydrology
- Preserve areas that are particularly susceptible to erosion and sediment loss
- Preserve areas that provide important stormwater management benefits and/or provide valuable habitat for aquatic and terrestrial organisms
- Protect the integrity of streams, wetlands and other natural drainage features
- Limit land disturbing activities, such as clearing and grading and cutting and filling, to protect existing vegetation and reduce erosion and sediment loss
- Limit increases in site imperviousness

In providing for the implementation of these "management measures," this CSS lays the foundation for an integrated, *green infrastructure*-based approach to natural resource protection, stormwater management and site design that can be used to protect coastal Georgia's unique and vital natural resources from the negative impacts of the land development process.

Although the term *green infrastructure* can mean different things to different people, in its broadest and, perhaps, truest sense, the term refers to an interconnected network of undisturbed natural areas and open space that helps preserve the ecological function of our watersheds (Benedict and McMahon, 2006). This interconnected network of aquatic and terrestrial resources supports a wide range of important resident and migratory organisms, provides important stormwater management benefits and contributes greatly to coastal Georgia's natural beauty, economic well-being and quality of life. Protecting this vital network of aquatic and terrestrial resources, which is the primary goal of this CSS, requires an integrated approach to natural resource protection and stormwater management.

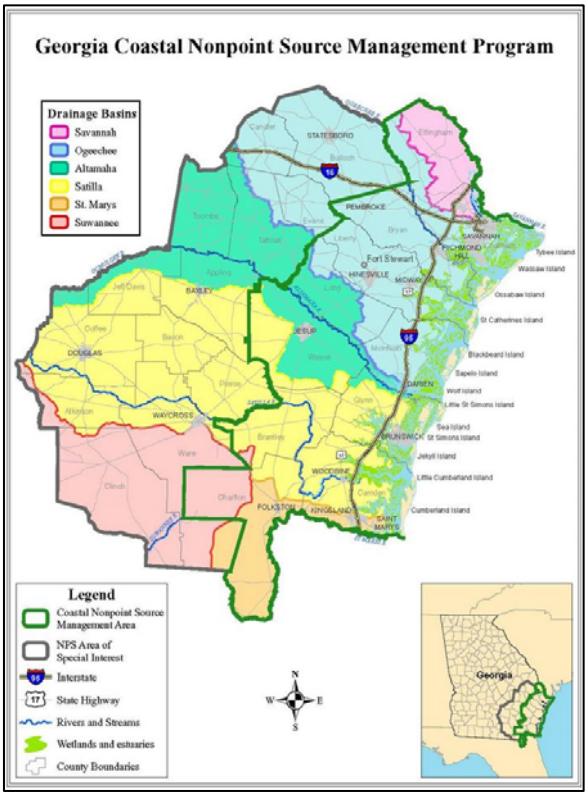

Figure 1.3: Georgia's Coastal Nonpoint Source Management Area and Area of Special Interest
(Source: Georgia Department of Natural Resources)

1.2 Applicability of the Supplement

This CSS, like the state's Coastal NPS Management Program, seeks to reduce the impacts of land development and nonpoint source pollution in a 24-county region located in southeast Georgia (Figure 1.3). Like the Georgia Stormwater Management Manual, it provides technical guidance that can be used to meet the post-construction stormwater management requirements of the National Pollution Discharge Elimination System (NPDES) permitting program. It

also provides technical guidance for permit applicants seeking Coastal Marshlands Protection Act permits (O.C.G.A. §12-5-280 through §12-5-297, as amended).

For administrative purposes, the state's Coastal NPS Management Program has divided the 24-county coastal region into two distinct areas:

- Coastal Nonpoint Source Management Area: Georgia's Coastal Nonpoint Source Management Area is comprised of the first two tiers of counties that border the Atlantic Ocean. This 11-county area is also known as the *Coastal Management Program Service Area* and is synonymous with the area regulated by the *Georgia Coastal Management Act* (O.C.G.A. §12-5-320 through §12-5-329). Counties included within Georgia's Coastal Nonpoint Source Management Area include: Bryan, Brantley, Camden, Charlton, Chatham, Effingham, Glynn, Liberty, Long, McIntosh and Wayne.

- Coastal Nonpoint Source Area of Special Interest: Georgia's Coastal Nonpoint Source Area of Special Interest is made up of an additional 13 counties located immediately to the west of the Coastal Nonpoint Source Management Area. Counties included within the state's Coastal Nonpoint Source Area of Special Interest include: Appling, Atkinson, Bacon, Bulloch, Candler, Clinch, Coffee, Evans, Jeff Davis, Pierce, Tatnall, Toombs and Ware.

