

1—Green Infrastructure A Sustainable Development Approach

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1—Green Infrastructure

A Sustainable Development Approach

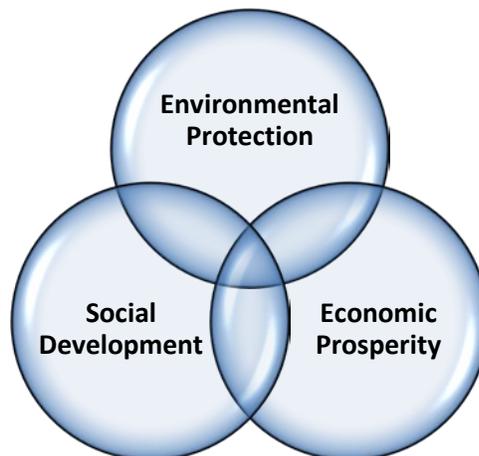
In This Chapter

- *Important Terms & Concepts—Green Infrastructure, Ecosystem Services, and Natural Capital*
- *Technical & Financial Assistance Tools and Resources for Local Governments, Developers, and Landowners*
- *Green Infrastructure Mapping Case Study for Coastal Georgia*

Green Infrastructure

Over the past couple of decades, **Green Infrastructure (GI)** and other conceptual advances in environmental planning have emerged in response to increasing concerns about the negative consequences of population growth and subsequent land consumption.

Our survival and well-being, either directly or indirectly, depends heavily on our natural environment. This is exactly why we should strive to create and maintain the conditions under which humans and nature can exist in a productive union. The primary goal of sustainable development is to meet our present needs without compromising the ability of future generations to fulfill their own.



Mutually important components of a sustainable society

The term “infrastructure” commonly refers to the substructure or underlying foundation on which the continuance and growth of a community depends. Gray Infrastructure provides our built environment with necessary facilities and support services such as highways, utilities, and wastewater treatment plants.

Equally important is our Green Infrastructure, which serves the many needs of our communities by delivering fundamental services such as clean

water, air, and soil, flood protection, diverse wildlife habitats, climate change mitigation and community resiliency.

At all scales, Green Infrastructure (GI) provides ecological, economic and social benefits. The *American Society of Landscape Architects* describes GI as a conceptual framework for understanding the “valuable services nature provides the human environment.”

At the national or regional level, interconnected networks of park systems and wildlife corridors preserve ecological functions, manage stormwater, provide wildlife habitat, and



Intact Green Infrastructure: Tidal Marshlands and Maritime Forest
Source: Tara Merrill

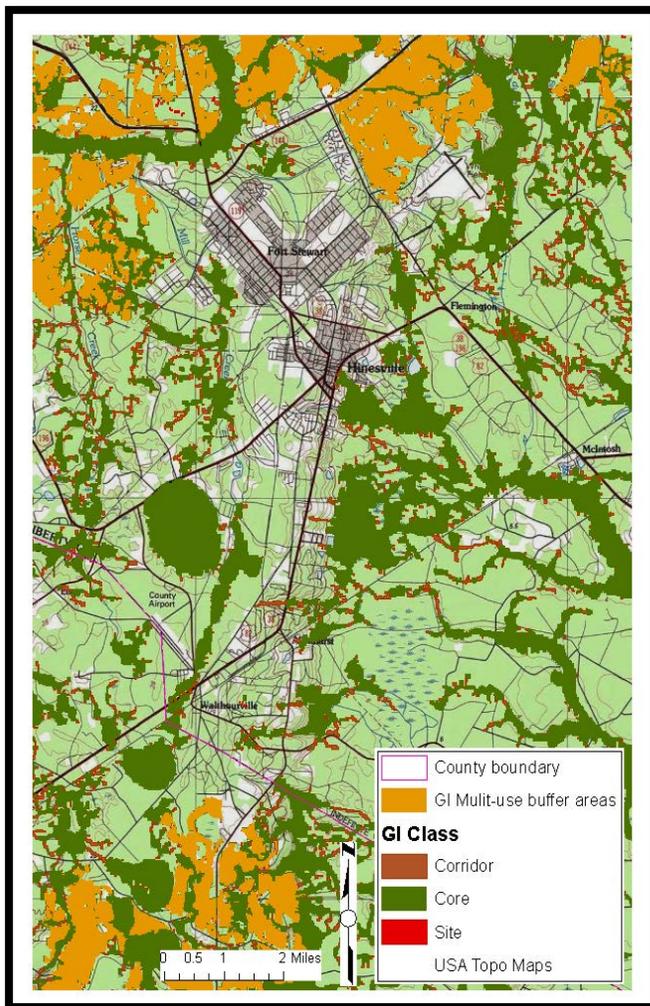
create a balance between built and natural environments. At the urban level, parks, and urban forestry are central to reducing energy usage and creating clean, temperate air. Lastly, green roofs, walls, and other techniques within or on the buildings themselves bring a range of benefits, including energy efficiency, stormwater management, and aesthetic improvement.



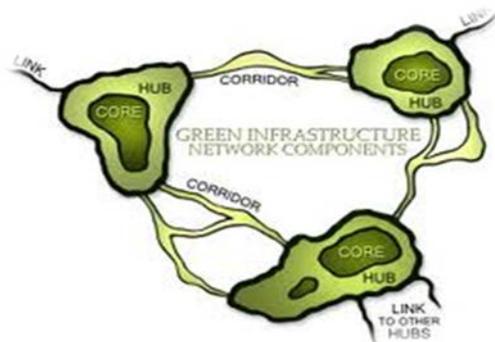
Georgia Ports Authority, Savannah River. Source: Fitnews

GI focuses on two key performance objectives—**biological diversity** and **connectivity**—both of which are characteristics vital to the sustainability and maintenance of healthy human communities and functional natural ecosystems. Biological diversity—or the variation of terrestrial and aquatic organisms within a community—is heavily dependent on the degree in which habitats are physically linked or attached. An interconnected network of aquatic and terrestrial resources supports a wide range of resident and migratory organisms, maintains air and water quality, and contributes greatly to a community’s natural beauty, economic prosperity, and quality of life. Like roads, utilities, and other supporting service facilities, green infrastructure must be connected to function at its fullest potential.

The GI network is comprised of three main components commonly known as **hubs**, **links** and **sites**. These components can vary in size, shape, and function.



Hubs, Links, and Ecologically-Significant Sites. Source: Coastal Habitat Mapping Project, Georgia Land Conservation Initiative



The primary building blocks of the Green Infrastructure Network are landscape “**hubs or cores**” which significantly contribute to the region’s water quality, wildlife habitat, and biodiversity. These large blocks of unfragmented natural lands serve as the anchors in the network. Hubs—in the form of national and state wildlife reserves, farmlands, and community parks—provide an origin and destination for wildlife and people. **Links** or corridors connect other system components (hubs and sites) together. Links can come in many forms and sizes— linear parks and trails used for recreation, natural

landscapes such as rivers, riparian corridors, and floodplains, as well as protective buffers for working and developed lands. When of sufficient width and length, these areas serve as the biological conduit of the GI network—facilitating wildlife migration, enhancing pollination, and seed dispersal and aiding in the overall retention of a variety of native plant and animal species in larger hubs or core areas.

Sites are typically smaller in scale and may or may not be attached to hubs, but despite their size or location these areas provide ecological and social values that are critical to the overall GI network. Maintaining connections between hubs, links, and ecologically significant sites strengthens the entire system by creating more resilient and biologically diverse natural communities.

“Green Infrastructure can be defined as both a process and a product. Referred to as a process, the term means a systematic and collaborative conservation approach which encourages land use planning and practices that benefit nature and people. The product, or result, of this process is an interconnected system of natural areas and open space networks planned and managed for its natural resource value and for the associated benefits it confers to human populations.”
(Benedict and McMahon 2006) Both uses of the term have in common a basic recognition that our built and natural environments are connected and mutually

Ecosystem Services & Natural Capital

Our natural surroundings provides direct services (e.g. air, food, water, energy) and furnishes supporting and regulating services such as water purification, carbon sequestration, and crop pollination. The benefits humans receive from ecosystem good and services are free to us and have true monetary value. When these services are impaired or lost, the community as a whole must pay to restore these systems or replace them with expensive gray infrastructure.



For example, diverse and intact wetland systems contribute to national, state, and local economies

by serving as nursery grounds for commercial and recreational fisheries, filtering terrestrial runoff, protecting coastal regions from erosion and storm damage, and acting as carbon sinks which buffer against negative effects of climate change. The value of wetlands in North America has been estimated to have an annual worth of over \$677 billion dollars based on the numerous functions these ecosystems perform (Worldwide Fund for Nature, 2004).

Economic Value of Wetland Functions (2000 estimates)	
Wetland Function	Median Economic Value (\$US/Acre/Year,2000)
Flood Control	\$1,146
Recreational Fishing	\$924
Amenity/Recreation	\$1,215
Water Filtering	\$711
Biodiversity	\$529
Habitat Nursery	\$496
Recreational Hunting	\$304
Water Supply	\$111
Materials	\$111
Fuel Wood	\$35
Total	\$5,582

GI seeks to identify, protect, restore, and manage the following natural ecosystem services and functions:

WATER QUALITY

Removes and reduces pollutants from water, increases groundwater recharge, and provides water quality protection for surface waters and wetlands

WATER SUPPLY & REGULATION

Stores and/or provides water within watersheds or aquifers reducing stormwater treatment needs and subsequent gray infrastructure improvement costs

AIR QUALITY & CLIMATE REGULATION

Maintains balance of atmospheric gases and sequesters greenhouse gases which regulates temperature, precipitation, and humidity through shading and evapotranspiration

POLLINATION

Enables fertilization and reproduction of important crops and other plants grown for food, beverages, fibers, spices, and medicines

PEST & DISEASE CONTROL

Provides a diverse habitat resistant to invasive pests and diseases

HAZARD MITIGATION

Reduces vulnerability to damage from flooding, storm surge, wildfire, and drought

WILDLIFE HABITAT

Provides refuge and reproduction habitats to plant and animal communities which contributes to the conservation of biological diversity and genetic evolutionary processes

EROSION & SEDIMENT CONTROL

Retains soil within an ecosystem for nutrient dispersal/cycling and prevents damage from erosion and siltation

RECREATION & ECOTOURISM

Supports ecotourism by providing an abundance of natural resources used for recreational activities (i.e. boating, fishing, kayaking, swimming, wildlife observation, and scientific education).

Valuation Tools and Resources

Listed below are a few of the more recent tools and resources that can be used by local governments and developers to identify ecosystem services and calculate the monetary value or natural capital generated from an intact and diverse Green Infrastructure Network.

