East Gulf Coastal Plain Ecoregional Plan

East Gulf Coastal Plain
Core Team

March 1999 -
Revised 2001

Executive Summary

In 1996 The Nature Conservancy (TNC) developed an ecoregional approach to conservation, outlined in *Conservation by Design: A Framework for Mission Success* (TNC 1996), stating that biodiversity conservation requires working at larger scales and along ecological instead of geopolitical lines. Ecoregions, large units of land and water delineated by characteristic biotic and abiotic factors, provide a better geographic basis than states for organizing our conservation priorities and actions. Ecoregions encourage us to look at many species and ecological communities at once, and they provide a structure for capturing genetic and ecological variability within species or communities. The Nature Conservancy will complete ecoregional planning efforts in the 63 domestic ecoregions *(*Map 1) by the end of 2001. The major products of an ecoregional plan include: 1) identification of a suite of sites that, if protected, collectively conserve the biodiversity of the ecoregion, 2) identification of data gaps to improve the quality of future conservation decision-making and 3) an implementation plan to protect sites, including strategies and conservation partners. This report includes the suite of sites and the identification of data gaps.

The East Gulf Coastal Plain ecoregion encompasses portions of five states (Georgia, Florida, Alabama, Mississippi, and Louisiana) and over 42 million acres, stretching from the southwestern portion of Georgia across the Florida Panhandle and west to the southeastern portion of Louisiana (Map 2). The ecoregion has a stunning diversity of ecological systems, ranging from sandhills and rolling longleaf pine-dominated uplands to pine flatwoods and savannas, seepage bogs, bottomland hardwood forests, barrier islands and dune systems, and estuaries. In fact, in North America, the East Gulf Coastal Plain ecoregion is one of the true hotspots of biodiversity and endemism. Many species, particularly vascular plants, reptiles, amphibians, and fishes occur only in this ecoregion, and many are even more narrowly limited within the ecoregion.The freshwater aquatic systems of the East Gulf Coastal Plain are among the most significant aquatic biodiversity resources in North America. Many aquatic animals are endemic to the ecoregion, with many species occurring only in a single river system and its tributaries.

Fire-maintained longleaf pine and slash pine woodlands, and their associated seepage bogs and depression wetlands, once dominated a string of five ecoregions from southeastern Virginia to eastern Texas, including the East Gulf Coastal Plain (Map 3). This system has now been reduced to less than five percent of its former range, making it one of the most endangered landscapes in North America (Noss et al, 1995). Not only have these pineland ecosystems in the East Gulf Coastal Plain been directly reduced in extent, but remaining areas are also fragmented and many suffer from the exclusion of fire, a critical ecological process for their maintenance and health. Aquatic systems have been severely affected by hydrologic alterations, pollution, and introduction of non-native species. Most of the hundreds of species endemic to the ecoregion, many of which were never common, have been further imperiled by these changes.

The conservation goal for the East Gulf Coastal Plain ecoregion is the long-term protection of all viable native species and community types through the design and conservation of portfolios of sites within the ecoregion.

Ecological community types as well as imperiled plant and animal species, collectively called "conservation targets" were used to identify a portfolio of 132 sites. The sites range from landscape scale complexes to "standard" sites, that if protected will ensure the long-term biodiversity of this significant ecoregion. Conservation targets included 288 species-level and 133 community-level targets (Table 1). Each conservation target was assigned a goal for the number of populations, or occurrences, that should be protected within the portfolio of sites to ensure that target's long-term sustainability.

Table 1. Conservation Targets

TARGET GROUPS	G1[1] (T1)[7]	G2[2] (T2)[8]	G3[3]	G4[4]	G5[5]	G?[6]	TOTAL TARGETS
Communities	15	53	41	13	7	4	133
Vascular Plants	25	45	35	13	20	0	138
Non-vascular Plants	1	0	0	0	0	0	1
Amphibians	0	5	2	3	2	0	12
Birds	0	0 (1)	4	7	2	0	14
Fish	3	7 (1)	11	1	1	0	24
Mammals	0 (5)	1 (2)	3	1	0	0	12
Reptiles	2	4 (1)	5	3	5	0	20
Invertebrates	27	28	8	3	1	0	67
TOTAL BY G RANK	78	148	109	44	38	4	**421**

The portfolio site acreage totals nearly 11 million acres (25% of the ecoregion). Of these sites, 96 are terrestrial, 32 are freshwater aquatic, and 4 are classified as coastal/barrier island. In addition to the 132 portfolio sites, significant estuaries across the East Gulf Coastal Plain were identified.

Most of the identified portfolio sites have mixed ownership (Table 2). Over 30 percent of the portfolio acreage (3,323,861 acres) is in public ownership, including almost all of the landscape scale sites. By acreage, the largest public ownership at portfolio sites is the U.S. Forest Service (1,524,775 acres). Approximately 39 percent of sites (51 sites) have some corporate/ industrial ownership. Twelve percent of sites (17 sites) currently have some Nature Conservancy ownership.

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[1]Critically imperiled globally because of extreme rarity (5 or fewer known extant populations) or because of some factor(s) making especially vulnerable to extinction.
[2]Imperiled globally because of rarity (6 to 20 known extant populations) or because of some factor(s) making it very vulnerable to extinction throughout its range.
[3]Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single physiographic region), or because of other factors making it vulnerable to extinction throughout its range (21 to 100 known extant populations).
[4]Apparently secure globally, though it may be quite rare in parts of it range, especially at the periphery (100-1000 known extant populations).
[5]Demonstratably secure globally, although it may be quite rare in parts of its range, especially at the periphery (1000+ known extant populations).
[6]The global extant is not known.
[7&8]Subspecies or variety rank (e.g., G5T4 applies to a subspecies with a global species rank of G5, but with a subspecies rank of T4).

Table 2. East Gulf Coastal Plain Portfolio Site Acreage by Landowner Category

LANDOWNER CATEGORY	PORTFOLIO ACREAGE	PERCENT OF PORTFOLIO
Department of Defense	**668,866 acres**	**6.1%**
National Park Service	**120,481 acres**	**1.1%**
U.S. Fish and Wildlife Service	**212, 651 acres**	**1.9%**
U.S. Forest Service	**1,524,775 acres**	**14.0%**
State/County Land	**795,695 acres**	**7.3%**
Other Public Land	**1,394 acres**	**0.012%**
The Nature Conservancy *	**8,247 acres**	**0.077%**
Other Private Land	**7,550,790 acres**	**69.4%**

*** Acreages were not available for all TNC preserves**

Across the portfolio, 63 percent of the animal targets captured at portfolio sites had enough existing populations to ensure their long-term sustainability. Fifty percent of plant targets met their conservation goals for long-term sustainability at portfolio sites, and 80 percent of community targets met their conservation goals. Overall, 87 percent of targets (species and communities) had at least one viable occurrence captured in the portfolio (100 percent of all communities had at least one viable occurrence in the portfolio). Approximately 70 percent of all G1 and G2 target species, which are most imperiled, met conservation goals. For animal species by major group, over 70 percent of target amphibians, reptiles, and invertebrates met conservation goals.

While the identified portfolio of sites is relatively robust, additional taxonomic and geographic survey work will undoubtedly reveal additional important conservation areas. Significant data gaps identified in the ecoregion, that if filled, might modify the ecoregional portfolio of sites include:

- Portions of Alabama, Georgia, and Mississippi,
- Inventory of ecological communities, particularly more common community types,
- Aquatic community surveys, especially in smaller tributaries of major rivers,
- Inventory of aquatic species, such as fish, crayfish, and mussels, and
- Inventory of terrestrial invertebrates.

To provide a focus for conservation action over the near term and to measure the success of these actions at conserving biodiversity, the Core Team selected twenty-four “Stage 1” priority sites from the full list of portfolio sites (Table 3). Stage 1 sites cover 6 million acres and include all of the landscape scale sites identified in the portfolio. Further, of Stage 1 sites, 9 are aquatic sites and the majority has some public ownership.

Table 3. East Gulf Coastal Stage 1 Sites

Abita Creek Complex	Fort Benning
Apalachicola National Forest	Grand Bay Savanna
Upper Apalachicola	Gulf Islands
Bainbridge Longleaf Pine	Indigo Pond
Blackwater River	Mobile-Tensaw River Delta
Blackwater/Conecuh	Pascagoula Watershed Area
Connector/ Conecuh NF	Pearl River
Chipola River	Perdido Pitcher Plant Bog
Worth/Colquitt County Pinelands	Red Hills
Conecuh/Escambia/	Splinter Hill Bog
Choctawhatchee Rivers Corridor	Tallahatta Bluffs and Ravines
Eglin Air Force Base Megasite	University of Mississippi Lands
Flint/Apalachicola Rivers and Bay	Yellow/Shoal Rivers

In addition, the Core Team identified six Watershed Project Areas where it will be important to work with partners to achieve conservation of high priority aquatic sites. Watershed Project Areas were based on the Stage 1 aquatic sites and include (Map 4):

- Perdido/Escambia/Conecuh/Blackwater/Yellow/Shoal/Choctawhatchee Rivers
- Pascagoula/Escatawpa Rivers
- Mobile-Tensaw River Delta
- Lower Apalachicola/Chipola Rivers
- Flint River
- Pearl River

Strategies that directly abate threats at single sites or clusters of sites in landscapes will comprise the majority of Nature Conservancy conservation efforts within the ecoregion. State Conservancy programs will develop single site strategies through site conservation plans, strategic partnerships with public and private partners, community visioning processes, and other means consistent with *Conservation by Design* (TNC 1996). Conservation activities at a single site will include the Conservancy's foundation strategies, such as acquiring and managing land, building conservation partnerships, working with public agencies, implementing compatible economic development strategies , increasing the availability of conservation funding and providing the best available science.

While conservation action at single sites will remain the cornerstone of Nature Conservancy activity in ecoregions, opportunities also exist for abating threats across multiple sites. Opportunities include cooperating across state boundaries and sites and building capacity to facilitate multi-state fire teams, increased funding for conservation land acquisition, and coordinated activities for grants and contracts.

Current opportunities for conservation of the extraordinarily rich biodiversity resources in this ecoregion are great, but effective conservation action will be needed quickly, before opportunities become more limited. Ecoregion-based conservation in the East Gulf Coastal Plain is a dynamic process. Gathering additional data, testing assumptions, and implementing proposed strategies will better inform future iterations of the ecoregional plan and improve our conservation effectiveness.

Acknowledgements

The development of the plan for the East Gulf Coastal Plain ecoregion would not have been possible without the dedicated effort, input, and support of many individuals and programs throughout the many stages of the planning process.

Particular acknowledgement is given to Core Team and Technical Team members (from TNC Field Offices and Natural Heritage Programs in Alabama, Florida, Georgia, Louisiana, and Mississippi as well as Conservancy staff from the Southeast Regional Office) who contributed a significant amount of time for team meetings, conference calls, methodology development, and data review. In addition, the successful implementation of this plan depends on the continued support and leadership of the five State Directors in this ecoregion.

Special thanks are given to the Alabama Natural Heritage Program, the Florida Natural Areas Inventory, the Georgia Natural Heritage Program, the Louisiana Natural Heritage Program, and the Mississippi Natural Heritage Program for their contribution of data and support of this process, without which there would be no credible first iteration of the plan. Also, without the data management and GIS technical expertise of Clifton Eakes and John Prince, we would never have been able to select target elements, let alone complete the complex tasks of data analysis, portfolio assembly, and accounting of goals. Thanks to Lisa Creasman for her assistance in the 2001 revision of the plan.

Thanks also go to the following individuals who contributed their tremendous expertise to various components of the planning and implementation process: Maggie Coon, Martha Green, Craig Groves, Alyson Heyrend, Bruce Sorrie, and Diane Vosick.

We also would like to thank the Kate Ireland Foundation, the Perkins Foundation, Tenneco, Inc., and the Turner Foundation, Inc., for their early support of ecoregional planning in the East Gulf Coastal Plain.

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Chapter 1

Introduction to the East Gulf Coastal Plain Ecoregion

1.1. Ecoregional Planning Overview

1.1.1. Ecoregional Planning in The Nature Conservancy

Responding to consensus in the scientific community that biodiversity conservation requires working at larger scales and along ecological instead of geopolitical lines, in 1996 The Nature Conservancy (TNC) developed an ecoregional approach to conservation outlined in *Conservation by Design: A Framework for Mission Success* (TNC 1996). Ecoregions provide a better geographic basis than states for organizing our conservation priorities and actions, they encourage us to look at many species and communities at once, and they provide a structure for capturing genetic and ecological variability within species or communities (Map 1).