1.3 Purpose of the Supplement

The purpose of this CSS is to protect Georgia's existing water quality standards, particularly those of the state's coastal waters. It also provides for the implementation of the federally established "management measures" related to new development, watershed protection and site development in the Coastal Nonpoint Source Management Area and Area of Special Interest. To provide for the implementation of these "management measures," it provides comprehensive guidance on an integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design that can be used by Georgia's coastal communities to better protect coastal Georgia's unique and vital natural resources from the negative impacts of land development and nonpoint source pollution.

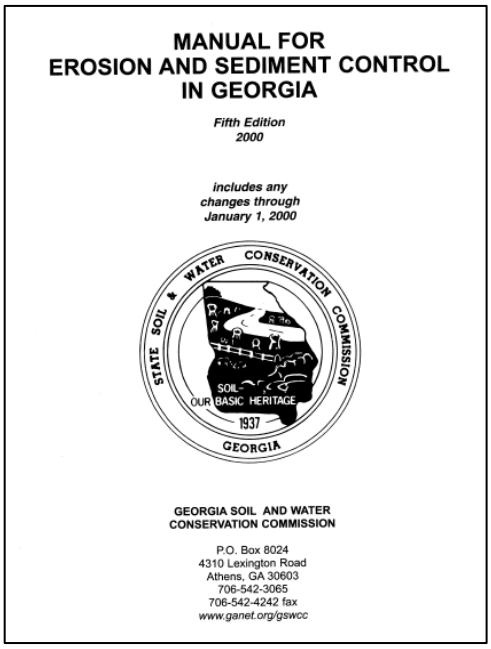

Figure 1.4: Manual for Erosion and Sediment Control in Georgia
(Source: Georgia Soil and Water Conservation Commission)

It should be noted that this CSS does not provide guidance on managing *construction* stormwater runoff on development sites. While many of the better site planning and design techniques, low impact development practices and traditional stormwater management techniques discussed in this CSS can also be used to address *construction* stormwater runoff, more extensive guidance on the control of *construction* stormwater runoff can be found in the *Manual for Erosion and Sediment Control in Georgia* (GSWCC, 2000) (Figure 1.4).

1.4 Organization of the Supplement

To enhance its utility and ease of use, this CSS has been divided into nine sections. Each section provides information that supports the implementation of an integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design that can be used to protect coastal Georgia's valuable natural resources from the negative impacts of land development and nonpoint source pollution. The nine sections presented in this document include:

- Section 1.0: Section 1.0 provides an introduction to this CSS. It describes the purpose of the document and summarizes all of the information presented within.

- Section 2.0: Section 2.0 provides an introduction to some of the most valuable aquatic and terrestrial resources found in coastal Georgia. It describes the numerous functions and values that these important natural resources provide.

- Section 3.0: Section 3.0 describes the direct and indirect impacts that land development and nonpoint source pollution can have on the aquatic and terrestrial resources of coastal Georgia. It also outlines an integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design that can be used to help control and minimize these impacts.

- Section 4.0: Section 4.0 presents a comprehensive set of post-construction stormwater management and site planning and design criteria that support an integrated approach to natural resource protection, stormwater management and site design. These criteria can be applied to new development and redevelopment activities occurring within the Coastal Nonpoint Source Management Area and Area of Special Interest.

- Section 5.0: Section 5.0 provides information on using accepted hydrologic methods to calculate the stormwater runoff volumes associated with the stormwater management criteria presented in this CSS. These calculations can be used to plan and design a post-construction stormwater management system that helps protect coastal Georgia's valuable natural resources from the negative impacts of land development and nonpoint source pollution.

- Section 6.0: Section 6.0 provides information about using the site planning and design process to satisfy the post-construction stormwater management and site planning and design criteria presented in this CSS. It provides detailed information about integrating natural resource protection and stormwater management with the site planning and design process.

- Section 7.0: Section 7.0 provides detailed information about the green infrastructure practices (e.g., better site planning and design techniques, low impact development practices) that can be used to meet the stormwater management and site planning and design criteria presented in this CSS. Each profile sheet provided in this Section describes a particular green infrastructure practice and includes information about its proper application, design, installation and maintenance.

- Section 8.0: Section 8.0 provides detailed information about the traditional stormwater management practices, such as wet ponds, wetlands and swales, that can be used to meet the stormwater management and site planning and design criteria presented in this CSS. Each profile sheet provided in this Section describes a particular stormwater

management practice and includes information about its proper application, design, installation and maintenance.

- Section 9.0: Section 9.0 provides information that can be used to develop a local post-construction stormwater management program that is consistent with the integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design presented in this CSS. Georgia's coastal communities should find this Section of the document to be a valuable resource in their efforts to develop or enhance their own post-construction stormwater management programs.