- The Center for Neighborhood Technology (CNT) developed the **Green Values © Calculator** which can be used to quickly compare the performance, costs and benefits of green infrastructure practices to conventional stormwater practices. This free tool can be accessed @ www.greenvalues.cnt.org/national/calculator.php.
- In 2006, the U.S. Forest Service developed **i-Tree ©**, which is a software suite that can be used to report the value of urban trees and/or forests on individual parcels, neighborhoods, cities, and regions of the state. By understanding the local, tangible ecosystem services that trees provide, i-Tree users can link urban forest management activities with environmental quality and community livability. Visit www.itreetools.org for more info.
- American Forests' **CITYgreen ©** is a GIS software tool that helps planners, engineers, and natural resource managers assign value to the trees found on their particular development site. It converts stormwater and energy impacts (among others) from trees and other vegetation into monetary values based on local specifications. Go to www.americanforests.org to purchase a licensed copy of this GIS analysis tool.
- The **Low Impact Development Rapid Assessment Tool (LIDRA)** is a model designed to compare to the life-cycle values of implementing various green infrastructure techniques used in reducing runoff versus conventional stormwater management practices. The tool pulls from a database of performance and cost values derived from national data. For more info, visit www.lidratool.org.
- The **GreenSave © Calculator**, developed by Green Roofs for Healthy Cities and the Athena Institute, allows for the analysis of various green roof types over a set period of time in order to compare lifecycle costs. The tool is intended to help users examine future operating, maintenance, repair and replacement costs, as well energy savings benefits. This enables the users to determine whether initial costs are justified by reducing future costs. It also makes it possible to determine whether some roofs have lower initial costs that may increase over time. Visit www.greenroofs.org for additional info.

GI Implementation

Over the past decade, Green Infrastructure initiatives have been adopted, promoted, and funded at a federal and state level. In order for the results of the program to be fully actualized, *local governments* must create and enact comprehensive planning strategies, development ordinances, and zoning regulations that not only allow for, but also encourage developers and their design teams to practice GI on their projects.

“Green Infrastructure considers conservation values and actions in concert with land development, growth management and built infrastructure planning. Unlike other conservation approaches which are typically undertaken in isolation from, or even in opposition to, development.” (Benedict and McMahon, 2006)

As our coastal communities continue to grow, local policies and laws must also expand, diversify, and mature to meet the needs of a changing population. In this day and age, citizens are more aware and increasingly concerned with how tax revenues are generated, appropriated, and essentially spent. For this reason, City and County officials are under more pressure to implement fiscally and environmentally responsible programs and policies.

Unlike many conservation efforts preceding it, the Green Infrastructure Program seeks to balance development with conservation needs by engaging a multi-disciplinary group of partners and stakeholders. This consortium includes community leaders, landowners, developers, engineers, land planners, federal and state regulators, and natural resource managers. Local governments should host regular public forums to identify and analyze GI resources, and build a consensus on a strategic plan for the prioritization and protection of these assets for the future well-being of the community and the region as a whole.

Basic Steps in the GI Implementation Process:

1. Identify and assess existing GI assets (hubs, links and ecologically-significant sites)
2. Invite interested parties to participate in the planning and design process
3. Evaluate existing development patterns, competing land uses, and areas prone to future growth
4. Develop a strategy to balance development with conservation of green infrastructure resources
5. Integrate management of publicly owned lands with local and regional GI initiatives
6. Modify local zoning ordinances and development codes to allow for GI practices

7. Leverage state and federal funding resources to advance the protection and enhancement GI network

A potential obstacle to GI implementation in coastal Georgia is the common misperception that land conservation for the good of the public realm will infringe or encroach on private property rights. Since private lands play an essential role in the GI network, local landowners and developers must be well informed and involved throughout the decision-making process as they are ultimately the end users (beneficiaries) of the GI system. As taxpayers, they should be aware of the following values and benefits of this approach:

- Present and future natural capital assets—land conserved for ecosystem services such as stormwater treatment and flood protection means a decreased need for expensive municipal gray infrastructure systems which equates to a reduction in taxes assessed to local residents
- Properties in close proximity of natural amenities typically hold higher re-sale values
- Landowners and developers may be eligible for tax credits and deductions (see the following section for details)
- Federal and state funding is available for participating communities (see the following section for details)

Long-term conservation measures and future development activities should be viewed as mutually important factors and addressed in tandem. The GI approach is a voluntary and equitable solution to the long-term sustainability of services and goods that yields natural capital to the entire community. Increased public sector participation in the preservation of GI translates to a decreased need for costly gray infrastructure investments. With unified support for this effort, a large-scale GI network that reaches across and beyond political and jurisdictional boundaries is possible.

Local governments can ensure developers and landowners preserve and protect Green Infrastructure by requiring these practices in local regulations and policies. Another way to encourage developers to use GI practices is to offer incentives to those who go the extra mile to create environmentally-sensitive developments.

The programs and tools identified in the next section provide a collection of both regulatory and incentive-based resources available to private landowners, developers, and their design teams, as well as County officials and NGOs operating within the county or region.

Conservation Tools & Resources

The following tools, strategies, and potential funding opportunities are available for local governments, landowners, and developers interested in implementing GI practices in their communities. This following list was compiled using information from Green Infrastructure publications and websites by the Environmental Protection Agency (EPA), Natural Resource Conservation Service (NRCS), Georgia Department of Natural Resources (GDNR), Georgia Forestry Commission (GFC), Coastal Regional Commission (CRC), Department of Community Affairs (DCA), the Georgia Conservancy, Atlanta Regional Commission (ARC), and the Trust for Public Land (TPL).

Incentives for Landowners and Developers

Conservation Easements - A conservation easement is a voluntary legal agreement made by a landowner to restrict the land uses permitted on their property. It is a flexible option that can be tailored to suit the goal of the easement and the desires of the landowner. Landowners can choose to restrict one or more land uses, or to permit only particular land uses on the property, for a specified period of time.

A donation of a permanent conservation easement is eligible for significant federal and state income tax incentives. It may also reduce the landowners' property taxes by reducing the assessed value of the land. Landowners may ask for a re-assessment by their local tax assessor after completing a conservation easement. Any landowner, either private or corporate, may place an easement on their property. There is no minimum or maximum size requirement, but eligible lands must meet conservation purposes as defined by the IRS in order to qualify as a charitable gift and receive federal tax incentives. To receive the state income tax credit, the land must be certified for conservation purposes as defined by GDNR and donated to a qualified easement holder such as the *Georgia Land Trust* or the *Saint Simons Land Trust*. Check the *Land Trust Alliance* <http://www.landtrustalliance.org/> and the *Georgia Land Conservation Program* (GLCP) at www.glcp.ga.gov for additional private and public entities accepting easements.

The *Georgia Conservancy*, *Association County Commissioners of Georgia* (ACCG) and the *Georgia DNR* developed the **Coastal Georgia Land Conservation Initiative**. The **CGLCI** works with coastal resource management agencies, land conservation organizations, developers, and private landowners to conserve critical lands and healthy ecosystems while promoting sustainable economic growth. Visit www.conservecoastalgeorgia.org for access to conservation easement resources as well as an interactive mapping application that shows important resources in the coastal region.

Mitigation Banking - Mitigation banking is the restoration, enhancement, or preservation of wetlands for the express purpose of providing compensation for unavoidable wetland impacts in advance of development actions. “Credits” are purchased by developers and landowners to offset damages caused by development projects. Restrictive covenants or conservation easements are placed on the property to ensure natural resources are protected in perpetuity. See <http://geo.usace.army.mil/ribits/index.html> for a list of mitigation banks serving your area.

Private Lands Program (PLP) – Developed by the Georgia Department of Natural Resources Wildlife Resources (WRD), this program promotes wildlife conservation on private lands. Landowners are provided with technical assistance, onsite biological consultations, management recommendations, and guidance on financial assistance programs. For more information, contact the PLP Program Office at (770)-918-6411 or (770)-761-3043.

Forest Stewardship Program (FSP) – Administered by the Georgia Forestry Commission (GFC) with help from GDNR Wildlife Resources Division (WRD), this program provides written land management plans at no cost to the landowner. Private, non-industrial forestlands of at least 25 acres are eligible for a forest stewardship plan. Based on the landowners objectives, the plan includes recommendations on managing timber, wildlife, soil and water resources, and recreational activities.

Environmental Quality Incentive Program (EQIP) – NRCS Farm Bill Program gives free technical assistance to landowners who implement management practices related to soil, water, forest, and wildlife resources on their property. Private landowners engaged in livestock, agriculture, or forestry activities are eligible for financial assistance (up to 50-70%) of the costs of implementing conservation practices. Visit the NRCS website www.ga.nrcs.usda.gov for more information.

Agriculture Conservation Easement Program (ACEP) – a Farm Bill program that recently replaced the Farm and Ranchlands Protection Program. Offers financial assistance to landowners who place a conservation easement on their property in an effort to keep productive farm and ranchlands in agricultural uses. NRCS pays 100% of the fair market value of permanent easements and between 75-100% of the restoration costs. For 30-year easements, NRCS pays 50% of the value of the easement and between 50-75% of the restoration costs. Interested parties should contact the state NRCS office at (706)-546-2272 or visit www.nrcs.gov/farmbill for more information.

Federal Income Tax Reduction – Donations of conservation easements that meet federal tax code requirements may entitle the donor to federal income tax deductions. For tax year 2014, the deduction is limited to 30% of adjusted gross income, which if not used up in 2014, may

be carried forward at 30% of adjusted gross income for an additional five years or until the donation is fully expended, whichever comes first. (An enhanced federal deduction was available for the past three years, but has now expired. It could be renewed or enhanced by Congress in 2014). Contact the IRS or a tax specialist for further details.

Georgia Land Conservation Tax Credit Program - The state of Georgia provides a state income tax credit for the permanent protection of conservation lands. Approved donors can earn credits equal to 25% of the value of the donated property or easement, capped at \$250,000 for individuals and an aggregate amount of \$500,000 for corporations and partnerships. The credit is available for the fee-simple donation of permanently protected property or the donation of a permanent conservation easement on property made after Jan 1, 2006. Donations must be made to a qualified conservation organization (as certified by GDNR) or to a state or local governmental agency. After making a qualifying donation, the landowner must submit an application to GDNR for certification and receive a certification letter to receive the credit. For more information on the tax credit, the certification process, and a list of qualified organizations, please see www.glcp.ga.gov/taxcredit or call 770-918-6411.

General Property Exchange – Section 1031 of the IRS code allows landowners to voluntarily exchange their property for another “like-kind” property without having to pay capital gains tax on the transaction. Contact the IRS or tax specialist for further details.

Reforestation Tax Credit – This credit applies to landowners who plant and maintain timber stands on their property. Landowners who reforest their lands may be allowed to take a 10% investment tax credit for capital expenses incurred on the first \$10,000 spent. Additional costs exceeding \$10,000 can be amortized over a 7-year period.

Conservation Use Valuation Assessment (CUVA) – The Georgia Department of Revenue provides a reduction in property taxes through the dedication of land to a qualified use (agriculture, farming, environmentally critical, etc.). Property is assessed at 40% of its current market value. Landowners may place up to 2,000 acres in the program (restrictive covenants must be in effect a minimum of 10 years). For more info visit <https://etax.dor.ga.gov/ptd/cas/cuse/index.aspx>.

Energy Efficiency Tax Incentives – Property owners can get tax credit for installing qualifying energy-efficient products such as solar hot water heaters, solar electric equipment, and wind turbines. The credit is 30% of the cost of these products. There is no limit to the amount of credit you can take, and you can carry forward any unused credit to future tax years. This credit has been extended to 2016. Contact the IRS or a tax specialist for more information.

