

Ecology and Management of a Forested Landscape

Fifty Years on the
Savannah River Site

Edited by
John C. Kilgo
and John I. Blake

Foreword by H. Ronald Pulliam


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List of Figures and Tables

Figures

- Figure A. At the time of government acquisition, all towns and buildings were removed or demolished. xxi
- Figure 1.1. Streams and physiography of the Savannah River Site. 3
- Figure 1.2. Pine savannas probably dominated most of the uplands in the area prior to European settlement. 4
- Figure 1.3. Bottomland hardwood forests occurred on the floodplains of larger streams and rivers. 5
- Figure 1.4. Pre-European vegetation types of the Savannah River Site. Color insert
- Figure 1.5. Cut-over condition of much of the Savannah River Site at the time of government acquisition. 11
- Figure 1.6. Land use on the Savannah River Site in 1951. Color insert
- Figure 1.7. Satellite image of the Savannah River Site and surrounding region, March 1999. Color insert
- Figure 1.8. Land-use areas of the Savannah River Site. Color insert
- Figure 1.9. Aerial view of a developed area and surrounding forest on the Savannah River Site. 14
- Figure 1.10. Size of the workforce on the Savannah River Site, 1987–2003. 16
- Figure 2.1. Topographic relief on the Savannah River Site. 32
- Figure 2.2. Geological stratigraphy and groundwater systems of the Savannah River Site. 34
- Figure 2.3. General soil map of the Savannah River Site. Color insert
- Figure 2.4. Major streams, wetlands, and larger lakes of the Savannah River Site. 42
- Figure 2.5. Relative mean monthly discharge for major streams on the Savannah River Site. 48
- Figure 2.6. During reactor operations, the high flow rates and temperatures of reactor cooling water destroyed riparian vegetation in Fourmile Branch, Pen Branch, and Steel Creek. 51

- Figure 2.7. Aerial view of Ellenton Bay, a large Carolina bay bisected by a utility right-of-way. 55
- Figure 2.8. Hydroperiods for fifty-six Carolina bays on the Savannah River Site. 56
- Figure 3.1. Longleaf pine planted in an old field on the Savannah River Site, early 1950s. 61
- Figure 3.2. Net number of acres planted 1953–2003 or seeded successfully 1960–1971 at the Savannah River Site for slash pine, loblolly pine, longleaf pine, and various hardwood species including cypress. 62
- Figure 3.3. Longleaf pine planted in cutover scrub oak on the Savannah River Site, early 1950s. 63
- Figure 3.4. Changes in silviculture and harvesting practices on the Savannah River Site 1952–2001. 71
- Figure 3.5. Number of wildfires and average area per fire 1954–2002 on the Savannah River Site. 77
- Figure 3.6. Trends in prescribed burning at the Savannah River Site, 1952–2002. 79
- Figure 3.7. Under proper conditions, smoke from prescribed burning is carried upward and away from sensitive areas. 83
- Figure 3.8. Locations of restoration projects on the Savannah River Site. 88
- Figure 3.9. Aerial view of the Pen Branch corridor and delta on the Savannah River Site during reactor operations. 90
- Figure 3.10. Degraded wetland areas of the Pen Branch corridor and delta on the Savannah River Site that were impacted by thermal releases from reactors and later restored as part of the mitigation effort. 91
- Figure 3.11. Planting trees in the Pen Branch corridor on the Savannah River Site, 1993. 92
- Figure 3.12. A drainage ditch from a Carolina bay on the Savannah River Site. 94
- Figure 3.13. Aerial view of restored Carolina bays on the Savannah River Site. 98
- Figure 3.14. Distribution of remnant and degraded savanna plant communities in relation to land-use and fire exclusion history, mapped for potential savanna restoration on a representative section of the Savannah River Site. 100
- Figure 4.1. Forest land-use associations of the Savannah River Site. Color insert
- Figure 4.2. Potential vegetation types of the Savannah River Site. Color insert
- Figure 4.3. Pine savanna. 115
- Figure 4.4. Sandhill woodland. 116
- Figure 4.5. Forested Carolina bay. 123
- Figure 4.6. Herbaceous Carolina bay. 126

