Annual Report

South Carolina
Department of Natural Resources

Fiscal Year
July 1, 2002 – June 30, 2003

SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES
2002-2003 ANNUAL REPORT

TABLE OF CONTENTS

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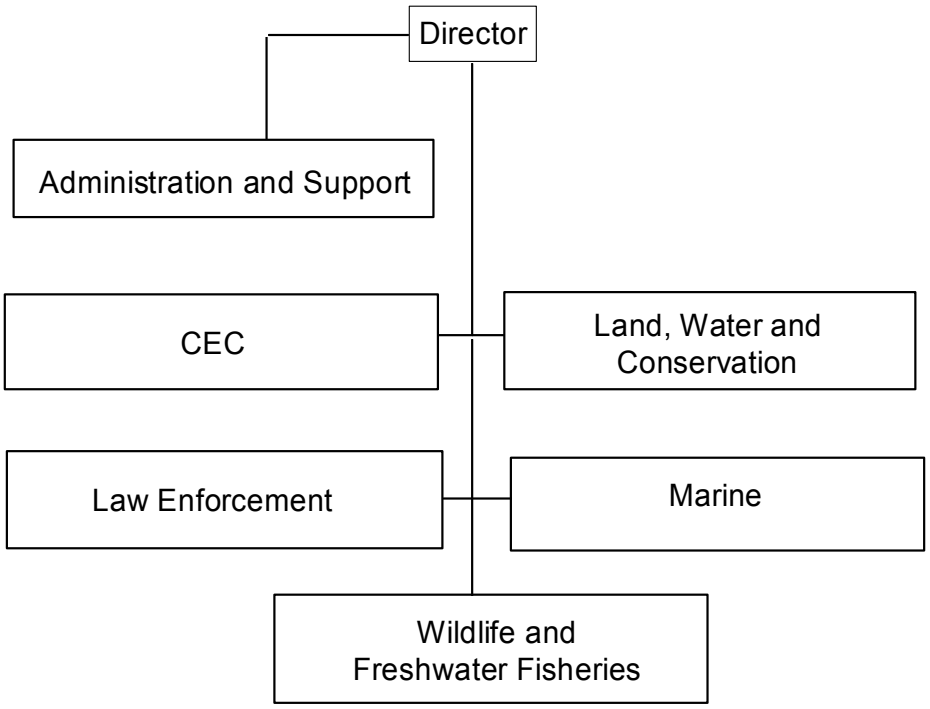
ORGANIZATIONAL CHART

SC Department of Natural Resources
Organizational Chart



SECTION I: HISTORICAL AND QUANTITATIVE INFORMATION

LAND, WATER AND CONSERVATION DIVISION

Land, Water and Conservation Advisory Committee:

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Pursuant to the Water Resources Planning and Coordination Act of 1967 (§49-3-10 et seq.), the Division of Land, Water and Conservation develops and implements programs that manage and conserve the land and water resources of South Carolina. This is accomplished by providing guidance in the development and management of these resources through planning, research, technical assistance, public education, and development of a natural resources database.

The division serves as the focal point for climatologic matters for State government and provides climate information and services to both public and private sectors. The South Carolina Geological Survey is also a section within the division. The State's 46 Soil and Water Conservation Districts receive staff, funding, and guidance from the division. The division conducts hydrologic studies of the state's surface and groundwaters.

CONSERVATION DISTRICTS

Technical Assistance

Staff provided technical assistance to the public in conjunction with the 46 conservation districts and the USDA-Natural Resource Conservation Service. Technical duties of staff include planning and application of soil and water conservation practices, promoting wildlife habitat protection, monitoring soil erosion, assessing sediment and storm water problems, and conducting technical clinics and workshops. With a $7 million increase in federal cost share assistance from the previous year, an additional 329,167 acres were placed under conservation

plans, bringing the grand total to 8.2 million total acres in South Carolina covered by conservation plans. As a member of the State Technical Committee, DNR is involved in the decision making process whereby federal cost share funding is distributed to program participants.

Staff assisted conservation districts with Clean Water Act Section 319 non point source (NPS) grants and provided technical assistance for water quality protection and management projects. Managers worked with staff from the South Carolina Department of Health and Environmental Control (SCDHEC) to discuss the NPS grants process and implementation. Field staff conducted research and began the preliminary grant application process in two targeted watersheds.

Conservation District and Watershed District Assistance

The Section provides program management assistance in the implementation of the Soil and Water Conservation Districts Law and the Watershed Conservation Districts Law. Section staff attended regular meetings of the 46 soil and water conservation district boards, the 37 watershed conservation district meetings, and training sessions. Staff provides direct assistance to the 230 district commissioners, 185 watershed directors, district employees, and other citizens. In July 2002, over 100 agency staff, conservation district commissioners, and watershed directors from across the state attended a Watershed Capacity Building Workshop. The workshop covered a variety of topics concerning watershed issues and opportunities. Section staff coordinated the meeting, provided on-site assistance and presentations. In April 2003, four interactive sessions were held around the state for Conservation District Commissioners, district employees, DNR, and NRCS staff to discuss and identify needs, issues, and priorities. During the 2002-03 Session of the SC General Assembly, staff tracked 75 bills relating to natural resource conservation and provided periodic updates and guidance to the conservation districts. Staff continued to assist with Web page development, updates, and design for conservation districts.

Conservation Equipment Program

Sixty-six (66) units of conservation equipment such as no-till drills, pasture aerators, and drip irrigation machines are made available to the general public through the conservation districts' equipment program. This program demonstrates an innovative approach to promote the adoption of emerging conservation technology to conserve water, save time and money, reduce soil erosion, and improve water quality. Conservation districts sponsor field days and demonstrations with assistance from federal, state, and private agencies to promote the use of the equipment and adoption of conservation practices.

Land Protection Programs

A partnership was initiated with the South Carolina Land Trust Network by cooperating with the Network on mutual projects. Specifically, the Section provided information on the role of conservation districts in land protection, and program details on the State Conservation Bank and the Federal Farm and Ranch Protection Program. The Section created and hosts a website for the Land Trust Network. Section staff partnered with the American Farmland Trust on four public meetings to educate and inform landowners of the benefits of conservation easements and other land conservation techniques.