Local Government Regulatory Tools for Land Conservation

Dedications - Requests a developer donate a negotiated portion of their land as open space or as natural green space as a condition for the development approval.

Impact Fees – Fees assessed to developers to help offset infrastructure and public amenity costs necessitated by the new development. Impact fees can be applied to on-site improvements such as buildings, roads, or extending utility lines and off-site improvements such as funding for a new school or community park.

Development Incentives – Offers higher densities to landowners or developers who wish to set aside large portions of their land as open space. The purchase and/or transfer of development rights is an effective way to exchange developable land for land with high conservation value.

Development Disincentives - Discourages conventional development designs by imposing a density reduction for developers who do not incorporate Green Infrastructure protection goals.

Fee Simple Acquisition - The direct and outright purchase of a piece of property. This option can insure protection of a sensitive area—it requires landowners who are willing to sell as well as sufficient funds available for purchase.

Special Purpose Local Options Sales Tax – SPLOST is an optional 1% special purpose tax used to finance specific capital projects (i.e. roads, drainage improvements, municipal buildings, and civic and community-based improvements. Since program inception in 1985, Chatham County has generated more than \$1.5 billion dollars from the 1 cent tax plus state-leveraged funds and interest earnings.

Local Government Zoning Tools

Local governments can use zoning designations, subdivision regulations, and building codes to control land uses and encourage green infrastructure projects.

- **Agricultural and Forest Districts** - The purpose of these districts are to help preserve blocks of agricultural and forest lands. These districts usually require that an area be kept in agricultural or forest use for the length of the agreement.
- **Planned Unit Developments (PUDs)** - Offers more flexible development practices than traditional zoning, while still meeting overall community density and land use goals. PUDs encourage open space preservation through the use of mixed use, compact or clustered development practices that result in smaller individual lot sizes. Provisions within the PUD can require developers to preserve part of the development for open space. Local governments can create a PUDs zoning district or permit a PUD in a regular zoning district on a site-by-site basis.
- **Open Space Districts** - Open space districts are created to protect natural areas and/or unique features of the site. These districts usually allow the same overall amount of development, but use clustering, density limitations, and other development restrictions to preserve open space and restrict development to a smaller area. The focus of open space districts (i.e. agriculture, forests, wetlands, parks) is flexible depending upon the desires of the local community.
- **Overlay District** - These districts are used to impose additional development restrictions in a certain area because a unique feature warrants protection. For instance, a floodplain overlay district can be used to further restrict development in the floodplain, beyond current zoning regulations.

Model Ordinances

Often, local government standards and ordinances do not allow for unconventional land development methods. In response to this challenge, the *Georgia Coastal Management Program* funded the creation of a package of companion ordinances to *Georgia's Green Growth Guidelines*. Local governments can modify these model ordinances to create development regulations and standards that are tailored to fit the individual needs of each community and the unique aspects of coastal Georgia. Templates for the following ordinances can be found at www.conservecoastalgeorgia.org.

- Stormwater Management
- Conservation Subdivisions
- Natural Resource Protection
- Riparian Buffers
- Wetlands
- Native Landscaping
- OSDS (Septic System) Maintenance and Inspection
- Preservation of Significant Lands

Additional model ordinances can be found on the *Georgia Department of Community Affairs* website@www.dca.state.ga.us/development/planningqualitygrowth/programs/modelcode.asp

- Soil Erosion & Grading
- Flood Damage Prevention
- Environmental Impact
- Alternative Development Standards
- Tree Protection
- Landscaping & Buffers
- Landuse Intensity Districts
- Scenic Corridor Overlay
- Special Growth Management
- Conservation Subdivision
- Traditional Neighborhood Design
- Low Impact Development

Funding Opportunities

A lack of funding is consistently cited as a barrier to the implementation of Green Infrastructure. Being GI projects offers so many benefits; they can compete for a variety of diverse funding services. Below is a list of several voluntary programs that offer technical and financial assistance to local governments, developers, and landowners who put GI practices into action.

EPA Clean Water Act Nonpoint Source Grants (Section 319) – 319 Grants are available for a wide variety of activities including technical and financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of implemented projects. Participating landowners and developers can qualify for 60% or more cost-share assistance for implementing conservation measures on their land. Visit www.gswcc.org to obtain an application, eligibility requirements, and availability of annual program funding.

EPA Clean Water State Revolving Fund (CWSRF) – Provides funds for water quality protection projects (wastewater/stormwater treatment, watershed management, and nonpoint source pollution control). Visit http://water.epa.gov/grants_funding/home.cfm for more information on the program.

EPA Community Action for a Renewed Environment Grants (CARE) – Supports community-based partnerships to reduce pollution at a local level. For more info, visit <http://www.epa.gov/care/>.

EPA Office of Wetlands, Oceans and Watersheds Funding (OWOW) – Free public website offering tools, databases, and information about sources of funding for watershed protection projects. Visit <http://water.epa.gov/aboutow/owow/> to access this resource.

NOAA Community Based Restoration Program – This program promotes and funds local efforts to conduct coastal habitat restoration projects in coastal Georgia. <http://www.habitat.noaa.gov/restoration/programs/crp.html>

DOT Transportation Enhancement Activities (TE) – Funding is provided for enhancement projects such as pedestrian/bike paths, scenic highways, landscaping, and stormwater management. Go to <http://www.dot.ga.gov/localgovernment/FundingPrograms/> for more info.

Wetlands Reserve Program (WRP) - The WRP is a voluntary program that offers financial assistance to landowners who protect wetlands on their property. Usually, the landowner enters an agreement with the USDA to restore and protect the wetland, while limiting the use of the land. The program offers agreements of varying lengths, from 10 years to permanent.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands/>

National Urban and Community Forestry Program (NUCFP) – Offers cost-share grants to support community forestry projects that have national or multi-state application or impact. Visit <http://www.fs.fed.us/ucf/> for further details.

Forestry Incentive Programs (FIP) - Promotes good forest management practices on privately owned, non-industrial forest lands in an effort to reduce wind and soil erosion, enhance water quality and wildlife habitat, and promote longevity of forest resources. Practices include tree planting, timber stand improvements, and natural regeneration. The FIP offers cost share assistance for participating landowners, with a limit of \$10,000 per landowner and up to 65% of total costs share for implemented practices. A full list of NRCS programs can be found at www.nhq.nrcs.usda.gov/PROGRAMS/cpindex.html.

Conservation Reserve Program (CRP): A voluntary program that provides technical and financial assistance to eligible farmers and ranchers to address soil, water and related natural resource concerns on their lands. CRP offers annual rental payments and cost share assistance (usually 50%) to farmers for the term of the multi-year contract. Agreements generally last from 10 to 15 years. A full list of Farm Service Agency programs can be found at www.fsa.usda.gov/dafp/cepd/conserva.htm.

Conservation Stewardship Program (CSP) – Developed and managed by the NRCS, CSP is a Farm Bill program (formerly the Conservation Security Program) that provides financial and technical assistance to agricultural and non-industrial forestlands for the conservation and improvement of natural resources on private lands. CSP rewards participants with an annual payment for installing new conservation practices and maintaining existing activities. Contact your local NRCS office for more details or go to the website @ <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/>.

Georgia Land Conservation Program (GLCP) – Offers low-interest loans and competitive grants to cities, counties, state agencies, and conservation organizations to purchase land or permanent conservation easements. For more information on the GLCP and application process, visit www.glcp.ga.gov or call (404)-584-1101.

Georgia Coastal Management Program (GCMP) – Administered by the GDNR Coastal Resources Division, the GCMP offers assistance to local governments, private landowners, and industry on conservation planning, smart growth, and natural resource protection within the 11-county coastal area. Funding for conservation planning and land acquisition is available through the **Coastal Incentive Grant (CIG) Program** and the **Coastal and Estuarine Land Conservation Program (CELCP)**. Visit www.coastalgadnr.org/cm/grants/cig or www.coastalmanagement.noaa.gov/land/celcp_fundingop.html or contact GDNR - CRD at (912)-264-7218 for more details.

DOE Weatherization and Intergovernmental Program – The Department of Energy provides grants, technical assistance, and information tools to encourage the use of green infrastructure practices such as green roofs, insulation, solar panels, etc. Go to <http://www1.eere.energy.gov/wip/> for more info.

DOI Rivers, Trails and Conservation Assistance Program (RTCA) – The National Park Service provides assistance for community-based conservation and outdoor recreation initiatives. RTCA provides guidance to communities that conserve open space and develop trails and greenways. For more information, visit <http://www.nps.gov/orgs/rtca/index.htm>.

HUD Community Development Block Grant Program (CDBG) – CDBG is a flexible program that works to provide affordable housing, provide services to vulnerable communities, and create jobs through the expansion and retention of local businesses. CDBG-financed projects should include green infrastructure practices in their design and construction. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs

HUD Sustainable Communities Regional Planning Grants – The Department of Housing and Urban Development's Sustainable Communities Regional Planning Grant Program supports planning efforts that integrate green infrastructure practices into housing, land use, economic development, transportation, and infrastructure investments. http://portal.hud.gov/hudportal/HUD?src=/program_offices/sustainable_housing_communities/sustainable_communities_regional_planning_grants

Georgia's Green Infrastructure Network

In 2001, the University of Florida GeoPlan Center and the Environmental Protection Agency's Region IV Planning & Analysis Branch completed the Southeastern Ecological Framework (SEF) project. The GIS-based analysis produced a large-scale map showing primary ecological areas (PEAs) and significant ecological areas (SEAs).

In 2009, the Georgia Land Conservation Program (GLCP) and Georgia Department of Natural Resources conducted a joint effort to map the state's conservation values and identify regions of importance. The results of the initiative produced a statewide geographical representation of the conservation value summary (CVS) which denotes value based on the presence and abundance of specific ecological species and communities. Both the SEF and CVS decision support tools were later enhanced with new data and applied to Green Infrastructure planning efforts along the Georgia coast.