Conservation by Design states that the Conservancy's conservation goal is the long-term survival of all viable, vulnerable native species and all viable native community types through the identification and conservation of a suite, or "portfolio," of sites in every ecoregion. Collectively conserved and managed, the portfolio of sites will sustain species, communities, and ecoregional biodiversity in the long-term. Designing a portfolio of sites in an ecoregion provides a "blueprint" that shows what biodiversity conservation success looks like, sets an end-point for conservation, enables practitioners to set priorities among sites, and given limited dollars and hours, aids practitioners in developing the most effective, highest leverage strategies to conserve sites.

Three main products of an ecoregional plan include:

1. Identification of a suite, or portfolio, of sites that will collectively conserve the vulnerable, viable native species and the viable natural community types in the ecoregion. The suite of sites gives us a "blueprint" for what biodiversity conservation success looks like in the ecoregion and focuses our limited time and dollars on the most feasible, highest biodiversity, highest leverage conservation sites;
2. Identification of data gaps to improve the comprehensiveness and quality of our conservation efforts in the future; and
3. An implementation plan to protect the portfolio of sites, including setting priorities for conservation actions, identifying partners, and developing strategies to abate threats.

While identifying sites is a major component of ecoregion-based conservation, the process is not planning for planning's sake. Once portfolio sites are identified, strategies to conserve the sites, as well as the target elements and ecological functions at the sites, will be developed. Additionally, data gaps that might influence where we work and how we establish our priorities will continue to be identified.

The conservation "blueprint" created through the identification of portfolio sites represents all of the places critical for conservation in an ecoregion, not just the places where The Nature Conservancy will work. The conservation blueprint is larger than the work of any one organization or agency. As the implementation plan is developed and further refined with the involvement and input of partners, efforts will be enhanced and will result in many partners working collectively to implement the conservation plan. An essential component of ecoregion-based conservation is engaging all the stakeholders in the work at these sites.

1.1.2. East Gulf Coastal Plain Ecoregional Planning

In addition to *Conservation by Design* (TNC 1996*)*, the portfolio design component of the East Gulf Coast Plain (EGCP) ecoregional plan also followed the ecoregional planning steps outlined in a second document, *Designing a Geography of Hope: Guidelines for Ecoregion-Based Conservation in The Nature Conservancy (*TNC 1997) .

The East Gulf Coastal Plain ecoregional planning process was steered by an interdisciplinary group called the Core Team and supported by several sub-committees called Technical Teams (see Section 2.1). The Core Team, represented by five Field Office and Natural Heritage Programs, as well as Southeast Regional staff support, had primary input into the planning process. The Core Team determined what methodologies were used for planning and contributed vital on-the-ground expertise about targets, sites, priorities, and communications issues. Additionally, Core Team members and their respective state Chapters committed to implementing conservation action at portfolio sites. Technical teams provided expertise on botanical, ecological, zoological, and data management issues.

While components of the planning process were organized linearly in this document, many planning activities occurred simultaneously and involved complex flows of data from one stage of the process to another. The ecoregional plan described in this document is a first iteration and represents best available data as of April 1998 (multi-state Biological Conservation Database (BCD) data from July 1997). Planning teams also identified significant data gaps and strategies to address those data gaps in the near future. The Core Team recognizes that ecoregional planning is a dynamic process and anticipates completing a second iteration of the plan in the next few years.

1.2. Ecological Description of the East Gulf Coastal Plain Ecoregion

The East Gulf Coastal Plain ecoregion encompasses portions of five states (Georgia, Florida, Alabama, Mississippi, and Louisiana) and over 42 million acres from the southwestern portion of Georgia across the Florida Panhandle and west to the southeastern portion of Louisiana (Map 2). The ecoregion has a diversity of ecological systems, ranging from sandhills and rolling longleaf pine-dominated uplands to pine flatwoods and savannas, seepage bogs, bottomland hardwood forests, barrier islands and dune systems, and estuaries. In North America, the East Gulf Coastal Plain ecoregion is one of the true hotspots of biodiversity and endemism. Many species, particularly vascular plants, reptiles, amphibians, and fishes occur only in this ecoregion, and many of those are even more narrowly limited within the ecoregion.

The East Gulf Coastal Plain ecoregion is a portion of Bailey's (Bailey 1998) larger Outer Coastal Plain Mixed Forest Province. The five ecoregions that make up the southern portion of this province, including the East Gulf Coastal Plain, share many characteristics. These ecoregions, collectively referred to as the Southeast Coastal Plain (Map 3), are physically characterized by subtle topography, a warm to hot, humid, maritime climate, and soils derived primarily from unconsolidated sands, silts, and clays transported to the ecoregion by the weathering of the Appalachian Mountains. The Southeast Coastal Plain ecoregions also share other features, including: a high percentage of land area in wetlands, a dominant role of frequent fire over the majority of the landscape, a diversity of river and stream systems, limited but important karst areas, diverse estuarine and tidal systems and significant large scale disturbance events, such as hurricanes.

The meager topographic and soil diversity of the East Gulf Coastal Plain would seemingly suggest an area of low biodiversity and endemism, yet the ecoregion is one of the biologically richest in North America. Among the Southeastern Outer Coastal Plain ecoregions, the East Gulf Coastal Plain experiences high species richness, species endemism, and community diversity in terrestrial, freshwater and aquatic systems (Sorrie and Weakley [in prep.], Thorne, 1993). Part of the reason for this is that the ecoregion has never been glaciated, and has been continuously occupied by plants and animals since the Cretaceous, giving ample time for the evolution of narrow endemic species.

The dominant ecological drivers of the terrestrial systems are soils (texture and chemistry), fire frequency, and hydrology. Habitats in the East Gulf Coastal Plain include barrier island systems with annual-dominated beaches, maritime grasslands and scrub, maritime shrub hammocks, and evergreen forests (both broadleaf and needleleaf). These grade through salt marshes to productive estuaries. Inland, longleaf pine woodlands are dominant over most of the landscape, on upland and wetland sites and a wide variety of soils. These pinelands (sandhills, clayhills, flatwoods, and savannas) support a tremendous diversity of plant and animal species; most of them specialized to these systems. For instance, the Southeast Outer Coastal Plain as a

whole supports about 1,500 endemic vascular plant species, most of them limited to pineland habitats. Embedded in these pinelands, specialized patch communities such as seepage bogs, treeless “savannas” and “prairies”, and seasonally flooded depression ponds provide rich habitat for plants, amphibians, and invertebrates (Grossman et al, 1998). Imperiled plant species are concentrated in fire-maintained pinelands (wetland and upland), associated seepage bogs and upland depression wetlands, and barrier island communities. While many imperiled animal species also occur in these communities, there are also significant concentrations in aquatic and bottomland systems, as well as in karstlands.

The freshwater aquatic systems of the East Gulf Coastal Plain are among the most significant and at-risk aquatic biodiversity resources in North America, particularly for fish and mussel species (Master et al, 1998). The rivers can generally be categorized into three main groups: brownwater (with headwaters north of the ecoregion and carrying substantial inorganic loads), blackwater (with headwaters in the Coastal Plain and with “coffee-colored” waters dominated by organic acids), and spring-fed (with headwaters in limestone karst). Each of these groups has unique biodiversity resources. Many aquatic animals are endemic to the ecoregion, and many are restricted to a single river system and its tributaries. Thus, conservation of aquatic biodiversity in the East Gulf Coastal Plain requires conservation of most of the river systems. In addition, the East Gulf Coastal Plain supports a range of bottomland hardwood forests and cypress-gum swamps, as well as many lakes and natural ponds.

What is the current status of East Gulf Coastal Plain biodiversity? The pineland ecosystem (consisting of fire-maintained longleaf pine and slash pine woodlands and their associated seepage bogs and depression wetlands) once dominated a string of ecoregions from southeastern Virginia to eastern Texas. This system has now been reduced to less than five percent of its former range, making it one of the most endangered landscapes in North America (Noss et al, 1995). Not only have these pineland ecosystems been directly reduced in extent, but remaining areas are also fragmented and many suffer from the exclusion of fire, a critical ecological process for their maintenance and health. Aquatic systems have been severely affected by hydrologic alterations, pollution, and introduction of non-native species. Most of the hundreds of species endemic to the ecoregion, many of which were never common, have been further imperiled by these changes.

Yet, significant conservation opportunities are available. Many natural areas remain, often vulnerable to future land use changes, but available for conservation action now. A strong commitment to the land is an important part of southern culture and opportunities for working with local communities in conservation efforts abound. Several states have state-funded conservation initiatives, providing funding for acquisition of conservation lands from willing sellers. The current opportunities for conservation of the extraordinarily rich biodiversity resources of the East Gulf Coastal Plain are great, but effective conservation action will be needed quickly, before opportunities become more limited.

Chapter 2

Designing the Ecoregional Portfolio

2.1. Project Management

2. 1.1 The Core Team

The development of the first iteration of the East Gulf Coastal Plain plan involved a Core Team with at least one participant from each Nature Conservancy Field Office and Natural Heritage Program in Alabama, Florida, Georgia, Louisiana, and Mississippi, as well as staff from the Southeast Regional Office. The Core Team was an interdisciplinary group with staff representation from Science, Stewardship, Protection, and Development backgrounds. The Core Team, which served as a steering committee and decision-making group for the ecoregion, also had a team leader who was responsible for keeping the work of the Core Team on track, monitoring the ecoregional budget center, and ensuring team communications.

The Core Team was the group charged with the overall responsibility for developing an ecoregional plan and implementing conservation based on the plan in the East Gulf Coastal Plain ecoregion. With representatives from eleven state and regional programs, the Core Team guided methodology development, identified a portfolio of sites, and made decisions about the planning process. Core Team members were accountable to the group as a whole, as well as to their individual programs. The Core Team functioned as a democratic unit and worked to resolve any conflicts or differences of opinion as they arose by finding common ground and compromise.

The Core Team developed a “job description” to explicitly outline team roles and responsibilities (Appendix E). In particular, responsibilities included:

- providing leadership in the planning process,
- acting as the primary liaison between the Core Team and each Team member’s program,
- facilitating and participating on Technical Teams,
- determining budget allocations,

- identifying partners,
- participating in portfolio assembly, and
- developing implementation plans.

The Core Team leader had additional responsibilities that included keeping the planning process moving forward, making sure benchmarks were accomplished on time, tracking the budget, and ensuring the flow of communication between Core Team members, Technical Teams, and individual programs. The Southeast Conservation Science (SCS) staff from the Southeast Regional Office provided facilitation and coordination support to the teams and developed methodologies used by the Core Team and Technical Teams.

2.1.2. Technical Teams

The Core Team had several supporting Technical Teams that conducted much of the portfolio assembly data analysis and made many of the detailed decisions that were critical to the progress of the plan. Technical Teams included Botany, Zoology, Community Ecology, and Conservation Areas teams. There also were several less formal sub-teams, such as a Data Management team that worked to compile data into a centralized database, and a Development team. Technical Team members were from Field Offices and Heritage Programs, as well as experts from state agencies and local universities. At least one Core Team member participated on each Technical Team.

While each Technical Team had particular responsibilities related to its area of expertise and identified tasks, general responsibilities for all Technical Team members included:

- conducting work critical to the progress of ecoregional planning and conservation, including making detailed decisions in each Team's area of expertise (e.g., zoology, data management, community ecology);
- communicating with Core Team members and other office staff;
- enlisting help from others to get relevant information or expertise as appropriate (non-TNC partners and stakeholders);
- coordinating discipline-specific tasks across states, Field Offices, and Heritage Programs by sharing ideas, tasks, and Technical Team membership;
- setting specific timelines and budgets for tasks; and
- identifying resource needs and capacity issues for respective offices/programs.

Additional Technical Team Leader Responsibilities included:

- setting up conference calls and meetings between team members;
- acting as a liaison to the Core Team -- reporting progress, meeting minutes, resource needs, and timelines to the Core Team;
- monitoring task/implementation progress against goals and timelines, and motivating Technical Team members to keep the process on track; and
- establishing sub-teams, if needed, to accomplish specific tasks.

2.2. Data Sources

The East Gulf Coastal Plain ecoregional plan is primarily element based (species and natural communities). Data assembled and analyzed in the portfolio design process consisted of species and community Element Occurrence Records (EORs) from the Biological Conservation Databases (BCD) of the five Natural Heritage Programs in the ecoregion (July 1997 data). BCD data were compiled into a centralized database. Supplemental information provided by Heritage staff and other experts on the location, quality, and viability of undocumented species and natural community populations/ occurrences complemented existing BCD records. Appendix F provides detailed information on data management and information flow throughout the portfolio assembly process.

The following Heritage Programs provided the species and community data for the East Gulf Coastal Plain Ecoregion: Alabama Natural Heritage Program, Florida Natural Areas Inventory, Georgia Natural Heritage Program, Louisiana Natural Heritage Program, and Mississippi Natural Heritage Program. Other expert input came from individuals associated with state agencies and local universities.