- Figure 4.7. Longleaf pine plantation, two to three years old, with well-developed shrub-scrub understory. 128
- Figure 4.8. Loblolly pine stand on an old-field site ("old-field pine"). 129
- Figure 4.9. Mature loblolly pine stand with some understory development. 130
- Figure 4.10. Mature slash pine stand with little understory but a hardwood midstory. 130
- Figure 4.11. Upland hardwood forest. 131
- Figure 4.12. Flooded swamp. 142
- Figure 4.13. Bottomland hardwood forest with herbaceous understory. 149
- Figure 4.14. Bottomland hardwood forest with switchcane understory. 150
- Figure 4.15. Old-field conditions typical of rights-of-way and other open areas. 158
- Figure 4.16. First-order (headwater) stream. 189
- Figure 4.17. Third-order stream. 190
- Figure 4.18. Terrestrial snakes associated with xeric upland habitats and mesic floodplain habitats on the Savannah River Site. 212
- Figure 4.19. Aquatic snakes associated with stream systems and Carolina bays on the Savannah River Site. 213
- Figure 4.20. Salamanders and frogs associated with Carolina bays on the Savannah River Site. 214
- Figure 4.21. Turtles associated with Carolina bay wetlands on the Savannah River Site. 216
- Figure 4.22. Locations of terrestrial refugia for wetland turtles in uplands surrounding Dry Bay on the Savannah River Site during autumn-winter, 1994–1997. Color insert
- Figure 4.23. Abundance of strong- and weak-excavating cavity-nesting birds and total bird species richness on plots with all coarse woody debris removed and with none removed on the Savannah River Site. 230
- Figure 4.24. Abundance, species richness, and diversity of birds in three successional stages of bottomland hardwood forest on the Savannah River Site. 234
- Figure 4.25. Probabilities of occurrence of four area-sensitive birds in bottomland hardwood forests of various widths on the Savannah River Site. 236
- Figure 4.26. Number of shrub-successional bird species and total number of bird species in clear-cuts of various sizes on the Savannah River Site. 237
- Figure 4.27. Densities of Bachman's sparrows in clear-cuts isolated by various distances from areas with source populations on the Savannah River Site. 238
- Figure 4.28. Number of small mammals captured in longleaf pine stands of various ages on the Savannah River Site. 257

- Figure 4.29. Number of cotton mice captured on plots where tornado damage created a pulse of dead wood in 1989 on the Savannah River Site. 261
- Figure 4.30. Diversity and species richness of small mammals in three sizes of clear-cuts on the Savannah River Site. 262
- Figure 5.1. Locations of smooth purple coneflower populations on the Savannah River Site. 269
- Figure 5.2. The response of individual smooth purple coneflower plants to burning and cutting treatments at the Burma Road population area, Savannah River Site. 271
- Figure 5.3. Flowering patterns of smooth purple coneflower following burning and cutting treatments at the Burma Road population area, Savannah River Site. 271
- Figure 5.4. Potential shortnose sturgeon spawning habitat in the Savannah River adjacent to the Savannah River Site. 284
- Figure 5.5. Population growth of American alligators in Par Pond on the Savannah River Site, 1972–1988. 287
- Figure 5.6. Seasonal use of the Savannah River swamp system by wood storks, 1983–2002. 290
- Figure 5.7. Average numbers of wood storks observed per aerial survey of the Savannah River swamp system, 1983–2002. 293
- Figure 5.8. Locations of bald eagle nest sites and management areas on the Savannah River Site. 296
- Figure 5.9. Number of groups and size of post-breeding-season population of red-cockaded woodpeckers on the Savannah River Site, 1975–2003. 304
- Figure 5.10. Location of active and inactive red-cockaded woodpecker groups and recruitment stands within habitat management areas during 2001 on the Savannah River Site. 306
- Figure 5.11. Artificial cavity inserts, developed at SRS, have become a critical tool in red-cockaded woodpecker recovery efforts rangewide. 307
- Figure 5.12. A red-cockaded woodpecker cavity tree with an encroaching midstory below. 308
- Figure 6.1. Volume of wood in softwoods and hardwoods sold on the Savannah River Site, 1955–2003. 335
- Figure 6.2. Total value of wood sold for all species on the Savannah River Site, 1955–2000, and the average unit price of the wood sold during each year. 336
- Figure 6.3. Habitats used by waterfowl and locations of nest boxes for breeding wood ducks and hooded mergansers on the Savannah River Site. 351
- Figure 6.4. Population parameter estimates for female wood ducks using nest boxes on the Savannah River Site, 1979–1995. 354