Public Outreach and Outdoor Education

Efforts to promote DNR programs include staff participation in meetings of the S.C. Outreach Council. The Outreach Council, coordinated by the U.S. Department of Agriculture, consists of several federal, state, and private agriculture and natural resource agencies and groups. In May 2003, the agency participated in a Federal Farm Bill Outreach Workshop targeting underserved groups, including Hispanic, African-American, and female individuals. Several staff participated in the Annual Conservation Partnership Conference held in conjunction with conservation districts and USDA-NRCS. Staff also participated in the Annual Legislative Conference and Mid-year Conference of the S.C. Association of Conservation Districts.

Section staff was involved in the planning and installation of outdoor classrooms and nature trails at several sites around the state. Staff provided technical assistance such as site plan assistance, identification of plant, soil, and water resources and installation of structures. Staff provides assistance at the Congaree Bluffs Heritage Preserve to establish an environmental and cultural education center. Other outdoor education centers associated with conservation districts include the Conservation Station in Richland County, Blue Heron Learning Center in Jasper County, Lynch's Woods Park in Newberry, Playcard Environmental Center in Horry County, Adair Environmental Center in Laurens County, and Roper Mountain Center in Greenville. Outdoor education programs conducted and/or sponsored by conservation districts include Hunter Education, Beach/River Sweep, Farm Safety Camp, Arbor Day, Earth Day, and Farm/City Week events.

Staff conducted the annual Governor's Institute for Natural Resource Conservation at Lander University in June 2003. High school students from across the state attended the weeklong workshop. Delegates, sponsored by their local conservation district, engaged in hands-on activities learning about water quality, soils, wildlife, land use, and watersheds. Six scholarships were awarded to participants who excelled in workshop activities. Delegates who passed the exams given during the week earned one hour of college credit in environmental science. The Institute is co-sponsored by the Department and the SC Conservation Districts Foundation. Section staff conducted the Institute with assistance from Lander University.

The 7th Annual SC Envirothon state competition was held May 2, 2003, at the Clemson Education and Research Center in Columbia. Students representing 23 high schools competed in the areas of aquatics, soils, forestry, wildlife, and land protection. Spartanburg High School won 1st place and represented the state at the International Envirothon held in August. Department staff coordinated this event with assistance from the SC Envirothon Steering Committee, DHEC, Conservation Districts, USDA-NRCS, Forestry Commission, Soil and Water Conservation Society, Richland School District 2 and the SC Department of Education.

The 2002 Carolina Coastal Adventure hosted 72 students representing conservation districts from around the state. Students studied coastal and water issues and participated in a tour of Ft. Johnson on the DNR research vessel. The Department and the Berkeley Conservation District, in cooperation with Santee Cooper, sponsor this event.

The Department hosted the 2003 Project WET National Coordinators Conference at Clemson University's Madren Conference Center. Project WET coordinators representing 47 states and

several foreign countries attended the weeklong event. Following the Project WET conference, DNR staff hosted a Healthy Water, Healthy People leadership training workshop at the DNR facility in Clemson.

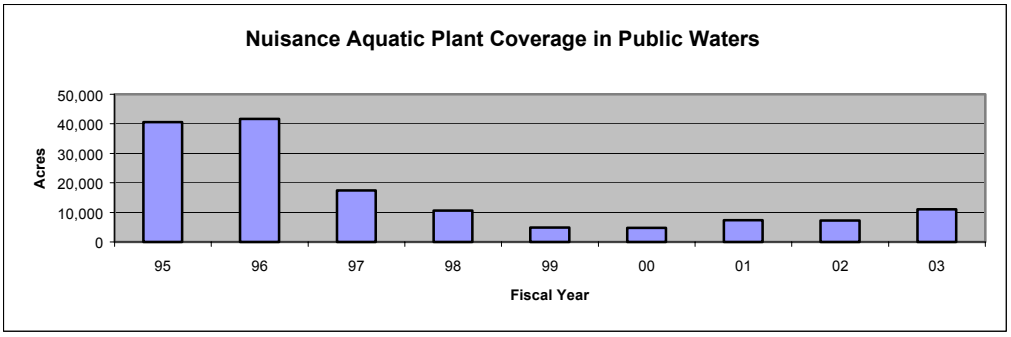
Land And Water Resources Group - Environmental Conservation Section

Rivers, Watershed and Stewardship Program

The Rivers, Watershed and Stewardship Program (formerly Land and Water Stewardship Program) includes the South Carolina Scenic Rivers Program, the Watershed and River Corridor Planning Program, and the Stewardship and Outreach Program. The State Scenic Rivers Program, created by the South Carolina General Assembly in 1974, and the Watershed and River Corridor Planning Program have a strong community-based planning component. A key measure of effectiveness and mission accomplishment for these projects is the level of public participation, with over 1,400 constituents directly involved in projects ranging from scenic river advisory councils, community outreach meetings, workshops, or river corridor planning projects. Other measures are the completion of resource management plans and the completion of management objectives. A management plan was completed for the Ashley Scenic River and the management plans for the Broad and Lynches Scenic Rivers were revised to meet current management objectives. The Beach Sweep/Rivers Sweep cleanup involved over 6,000 volunteers who picked up approximately 56 tons of trash at over 125 sites in South Carolina.

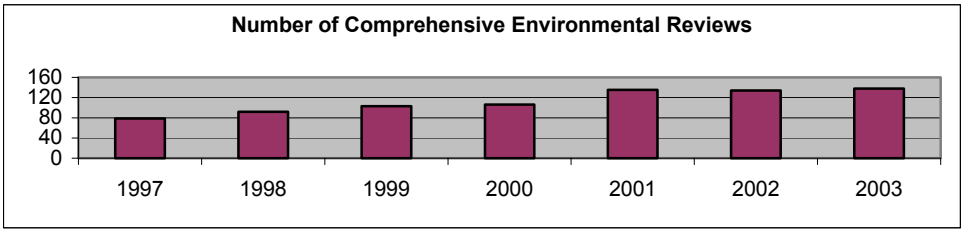
Aquatic Plant Management Program

The purpose of the South Carolina Aquatic Plant Management Program (Section 49-6-10) is to prevent, identify, investigate, manage, and monitor aquatic plant problems in public waters of the state. The Program works closely with the Aquatic Plant Management Council (Section 49-6-30). Funding for the program is cost-shared between Federal, State, and local (public and private) sources. Aquatic plant management operations were conducted on 17 water bodies at a cost of $297,236 using Federal and local funds. (No State appropriated funds were received in FY 2003. The Aquatic Plant Management Program was part of a larger set of programs titled the Aquatic Nuisance Species Programs; however, State budget cuts have forced the elimination of all non-legislatively mandated activities.) The ultimate success of the program is measured by the presence of aquatic nuisance plants in the State's public waters. During the past year, the total area infested with nuisance aquatic vegetation was 11,086 acres. This represents a 54% increase in coverage from FY 2002 primarily due to the expansion of hydrilla on Lake Murray; however, it also represents a 73% decrease from peak coverage in 1996. (See Figure)