Spatial data used in the Geographic Information System (GIS) component of portfolio design was imported from the ecoregional BCD dataset and U.S. EPA "BASINS" coverages into ArcView. Appendix F also provides a list of GIS coverages used throughout the portfolio assembly process as well as a list of the MSWord and Excel worksheets and tables generated and maintained for the planning process.

2.3. Evaluating Existing Conservation Areas

Land in a Nature Conservancy preserve or in public ownership has often been considered "protected" without any analysis of how the management or legal protection status of the site affects the long term viability of the species and natural communities at the site. Often times the management at the sites was directed to specific components of the system, not the full range of species and communities now recognized to exist there. In an effort to assess the status of planning and management at existing preserves and public lands, a Conservation Areas Technical Team evaluated the contribution and conservation value of existing conservation areas in the ecoregion to the East Gulf Coastal Plain goals.

The Conservation Areas Technical Team worked with the Data Management team, Heritage Program staff, and others to identify the universe of current conservation areas within the ecoregion. The team defined "conservation areas" as Nature Conservancy preserves and other private preserves, as well as federal, state and municipal owned and long-term leased lands. Conservation areas were identified through Managed Area Basic Records (MABRs), other BCD records, state and/or federal records, and interviews with experts.

As outlined in *Geography of Hope* (TNC 1997), Technical Team members ranked each conservation area on a four-point scale by its legal protection status ("L Rank") (Table 4). Several conservation areas had subunits or zones with different management or land use practices. The Conservation Areas Technical Team decided that the subunits should be nested under the larger conservation areas, but that each subunit should be ranked separately (Appendix G).

Table 4. East Gulf Coastal Plan Conservation Area Legal Protection Status
(modified from *Geography of Hope*)

L1 = Conservation areas legally designated for biodiversity conservation; active management and monitoring plans and sufficient resources support biodiversity conservation; natural processes are not significantly altered by human activities; plans, goals, and resources comprehensively support biodiversity conservation. **L2 =** Conservation areas designated and managed for nature-based human benefits and/or conservation of natural resources; natural processes are altered by human activities; OR areas that would be ranked L1, but goals, plans, and/or natural resources do not fully support L1 status. **L3 =** Conservation areas designated mainly for human uses and where natural processes are significantly altered by human activities; OR areas that would be ranked L2, but goals, plans, and/or natural resources do not fully support L2 status. **L4 =** Conservation areas designated for intensive human uses.

The Conservation Areas Team identified and ranked 230 conservation areas in the ecoregion. However, due to the distribution of target elements, not all of the evaluated conservation areas were included as portfolio sites. Of total conservation areas:

- 58 were ranked L1
- 91 were ranked as L2
- 71 were ranked L3, and
- 10 were ranked L4.

While the Conservation Areas Technical Team used the best available information, further assessment of conservation areas in portfolio sites should include management status and other data that could be gathered through interviews and research with land managers, partners, and other experts, in addition to a management analysis and an element-by-element assessment.

2.4. Identifying Conservation Targets

Following guidelines in *Conservation by Design* (TNC 1996), conservation "targets" in the East Gulf Coastal Plain were defined as viable, vulnerable native species and all viable native communities in the ecoregion. These species and communities (habitats) became the focus of conservation planning efforts in the ecoregion and were the elements around which portfolio sites were designed. Using the best available data from a centralized ecoregional database, the Botany, Zoology, and Community Ecology Technical Teams worked separately but simultaneously to select specific conservation

targets. The three taxonomic Technical Teams independently selected a total of 421 conservation targets from lists of all known species and natural community types occurring in all counties in the ecoregion (Table 5; Appendix B).

Table 5. East Gulf Coastal Plain Conservation Targets (G1-G5, T1 and T2 defined on page ii)

TARGET GROUPS	G1 (T1)	G2 (T2)	G3	G4	G5	G?	TOTAL TARGETS
Communities	15	53	41	13	7	4	133
Vascular Plants	25	45	35	13	20	0	138
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Amphibians	0	5	2	3	2	0	12
Birds	0	0 (1)	4	7	2	0	14
Fish	3	7 (1)	11	1	1	0	24
Mammals	0 (5)	1 (2)	3	1	0	0	12
Reptiles	2	4 (1)	5	3	5	0	20
Invertebrates	27	28	8	3	1	0	67
TOTAL BY G RANK	78	148	109	44	38	4	**421**

2.4.1. Species Conservation Targets

The Botany and Zoology Technical Teams reviewed information on all species occurring in the ecoregion and determined which species should be included as conservation targets. Using the best available information, conservation targets included aquatic, estuarine, marine, and terrestrial species. Targets also included "aggregations of special concern," which were particular places critical to conservation of species, such as rookeries and shorebird migration concentration areas.

Using guideline criteria developed by Southeast Conservation Science (SCS) staff (Table 6), the Botany and Zoology Technical Teams first evaluated all globally imperiled and rare species and subspecies (species with global ranks of G1, G2, T1, and T2 – defined p.ii) for inclusion as targets. Evaluation included determining the overall viability of the potential target species by reviewing known element occurrence ranks and using expert opinion. Species the Technical Teams considered non-viable were dropped from the target list.

After evaluating the most rare species, several more common native species (global ranks of G3, G4, and G5 – defined p. ii) were also identified as targets because they were:

- highly threatened or declining through all or part of their range,
- endemic to the ecoregion,
- widely disjunct from another ecoregion, or
- area sensitive (requiring landscape scale sites to be viable).

The Botany Technical Team identified 139 plants as conservation targets. A majority of the plant targets were identified as endemic to the ecoregion or widely disjunct from another ecoregion. Because of the paucity of data on non-vascular plants, only one non-vascular plant (a G1 species) was selected as a conservation target.

The Zoology Technical Team selected 149 animals as conservation targets, including 67 invertebrate species. Reflecting both the high biodiversity and threat to aquatic systems in the ecoregion, many of the animal targets were aquatic species, including 24 fish species and 31 mussel species.

2.4.2. Additional Species of Conservation Concern

The Botany and Zoology Technical Teams each identified several species and communities that were vulnerable or of other conservation concern in the ecoregion, but lacked adequate information (BCD records or other expert opinion) for credible conservation planning. These species were recorded in a separate spreadsheet, as documentation for future inventory and data needs (Appendix D). These additional elements of conservation concern provide a focus for future inventory work in the ecoregion and may become conservation targets in the next iteration of the plan.

Table 6. East Gulf Coastal Plain Criteria for Target Element Selection

BOTANY TEAM: Criteria for Vascular and Non-vascular Plant Targets
1. All vulnerable (G1-G2/T1-T2) plants; 2. After G1-G2 plants are selected, also select species of special concern through a series of filters: - review G3 plants that are: 1) declining through part or all of their range, 2) disjunct from distant ecoregions, 3) endemic within the ecoregion, and/or 4) other ecological/conservation value; - after G3 species are selected, use the same filters to select additional G4 and G5 plants that should be conservation targets.

ZOOLOGY TEAM: Criteria for Vertebrate and Invertebrate Targets
1. All vulnerable (G1-G2/T1-T2) vertebrates and invertebrates; 2. After G1-G2 animals are selected, also select species of special concern through a series of filters: - review G3 animals that are: 1) declining through part or all of their range, 2) disjunct from distant ecoregions, 3) endemic within the ecoregion, 4) area sensitive, and/or 5) other ecological/conservation value (e.g., “aggregations of special concern”); - after G3 species are selected, use the same filters to select additional G4 and G5 animals that should be conservation targets.

COMMUNITY ECOLOGY TEAM: Criteria for Naturally Occurring Community Targets
1. All (G1-G5) natural communities; 2. After all G1-G2 communities are identified, identify all common communities (G3-G5): - if there are too many common communities in an ecoregion to effectively consider all of them as conservation targets, then focus on those community types that are restricted to or best represent the ecoregion. - community ecologists may develop a surrogate system for common communities or under-represented communities, if necessary, in coordination with the SCS community ecology group.

2.4.3. Natural Community Conservation Targets

The first stage in the process of identifying community conservation targets was to develop consistent definitions for community types across state lines. As part of an ongoing process between Heritage programs and SCS Ecology staff, Technical Team

members worked with SCS to consolidate, modify, or split state community classification units to reconcile them with the national community classification taxonomy. The National Vegetation Classification was reviewed at increasing fineness; this ultimately resulted in the assignment of national types to the states' Element Occurrence Records (EORs). In addition, Technical Team members reviewed and refined Global Ranks (GRANKs). SCS staff created and distributed a spreadsheet showing all reconciled ("cross-walked") community types developed out of this process. State community taxonomy was cross-referenced in the national classification as well.

State Heritage Ecologists and TNC Regional Ecologists collaborated on a review of State Element Occurrence Records, first assigning them to National Vegetation Classification Alliances and finally to associations. With the assistance of Heritage Data Managers, BCD records were "tagged" with a national Element Code (ELCODE) to reflect the assignment of a national type. If additional information was needed to make an assignment with higher confidence, this was obtained through expert interviews. If there was uncertainty about the assignment, it was made at a lower level of confidence.

In contrast to species targets that were selected, at least in part, on the basis of G Rank, all naturally occurring community types were regarded as conservation targets regardless of their G Rank. Special issues for community target selection included: adequate representation of aquatic communities, modeling for under-represented communities, different scales in the classification hierarchy, the use of surrogates, and dealing with the large numbers of community types.

The Community Ecology Technical Team identified 133 elements as conservation targets (Table 5 and Appendix B). The development of a target list for communities was an iterative process, involving repeated "approximations" developed through several meetings of the Community Technical Team and further refined as each Heritage Program (with assistance and support from SCS ecology staff) "converted" their EORs to the national types.

In general, the large number of terrestrial community EORs in this ecoregion allowed conservation planning to be based on ground-inventoried Heritage Program occurrences with ground assessment of quality, size, and landscape integrity.
In particular, many of the hallmark communities of the ecoregion (such as longleaf pine flatwoods and sandhills, seepage bogs, beech-magnolia forests, barrier island scrubs and grasslands) were relatively well documented by Heritage EOs, and allowed the prioritization of occurrences. Some other communities, however, such as bottomland hardwood forests, salt marshes, and aquatic communities had poor EOR documentation – in other words, the EOR coverage would not provide an adequate basis for conservation planning for the type. In such cases, the Community Technical Team grouped finer level conservation targets into broader, more practical conservation targets, as well as identifying EOs through an expert process. Expert-identified sites for these conservation targets were made into "pseudo-EOs". For instance, various bottomland hardwood associations that were poorly represented by EOs were grouped into Ecological Groups, such as "Blackwater Bottomland Hardwoods", and experts

identified high-quality sites representing the geographical and ecological range of the Groups.

Many communities and Ecological Groups identified as targets by the Community Team were strongly associated with aquatic systems, such as expert-identified bottomland hardwood associations and EORs for spring runs. Because of relatively good data for aquatic species, however, conservation planning and portfolio design for aquatic systems largely was based on occurrences of target species. Even though aquatic species data were substantial, and ultimately most major aquatic systems in the ecoregion were selected as portfolio sites, additional work on aquatic communities in the ecoregion will be needed for the next iteration of the portfolio design.

2.5. Establishing Conservation Goals

In order to identify a portfolio of sites that best represented a conservation "blueprint" in the ecoregion, the EGCP taxonomic technical teams set goals for the number of populations, or occurrences, of each target element that should be conserved in the ecoregion to ensure each target's long-term sustainability. Establishing conservation goals created an efficient endpoint against which conservation success for each target element could be measured.

2.5.1. Species Conservation Goals

Setting conservation goals for target species included: 1) reassessing an element's overall viability, 2) identifying principal element occurrences, and 3) deciding how many populations (occurrences) of each target should be conserved. Goal setting also included determining how element occurrences for selected targets should be distributed across the ecoregion.

Viability

During a second round of Technical Team workshops, Botany and Zoology Team members and other experts reaffirmed the global rank (G Rank) and overall sustainability of each target element. Additional viability assessments were made on an occurrence-by-occurrence basis at a later stage of the portfolio design process.

Principal Element Occurrences

After targets were selected, Technical Teams evaluated an ecoregional "scorecard" (multi-state EO records organized by G Rank and EO Rank) to determine the practical units of conservation for each target element (a "principal" EO). New standards for Element Occurrences now differentiate between *principal* EOs and *sub*-EOs. The draft *Element Occurrence Data Standard* document (August 17, 1998) states that "for species, principal EOs conceptually represent the full occupied habitat[1] (or previously occupied habitat) that contributes, or potentially contributes, to the persistence of the

[1] For species Elements, occupied habitat is the area that encompasses the full extent (or full seasonal extent for aerial, marine, or anadromous migratory species) of all behaviors and life history functions, except dispersal, for that local population. For aquatic species, this may encompass an entire watershed.

species at that location. Generally, a principal EO corresponds to a population or metapopulation. Principal EOs are typically separated from each other by barriers to movement or dispersal, or by specific distances defined by each Element across either unsuitable habitat, or suitable but apparently unoccupied habitat."