1.5 Regulatory Status of the Supplement

This CSS has been designed to provide Georgia's coastal communities with comprehensive guidance on an integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design that they can use to better protect the region's valuable natural resources from the negative impacts of land development and nonpoint source pollution. Although communities may choose to use the information presented in this CSS to regulate new development and redevelopment activities, the document itself has no independent regulatory authority. The integrated approach to natural resource protection, stormwater management and site design detailed in this CSS can only become required through:

(1) Codes and ordinances established by local governments
(2) Rules and regulations established by other local, state and federal agencies

It is *recommended* that all communities located within Georgia's 24-county coastal region, particularly those communities that are regulated by the NPDES Municipal Stormwater Program, use the information presented in this CSS, or an equivalent post-construction stormwater management manual, to regulate new development and redevelopment activities. Communities are encouraged to review and modify the contents of this CSS, as necessary, to meet local watershed and stormwater management goals and objectives.

1.6 Relationship of the Supplement to the Georgia Stormwater Management Manual

In 2001, the Atlanta Regional Commission (ARC), in conjunction with the Georgia Department of Natural Resources Environmental Protection Division (GA EPD) and 35 cities and counties from around the state of Georgia, published the *Georgia Stormwater Management Manual* (GSMM) (ARC, 2001). The GSMM outlines a comprehensive approach to post-construction stormwater management that has greatly improved the way that communities around the state address post-construction stormwater runoff.

Figure 1.5: Cypress Swamps Provide Valuable Habitat for Wood Storks
(Source: Jeannie Lewis Rhodes, Georgia Department of Natural Resources)

Although the GSMM contains a wealth of valuable information about post-construction stormwater management, it does not provide all of the information needed to protect coastal Georgia's valuable natural resources from the negative impacts of land development and nonpoint source pollution. For example, the GSMM does not provide much information about

the aquatic and terrestrial resources that can be found in coastal Georgia or about the negative impacts that land development and uncontrolled stormwater runoff can have on these critical natural resources (Figure 1.5). In addition, the GSMM does not provide *detailed* guidance on using green infrastructure practices (e.g., better site planning and design techniques, low impact development practices) or on adapting the design of traditional stormwater management practices, such as wet ponds and swales, to the site characteristics and constraints commonly encountered in coastal Georgia. To provide coastal Georgia with this valuable additional information, this CSS was developed. It builds on the wealth of information presented in the GSMM to promote an integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design that can be used to better protect coastal Georgia's unique and vital natural resources from the negative impacts of land development and nonpoint source pollution.

The approach to natural resource protection and post-construction stormwater management that is currently used throughout most of coastal Georgia focuses primarily on *managing* stormwater quantity (and, in some cases, quality) and relies heavily on traditional stormwater management practices, such as wet and dry ponds, to *mitigate*, rather than *prevent*, the negative impacts of land development and nonpoint source pollution. The integrated approach to natural resource protection, stormwater management and site design presented in this CSS shifts the focus away from the *mitigation* of these impacts and instead places it on their *prevention*. To accomplish this, the CSS introduces the concept of *stormwater runoff reduction*, which effectively puts green infrastructure practices in the same "stormwater management toolbox" as traditional stormwater management practices, such as wet and dry ponds. The introduction of this *stormwater runoff reduction* concept marks an important milestone in the evolution of stormwater management in coastal Georgia. If successfully integrated into existing stormwater management efforts, it will lead to better protection of the aquatic and terrestrial resources that contribute so greatly to the region's natural beauty, economic well-being and quality of life.

Figure 1.6: Alligators are One of the Many Creatures that Call Coastal Georgia Home
(Source: Jeannie Lewis Rhodes, Georgia Department of Natural Resources)

The CSS is presented in a format that is similar to that of the GSMM. This allows readers that are already familiar with the GSMM to more efficiently use the information presented within. Although this CSS can be used as a stand-alone stormwater management manual, it does make a number of references to information presented in the GSMM. In case of a conflict between information presented in this CSS and the GSMM, the information contained in this CSS should be considered to be more protective of coastal Georgia's natural resources, habitats and wildlife (Figure 1.6).

1.7 How to Get Copies of the Supplement

Hard copies of this CSS can be ordered by calling the Georgia Department of Natural Resources Environmental Protection Division (GA EPD) Nonpoint Source Program at (404) 675-6240 or Coastal District at (912) 264-7284.

1.8 How to Find the Supplement on the Internet

Electronic copies of this CSS are available for free download from the following websites:

http://www.gaepd.org
http://www.mpcnaturalresources.org
http://www.coastalgeorgiardc.org

1.9 Contact Information

If you have any questions or comments about this CSS, please contact the Georgia Department of Natural Resources Division (GA EPD) Nonpoint Source Program at (404) 675-6240 or Coastal District at (912) 264-7284.

References

Atlanta Regional Commission (ARC). 2001. *Georgia Stormwater Management Manual*. Volume 2. Technical Handbook. Atlanta Regional Commission. Atlanta, GA. Available Online: http://www.georgiastormwater.com/.

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