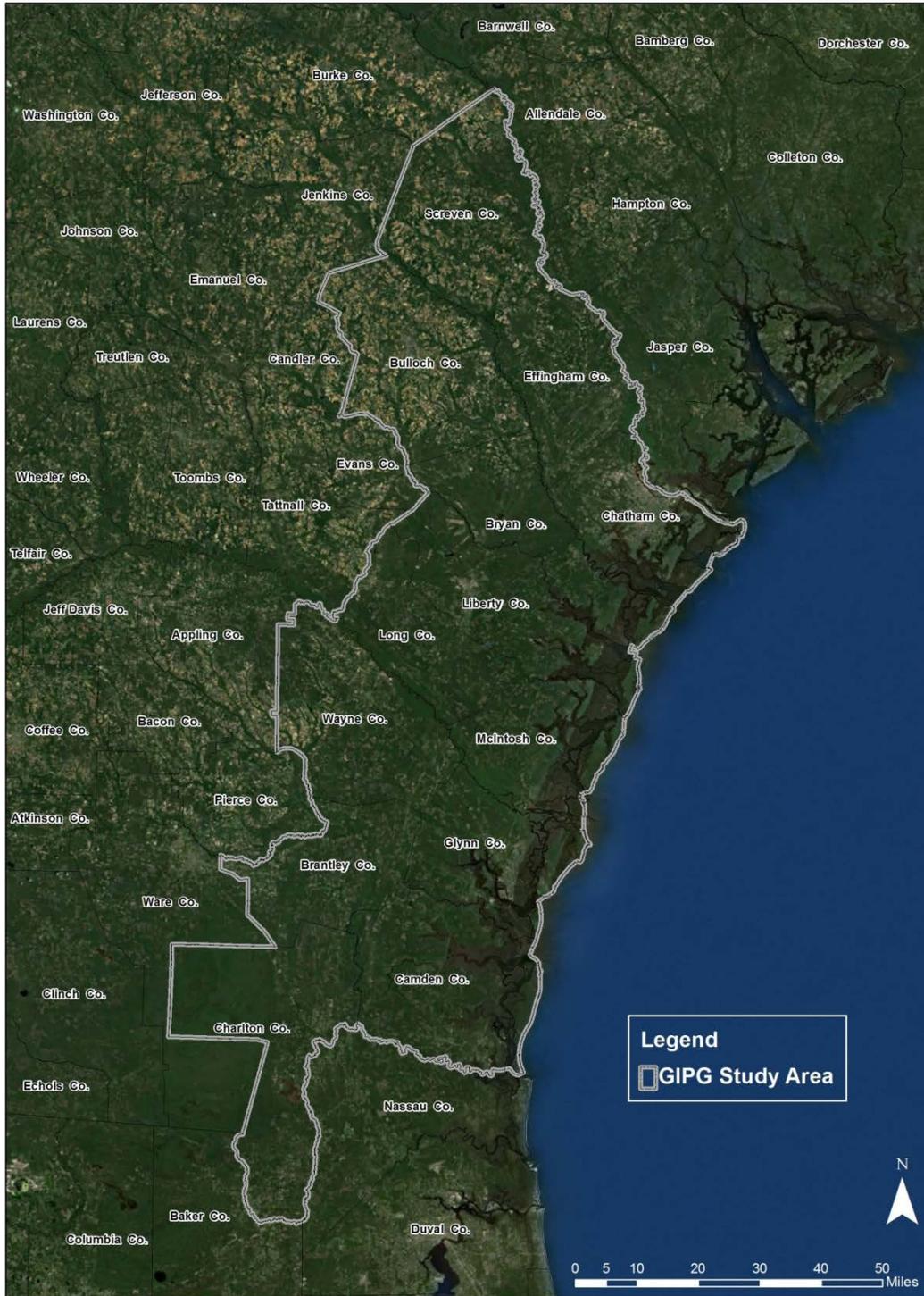
In 2011, the Coastal Georgia Land Conservation Initiative (CGLCI)—a public-private consortium comprised of the Department of Natural Resources Wildlife Resources Division (DNR), the Association of County Commissioners of Georgia, the Georgia Conservancy, and NatureServe—concluded a three-year long coastal habitat mapping project. Over 70 habitat types were assessed and mapped for each of the eleven coastal counties. In collaboration with the Wildlife Resources Division of DNR, NatureServe developed a database that includes representative ecosystem types, critical habitats supporting species of greatest concern, current land use patterns, and future land use scenarios. The analysis and inventory takes into account the presence of large, contiguous swathes of forests and wetlands, healthy streams and riparian zones, presence of rare, threatened or endangered species, existing conservation lands, prime farmland, compatible agricultural lands, pine plantations, and canopy coverage.

GI Maps

In 2012, the Georgia Forestry Commission and the Coastal Regional Commission developed the *Green Infrastructure Planning Guidelines*. The Guidelines provide conservation tools and strategies including a series of maps that illustrate the relative significance of existing conservation lands, identify areas of high conservation opportunity and vulnerability, and prioritize areas for efficient conservation action and future growth.

The following green infrastructure maps can be used by local governments, developers and their design teams when planning a development project in coastal Georgia. A detailed list of additional GIS Resources can be found in Appendix B.

GIPG Study Area

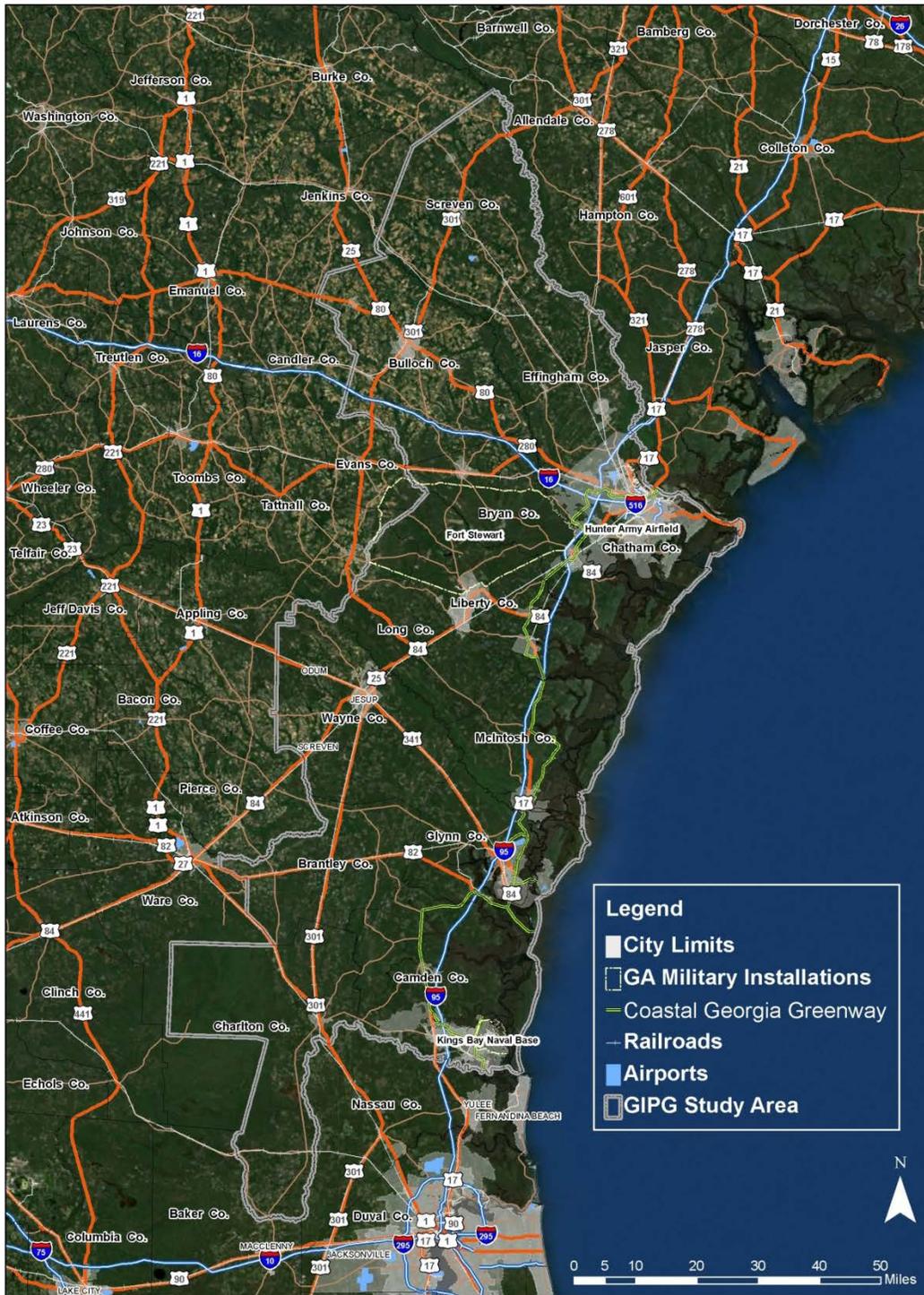


Green Infrastructure Planning Guidelines (GIPG)

**MAP # 1
Study Area**



Population Centers



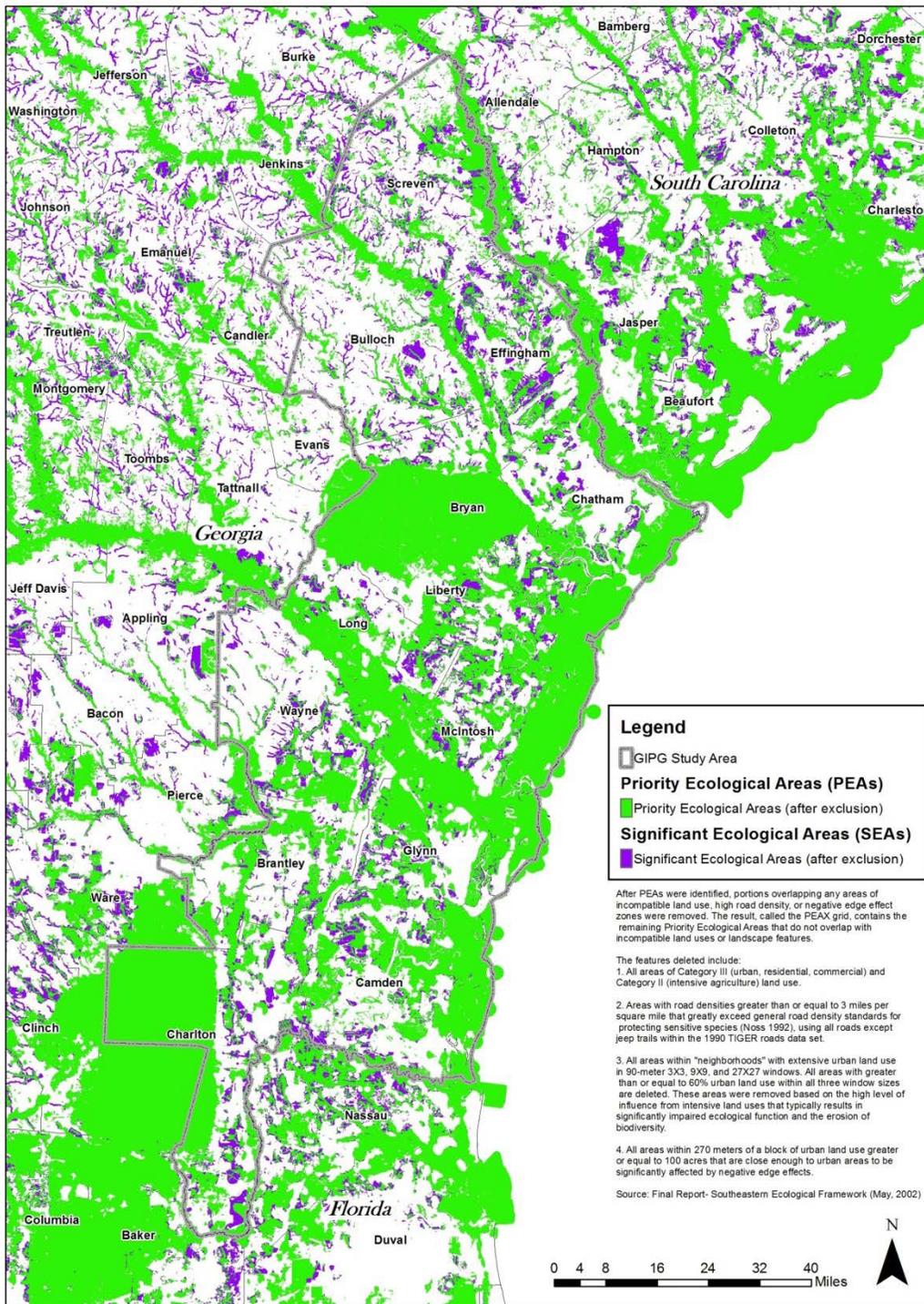
Green Infrastructure Planning Guidelines (GIPG)