Principal EOs for ecoregional target species were defined based on the biological and ecological requirements of the element. Principal EOs for aquatic species were based on stream or river segments or watersheds, rather than on collection localities. Principal EOs for species that occurred in unstable or shifting habitats included currently unoccupied, but apparently suitable, habitat to accommodate possible population shifts in the future. For species thought to frequently occur as metapopulations, the metapopulation usually was considered the principal EO. However, for some species with especially large metapopulations, like some birds and large mammals, the subpopulations were treated as the principal EOs.

Many existing EOs were combined or revised to form principal EOs based on definitions in the new draft EO Design document. Throughout this process, consistent re-evaluation of EOs by Heritage and Conservancy staff was important to assess viability and identify the potential pool of viable occurrences for each target element, to set conservation goals for target elements, and ultimately, to assemble the suite of sites and respective EOs that constitute an ecoregional portfolio. For example, if the EOs had been finely divided, the selection (and conservation) of 10 EOs per species may have represented substantially fewer real populations and failed to adequately conserve the species. Re-evaluation caught such potential mistakes.

Generally, there was only one principal EO at a site, particularly for animals and for relatively small-scale sites. However, some landscape scale sites had multiple, discrete principal EOs of the same species. Each principal EO could have several sub-EOs. Sub-EOs were geographically nested components within the principal EO that could be identified for monitoring, biological management, or other purposes.

Goal Setting

Botany and Zoology Technical Teams set goals for each target species based on guidelines developed by SCS staff. Guidelines for goals were based on a combination of: the abundance (G Rank), distribution (range information as available), and viability (EO Rank or other measure) of each element (Table 7). Goals ranged from "all viable occurrences" (AVO) for G1 and T1 elements and then generally followed brackets of: 12, 10, 8, or 5 high quality occurrences for more common or more widely ranging species (G2-G5, T2). Goal guidelines were modified for individual targets as appropriate (see Appendix B for goals for each target element).

Goals set for the number of occurrences needed to ensure long-term viability were based on best professional judgment because of the current lack of population viability analyses for the majority of target species. Botanical and zoological experts from Natural Heritage Programs, local universities, and the Conservancy established first

iteration goals, based on current knowledge of each element. Future iterations of the ecoregional plan may revisit the goals established for target elements.

The goal of "all viable occurrences" (AVO) was suggested for globally imperiled (G1 and T1) elements. Goals generally were also high for elements endemic to the ecoregion or with very narrow distribution because this was the only ecoregion where those elements could be protected. On an element-by-element basis, G2 target species with extremely limited distributions or in extreme decline were assigned an "AVO" goal as well. In the future, goals for globally imperiled species may include more quantitative measures, such as minimum and maximum goal numbers, for long-term element sustainability. The guidelines made the assumption that more common elements with distribution across multiple ecoregions did not necessitate as large or as inclusive a number of occurrences in any one ecoregional portfolio because occurrences would be captured in multiple portfolios.

The technical teams also determined whether distribution (stratification) of occurrences across the ecoregion was necessary for a given target element. The Core Team agreed on three broad sub-units for element stratification in the East Gulf Coastal Plain ecoregion: 1) the Apalachicola River and east, 2) the Mobile-Tensaw River Delta to the Apalachicola River, and 3) west of the Mobile-Tensaw River Delta. However, stratification of target element occurrences was not a significant component of the portfolio assembly process.

Table 7. Summary of Conservation Goal Guidelines for Target Species

G1 (and T1) TARGET SPECIES:

Conserve all viable (EO rank of A, B, C or AC) occurrences of G1 target species. Where currently viable occurrences are insufficient to meet conservation goals, consideration may also be given to restoration of non-viable and/or extirpated populations where deemed feasible, necessary, and important for survival of the element. Since all occurrences should be conserved, stratification is not an issue for G1 (T1) species.

G2 (and T2) TARGET SPECIES:

Endemic to the ecoregion or of limited distribution[1]: *Conserve 12 viable (EO rank of A, B, C or AC) occurrences of each target species.* Where currently viable occurrences are insufficient to meet conservation goals, consideration may also be given to restoration of non-viable and/or extirpated populations where deemed feasible, necessary, and important for survival of the element. Select occurrences of each target species across geographic subunits of the ecoregion.

Not endemic[2] to the ecoregion: *Conserve 8 viable (EO rank of A, B, C or AC) occurrences of each target species*. Select occurrences of each target species across geographic subunits of the ecoregion.

G3 TARGET SPECIES:

Endemic to the ecoregion or of limited distribution: *Conserve 10 viable (EO rank of A, B, C or AC) occurrences of each target species.* Select occurrences of each target species across geographic subunits of the ecoregion.

Not endemic to the ecoregion: *Conserve 5 highly viable (EO rank of A, AB or B) occurrences of each target species*. Stratification of target EOs across the ecoregion is less important for this group.

G4 TARGET SPECIES:

Conserve 5 A ranked (or other measure of excellent viability) occurrences of each target species. If A ranked occurrences are not available, AB or B occurrences may be selected. Stratification of target EOs within an ecoregion does not need to be considered for this group.

G5 TARGET SPECIES:

Conserve 5 A ranked (or other measure of excellent viability) occurrences of each target species. If A ranked occurrences are not available, AB or B occurrences may be selected. Stratification of target EOs within an ecoregion does not need to be considered for this group.

[1] For goal setting purposes, species endemic to the ecoregion or of limited distribution were considered to have > 75% of rangewide occurrences in one ecoregion. Narrow endemics may have over 90% of occurrences in a subsection of one ecoregion.

[2] Species not endemic to the ecoregion or of narrow distribution have < 75% of rangewide occurrences in one ecoregion.

2.5.2. Community Conservation Goals

The Community Ecology Technical Team identified conservation goals (number and distribution, as well as key ecological processes and disturbance regimes needed for community viability) for all community conservation targets. To determine the conservation goals for communities, it was necessary to develop additional information, some of which was not part of the regular Heritage methodology (Table 8). First, the members of the Ecology Technical Team reviewed the rarity and threat information that affected G Ranking of natural community elements. All "natural" communities were treated as conservation targets (those with G Ranks of G1 through G5); those with other G Ranks (e.g. GW, GM, GC) were not.

Other factors which were considered included the pattern of distribution relative to the ecoregion (e.g. Endemic, Limited, Widespread, Peripheral); the distribution within the ecoregion; the coarseness or fineness of the classification; the need for geographic and/or environmental stratification; and the pattern of landscape occurrence within the ecoregion (size type). In addition, viability information was used to distinguish between occurrences potentially targeted for conservation.

Globally Imperiled Communities

After the G Ranks were reviewed, they were used as the first criterion in a stepwise process of stratification. Communities with G Ranks of G1 or G2 and all viable occurrences (AVO) were included in the initial selection of EOs. Where currently viable occurrences were insufficient, consideration was given to restoration of those occurrences. Since all occurrences should be conserved, stratification was not an issue for G1 communities.

More Common Communities

For communities that were not as rare, additional data provided the means for stratification. The geographic pattern of distribution relative to the ecoregion was used as the next step in the stratification. The assumption was made that fewer examples of a particular community are needed in the portfolio of a given ecoregion if the community is relatively widespread (versus endemic to the ecoregion or of more limited distribution). TNC Regional Ecologists in consultation with State Natural Heritage Ecologists made the assignment of this qualifier.

For G3 through G5 communities that were Endemic to the ecoregion or of Limited distribution, the preliminary goal was 24 viable examples, stratified across the landscape, including 8 in large, functioning landscapes. In contrast, for communities that are Widespread relative to the ecoregion, the goal was only 8 examples, but preferably ones of high viability. The goals for Peripheral and Disjunct community elements required evaluation on a case-by-case basis.

The designation of occurrences that were considered by the Community Technical Team to be "indispensable" or "primary targets" was valuable information that fed into portfolio design. In some cases, it partially or completely substituted for stratification.

Table 8. Summary of Conservation Goal Guidelines for Ecological Communities

G1 and G2 COMMUNITIES:

Conserve all viable (EO rank of A, B, C or AC) occurrences of G1 and G2 communities. Where currently viable occurrences are insufficient to meet conservation goals, consideration may also be given to restoration of currently non-viable occurrences, where deemed feasible, necessary, and important for survival of the element. Since all occurrences should be conserved, stratification is not an issue for G1 communities. In addition to setting conservation priorities, each element should be assessed for potential of locating additional occurrences.

G3 – G5 COMMUNITIES:

Endemic/limited to the ecoregion: *Conserve 24 viable (EO rank of A, B, C or AC) occurrences of each target community, including 8 large, functioning landscapes.* Select occurrences of the community via FINE stratification across geographic subunits of the ecoregion.

Widespread relative to the ecoregion: *Conserve 8 highly viable (EO rank of A, AB or B) occurrences of each target community*. Select occurrences of the community via COARSE stratification across geographic subunits of the ecoregion.

Peripheral/disjunct relative to the ecoregion:

Community "significantly" peripheral or disjunct: The selection of occurrences is dependent on analysis relative to occurrences in other, adjacent, ecoregions. Stratification of target EOs across the ecoregion is less important for this group.

Community "not significantly" peripheral or disjunct: The selection of occurrences is dependent on analysis relative to occurrences in other, adjacent, ecoregions. Stratification of target EOs across the ecoregion is less important for this group.

NON-ASSOCIATION COMMUNITIES (Alliances or other coarser community taxa)

Treat as an association, but increase numbers based on the estimated coarseness of the taxon. *Conserve [6X] or more viable (EO rank of A, B, C or AC) occurrences of each target community.* Number should be determined by the coarseness of the taxon -- the coarser, the higher the number. Select occurrences of the community via FINE stratification across geographic subunits of the ecoregion.

G? COMMUNITIES:

Generally treat as G4G5 endemic. Future research and information will refine ranking.

LANDSCAPE NEEDS: If a community association has landscape needs (such as most matrix or large patch communities), consideration should be given to requiring all or a portion of selected occurrences to be in viable landscape matrixes, and/or for there to be a total acreage requirement for the element. For instance, for a G3 endemic matrix community, one might require that 15 of the 30 occurrences be selected to have at least 500 acres of the association in an overall intact landscape of at least 5,000 acres, and that the total area targeted for conservation be at least 50,000 acres. Such decisions will be ecoregion and community specific. The conservation of matrix communities (for themselves and as "coarse filters" for other elements) is highly dependent on the nature of the ecoregion, its pattern of communities, and the current condition of natural areas. An appropriate selection of "landscapes" in an ecoregion may be approached either via element occurrences of matrix communities (if they are feasibly defined) or via the direct selection of representative landscapes.

INDISPENSABLE OCCURRENCES: The designation of occurrences, which are considered by the Community Technical Team to be "indispensable" or "primary" targets, is a valuable tool, which leads into portfolio design. In some cases, it can substitute for stratification in part or in whole for stratification.

2.6. Selecting the Best and Most Viable Occurrences

After conservation goals were identified, the Botany and Zoology Technical Teams each developed criteria for selecting the "best and most viable" occurrences of each conservation target. For the first iteration of the ecoregional portfolio, viability of target element occurrences was assessed through Heritage element occurrence ranking methodology, principal element occurrence ranks, or other determinations of long-term sustainability such as expert opinion.

Element occurrence ranks indicated the *predicted* viability of an element based on the integration of three rank factors: size, condition, and landscape context. *The Element Occurrence Data Standard* (August 18, 1998 draft) defined **size** as a quantitative measure of the area and/or abundance of an occurrence. Components of this factor included area, population abundance, population density and area of occupancy, and population fluctuation. **Condition** was an integrated measure of the quality of biotic and abiotic factors, structures, and processes *within* the occurrence, and the degree to which they affected the continued existence of the occurrence. Components included reproduction, species composition and biological structure, ecological processes, and abiotic factors. **Landscape context** was an integrated measure of the quality of biotic and abiotic factors, structures, and processes *surrounding* the occurrence. Components of this factor included landscape structure and extent, as well as condition of the surrounding landscape.

These three rank factors were integrated (with relative weighting dependent on the element) into the element occurrence rank. The element occurrence ranks were defined as:

- **A** = excellent predicted viability
- **B** = good predicted viability
- **C** = fair predicted viability
- **D** = poor predicted viability (probably not viable).

In many cases, Heritage Programs historically had not assigned EO Ranks to element occurrences in the East Gulf Coastal Plain data set. When EO ranks were not available for target element occurrences, Technical Team members used other determinations of viability such as expert opinion. Generally experts were able to distinguish between AC (broadly viable) and D (not viable) ranks as broad predictors of an occurrence's viability.