- Figure 6.5. Maximum numbers of ring-necked ducks, lesser scaup, buffleheads, and ruddy ducks observed per year during aerial surveys of Par Pond and L Lake on the Savannah River Site, 1982–2003. 358
- Figure 6.6. Hunter recovery locations in the eastern United States of 594 ring-necked ducks originally banded on the Savannah River Site, 1985–2002. 359
- Figure 6.7. Wild turkey observations recorded during South Carolina Department of Natural Resources summer brood surveys 1974–2003 on the Savannah River Site. 363
- Figure 6.8. Number of Virginia opossum, raccoon, and striped skunk captured per year during the Small Furbearer Survey, Savannah River Site, 1954–1982. 367
- Figure 6.9. Number of red fox, gray fox, and bobcat captured per year during the Small Furbearer Survey, Savannah River Site, 1954–1982. 370
- Figure 6.10. Expansion of wild hog distribution on the Savannah River Site. 375
- Figure 6.11. Estimated size of the deer population and number of deer harvested on the Savannah River Site, 1965–2003. 383
- Figure 6.12. Relationship between the number of deer-vehicle accidents and (a) the estimated size of the deer population and (b) the size of the workforce on the Savannah River Site. 387

Tables

- Table 2.1. Mean monthly rainfall and extremes for the 773-A area at the Savannah River Site for the period 1952–2001. 22
- Table 2.2. Predicted extreme precipitation recurrence estimates by accumulation period and observed extreme total precipitation received in the Savannah River Site region, August 1948–December 1995. 23
- Table 2.3. Ranges for monthly mean, monthly high, and monthly low temperature and monthly mean, maximum, and minimum relative humidity, 1964–2001, from A Area at the Savannah River Site. 24
- Table 2.4. Historical average pan evaporation at the Edisto Experiment Station, Blackville, South Carolina, 1963–1992. 25
- Table 2.5. Monthly occurrences of tornadoes, hurricanes, thunderstorms, and snow or ice in the Savannah River Site region. 27
- Table 2.6. Chemical characteristics of selected upland soils, by depth, on the Savannah River Site. 40
- Table 2.7. Hydrologic characteristics of major streams on the Savannah River Site. 46
- Table 2.8. Chemical characteristics of major streams on the Savannah River Site. 49