Environmental Review Program
The purpose of the Environmental Review Program is to coordinate agency-wide review of environmental permits and other environmental actions affecting natural resources in the 38 inland counties of the State. Primary objectives of the program are to 1) keep abreast of local, State, and Federal environmental regulatory requirements, 2) coordinate the inter-divisional review of all environmental review requests, 3) ensure that all agency comments and positions on environmental reviews are scientifically sound, timely, and in conformance with DNR policies and procedures, and 4) ensure that all comments and positions are unified and that the agency speaks with one voice.

Customer satisfaction and mission accomplishment may be assessed by the timeliness of review completion and response, and by the comprehensiveness of reviews conducted. For each of the past five fiscal years, more than 90% of all requested environmental reviews were completed within the requested time period. The number of comprehensive reviews conducted (those for which a field site visit and evaluation were performed) increased steadily for the five-year period 1997 – 2001. In 2002, travel restrictions due to budget reductions led to a leveling off in the number of comprehensive reviews conducted. This trend continued in 2003 (See Figure).



Laboratory Services Program
The purpose of the Laboratory Services Program is to provide analytical chemical and biological services in support of the agency's resource management, assessment and monitoring programs and activities. The laboratory specializes in analyzing water, sediment, and biological tissue samples, and provides chemical analyses on over 32 constituents for field staff from all divisions within the department and occasional requests from outside the agency. Time-critical chemical analyses are provided for a number of programs including herbicide residue analyses for the Aquatic Plant Management Program.

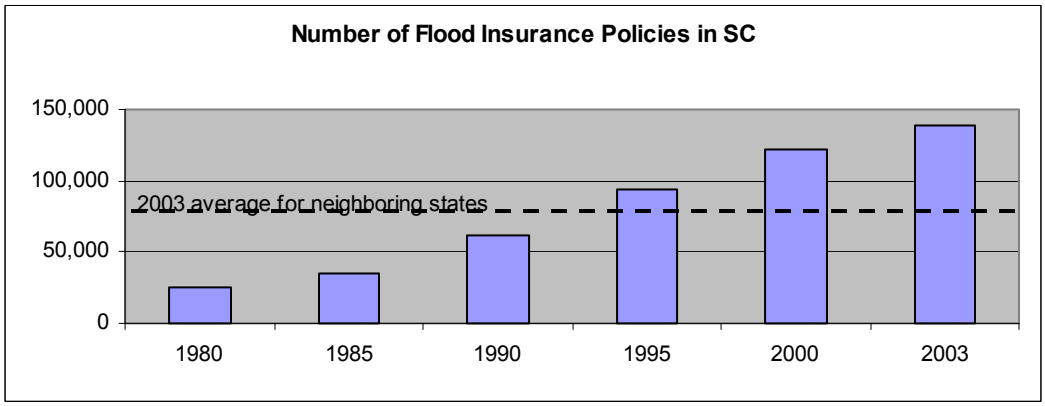
During FY 2003, the laboratory conducted 580 analyses on 81 total samples (75 water samples and 6 tissue samples) from all DNR resource management divisions. Recent budget restrictions have resulted in a sharp reduction in agency program activities. Consequently, requests for laboratory analyses that support these programs are down significantly from previous years. Quality assurance and quality measures were maintained.

Flood Mitigation Program
The purpose of the Flood Mitigation Program is to minimize the impact of floods and reduce flood-related disaster costs in South Carolina. The program provides technical assistance to communities in administration of the National Flood Insurance Program (NFIP) and financial

assistance for flood mitigation planning and projects with funding from the Federal Emergency Management Agency (FEMA).

During FY 2003, program staff trained over 200 community officials and professionals, provided technical assistance to over 2,000 citizens, and delivered information with over 1,000 website visits. The program initiated a Flood Map Modernization Initiative that will provide more accurate GIS based Flood Insurance Rate Maps. FEMA awarded $2 million in FY 03 toward the project.

One measure of the effectiveness of the program is community participation in the NFIP. South Carolina ranks sixth in the nation for flood insurance policies in effect. The number of policies in 2003 exceeded 138,000 and has steadily increased over the past 20 years. (See Figure).



South Carolina Geological Survey

Work activities continued to be refined to complement legislatively described functions. Those functions include: mapping, gathering of surface and subsurface data, involvement in regional planning and effective land use, economic development, and distribution of geologic information. Based on the functions, the established program areas became Geologic Mapping, Product Refinement, and Outreach. The Geologic Mapping Program gathers basic field data and produces geologic information from different regions of the State. The Product Refinement Program assembles that information and creates geologic knowledge in a reproducible format. Outreach then delivers this knowledge or asks for needed derivative products to be produced. Work activities under each program area continued to focus on a value-added approach.

Under the Geologic Mapping Program, quantitative control of map information was improved with expanded use of GPS (Global Positioning System). Use of GPS was considered a value-added step in the mapping process. Mapping was supported primarily by either the National Cooperative STATEMAP program or National Park Service funds. In the Piedmont, *Filbert* 7.5-minute quadrangle in northern York County was mapped as part of the National Park Service's inventory of natural resources. The STATEMAP program addressed socio-economic needs for information in three different regions. Mapping in those regions focused on new mapping, as well as refinement of existing information. In the Piedmont, parts of three 7.5-minute quadrangles were mapped and four 7.5-minute quadrangles were field checked. The identification of polyphase deformation was stressed during the mapping to help define controls