Much of the selection of the best and most viable occurrences took place during the identification of principal EOs (see page 13). At this time, all EOs for a given target were evaluated for their viability as well as their EO status (principal or sub EO).

2.7. Portfolio Assembly Methods

2.7.1. The Pre-Assembly Process

Based on Technical Team data on best and most viable occurrences of target elements, an initial portfolio of sites was pre-assembled using ArcView. Given the large number of target elements and over 11,000 BCD records the Core Team pre-assembled priority element occurrences as the core areas around which portfolio sites would be created and refined.

Pre-assembly was possible because there were many "irreplaceable" occurrences of target elements that had to be included in any conceivable portfolio design. Irreplaceable occurrences included all viable occurrences of G1 elements and all viable occurrences of G2-G5 targets where there were fewer occurrences than the goal number for that species or community type.

In an effort to move from the element-based data to a preliminary site level map for the ecoregion, without the advantage of much available landcover spatial imagery, the first step in the pre-assembly process was to assign circular buffers to all viable target EO points. The clusters of overlapping buffered EOs highlighted biodiversity-rich and unfragmented areas that became the core areas around which the first draft of portfolio sites were centered. The use of overlapping buffers also highlighted potential corridors between occurrences.

Buffer sizes ranged from a radius of 0.5 km for plant EOs, to 1 km for animal EOs, 2 km for community EOs, and 0.5 km on each side of stream segments for aquatic EOs. Buffers of different radii were chosen to reflect general minimum element occurrence sizes for plants, animals, and communities. Buffer sizes were modified from minimum separation distances between element occurrences as outlined in *The Element Occurrence Data Standard* (August 18, 1998 draft). In future iterations of the portfolio design, the planning team may be able to adjust buffers to more accurately reflect dispersal and range requirements of specific target species and communities.

After buffering all viable target element occurrences, the occurrences were coded by their priority for inclusion. The Core Team chose to prioritize occurrences by the global rank (rarity) and element occurrence rank (predicted viability) of each target. Using this method meant that there was a slight bias toward rarer elements. Buffered EOs were pre-selected for the portfolio in a stepwise process, from highest to lowest priority for inclusion, which also considered spatial distribution of buffers. To determine selection priority, all viable target EOs in the ArcView database were manually coded by SCS staff using a "pre-select" system of P1-P4, where:

- **P1** = "irreplaceable", viable occurrences for G1 target elements to meet conservation goals,

- **P2** = "irreplaceable", viable occurrences for G2 target elements to meet conservation goals,

- **P3** = “best and most viable” occurrences for G3 (EO ranks of A-C) and G4-G5 (EO ranks of A-B) target elements to meet conservation goals where there were fewer viable occurrences than the goal number, and

- **P4** = other viable occurrences of target elements to meet conservation goals.

Southeast Conservation Science staff mapped the buffered EOs by their pre-selection codes to determine distributions, potential hotspots, and overlaps where P1-P2 and P3-P4 elements co-occurred. SCS staff then numerically coded geographically distinct clusters of P1-P4 EO buffers as “pseudo-sites”. Buffered occurrences coded P1 and P2 were considered essential to the portfolio and were automatically selected as the basis for pseudo-sites, along with Phase 1 sites. Phase 1 sites were previously selected as priority sites and a substantial number of P1-P2 occurrences overlapped with Phase 1 sites. P3 buffered occurrences were added to complement P1 and P2 selections and were also considered necessary for the portfolio. P4 buffered occurrences were added as a final layer.

SCS staff ran new element- and site-based scorecards showing which target EOs were captured at which pseudo-sites. Because of geographic distribution of EO buffer clusters, not all P3 or P4 occurrences were pre-selected for the portfolio (e.g., single buffers not falling within or near another cluster of buffered EOs).

2.7.2. Building the Portfolio

In final preparation for building the portfolio the Core Team and supporting Technical Teams reviewed buffered EOs and pre-assembled pseudo-sites, selected additional portfolio sites, and refined the sites along more ecologically appropriate lines.

Prior to the portfolio assembly, the Community Ecology Technical Team reviewed the pre-assembly maps and added new occurrences of ecological community types not yet in the database and therefore not captured on the map during the pre-assembly process. Areas of the ecoregion where new community occurrences were added included southwest Georgia and eastern Louisiana.

Next, the Botany, Zoology, and Community Ecology working groups reviewed occurrences, by target element, to confirm that the best and most viable occurrences were captured in the pre-assembly pseudo-sites. The working groups concentrated on targets for which all occurrences were assigned pre-select codes of P4. These were the elements for which there were more occurrences than the goal number (i.e., teams had a choice of which occurrences should be in the portfolio). Through this review process, the majority of occurrences coded as P4 were determined to be necessary components of the portfolio.

Finally, the working groups broke out by state to review and refine pre-assembled polygons on the portfolio map. The pre-assembled pseudo-sites were depicted on four map panels at 1:250,000 scale. Spatial data layers on the maps included P1-P4 buffered EOs, coded pseudo-sites, Phase 1 sites, major roads, and rivers. At this time

other sites containing viable target occurrences, identified through expert opinion rather than existing BCD data, were added to the portfolio. Team members also evaluated and refined pseudo-sites based on adjacency to other sites, unfragmented areas, and surrounding land uses as understood from team members' local knowledge of the landscape.

In general, portfolio sites were identified in the following order:

1. Existing Phase 1 sites;

2. Previously identified pseudo-sites (EO buffer clusters) containing P1-P3 target element occurrences – many of these sites also contained P4 occurrences;

3. Public lands with additional P4 occurrences needed to meet conservation goals;

4. Isolated occurrences deemed viable as standard-scale sites and important for inclusion in the portfolio to meet conservation goals; and

5. Additional expert-identified occurrences not yet in the centralized ecoregional database.

Following individual state review, the working groups came together to refine sites that crossed state boundaries. After joining the map panels together, the team members evaluated sites that crossed state lines to resolve differences in boundaries initially drawn by different state working groups. The Core Team agreed that the portfolio site boundaries as drawn would be refined at the site conservation planning level. After the portfolio assembly meeting, SCS staff digitized the hand drawn ecological boundaries around portfolio sites, assigned ecoregional codes to each portfolio site, and generated new scorecards showing the target element occurrences at each portfolio site. Field Office and Natural Heritage program staff had the opportunity to further refine sites using new 1:250,000 scale maps with the first draft of digitized portfolio sites. State staff also assigned names to each portfolio site. Staff at SCS coordinated the post-assembly review process and made all recommended revisions to centralized ecoregional databases (BCD and ArcView linked).

Chapter 3

The Ecoregional Portfolio

3.1. Overview of Identified Sites

3.1.1. Sites and Statistics

Based on data for 421 species and ecological communities of conservation concern, collectively called “conservation target elements”, the East Gulf Coastal Plain planning team identified 132 sites critical to the long-term conservation of these species and communities. The identified portfolio of sites covered almost 11 million acres (25 % of the ecoregion). Of the 132 portfolio sites, 96 were terrestrial, 32 were riverine (freshwater aquatic), and 4 were classified as coastal/barrier island.

In addition to the 132 portfolio sites some of the largest and perhaps most significant estuaries across the East Gulf Coastal Plain were identified as portfolio sites. The largest bays and estuaries along the East Gulf Coastal Plain include:

West Mississippi Sound	Choctawhatchee Bay
East Mississippi Sound	St. Andrew Bay
Mobile Bay	St. Joseph Bay
Perdido Bay	Apalachicola Bay
Pensacola Bay	Apalachee Bay

Most of the freshwater systems identified as portfolio sites feed directly into these highly productive bays and estuaries. In conjunction with the planning efforts of the East Gulf Coastal Plain and adjacent ecoregions along the Gulf of Mexico, a team is being assembled to identify and prioritize the importance of critical marine sites in the Northern Gulf of Mexico.

The majority of portfolio sites had multiple occurrences of many different target species and ecological communities. However, 11 of the 132 sites in the portfolio were selected for single occurrences of a target species or community type. Appendix A lists target species and natural communities documented in our ecoregional database that were found at portfolio sites. We anticipate that many important species and natural communities not yet documented in the database also occur at portfolio sites.

Portfolio site acreage ranged from landscape scale complexes of over a million acres to "standard" scale sites as small as 32 acres. All sites, large and small, were determined to be viable for the target species and/or ecological communities they contain. Several clusters of standard scale sites in close proximity to each other were not depicted as landscape scale complexes because of highly fragmented land uses between the sites.

Map 5 illustrates land ownership patterns across the East Gulf Coastal Plain portfolio of sites. Most of the portfolio sites had mixed ownership, including both public and private landowners. Over 65 percent of portfolio sites (87 sites) had some public ownership (the majority were state lands), including almost all of the landscape scale sites. By acreage, however, public lands accounted for only over 30 percent (3,323,861 acres) of the total portfolio. Approximately 39 percent of sites (51 sites) had some corporate/industrial ownership. Twelve percent of sites (17 sites) had some TNC ownership.

3.1.2. Mapping Conventions

In several cases, such as the Apalachicola-Flint Rivers and the Apalachicola Bluffs and Ravines, aquatic and terrestrial sites overlapped. In other cases, several adjacent sites linked together to form landscape scale complexes, such as the Eglin Air Force Base, Blackwater/Conecuh National Forest Connector, and Conecuh National Forest site complex. Although there were several landscape scale sites, or complexes of sites, in the portfolio, there were also many highly fragmented, "standard" scale sites. These sites were not grouped into larger sites because of the fragmented character of the surrounding landscape, and because it was determined that the smaller sites were viable as delineated.

Aquatic sites were depicted as river corridors instead of as watersheds, partly as an artifact of the EO buffering system used to identify preliminary sites and also because watershed GIS coverages for the ecoregion were not available at a meaningful scale for conservation planning. The Core Team acknowledged that entire watersheds affect aquatic sites and that conservation activities may take place throughout these watersheds. While coastal/barrier island sites covered the majority of the coast in the ecoregion, the Core Team recognized that these sites had a mix of natural areas and areas with intensive human use. Future site conservation plans will more clearly delineate the natural portions of these sites.

3.2. Stage 1 Priority Sites

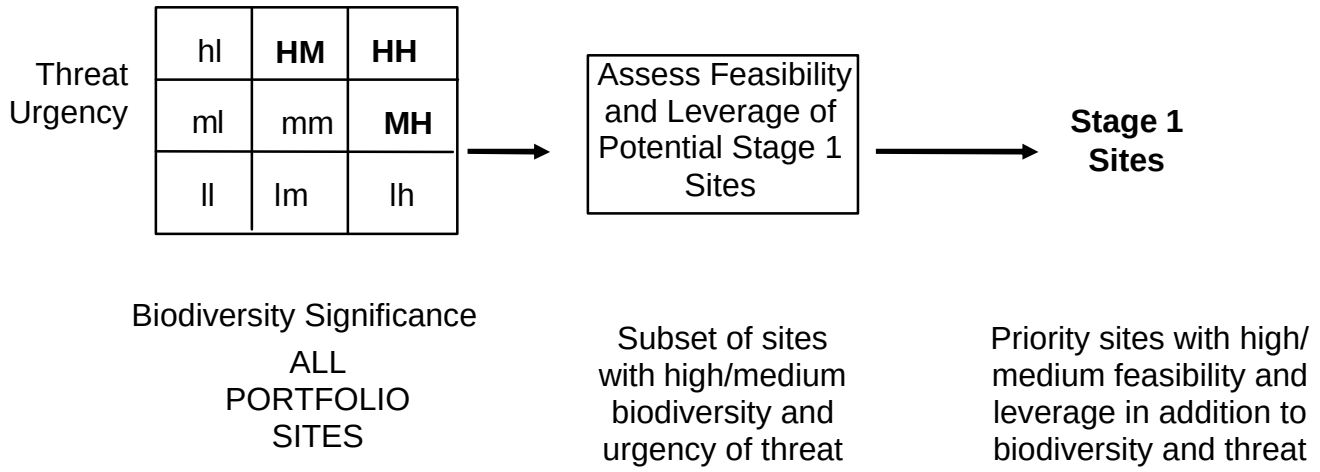
3.2.1. Stage 1 Site Selection

Core Team members selected twenty-four "Stage 1" priority sites from the total 132 portfolio sites. The Stage 1 sites will provide a focus for Nature Conservancy action over the near term and will provide a group of sites to measure our conservation

progress (e.g., tracking abatement of threats at these sites over time). Stage 1 sites will also be the first to have completed site conservation plans.

Stage 1 sites were selected based on two layers of criteria: 1) sites with very high biodiversity significance (relative to the other portfolio sites), high urgency of threat, and ecological systems intact, and 2) high leverage sites where it is feasible for the Conservancy to do work. Using summary information collected for all portfolio sites, sites were first sorted by Biodiversity Significance and Threat Urgency ranks of High, Medium, and Low. The subset of sites with High or Medium Biodiversity Significance and Threat Urgency ranks were then re-evaluated for feasibility and leverage based on staff knowledge of the sites. An additional filter, the Ecological Function of each site, was applied to the subset of sites as a tiebreaker for setting priorities (Figure 1).