MAP # 2

Population Centers



EPA Ecological Framework

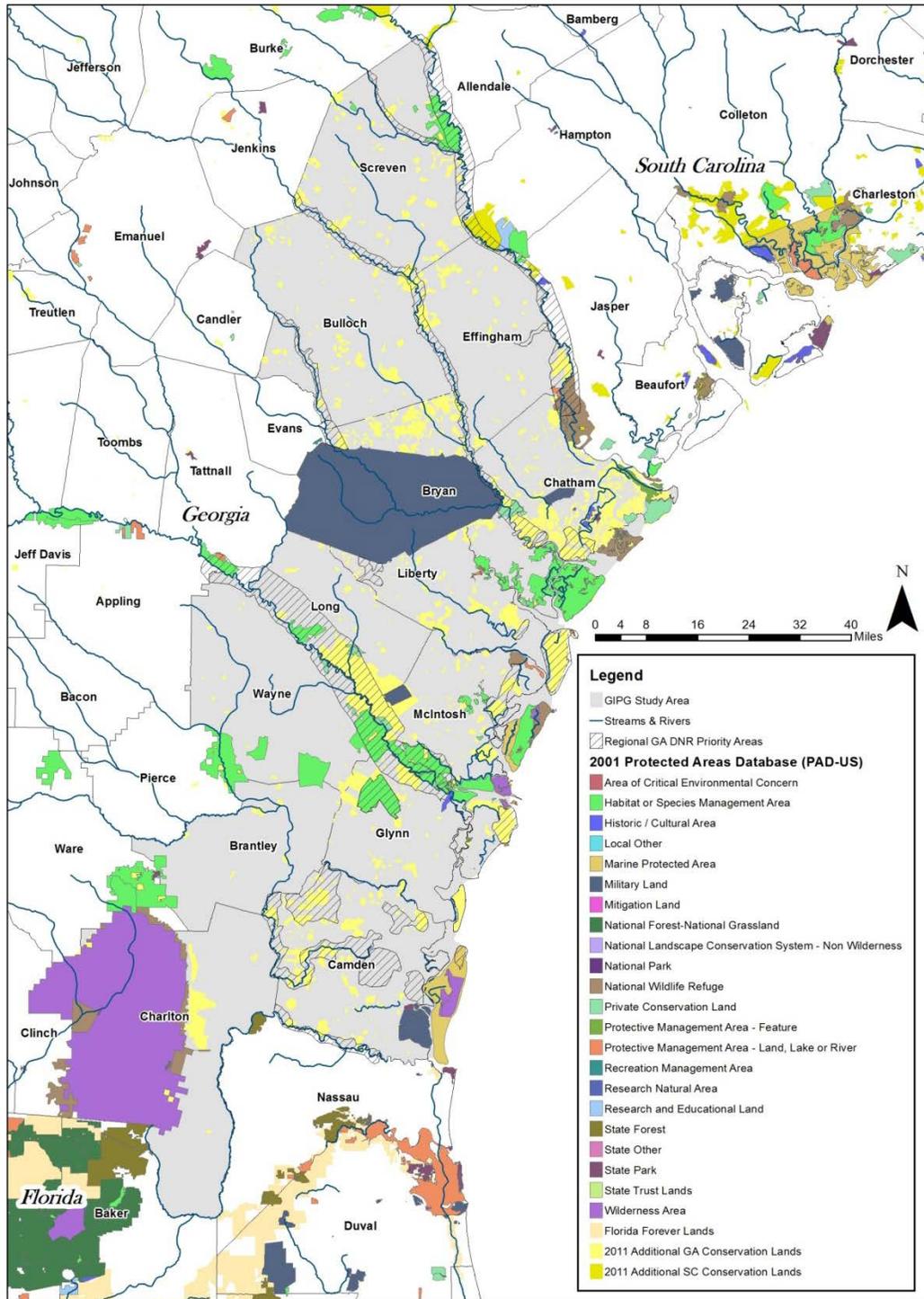


Green Infrastructure Planning Guidelines (GIPG)



MAP # 3 EPA Southeastern US Ecological Framework Project

2001 Southeast GAP Analysis – Protected Areas

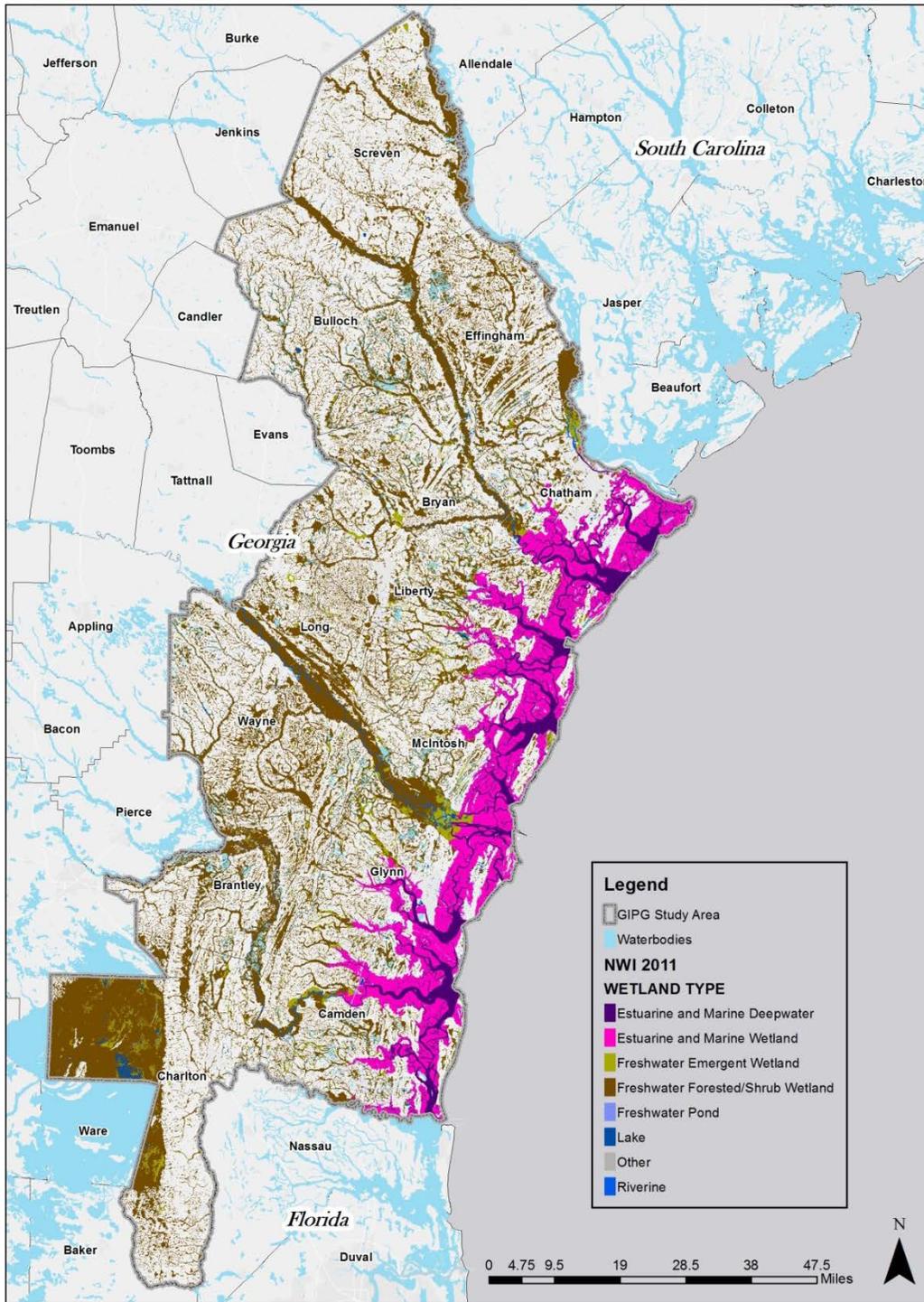


Green Infrastructure Planning Guidelines (GIPG)



MAP # 4 2001 Southeast GAP Analysis Project Protected Areas Database (PAD-US)

2011 National Wetland Inventory

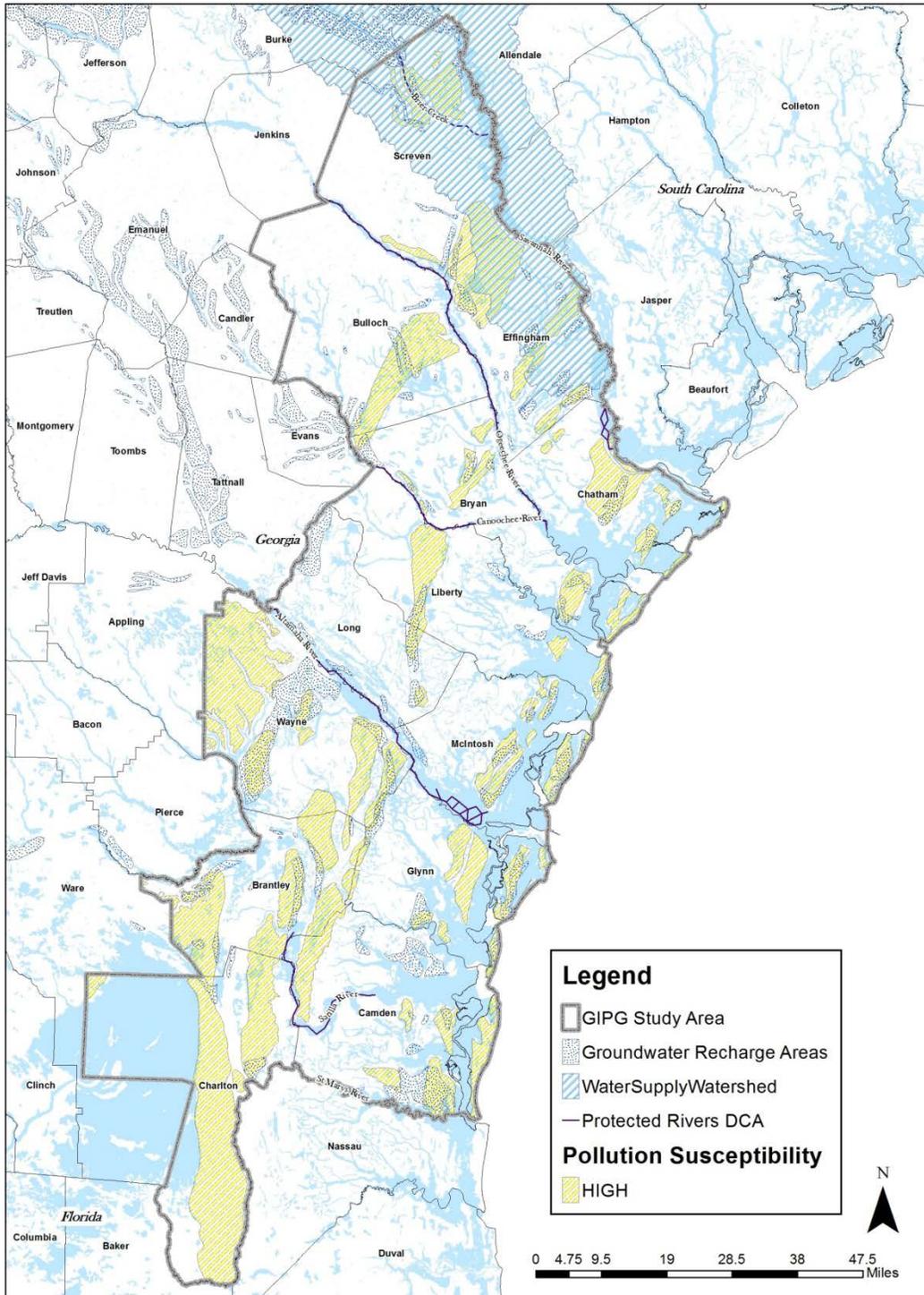


Green Infrastructure Planning Guidelines (GIPG)