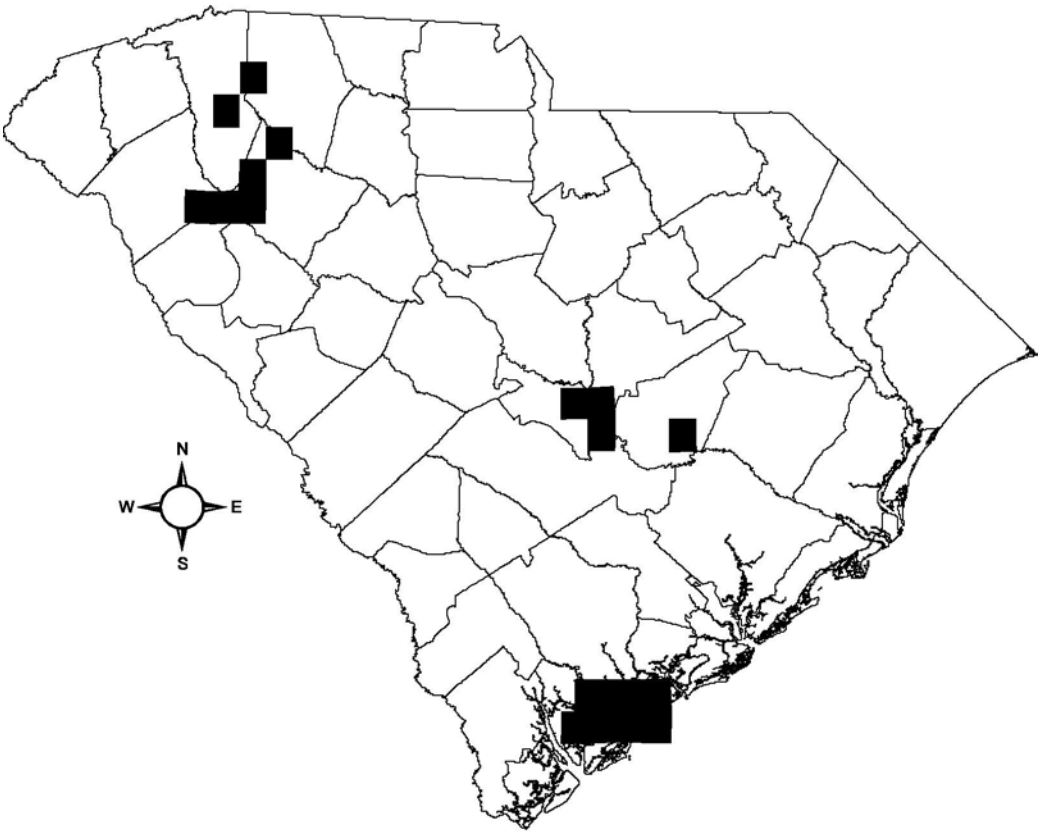
on uranium-contaminated groundwater. In the Coastal Plain, one 7.5-minute quadrangle was mapped, and three quadrangles were field checked and refined. A five-year study was begun in the Lake Marion area of the effect uplift the Charleston earthquake zone has had on the stratigraphy of the middle and Lower Coastal Plains. Along the southern coast, the land area of four 7.5-minute quadrangles was mapped, and the information of four other quadrangles was refined. The assembly of that map information completed the mapping of the southern coast from Edisto Beach to the Savannah River. This information will be used in deciphering the evolution of the coastal zone and in understanding the impact of man's activities on the coastal ecosystem. Outsource maps also continued to be a source of information. In the Piedmont, geologic maps of *Standingstone Mountain* and the northern ½ of *Maulden* 7.5-minute quadrangles were obtained from outside sources, and mylars of those maps were open-filed.

The Product Refinement program is the second step in data handling; map compilation is the first. The program continued to focus on the development of digital electronic products of 1:24,000-scale maps. Twenty 1:24,000-scale quadrangles were digitized in FY2003. Nineteen of the maps were related to STATEMAP projects and one was a Piedmont outsource map. The outsource map was of *Tablerock* 7.5-minute quadrangle in the Piedmont. This map was digitized as an initial product of the Jocassee mapping project that will include a biological inventory of the mountain region in the Piedmont. Value was added to all of the maps when cross-sections were included with the final electronic products. Nine Coastal maps covering the Buffton area also were compiled into a 1:62,500-scale map. Value was added to the compiled map when graphics were added to illustrate the geologic relations.

Under Outreach, 100 mineral kits and 100 educational CD's were provided to the Department of Education to be distributed to needy schools throughout the State. An additional 198 educational CD's, as well as 53 mineral kits, were provided to teachers via other contact means. A new power-point presentation on *Mineral Identification* was added to the educational CD. Two teacher workshops and 22 classroom presentations were made in schools or to home study groups. An information booth was manned at the South Carolina Science Council's Annual Meeting. New posters were placed in different education kiosks. Three manuscripts were received and reviewed for publication in *South Carolina Geology*.

General assistance was provided to 225 walk-in or call-in customers. Specific information was provided to industrial contacts interested in economic development or environmental projects in Colleton, Charleston, Berkeley, York, Hampton, Darlington, Orangeburg, Horry, Beaufort, Anderson, Cherokee, Jasper, Greenville, and Aiken Counties. An additional 15 requests were made for statewide overviews of the geology. The USGS, SCPRT and SCDNR-Wildlife Diversity also were provided information and assistance. An overview of the geology of the State, with supporting graphics, was prepared for the Water Assessment Report. Information concerning natural hazards, i.e. earthquake or sinkhole, was provided about Lexington, Richland, Dorchester, Georgetown, and Greenville Counties. Technical assistance was provided to DHEC in the investigation of the uranium-contaminated groundwater problem in the Fountain Inn-Simpsonville area, Greenville County. The area in the vicinity of the contamination was remapped, and a major fault system was recognized. A core recovered from the same area was logged for DHEC, and relations showed that uranium was concentrated along fault zones. Specific assistance also was given to SCE&G consultants interested in the geology in the vicinity

of the Lake Murray dam. In-house presentations and field trips were given to those consultants on the local geology and on structural styles of faulting. Graduate students from Clemson, University of South Carolina, University of Tennessee, and Vanderbilt University also were helped in the field.



Location of Mapped Quadrangles.

Hydrology

The Hydrology Section maintains a statewide surface and ground water monitoring network in cooperation with the U.S. Geological Survey. Information collected from this network is used to regularly assess water availability and to continuously evaluate the impact that withdrawals, diversions, floods, and droughts have on our water supplies. Furthermore, in accordance with the goals and objectives of the *South Carolina Water Plan*, this information forms the basis for developing sound management alternatives for the utilization and protection of the State's water resources.

The *South Carolina Water Plan* was updated and revised to reflect important information and knowledge that was acquired as a result of the extreme drought that occurred during 1998-2002. A final draft version of the *Water Plan* is currently being reviewed by local, State, and Federal agencies and is posted on the SCDNR Website. The *State Water Assessment* is also being updated and revised. This report will include additional water-resources information that has been collected since 1983, when the report was initially published.