Figure 1. Selection Process for Stage 1 Sites



Of the twenty-four Stage 1 sites, 9 were aquatic sites, and the majority had some public ownership. Stage 1 sites covered 6 million acres and included all of the landscape scale sites identified in the portfolio. The Stage 1 sites were (dark green polygons in Map 6):

Abita Creek Complex
Apalachicola National Forest
Upper Apalachicola
Bainbridge Longleaf Pine
Blackwater River
Blackwater/Conecuh NF Connector
Chipola River
Worth/Colquitt County Pinelands
Conecuh/Escambia/ Choctawhatchee Rivers Corridor
Eglin Air Force Base Megasite
Flint/Apalachicola Rivers and Bay
Fort Benning
Grand Bay Savanna
Gulf Islands
Indigo Pond
Mobile-Tensaw River Delta
Pascagoula Watershed Area
Pearl River
Perdido Pitcher Plant Bog
Red Hills
Splinter Hill Bog
Tallahatta Bluffs and Ravines
University of Mississippi Lands
Yellow/Shoal Rivers

3.2.2. Watershed Project Areas

Based on Stage1 aquatic sites and additional aquatic sites within a watershed boundary, the Core Team also identified six watershed project management areas (Map 4). The watershed project areas are:

- **Perdido/Escambia/Conecuh/Blackwater/ Yellow/Shoal/Choctawhatchee Rivers,**
- **Pascagoula/Escatawpa Rivers,**
- **Mobile-Tensaw River Delta,**
- **Lower Apalachicola/Chipola Rivers,**
- **Flint River, and**
- **Pearl River.**

3.3. Meeting Our Conservation Goals

The East Gulf Coastal Plain plan was developed based on data for 421 target species and ecological communities considered of conservation concern in the ecoregion. For each target species and community type, Technical Teams established a goal number of populations, or occurrences, that should be conserved in the portfolio of sites to ensure the long-term sustainability of those targets.

The following information provides a summary of how well current target elements are being conserved relative to the goals set. Results were tabulated in a spreadsheet (Appendix B) that listed for each target element: conservation goal number, total number of occurrences in the ecoregional database, and number of viable occurrences at portfolio sites (occurrences with poor viability were not counted toward the goal numbers).

Of 149 animal targets, 63 percent had enough populations represented at portfolio sites to meet their conservation goals. Fifty percent of the 139 plant targets met their conservation goals, and 80 percent of the 133 community targets met their conservation goals (Figure 2). Overall, 87 percent of all species and community targets had at least one viable occurrence captured in the portfolio (100 percent of all communities had at least one viable occurrence in the portfolio).

Approximately 70 percent of G1 and G2 species, which are globally imperiled, met conservation goals (Figure 3). The high percentages for G1 and G2 species reflected traditional Heritage and Conservancy focus on rarer species. Percentages were slightly lower for G3-G5 species, which could be largely due to the data gaps for more common species. Further, states such as Florida have such high biodiversity that they do not track G3-G5 elements; therefore their occurrences were not in the database to be considered.

Figure 2. Targets Meeting Conservation Goals

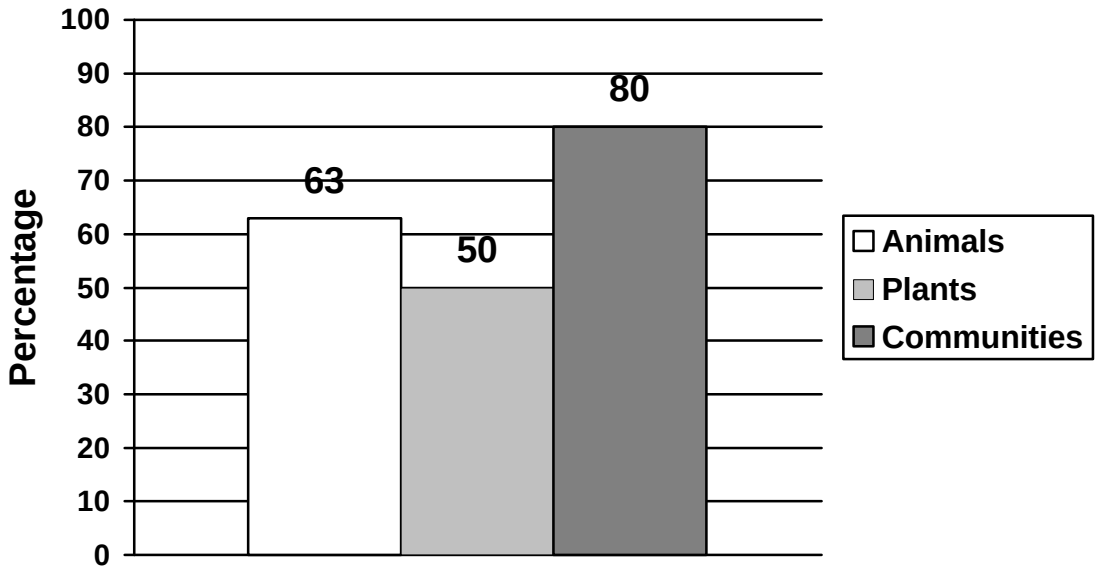
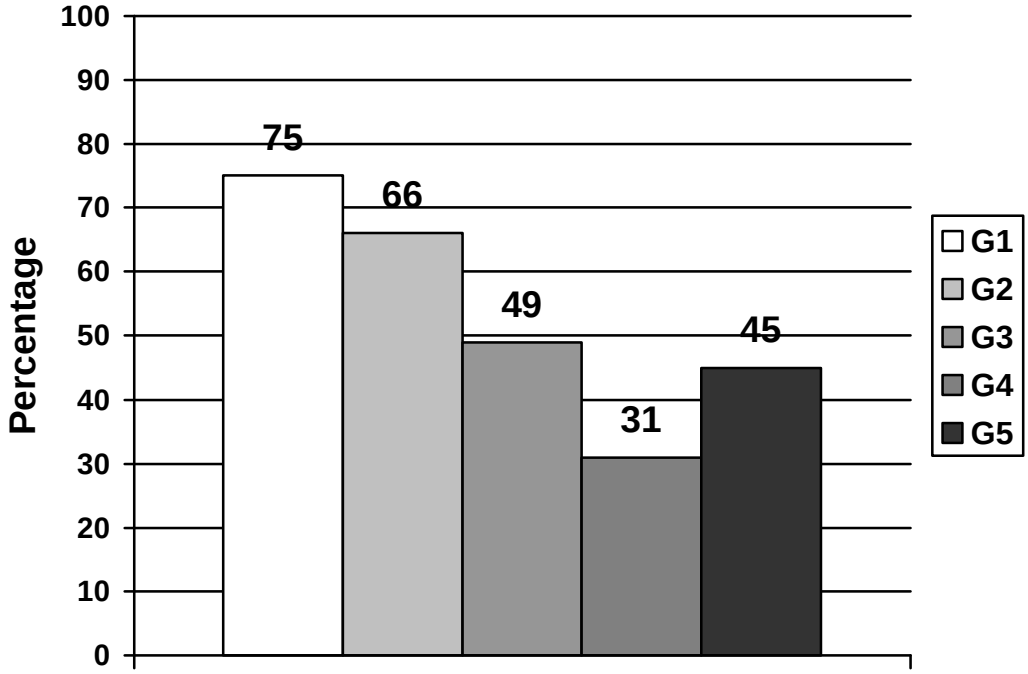
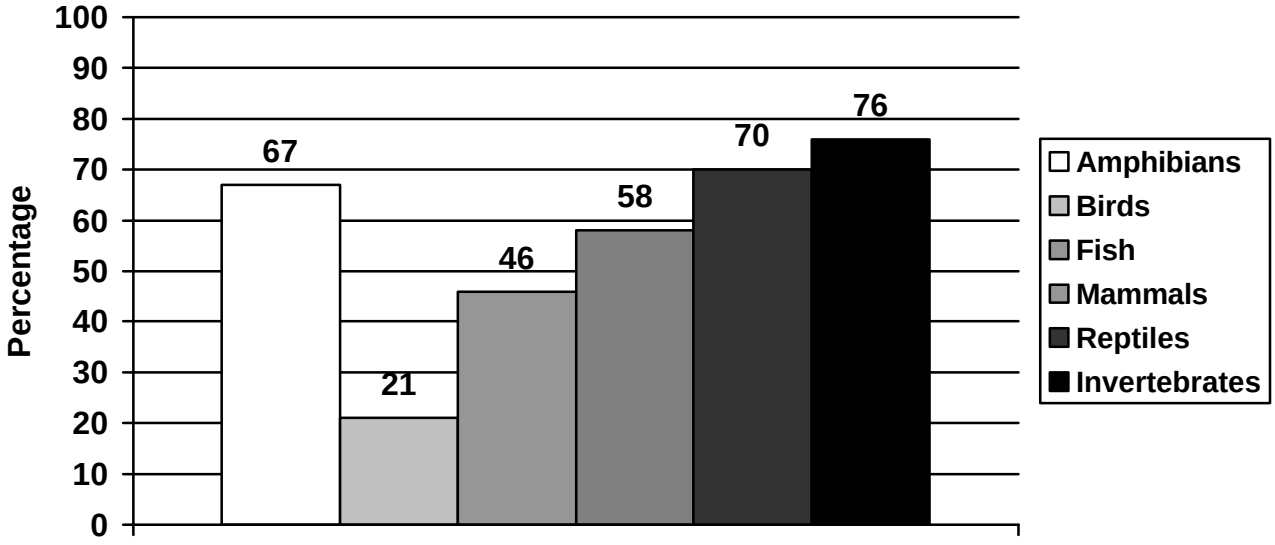


Figure 3. Species Meeting Conservation Goals by Global (G) Rank



For animal species by major group, over 70 percent of target amphibians, reptiles, and invertebrates met conservation goals (Figure 4). Only 21 percent of avian targets met conservation goals. The lower percentages for avian targets could be due in large part to significant data gaps for birds.

Figure 4. Animal Targets Meeting Conservation Goals by Major Group



Many occurrences of more common species, as well as target element occurrences of unconfirmed viability, co-occurred with target occurrences earmarked as priorities for inclusion in the portfolio. Further, unranked occurrences were also captured at portfolio sites automatically selected for higher priority occurrences.

Appendix B also indicates the number of target species occurrences captured in the portfolio by EO Rank (including “no rank”). Although viability data were not available for many of the target species occurrences, many of the occurrences without EO Ranks were considered to be viable, but not yet confirmed. If a large number of “no rank” occurrences were captured for a target species, the conservation goal was preliminarily assumed met for the species. However, one of the major tasks to fill information gaps will be to complete EO Ranks for these occurrences and revisit assumptions about goals met.

There is one caveat about the accounting of conservation goals met for target elements for “all viable occurrences” (AVO). For many of the targets with AVO goals (generally G1-G2 elements or very limited endemics), Technical Team experts were confident that just one or two existing element occurrence records (EORs) reflected all occurrences of these elements, which meant that the AVO goal was met. For example, there was high

confidence that there was only one occurrence of *Bigelowia nuttallii* in the ecoregion; so capturing this occurrence in the portfolio accurately fulfilled the AVO goal. For other targets with AVO goals where new or undocumented occurrences might exist, however, capturing one viable occurrence in the portfolio did not mean that the element was adequately conserved. This second example was often the case with many of the invertebrate species.

Chapter 4

Ensuring Conservation at Portfolio Sites

4.1 Conservation Strategy Development

Successful conservation of the portfolio sites and the species and communities they contain will take many years, will rely on myriad approaches, and will require the dedication and action of many private landowners, federal and state agencies, as well as The Nature Conservancy and other conservation organizations. Scientists at the Conservancy, as well as experts from agencies and universities developed the first iteration of the conservation plan. The Conservancy has already begun responding to the results of this initial version, prioritizing conservation efforts on Stage1 sites. However, the initial blueprint of sites important for biodiversity conservation, identified as the East Gulf Coastal Plain portfolio, is much larger than the work that can be accomplished by the Conservancy. Concurrent with the Conservancy's conservation action, we need to broaden the input and involvement to include all the stakeholders in further conservation planning and implementation in the East Gulf Coastal Plain. Future iterations of the plan, based on constituency needs and input, will be revised and enhanced, resulting in a more effective and integrated strategy. Successful conservation of the ecoregion will require a plan that is responsive to all parties that live and work in the East Gulf Coastal Plain.