MAP # 5 2011 National Wetlands Inventory

Hydrology

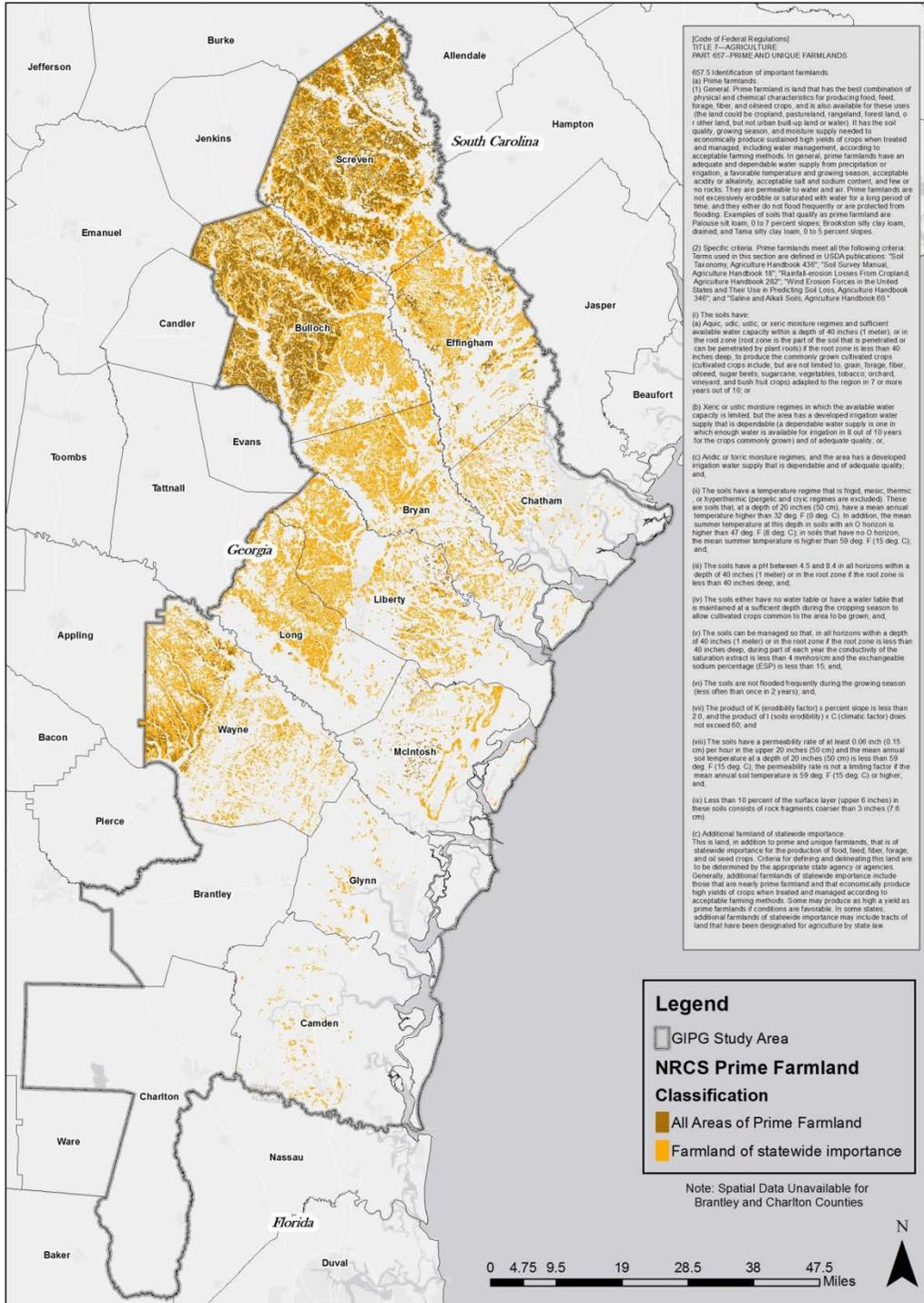


Green Infrastructure Planning Guidelines (GIPG)



MAP # 6
Hydrology

NRCS Prime Farmlands

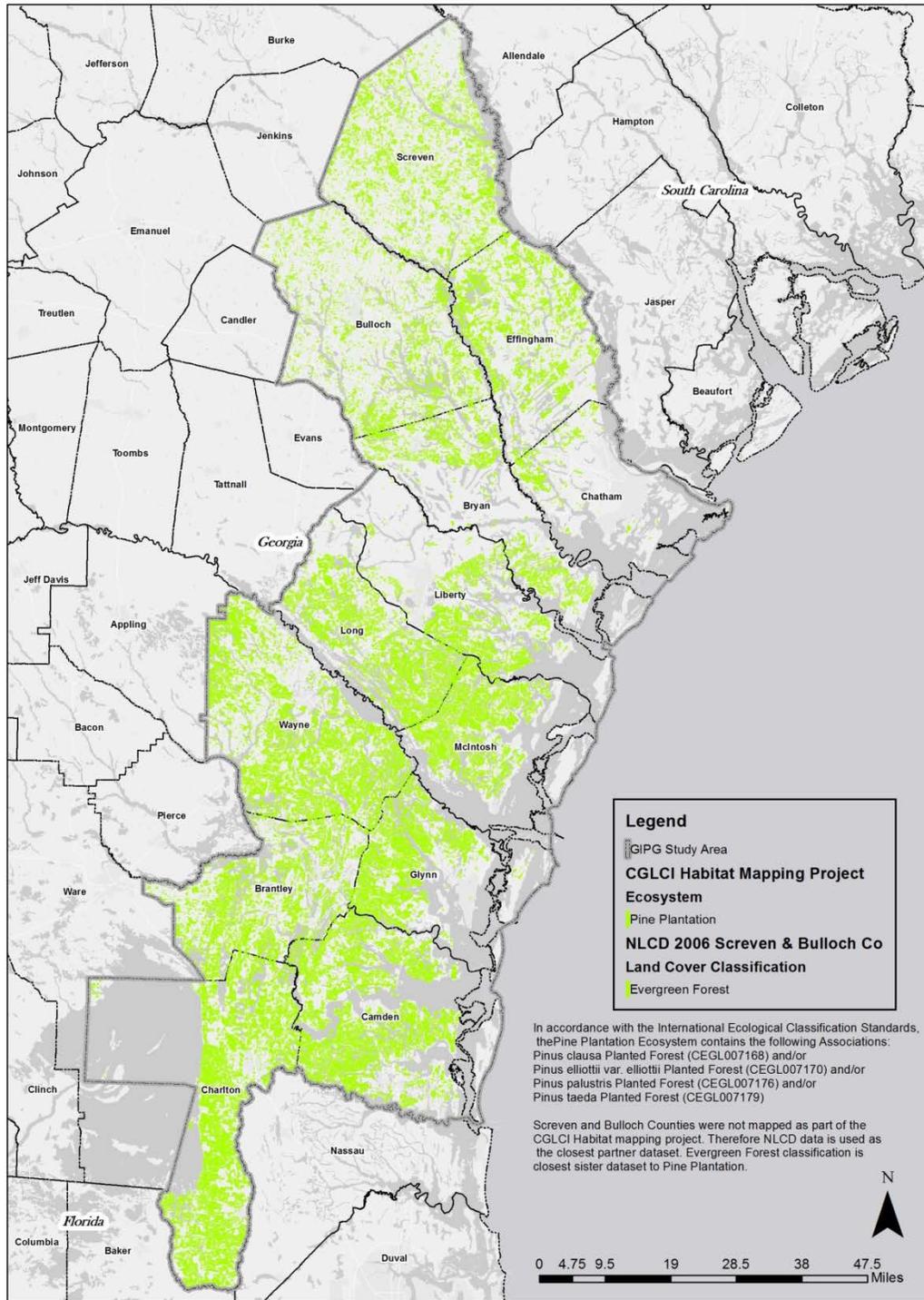


Green Infrastructure Planning Guidelines (GIPG)