The hydrology staff represents SCDNR in its continuing efforts to work with the North Carolina Department of Environment and Natural Resources, Duke Power, Progress Energy, Alcoa Power Generating, Inc. and all stakeholders of the Yadkin-Pee Dee Basin and the Catawba-Wateree Basin on developing hydrologic models that will be used to determine South Carolina's water demands during normal and low flow conditions. These models will be used to optimize the economic and ecological values of water in each basin and to assess the impacts that will be incurred during periods of water shortages. The staff is also working with the Corps of Engineers and the Georgia Department of Natural Resources to develop a management model of the Savannah River Basin that will balance the needs of the upper basin with the needs of the lower basin.

Staff hydrologists worked with the SCDNR Wildlife and Freshwater Fisheries Division, Georgia Department of Natural Resources, and several Federal agencies to determine minimum required flows in the Augusta Shoals Bypass of the Savannah River, and to develop flow allocation schemes to distribute the Savannah River flow between the Augusta Shoals and Augusta Canal in Augusta, Georgia, as part of the Federal licensing of the Augusta Canal.

Hydrologists continue to maintain a statewide groundwater monitoring network, which currently consists of 56 observation wells (six wells were added in the past year); to maintain salinity monitoring stations at the mouths of the Santee and Savannah Rivers and in two wells at Edisto Island; and to maintain one tide and one climate station. Borehole geophysical data were collected from eight wells in the past year to delineate aquifer boundaries and to determine well-screen locations. Surface geophysical data were collected from 13 sites, and traditional surveys (non-geophysical) were made at 65 sites in the Piedmont to locate high-yielding wells. Most of these surveys were done as part of a cooperative effort with the Federal Farm Service Agency. Interactions between surface and ground water are being investigated, and mathematical models are being developed to determine the feasibility of implementing aquifer storage-and-recovery programs in the Piedmont. Staff hydrologists have begun working with the USGS on developing a statewide ground water flow model, and are assisting with a study to determine if the construction of a bridge on the Edisto Beach causeway will result in the restoration of estuarine ecosystems and water quality.

Statewide potentiometric maps, used to determine ground water storage and ground water flow directions, were made of the Black Creek and Middendorf aquifers. The report *Ground-Water Levels in South Carolina – A Compilation of Historical Water-Level Data* was published and includes water levels measured from 282 wells. The report *Ground-Water Resources of Richland County, South Carolina* was published, providing detailed information about ground water to water suppliers, engineers, and well drillers in the county. Similar investigations are underway for Lexington and Lee Counties.

Office of Climatology and Southeast Regional Climate Center

As the persistent four-year drought finally came to an end in Fall 2002, the Office of Climatology focused on using the experience gained to improve South Carolina's overall readiness for future hazards. Significant accomplishments were the compilation of a Drought Economic Impact Assessment Survey, and the development, coordination, and implementation

of a new Drought Management Plan and Response Ordinance for all South Carolina public water systems.

Throughout the record drought only minimal financial assistance was available for those impacted. In order to justify change in the current policies and focus the extent of the problem for State and Federal decision-makers, a Drought Economic Impact Assessment Survey revealed major losses such as:

- $357,410,000 economic loss for agronomic row crops, hay, and forages; fruits and vegetables; and tree crops (Clemson University),
- $1,311,533,243 impact on forestry (SC Forestry Commission),
- $38,000,000 average loss per power generation facility impacted,
- $7,500,000 for 13 non-utility hydropower plants,
- $500,000 average loss per impacted industry.

The new model Drought Management Plan and Response Ordinance for public water systems was developed in accordance with requirements set forth by the South Carolina Drought Response Act of 2000 (Section 49-23-90) and the South Carolina Drought Response Act regulations (Chapter 121-11.12). The model water system ordinance and plan was created in coordination with the South Carolina Department of Health and Environmental Control and the South Carolina Water Utility Council. The model provides innovative ways for water systems to better mitigate future droughts such as through advanced system specific drought triggers.

In order to efficiently store, review, and distribute the plan and ordinances, a web site was developed and maintained (Drought Response Ordinance Electronic Submission Web Site: http://www.dnr.state.sc.us/pls/drought/login). This electronic database broadens access so that water systems, decision-makers, and the public can share information and better prepare for future droughts with the ultimate goal being to protect our integrated water resources.

Severe weather events, including tropical and winter storms, produce widespread impacts to government, individuals, and commercial/private industries including economic set-backs and loss of life. The Office of Climatology created a new Climatologist II/Severe Weather Liaison position to focus on liaison activities with organizations involved in emergency preparedness and response. The Severe Weather Liaison participated in hurricane task force meetings and preparedness conferences during the late summer and established a network of contacts to enhance the role of the Office of Climatology in providing meteorological information and forecasts. New research proposals and product development for improved assessments of current climate and weather conditions are underway. Through the collaboration of local, State, Federal, public, and private sector entities, the Office of Climatology began an agenda to enhance the public awareness and safety during severe weather events in 2003.

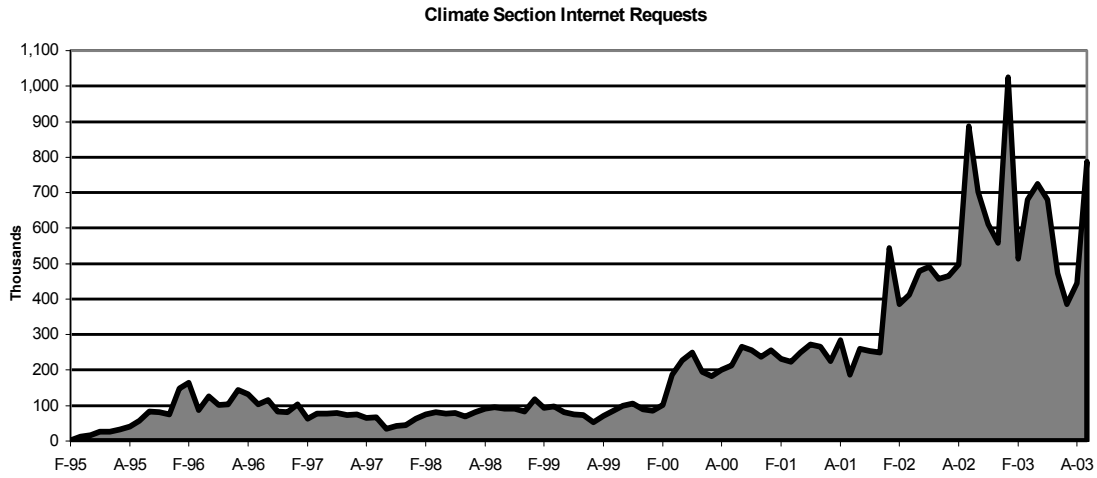
To improve ingest, search, and retrieval of information through the CIRRUSWeb system, the Southeast Regional Climate Center (SERCC) reconstructed the metadata for all National Weather Service (NWS) and USDA weather stations in the southeastern United States. Two thousand weather stations not previously in the database were identified within the region by expanding the geographic scope of the database. The SERCC was also responsible for