Table 3.1. Acreage treated by various silvicultural practices at the Savannah River Site 1952–2001.	65
Table 3.2. Pre- and postburn fuel loading and total fuel reduction.	80
Table 3.3. Observed annual mean twenty-four-hour PM ₁₀ values from three counties near the Savannah River Site.	84
Table 3.4. General ecological impacts from post-European settlement in the Central Savannah River Area and strategies for ecological restoration.	86
Table 3.5. Species richness for taxa in Pen Branch compared with disturbed post-thermal and late-successional forested reference sites at the Savannah River Site.	93
Table 3.6. Level of disturbance to surface hydrology by drainage ditches in isolated depression wetlands at the Savannah River Site in 2002.	95
Table 3.7. Effects of burning, harvesting, and harvesting plus burning on the average herbaceous species richness and percent wetland species occurring in Bay 93 on the Savannah River Site before and after closing the drainage ditch in 1994.	96
Table 3.8. Savanna grasses, composites, and legumes selected for experimental introduction to old-field pine sites at the Savannah River Site to establish founder populations.	101
Table 4.1. Extent of forest cover types on the Savannah River Site.	111
Table 4.2. Extent of vegetation types on the Savannah River Site.	114
Table 4.3. Percent basal area for species associated with sandhill woodland and remnant pine savanna communities on the Savannah River Site.	118
Table 4.4. Percent basal area for species associated with Carolina bay forests and savanna communities on the Savannah River Site.	124
Table 4.5. Percent basal area for species associated with upland oak-pine woodland and pine-hardwood forest communities on the Savannah River Site.	134
Table 4.6. Percent basal area for species associated with upland slope and hardwood communities on the Savannah River Site.	138
Table 4.7. Percent basal area for species associated with swamp communities on the Savannah River Site.	144
Table 4.8. Percent basal area for species associated with river and large stream bottom habitats on the Savannah River Site.	146
Table 4.9. Percent basal area for species associated with stream bottom communities on the Savannah River Site.	152
Table 4.10. Habitats of aquatic insects on the Savannah River Site.	162
Table 4.11. Habitats of aquatic arthropods on the Savannah River Site.	165
Table 4.12. Habitats of other aquatic invertebrates on the Savannah River Site.	166
Table 4.13. Conservation status of aquatic invertebrates of the Savannah River Site.	172

Table 4.14. Butterfly species of the Savannah River Site, organized by family, with month and habitat of occurrence.	176
Table 4.15. Number of butterfly species on the Savannah River Site, by family.	183
Table 4.16. Fish species confirmed at the Savannah River Site.	185
Table 4.17. Relative density of fish in streams recovering from thermal impacts and in undisturbed streams on the Savannah River Site.	193
Table 4.18. Percent composition of fishes from Par Pond on the Savannah River Site, 1969–1980.	199
Table 4.19. Number of fish (and percent composition) captured in two studies of Carolina bays and isolated depression wetlands on the Savannah River Site.	201
Table 4.20. Habitat characterizations and rarity rankings of amphibians and reptiles of the Savannah River Site.	205
Table 4.21. A typology of species rankings for amphibians and reptiles on the Savannah River Site based on geographic range, habitat specificity, and local population size.	210
Table 4.22. Bird-habitat matrix for the Savannah River Site, South Carolina.	240
Table 4.23. Typical avian communities associated with six common habitats on the Savannah River Site.	228
Table 4.24. Taxonomic listing and conservation status of the mammals of the Savannah River Site.	254
Table 4.25. Primary habitats of nongame mammals of the Savannah River Site.	258
Table 4.26. Levels of foraging bat activity over nine habitats on the Savannah River Site.	260
Table 5.1. Number of ramets for three smooth purple coneflower populations on the Savannah River Site, 1988–2003.	270
Table 5.2. Sensitive plants occurring on the Savannah River Site, with their global and state ranking and number of populations for each species in 1990, 1995, and 2000.	276
Table 5.3. The Nature Conservancy and South Carolina Department of Natural Resources rarity and vulnerability rankings used on the Savannah River Site.	278
Table 5.4. Estimated population size and sex ratios of American alligators in Par Pond on the Savannah River Site 1972–1974 and 1986–1988.	286
Table 5.5. Wood stork use of the Savannah River swamp system, 1983–2000.	292
Table 5.6. Number of nestlings fledged by bald eagle nesting pairs on the Savannah River Site, 1986–2000.	299
Table 5.7. Numbers of red-cockaded woodpecker fledglings and groups on the Savannah River Site, 1990–2003.	304