MAP # 7
Natural Resources
Conservation Services
Prime Farmlands

Pine Plantations

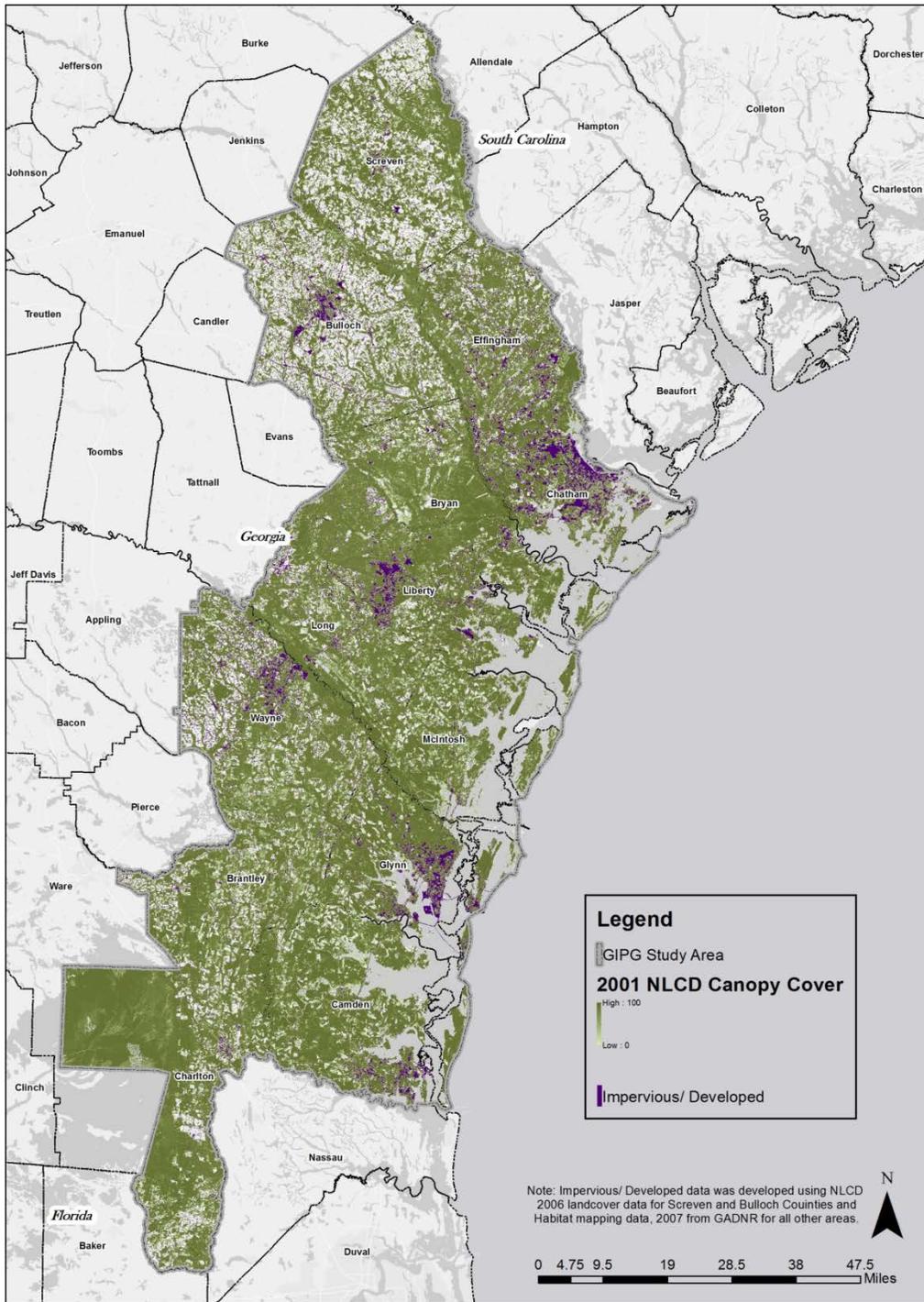


Green Infrastructure Planning Guidelines (GIPG)



MAP # 8 Pine Plantations

NLCD Canopy Cover

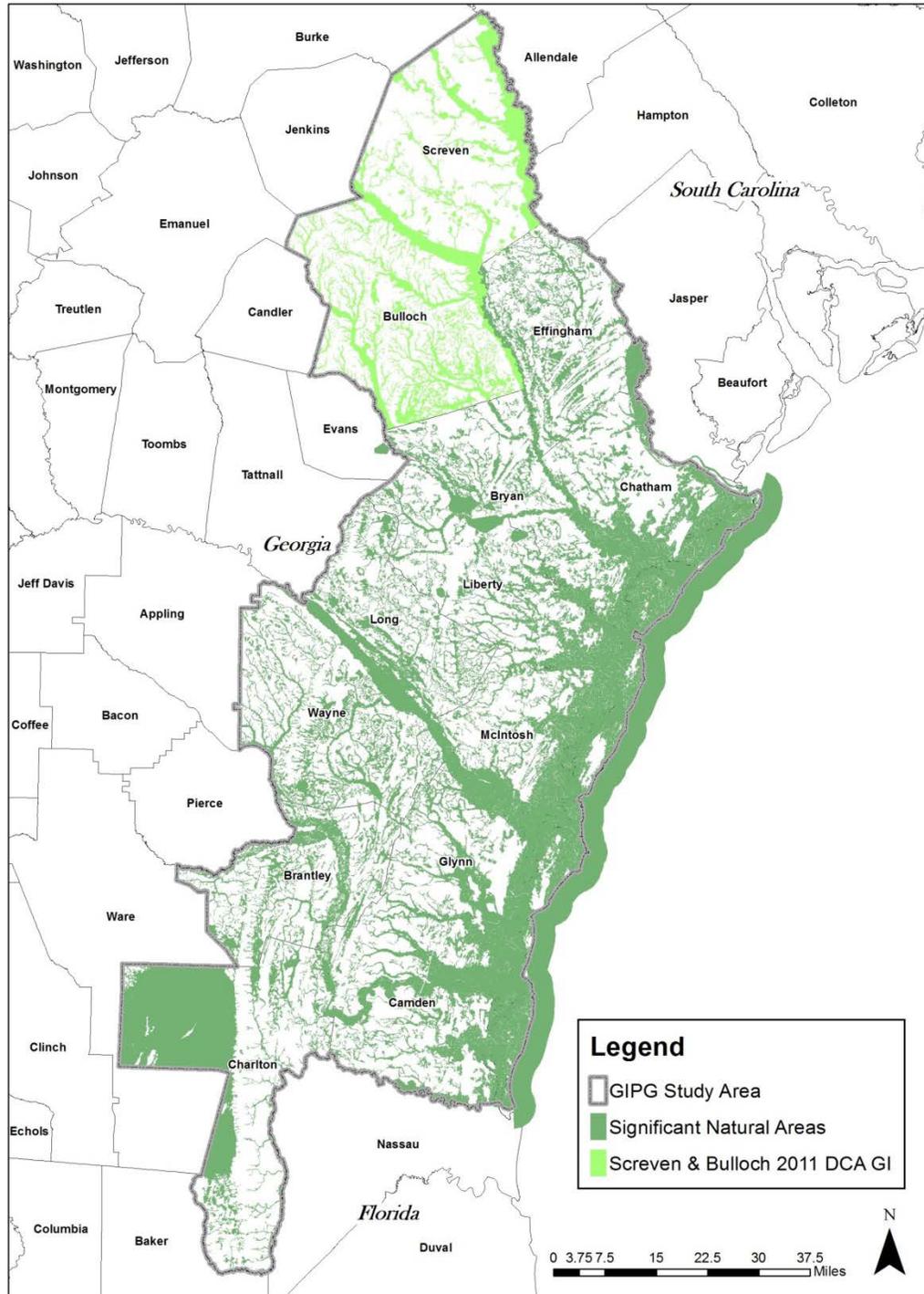


Green Infrastructure Planning Guidelines (GIPG)



MAP # 9
NLCD 2001 Canopy Cover

Significant Natural Lands

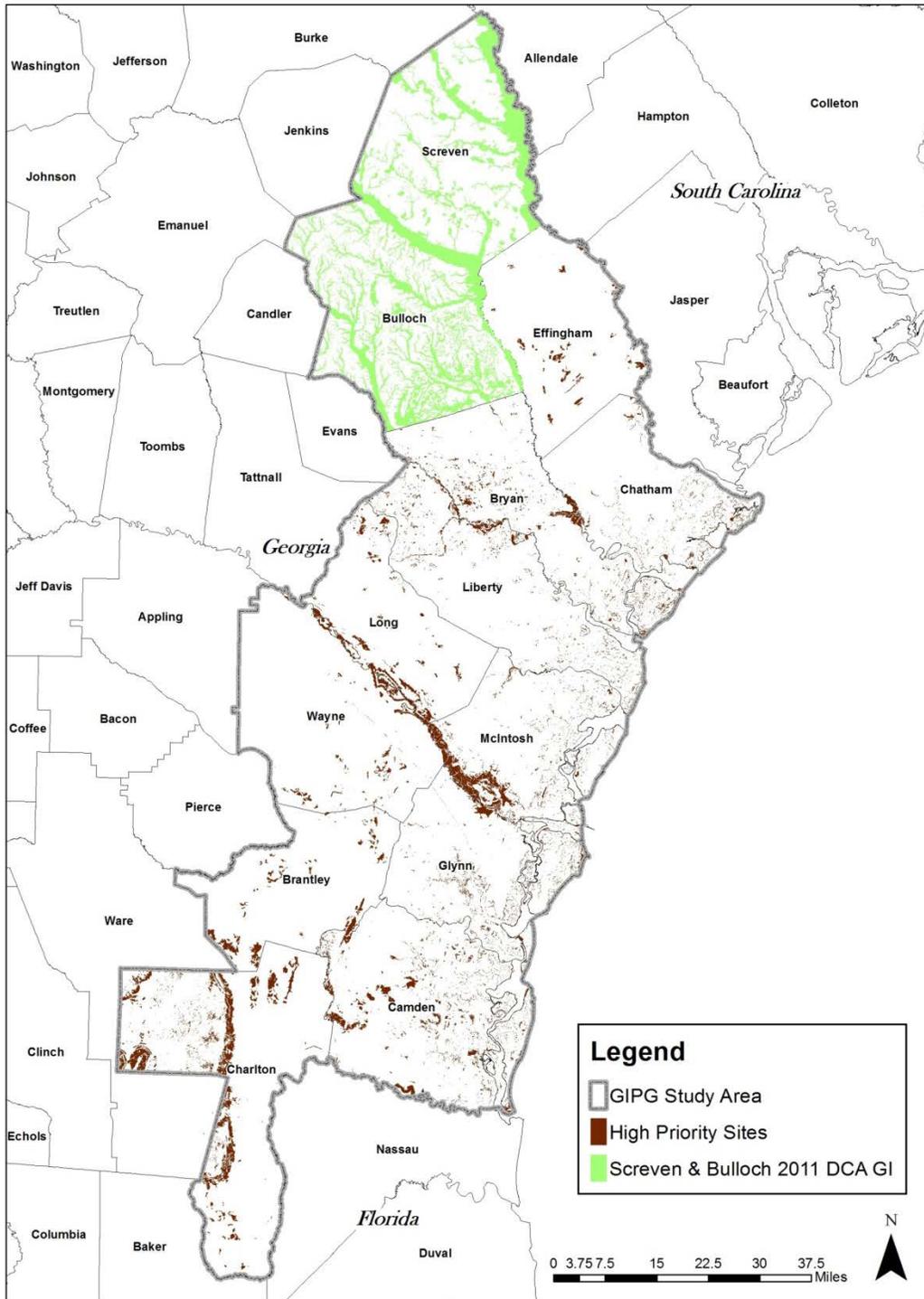


Green Infrastructure Planning Guidelines (GIPG)