coordinating the receipt of information and climate data from more than 100 non-NOAA stations associated with four state-operated meso-networks and one federally operated network in the southeastern United States. During FY2003, 23,914 total NWS daily station reports were received or about 1,993 per month; 5,320 total NWS hourly station reports or about 443 per month; and 1,121 total non-NOAA station reports or about 93 per month. Total weather reports received increased 125% over the previous fiscal year.

The SERCC/SC DNR entered into a cooperative agreement the USDA/NRCS to install and maintain automated weather stations in the southeastern United States. These activities enhanced the Soil Climate Analysis Network operating in near-real time and transmitting data to a central facility for redistribution. As part of our involvement with NOAA's US Climate Reference Network (US CRN), the SERCC conducted site surveys in 13 states to examine potential sites for suitability and coordinated local host agencies and points of contact. Research to estimate the optimal density for the US CRN was completed and will be published in the *Journal of Climate*.

The SERCC partnered with the Desert Research Institute and National Climatic Data Center to develop a digital database of pre-1948 hourly precipitation data and merge these data with existing digital archives. The SERCC partnered with Cornell University and the University of Illinois to develop climate indices related to the abundance of mosquitoes that transmit West Nile virus. The South Carolina component of this project draws on a partnership with researchers at the Department of Health and Environmental Control and the University of South Carolina. SERCC developed and made operational several new products for monitoring seasonal and annual climatic conditions of the southeastern United States, including graphs of departure from normal precipitation for selected southeastern cities for various time scales during the past five years, maps of departure from normal precipitation for the Southeast for year to date, and weekly drought index maps and tables. Research on some of this development was published in the *International Journal of Wildland Fire*.

The Climate Section received and fulfilled 3,193 requests for climate data or information. An additional 558 data or information requests were invoiced, generating $21,497 in revenue. Web pages were accessed 7,815,649 times, or about 651,304 per month, reflecting an 85% increase in web access.



Technology Development

In October 2002, the Natural Resource Information Management and Analysis Section of the Land, Water and Conservation Division and the Computing Services Section of the Administrative Services Division were merged into the Technology Development Section. Although this Section remains organizationally in the Land, Water and Conservation Division, its mission is to consolidate all information technology, database management, and applications development support for the Department. A new organizational structure was developed that created two primary branches. The first, Information Technology Management, provides all hardware, software and communications operational support. The second, Database Administration and Applications Development, integrates the large quantity of tabular and geographic data into a comprehensive data management system and provides applications programming support to the agency staff.

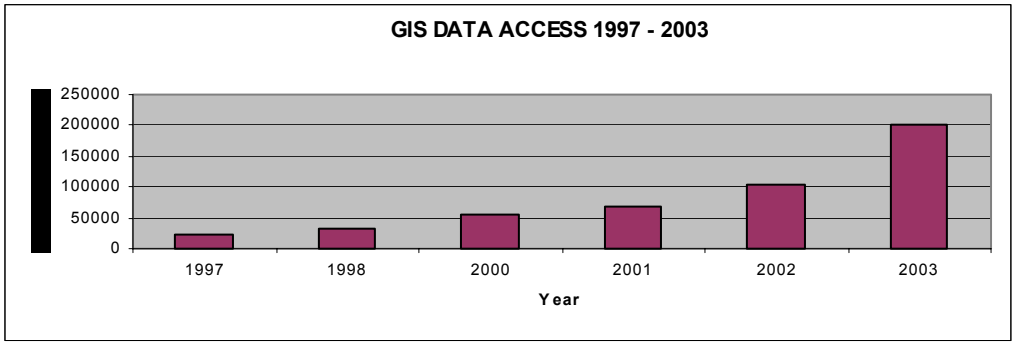
An assessment of the agency's computing environment indicated numerous problems. First, there was an inconsistent and disparate communications network. Several network routers, switches, and hubs were replaced to provide 100-megabit network speed across the three Columbia office buildings. Similarly, several of the Frame Relay connections to various field offices were replaced with Virtual Private Network (VPN) protocols to increase remote communications capabilities. Others will be replaced as resources become available. Second, the administrative computing components (financial, human resources, grant management, licensing, boat titling and law enforcement violations) are implemented in antiquated, programmer-driven COBOL code. Two approaches have been developed to address these issues. The first approach is to evaluate Commercial Off-The-Shelf (COTS) software that can provide turnkey financial, human resources, asset management, and grant management modules. This evaluation was initiated by staff from all relevant sectors of the agency. Second, programming staff has initiated efforts to convert other administrative and programmatic data (licenses, titling, violations, mailing and contact lists, etc.) to the Oracle relational data base management system and develop browser-based tools for user-friendly data access.

The third problem area is the proliferation of numerous personal databases that have been developed independently in various PC-based software systems. No database schema, filtering

or normalization procedures, or metadata have been developed for any of these data. Database Administration staff have initiated a plan to incorporate these data into the Oracle relational database management system and develop appropriate user interfaces for efficient data access and analysis.

Technology Development staff assisted other sections with several projects. A new license scanning system was installed and linkages established to the Oracle database to capture more accurate licensee information from point of sale sources. Staff served as technical representatives on a proposal evaluation committee to provide Internet and telephone license sales.

During FY2002, the 1:24,000 and 1:12,000-scale GIS and Digital Orthophoto Quarter Quadrangle (DOQQ) data were completed statewide and made available through the SC DNR GIS Data Clearinghouse. Since the Clearinghouse was established in 1997, various state, federal and local government agencies, conservation organizations, educational institutions, private sector firms, and the general public have downloaded approximately 500,000 map files.