- Table 5.8. Acreage receiving midstory control and prescribed burning for red-cockaded woodpecker management on the Savannah River Site, 1990–2003. 309
- Table 5.9. Number of red-cockaded woodpeckers translocated to the Savannah River Site, 1986–2000. 310
- Table 5.10. Number of southern flying squirrels removed from red-cockaded woodpecker cavities on the Savannah River Site, 1986–2003. 312
- Table 6.1. Chemical formulas of minerals occurring at the Savannah River Site. 327
- Table 6.2. Standing volume of pine and hardwood at the Savannah River Site at intervals, 1952 to 2001. 330
- Table 6.3. Approximate distribution of the total forest area by stand age class and major commercial forest type using the Savannah River Site periodic stand mapping database. 331
- Table 6.4. Estimated total number of trees by species and diameter class on the forested land area on the 2001 Savannah River Site in 1992. 333
- Table 6.5. Comparative volume, value, and revenue sold from selected clear-cut or regeneration sales versus thinning or partial-cut sales 1987–1996 on the Savannah River Site. 336
- Table 6.6. Area raked, total sales revenue, and unit value per acre for pine straw harvest at the Savannah River Site, 1991–2000. 337
- Table 6.7. Estimate of percentage of fish species harvested from New Savannah Bluff Lock and Dam on the Savannah River during the 1999 access creel census. 340
- Table 6.8. Christmas Bird Count data for small game birds at the Savannah River Site, 1979–2002. 342
- Table 6.9. Small game harvest at Crackerneck Wildlife Management Area and Ecological Reserve, Savannah River Site, 1984–2003. 344
- Table 6.10. Locations on the Savannah River Site where waterfowl and other selected aquatic birds have been observed, 1952–1997. 349
- Table 6.11. Number of wild turkeys trapped on the Savannah River Site by the South Carolina Department of Natural Resources for off-site restocking programs, 1978–2000. 361
- Table 6.12. Wild turkey harvest data recorded on Crackerneck Wildlife Management Area and Ecological Reserve, 1983–2003. 362
- Table 6.13. Causes of mortality among 132 radio-instrumented wild turkeys on the Savannah River Site and the Crackerneck Wildlife Management Area and Ecological Reserve, 1998–2001. 363
- Table 6.14. Annual number of beaver trapped on the Savannah River Site, 1983–2003. 369
- Table 6.15. Number of wild hogs removed annually from the Savannah River Site, 1965–2003. 377

Foreword

In 1539, Hernando de Soto and his band of six hundred soldiers, gold seekers, and Indian guides set out to explore the interior of what is now the southeastern United States. De Soto and his men traveled north and east from Florida and across the upper coastal plain of Georgia before crossing the middle Savannah River into South Carolina. Although their exact route is unknown, they would have passed through a heavily forested landscape, perhaps following Indian trails and sticking, as much as possible, to the open, sandhill scrub forest and longleaf pine-dominated uplands, avoiding the more difficult terrain of the tupelo-cypress swamps and bay forests of the bottomland floodplains.

Though no doubt grand by modern-day standards and magnificent to behold, the forests encountered by De Soto had already been modified for centuries by Indians seeking to improve their hunting grounds and increase the abundance of edible berries and other wild foods. But the changes wrought by Native Americans were relatively minor compared to what was to come. Four hundred years after De Soto's travels, the uplands of the upper coastal plain had been almost entirely cleared for intensive agriculture, and even much of the swampy lowlands had been drained and cleared. These dry, infertile lands provided a farmer little yield and a difficult life, however, so by the mid-twentieth century, many farmers had left, leaving the patchwork of abandoned farms and second-growth forests still seen throughout most of the upper coastal plain today.