MAP # 10
Green Infrastructure
Network Components

High Priority Sites

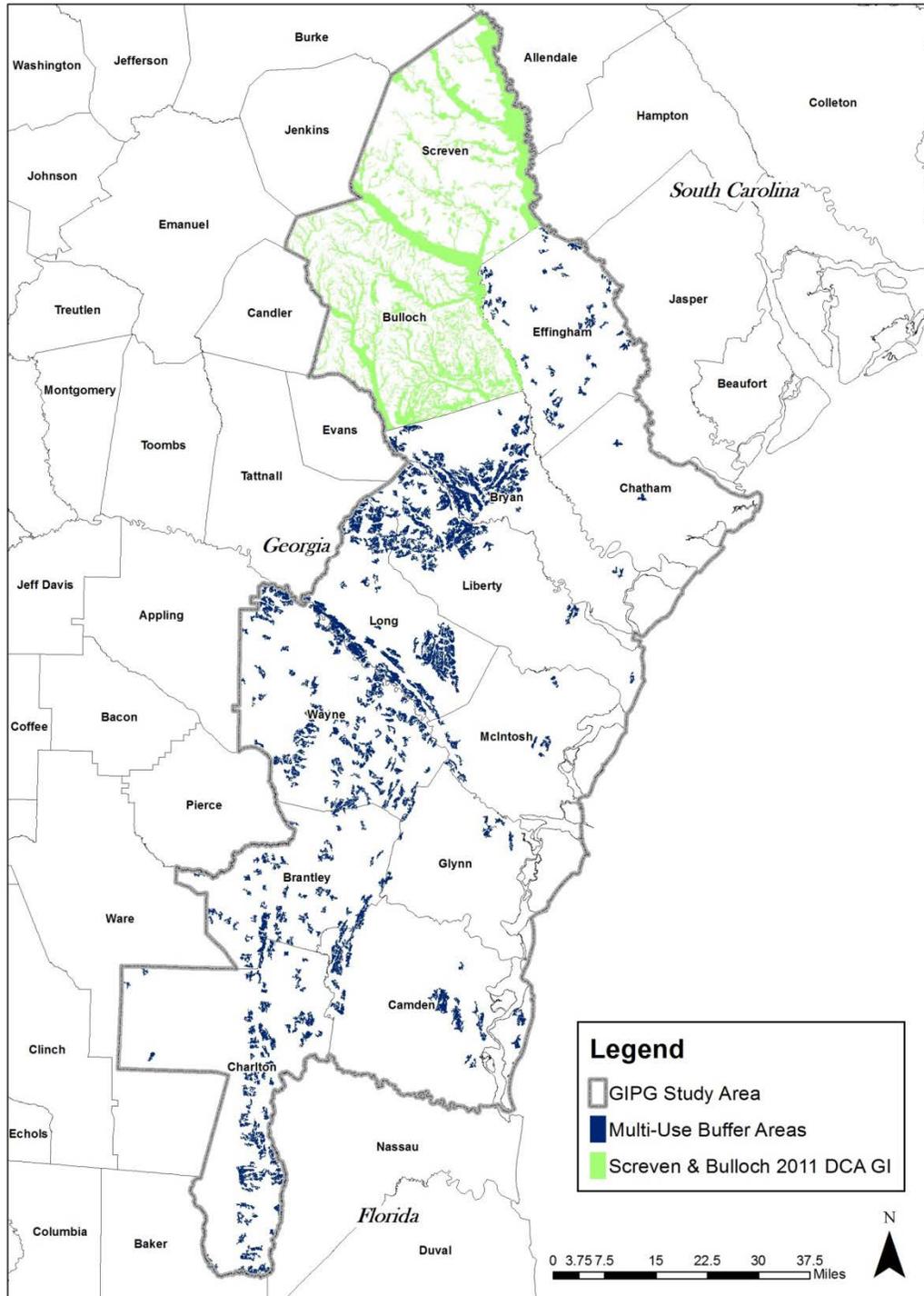


Green Infrastructure Planning Guidelines (GIPG)



MAP # 11
Green Infrastructure
Network Components

Multi-Use Buffers

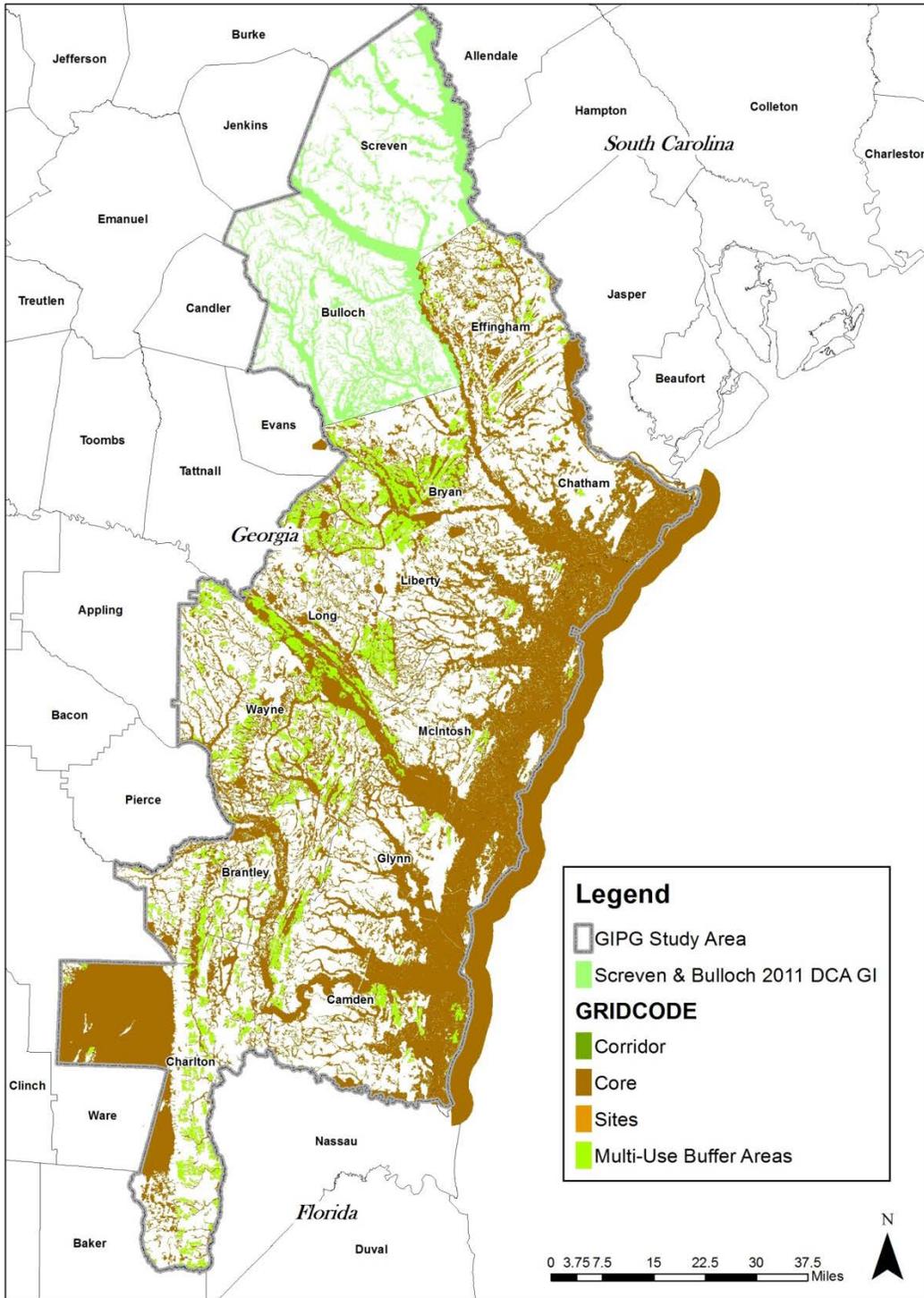


Green Infrastructure Planning Guidelines (GIPG)



MAP # 12
Green Infrastructure
Network Components

Green Infrastructure Network Components

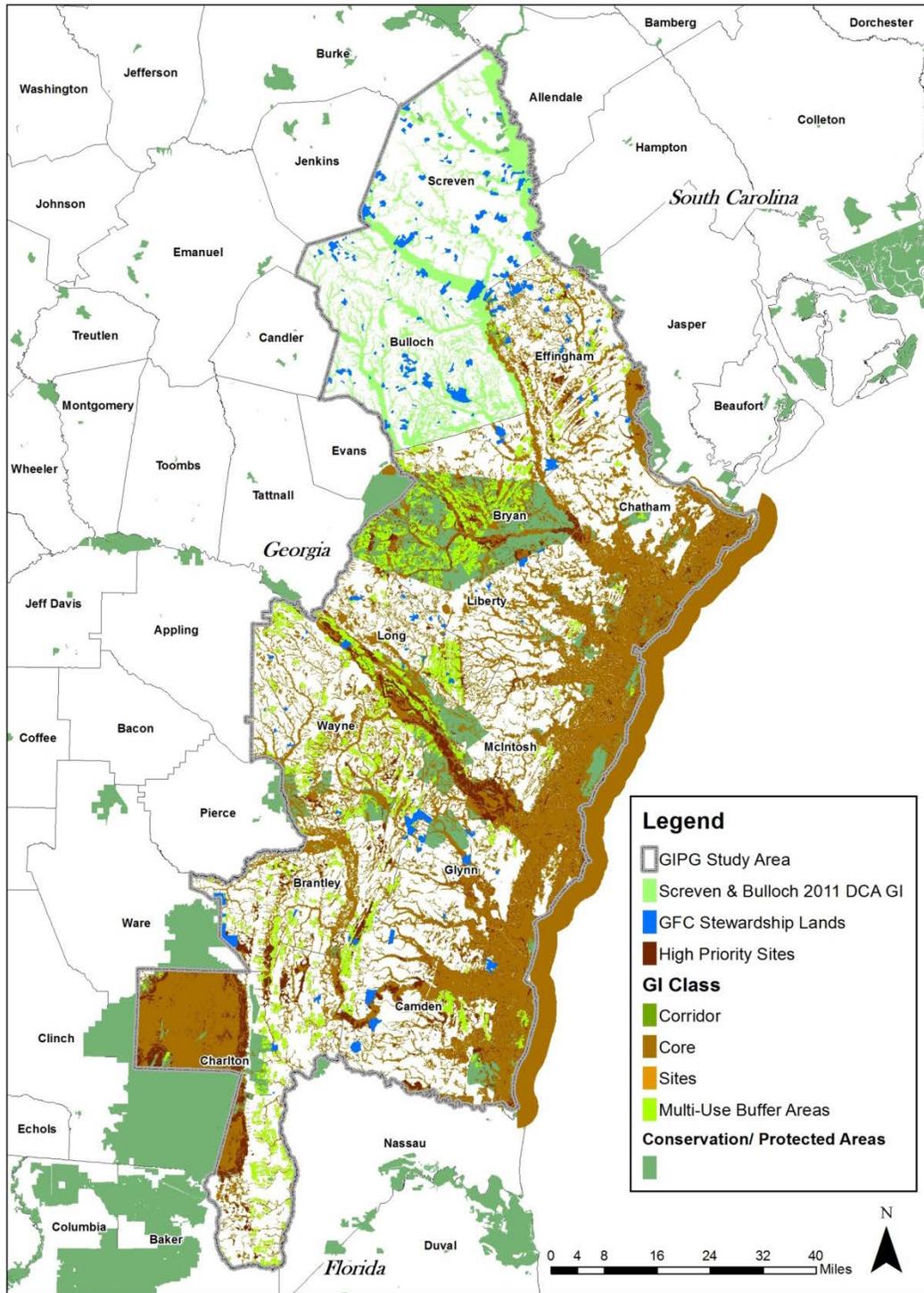


Green Infrastructure Planning Guidelines (GIPG)



MAP # 13
Green Infrastructure
Network Components

Green Infrastructure Network Components Expanded



Green Infrastructure Planning Guidelines (GIPG)



MAP # 14
Green Infrastructure
Network Components