This year GIS staff installed the Arc Internet Map Server (ArcIMS) software that will allow data to be viewed across the Internet without having to download files to user computers. The statewide GIS data including the SCGAP biodiversity project data were converted to geodatabase format for processing by the ArcIMS software. This system will be operational by January 5, 2004.

Classification of 1983-1986 LANDSAT Thematic Mapper imagery was completed to support long-term change detection studies for South Carolina. This imagery will provide a baseline to determine the impacts of urbanization on natural resources of the state. GIS staff also provided support for geologic and hydrology modeling and mapping projects, scenic rivers planning and fisheries migration restoration mapping.

The Map and Information Center serves as a mapping assistance and distribution center and provides cartographic products (maps, aerial photos, etc.) and natural resource information to planners, resource managers and the general public. During FY2003, the Center fulfilled 7,163 maps, aerial photos, and other cartographic products related to natural resources. Staff participated in SCMAPS workshops and other educational activities.

SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES
MARINE RESOURCES DIVISION

Marine Resources Advisory Committee

Benjamin H. Gregg Jr., Chairman	Columbia
Dr. Madilyn Fletcher, Vice Chairman	Columbia
Jenkins Mikell, Jr.	Columbia
Michah J. LaRoche, III	Wadmalaw Island
Ted Elefson	Greenville
Ms. Terry R. Murray	Beaufort
James M. LeLand	McClellanville
Peter B. Dodds	Charleston
William T. Cooper	Charleston
William B. Dukes	Chapin

The MRD is located on the 90-acre site of historic Fort Johnson on James Island, Charleston. The Division is one of the largest and most sophisticated marine research and management facilities on the east coast. The Division conducts programs to provide solutions to coastal issues through research, management and public education.

Adjacent to the Charleston Harbor, Fort Johnson offers ready access to the state's coastal waters and the Atlantic Ocean. The Division maintains a fleet of three research vessels including the Research Vessel Palmetto, a 110 foot steel hulled ocean vessel, the Research Vessel Lady Lisa, a 73 foot trawler, and the Research Vessel Anita, a 52 foot wooden hull inshore vessel; and one educational vessel, the Educational Vessel Discovery, a 45 foot fiberglass hull catamaran. Vessels have trawl capabilities and research vessels are able to support extended cruises. U. S. Coast Guard licensed captains man each vessel. Division vessels support various state and federally funded programs with vessel needs as well as academic institutions in their educational efforts.

The Division employs approximately 150 people with a diversity of educational backgrounds. The Division operates on a combination of state and federal funds with grants from agencies such as the U. S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, the Environmental Protection Agency and others.

The Division is responsible for the conservation, protection and wise use of the state's marine resources through efforts in research, management and public education. The Division addresses coastal issues by conducting projects to analyze conditions in the commercial and recreational fisheries and the habitats upon which these fisheries depend. The Division also conducts ongoing research in mariculture at both the Fort Johnson site and the James A. Waddell Mariculture Research and Development Center. The Division serves as the state's mission-oriented research facility in the area of marine resources in general.

The Marine Center not only houses the Marine Division, but also offices and units of other Divisions within the Department of Natural Resources including the Administrative Services

Division, the Conservation Education and Communication Division, the Land and Water Conservation District Division, the Law Enforcement Division and the Wildlife and Freshwater Fisheries Division. It is also home to other research and management facilities such as National Oceanic and Atmospheric Administration, National Marine Fisheries Service, the University of Charleston, the Medical University of Charleston and the University of South Carolina.

Although the Division is not an academic institution, it does provide a seaside facility for the state's colleges and universities. Many of the Division's scientists serve as faculty members to the Master of Science Degrees at the University of Charleston, the University of South Carolina and Clemson University.

To find out more about these programs being conducted at the Marine Resource Center contact the Office of Public Affairs at (843) 953-9300.

There are three citizen advisory groups that provide input into the divisions policies and programs:

Marine Resources Advisory Committee

Benjamin H. Gregg Jr., Chairman	Columbia
Dr. Madilyn Fletcher, Vice Chairman	Columbia
Jenkins Mikell, Jr.	Columbia
Michah J. LaRoche, III	Wadmalaw Island
Ted Elefson	Greenville
Ms. Terry R. Murray	Beaufort
James M. LeLand	McClellanville
Peter B. Dodds	Charleston
William T. Cooper	Charleston
William B. Dukes	Chapin

Saltwater Recreational Fisheries Advisory Committee

Tommy Webster	Hilton Head
Skeeter Nash	Murrells Inlet
Cheshire Rhett	Charleston
William Puckett III	Georgetown
Stephen L. Chryst	Myrtle Beach
Edward P. Holder, Jr.	Greenville
Charles Griffith	Cottageville
Daniel E. Henderson	Ridgeland

Governor's Cup Billfishing Series Advisory Board

Robert Hood, Chairman	Charleston
Smyth McKissick	Easley
John C. L. Darby	Charleston

Furman R. Cullum	Charleston
Norman F. Pulliam	Spartanburg
Bert L. Pooser, III	Columbia
Michael Larrow	Ridgeland
Edgar A. Buck, Jr.	Charleston
Bony H. Peace, III	Georgetown
Francis Johnson	Sullivan's Island
Nancy D. Ravenel	Mt. Pleasant
Larry Duncan, ex officio	Walterboro
Gov. Carroll A. Campbell, Jr., ex officio	Georgetown
Dr. Paul A. Sandifer, ex officio	Columbia
Dr. John V. Miglarese, ex officio	Charleston
William L. Hiott	Charleston

Office Of Public Affairs

The Office of Public Affairs (OPA) provides broad based informational, educational and public affairs support to all agency coastal programs and activities, including those of the Division of Marine Resources, the Conservation Education and Communication Division, the Wildlife and Freshwater Fisheries Division and Law Enforcement and Boating Division. Support includes production of news releases, coordination of media relations, legislative outreach, the production of special publications, dispensing public information, conducting educational programs, performing educational outreach activities, conducting special agency functions and other appropriate activities. It is also the goal of the OPA to inform and educate the citizens of South Carolina about:

- the ecological diversity and economical value of South Carolina's natural coastal resources,
- what the Agency is doing to better understand, manage and conserve these resources,
- the expertise the Agency uses in management and research endeavors,
- and what user groups can do to protect and conserve these resources.