Strategies that directly abate threats at single sites or clusters of sites in landscapes will comprise the majority of TNC conservation efforts within the ecoregion. State Conservancy programs will develop single site strategies through site conservation plans, strategic partnerships with public and private partners, community visioning processes and other means consistent with *Conservation by Design (TNC 1996)*. Stage 1 priority sites will be the first to have site conservation plans and strategies developed.

For the Conservancy, efforts at a single site will utilize the organization's foundation strategies, such as:

- acquiring and managing land,
- building conservation partnerships,
- working with public agencies,
- implementing compatible economic development strategies,
- increasing the availability of conservation funding, and
- providing the best available science.

While conservation action at single sites will remain the cornerstone of TNC activity in the East Gulf Coastal Plain ecoregion, opportunities also exist for abating threats across multiple sites. Assessing the frequency and urgency of threats across an entire ecoregion often indicates a number of impacts that consistently affect much of the ecoregion. Developing highly feasible, high leverage strategies that may mitigate threats across multiple portfolio sites in the ecoregion, in addition to single site strategies, will greatly enhance the effectiveness of conservation efforts. Multiple site strategies cross many scales, including a small set of sites, sites with common land ownership, landscapes, sites that cross ecoregions, and strategies that are best implemented at national levels.

4.2. Engaging Conservation Partners

The first iteration of the ecoregional plan involved the five participating Natural Heritage Programs as partners in the planning process. Other partners included individuals from state agencies and local universities who participated on Technical Teams, sharing their expertise to fill taxonomic information gaps during the data analysis process.

Now that a preliminary plan and blueprint has been drafted, further involvement of the stakeholders and integration of myriad needs and objectives will be required. A critical component of implementation is to involve partners into the process of refining the plan. Successful conservation of the East Gulf Coast Plain will require the involvement and support of all stakeholders. The Core Team will continue to build conservation partnerships, work with private landowners and public agencies, engage other scientists and conservation organizations, and promote local presence and compatible economic development at portfolio sites. Many of the Conservancy's partners have shown interest in the portfolio plan, would like to provide input on the plan, and possibly use components of the planning process and sites identified in the portfolio to move forward with their planning efforts.

4.3. Identified Data Gaps

Team members and other biodiversity experts knowledgeable about the East Gulf Coastal Plain identified the following significant inventory gaps. While we consider the identified portfolio to be relatively robust, additional inventory will undoubtedly reveal additional significant sites. Without deleting existing portfolio sites, some of the newly identified sites will be added to the existing portfolio in order to meet the conservation needs of elements whose conservation goals are not met by the identified "first iteration" portfolio. In other cases, additional inventory may result in the identification of sites where conservation for one or more elements can be achieved more efficiently or effectively than at portfolio sites which have been identified in this first iteration. In these cases new sites may be substituted for first iteration sites. Obviously such "portfolio instability" is undesirable. It is therefore important to expeditiously identify, prioritize, and efficiently complete inventory efforts that may change the portfolio.

The planning team selected a general list of priority inventory needs that could result in a change to the portfolio. The following list does not include inventory efforts needed for a "complete biodiversity inventory" or to better refine the boundaries of known sites. Additional analysis and planning is needed in order to prioritize this "long list" of inventory projects and identify the resources needed to efficiently accomplish it. Additional inventory needs are outlined by state in Appendix C. General significant inventory gaps include much of Alabama**,** most of the northern portion of the ecoregion, portions of Mississippi and Georgia, natural communities (especially some of the more common "matrix" types), aquatic systems, some invertebrate animals and nonvascular plants, targets for which there were not enough known viable occurrences to meet conservation goals, targets for which there were only marginally viable occurrences, fish, crayfish, and mussel species, and additional ecological community assessments at selected sites.

The Core Team also addressed data gaps specifically for Stage 1 sites, prioritizing significant data gaps that would impede development of conservation strategies or accomplishment of conservation work. The majority of data gaps identified for Stage 1 sites focused on aquatic inventory needs. Stage 1 sites with significant data gaps include:

- **Blackwater River:** additional aquatic (vertebrate and invertebrate) inventory needed,

- **Chipola River:** need data,

- **Conecuh/Escambia River:** aquatic inventory needed,

- **Fort Benning:** data not in database; assess these needs across states; need recommendation for updating data,

- **Lower Pearl River (LA):** data getting old; need more work on aquatic invertebrates,

- **Upper Apalachicola and Flint/Apalachicola:** not sure of status of aquatic inventory; some of this work done recently but not in database,

- **Wolf Bay (Gulf Islands site):** a big data gap, and

- **Yellow/Shoal Rivers (AL):** need aquatics work.

4.4 Filling Data Gaps

Based on the major information gaps identified by the Core Team and Technical Team members (Appendix C), the Core Team brainstormed several potential strategies to address data gaps. Data gaps were identified on three levels: 1) information gaps for existing sites, 2) gaps related to aquatic (freshwater, estuarine, and marine) systems in the ecoregion, and 3) taxonomic gaps (particularly avian species).

4.4.1. Site Data Gaps

Strategies brainstormed by the Core Team to fill data gaps at Stage 1 sites included:

- Increasing aquatic inventory,
- Increasing networking with freshwater and marine programs,
- Conducting Rapid Ecological Assessments in selected areas, and
- Starting site conservation plans for Stage 1 sites.

4.4.2. Aquatic Data Gaps

Several significant aquatic, estuarine, and marine data gaps and data backlogs were identified in the ecoregion, particularly at Stage 1 sites. Ecoregional planning efforts in the Northern Gulf of Mexico will build from the East Gulf Coastal Plain portfolio and identify and prioritize the most significant bays and estuaries of the coastal zone. Current research and ongoing cooperation between TNC and the heritage programs will be important to filling these data gaps, as well as others. For now, team members will address all data backlog problems on a state-by-state basis and work with partners on filling gaps for Stage 1 sites first.

4.4.3. Taxonomic Data Gaps

Data gaps were identified for several conservation targets, as well as additional species of conservation concern that were not selected as targets because of significant data gaps (Appendix D). In particular, avian species had significant information gaps largely because of their more common (G4-G5) status, which meant that Heritage Programs generally did not track these species. With better taxonomic data, future ecoregional plans may include some of the species of concern as targets and may have better occurrence information on more common targets.

Suggested strategies to fill taxonomic data gaps and improve data backlogs include:

- Updating Biological Conservation Databases (BCD) Element Occurrence Records (EOR) for target elements,
- Using remote sensing data to find additional potential sites for the second iteration of the portfolio,
- Locating the resources to develop Element Stewardship Abstracts (ESAs) for G1 elements, and
- Working with Partners in Flight over the next year to improve avian information.

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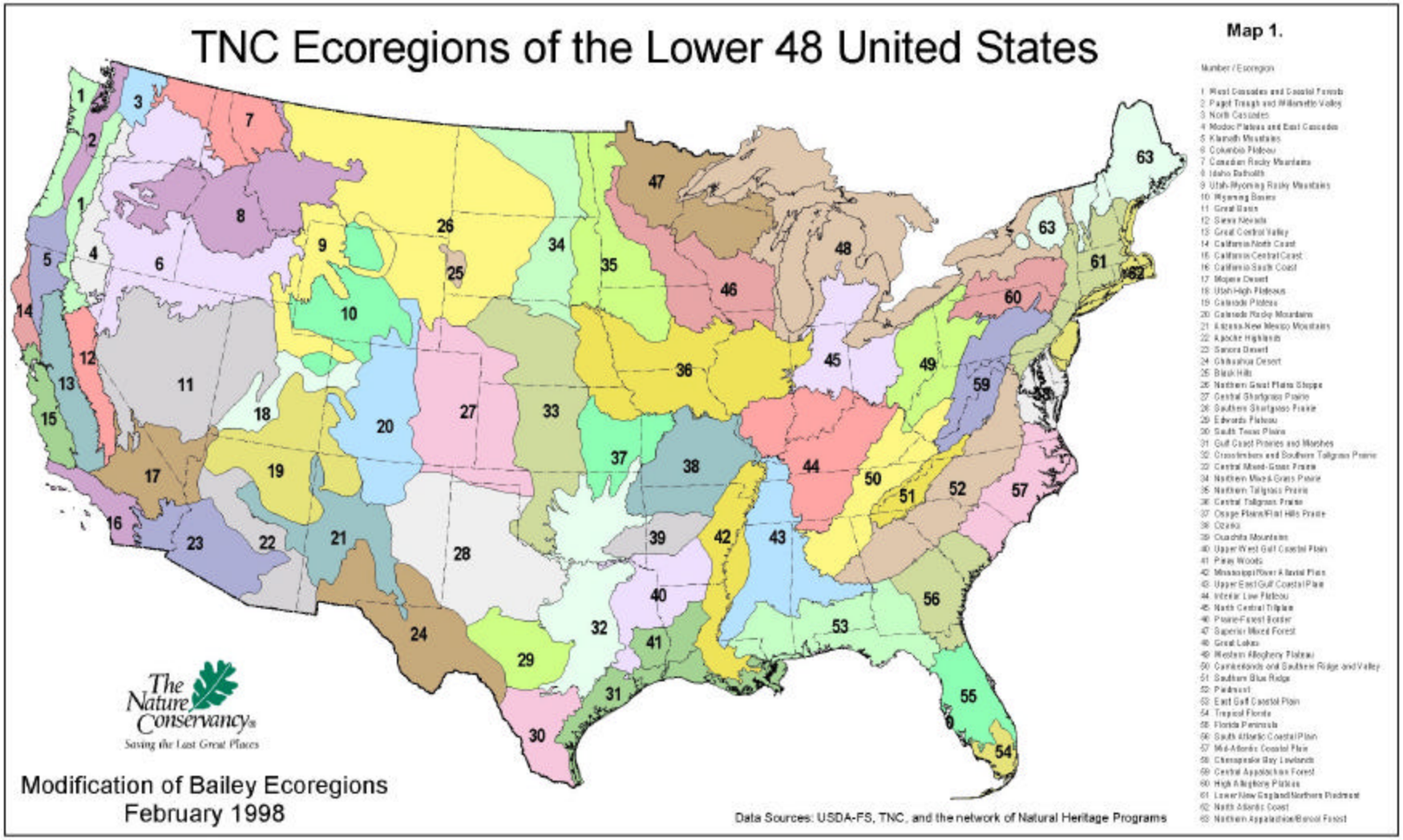
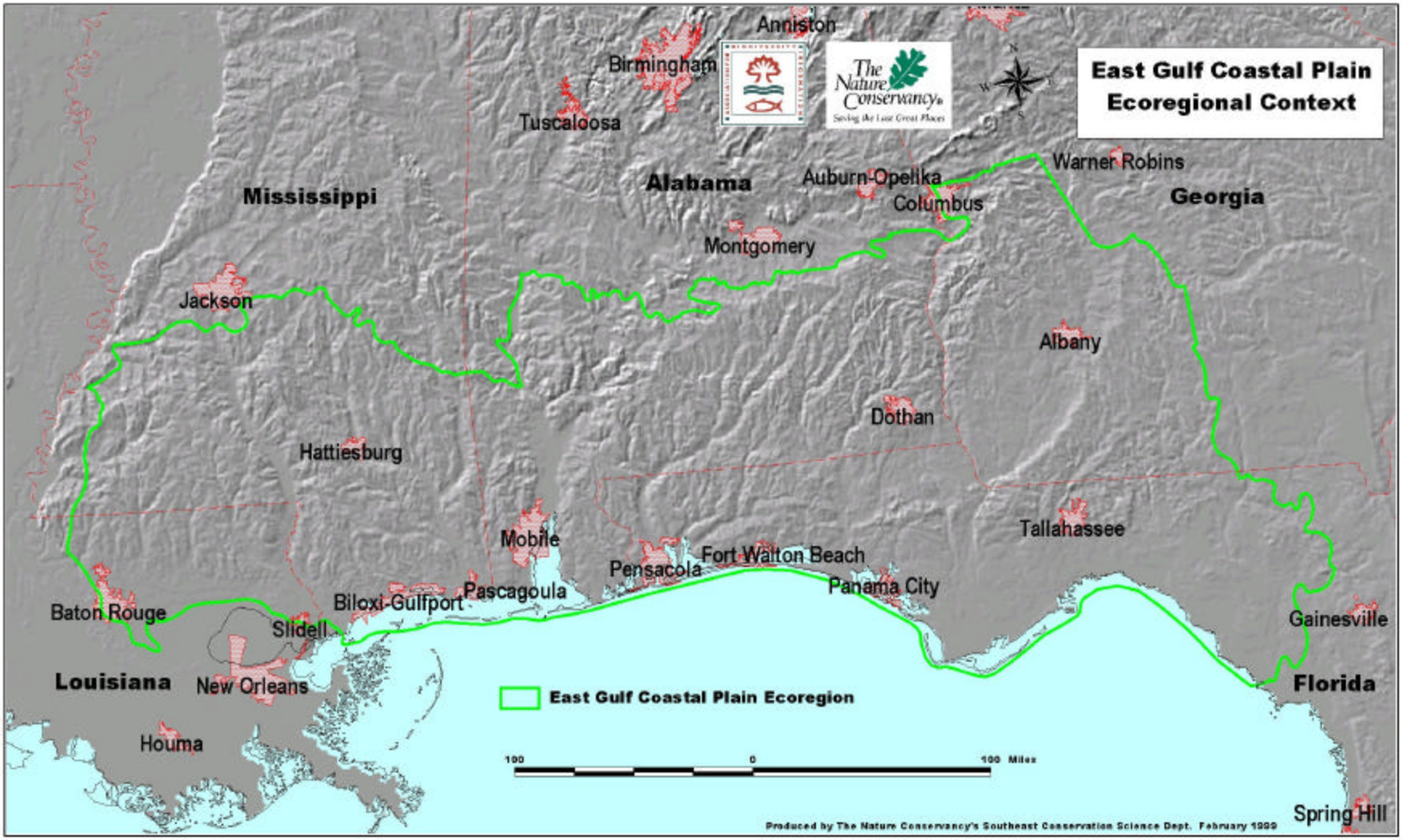
Maps