Can land degraded by centuries of poor agricultural practices be restored to something approaching its original productivity and diversity? This book tells the remarkable story of fifty years of natural resource management and restoration of the forested landscape of the Savannah River Site (SRS). In 1950, the Atomic Energy Commission began purchasing land and relocating thousands of descendants of the original European settlers who had cleared the land and tried to eek out a living from it.

Shortly afterward, researchers from the Universities of Georgia and South Carolina and the Philadelphia Academy of Sciences were invited to work on the site, and the USDA Forest Service began an aggressive program to replant and restore the forests. As a result of these efforts, the Savannah River Site is one of the best-studied ecological research sites in North America, and an amazing diversity of native flora and fauna exist in what was once corn and cotton fields, pastures, and degraded and poorly managed forests.

Editors John Kilgo and John Blake have assembled a talented group of authors, all of whom are intimately familiar with the subject matter of their chapters. Some authors are university faculty who for years have traveled back and forth from schools across the country to work at the Savannah River Site because of the unique research environment the site offers. Others are permanent residents working on site at Westinghouse, the U.S. Forest Service, or the University of Georgia's Savannah River Ecology Laboratory. Their collective knowledge of the history, ecology, and management of the Savannah River Site is itself a unique resource, and this book serves to make their knowledge and experience available to others.

Today, most of the original forest traversed by De Soto is gone. In 1989, in "Longleaf pine and wiregrass: Keystone components of an endangered ecosystem" (*Nat. Areas J.* 9:211–213), Reed F. Noss estimated that less than 30 percent of bottomland and riparian forests and only 14 percent of longleaf forests remain in the Southeast and only 3 percent of longleaf habitat survives as old growth. Some of the unique species of the southeastern forests (e.g., Carolina parakeet, ivory-billed woodpecker, and Bachman's warbler) are gone forever, but—though many of the remaining species are threatened or endangered—much of the original diversity of the region has survived. Our ability to ensure the long-term viability of the region's biological diversity depends on three critical steps: (1) inventorying the existing diversity of native species, (2) determining the habitat requirements of the threatened species, and (3) restoring habitats and managing them to provide for the habitat requirements of native flora and fauna.

In summarizing fifty years of research into the biotic communities and native species of the Savannah River Site, this book provides a comprehensive overview of the forest management practices that can support long-term forest recovery and restoration of native habitats. The success of the management efforts at SRS is attested to by the 103 species of reptiles and amphibians, 87 fish species, 69 species of dragonflies and damselflies,

99 species of butterflies, 64 rotifer species, and literally thousands of other species that still exist there. Not only the presence of species but also their habitat requirements have been documented in detail, even for often ignored groups such as aquatic invertebrates. As a result of reintroducing or regenerating appropriate native species, restoring natural hydrological cycles in the lowlands and regular burning in the uplands, controlling non-native invasive species, and carefully regulating hunting and fishing, the native flora and fauna of the Savannah River Site is flourishing.

Our ability to preserve the native biological diversity of the southeastern United States, or any other region of the world, over the next thousand, or even hundred, years is still uncertain. There are those who feel we have done too little too late, and the loss of habitat and poor management practices of the past combined with our ignorance and greed in the future will inevitably lead to massive losses of biological diversity. This book stands as a counterargument to that bleak and gloomy view of the future and provides a concrete example of the role that good science combined with good management can play in ensuring that our descendants will be able to enjoy the splendors of nature that have delighted our own generation.