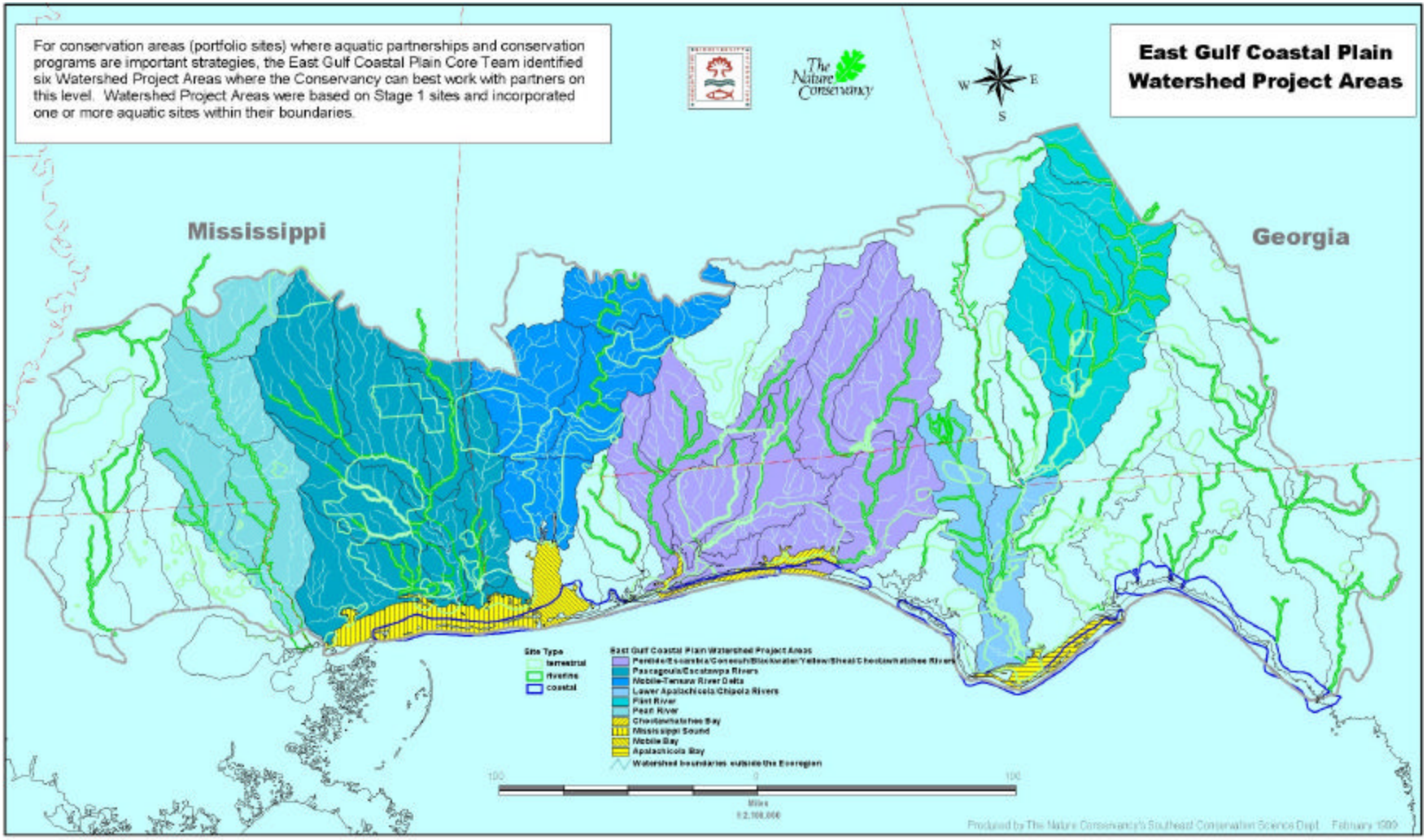


Map 1. TNC Ecoregions of the Lower 48 United States

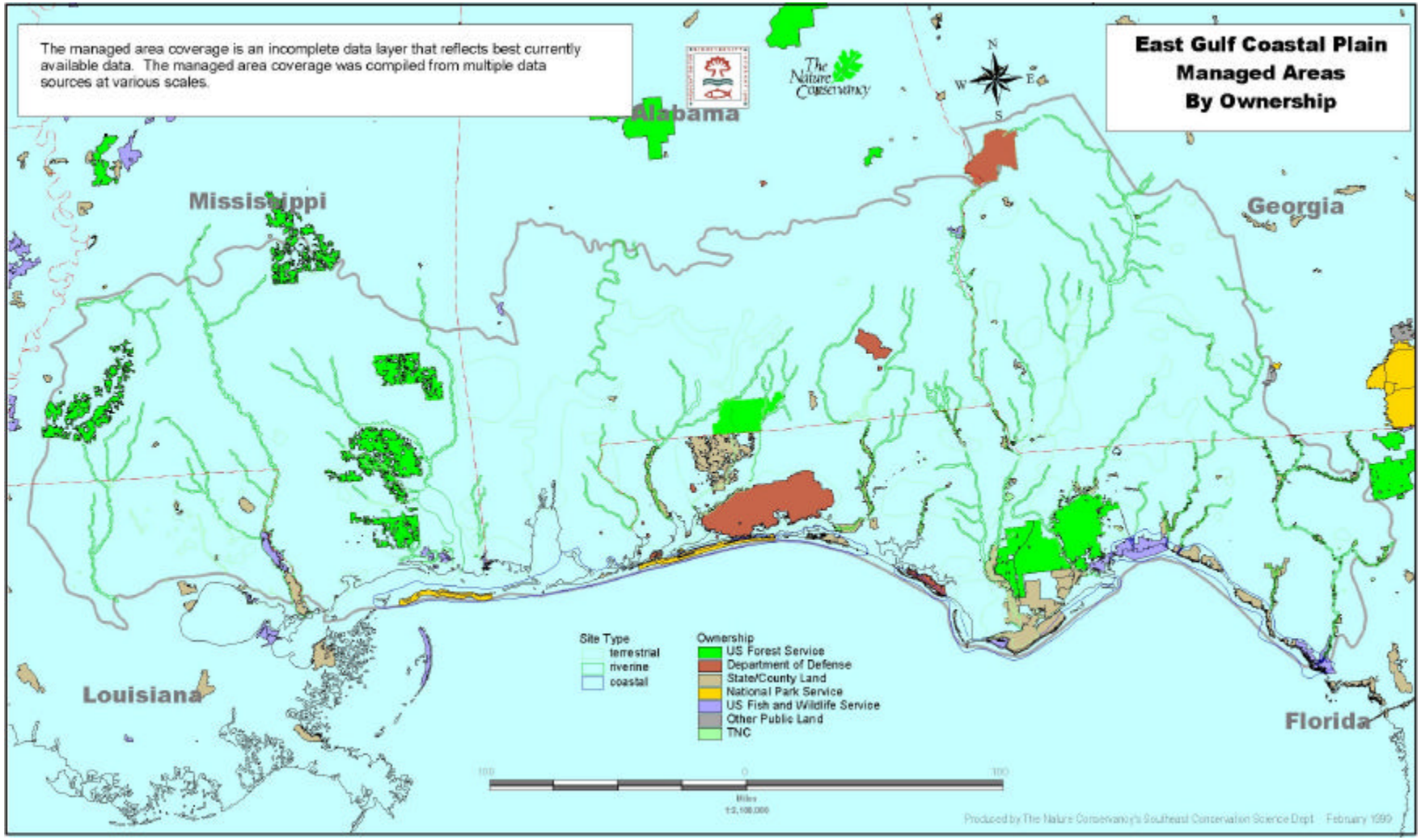


Map 2. East Gulf Coastal Plain Ecoregion Context

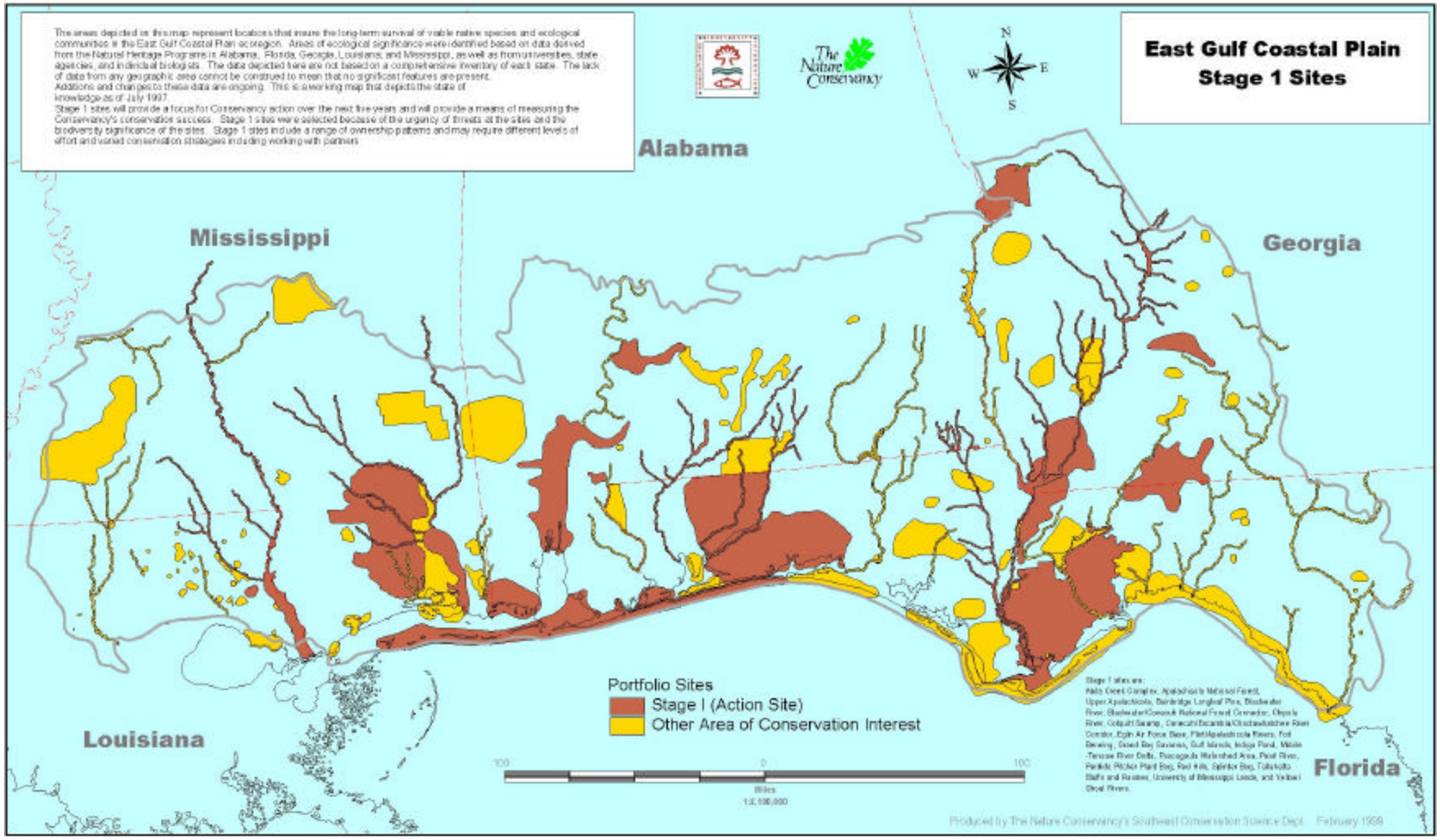
Map 3. Coastal Plain Ecoregions



Map 4. Watershed Project Areas



Map 5. Managed Areas by Ownership



Map 6. Stage 1 Sites