H. Ronald Pulliam
Regents Professor of Ecology
University of Georgia
August 12, 2004

Preface

In 1950, the United States Department of Energy (then the U.S. Atomic Energy Commission) began purchasing the land that became the present Savannah River Site (SRS). All residents were removed (figure A), and in 1951 the government closed the site to the public to begin work on production of nuclear weapons materials. At the time, abandoned agricultural fields dominated upland areas, and the SRS and the USDA Forest Service initiated an aggressive reforestation program. Concurrently, the primary site contractor at the time, E.I. DuPont de Nemours Co., sub-contracted researchers from the University of South Carolina, the Philadelphia Academy of Sciences, and the University of Georgia (which would eventually establish the Savannah River Ecology Laboratory) to initiate baseline ecological surveys of the site. Since that time, researchers from those organizations and many others have intensively studied and monitored the natural resources of the SRS. The initial inventory of the fauna and flora established both a baseline for future comparison and a philosophy of stewardship for resources that persists today. Although management objectives have changed, the SRS goal for stewardship has remained focused upon innovative leadership in resource management through sound scientific and technical strategies. In 1972, the Department of Energy designated the SRS as the nation's first National Environmental Research Park, a place where the effects of human impacts on the environment could be studied. The SRS has provided excellent opportunities for research within that concept. The comprehensive nature and scope of information on the ecology of the site and its resources is unparalleled.

The SRS has made this information available to the public through numerous professional journals, reports, and publications by the Savannah River Ecology Laboratory, the Savannah River Technology Center, the South Carolina Archeology Research Program, the U.S. Forest Service,

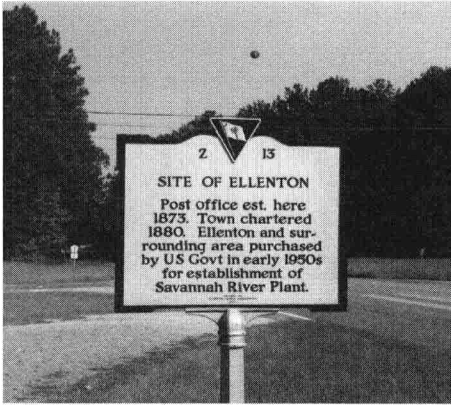


Figure A. At the time of government acquisition, all towns and buildings were removed or demolished (J. Kilgo).

cooperating universities, and other agencies. The SRS has periodically published overviews of the natural resources in various formats. However, no publication has integrated information on ecology, natural resources, and management practices, and various public groups have expressed a desire to obtain that relevant scientific and technical information about the site in a single document.

This book tells the story of the fifty-year period after human residents moved from that 310-square-mile tract of land in the South Carolina coastal plain. Human impact has continued, to be sure. The SRS workforce approached twenty-five thousand at its peak in 1991. Nuclear reactors and related facilities have been constructed, as well as several large cooling reservoirs, and environmental contamination has occurred (there are sites on SRS designated under the provisions of the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act). These impacts have generally been localized within the site, however; industrial development (not including rights-of-way and reservoirs) constitutes less than 3 percent of the site's area, and surface contamination exists in only 0.6 percent of the area. The SRS manages its forests on a far longer rotation length than most managed lands in the Southeast. Thus, the vast majority of the land area of SRS has suffered relatively minimal human impact in the past fifty years. We hope that this book will provide its readers with a better understanding of the plant and animal populations and communities present on the SRS and the effect on them of fifty years of land management by the Department of Energy.

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Many individuals generously contributed their time, efforts, and ideas to make this book possible. Elizabeth LeMaster, formerly of USFS-SR, was instrumental in the original conception of the book. Special thanks are offered to Dumitru Salajanu and Andrew Thompson (USFS-SR) for creating most of the maps used herein, to David Scott for providing many of the photographs, and to Kim Hale for support in putting it all together. Donald Von Blaricom (Strom Thurmond Institute, Clemson University, South Carolina) provided figure 1.3 and associated image analysis. Deno Karapatakis (SREL) provided figure 1.4. Dean Fletcher (SREL) provided the list of SRS fishes in chapter 4. Kay Franzreb and Chuck Daschelet (USFS-SRS) collected much of the unpublished red-cockaded woodpecker data in chapter 5. The late Tom Lloyd provided invaluable assistance with the forest inventory data in chapter 6. Finally, we wish to thank the multitude of land management professionals, from many organizations, whose diligent work during the past fifty years has resulted in the unique resource that is the Savannah River Site.