Public Assistance

The OPA is the primary information contact for the general public at the Marine Resources Division. The office also serves as receptionist for anyone who visits the MRD looking for assistance and offers a number of informative brochures, maps, etc. for this purpose. During FY 2002-2003, the OPA received thousands of telephone calls from the public requesting assistance with a wide range of topics, including boat titling, hunting, commercial and recreational fishing information, regulations, environmental issues, referrals for wildlife assistance and educational activities.

Information and Media Coordination

During FY 2002-2003, the OPA's media relation's coordinator wrote 58 news releases that were included in the weekly DNR news packet. News release topics included various resource season openings/closings and summaries, MRD studies and projects, coastal DNR law enforcement cases, new resource regulations, S.C. Governor's Cup Billfishing Series, meeting announcements, etc. This employee is a field editor for the *South Carolina Wildlife* Magazine,

and among shorter articles for the Round Table section, wrote the feature article *Scorpion's Kin* on horseshoe crabs and an *At Your Service* column.

The media relations coordinator also organized and participated in several large/group media events and/or ride-a-longs to publicize MRD programs, with an emphasis on extending focus outside of the immediate Charleston area. Events included red drum stocking in May River, Murrells Inlet and Charleston; oyster recycling and restoration projects in Myrtle Beach, Charleston and Beaufort; subway car deployments in Charleston, Murrells Inlet and Beaufort (resulting in national coverage on NBC's *Today Show*); shrimp harvest at Waddell Mariculture Center; dedication of the Michael D. McKenzie Field Station at Bennett's Point; joint DNR and US Coast Guard (USCG) media event highlighting Homeland Security training exercises and ship escorts; crustacean sampling in Hilton Head; and shark tagging in Charleston and Beaufort.

This employee on a daily basis assisted newspaper, television and radio reporters in gathering information and/or interviewing DNR employees on a large number of coastal topics including popular ones such as nuisance alligator removals, satellite tagged loggerhead sea turtles, DNR involvement in Homeland Security, and LE safety tips for swimmers and boaters after several drowning incidents. Employee worked with DNR law enforcement officers on press releases written to increase public awareness of LE Marine Patrol cases. This employee participated in the October 2002 oil spill through working with USCG Public Relations employee to organize, attend and invite media to all press conferences, update reporters on a daily basis and organize media ride-a-longs.

Outside of statewide media, the media relations employee set up and assisted with interviews between producers for "Natural South" TV show on Turner South and biologists for shows featuring the oyster recycling/restoration projects and the artificial reef program; worked with national magazine *North American Fisherman Magazine* for an article on the Artificial Reef Program focusing on subway car deployments; and participated in joint campaign with South Carolina Aquarium to kickoff their Gardens of the Oceans event, resulting in footage of DNR interview on National Weather Channel.

Public Education Program

During FY 2002-2003 approximately 450 students, teachers and members of the public participated in educational tours, cruises, classroom programs and special events. Approximately 14 educational cruises and programs were conducted that provided hands-on experience to students and teachers. These programs covered topics such as marine conservation, wetlands, water quality and the role of the Division in research and management of the state's marine resources. Additionally, the Marine Education Program participated in large outreach programs including the Southeastern Wildlife Exposition and the Palmetto Sportsman's Classic.

Educate Colleton Outdoors (ECO)-Project

The Gaylord and Dorothy Donnelley Foundation (GDDF) continued its financial support of the Educate Colleton Outdoors (ECO) – Project this FY. The ECO-Project provides marine and environmental education opportunities for the middle and high school teachers and students of Colleton County. Because Colleton County lies in close proximity to the ACE Basin, the ECO-

Project strives to increase awareness of this unique and unspoiled wetland expanse. Educational opportunities provided to Colleton County included the following.

1) Teacher's Environmental Network (TEN)- The DNR and partners (the Colleton Museum, USC-Salkehatchie, Youth Service Charleston-Earth Force and the GDDF) implemented the Colleton County Teachers Environmental Network (TEN) designed to foster an interest and encourage teaching and learning about environmental science. Events scheduled included a kickoff meeting featuring a presentation on the "Dynamics of the Lowcountry"; a butterfly program and natural history walk at the Caw Caw Interpretive Center in Ravenel, SC; a presentation regarding research expeditions by DNR biologist; and a canoe/kayak trip on the Edisto River.
2) ACE Basin Cruise and Field Trips- Colleton County students and teachers, youth leaders and community leaders participated in six cruises in the ACE Basin to learn how to use different marine research equipment and recorded data in a logbook. Classes also participated in wetland and plankton studies at the Michael D. McKenzie Field Station. During these programs, participants learned about the importance of the wetlands through games, models, and marsh walks/transect activities; and how to deploy a plankton net and how to identify different kinds of plankton using microscopes. In addition, Youth Leadership Colleton toured the Donnelley Wildlife Management Area with a DNR biologist to learn about local flora and fauna and the cultural history of the area.
3) SCMEA sponsorship- Colleton County teachers attended the 2003 South Carolina Marine Educator's Association (SCMEA) Conference in Myrtle Beach, SC. One Colleton County Middle School teacher presented an original activity developed to incorporate marine science into a language arts curriculum.
4) Camp Wildwood sponsorship- Colleton County students were sponsored to attend the natural resource leadership training camp in June.
5) Marine and Environmental Resource Room- In spring of 2003, the Marine and Environmental Resource Room opened for use by the Colleton County School District providing a variety of books, kits, models and games for teachers to use in their classrooms to encourage the teaching of marine and environmental science.
6) Workshops- Workshops were held to train Colleton County teachers to effectively use materials available in the Marine and Environmental Resource Room; COASTeam (Coastal and Ocean Awareness for Southeastern Teachers) participants presented their original activities to colleagues; and teachers learned to identify shorebirds and how to record and enter data into the system wide website at a Shorebird Sister Schools Workshop.
7) Marine Madness-The distribution of the monthly *Marine Madness* newsletter continued to alert Colleton County teachers to upcoming marine and environmental opportunities. The newsletter also showcased teachers who participated in such opportunities.

Clean Vessel Awareness Campaign

The Clean Vessel Act (CVA) Awareness Campaign is designed to inform and educate boaters and marinas about the potential hazards of sewage pollution, and ways to decrease the amount of pollution in South Carolina's waterways. This campaign started in South Carolina in 1998, and to date has been an extremely successful and well-received anti-pollution effort.

During the year, the CVA coordinator participated in five statewide and regional boat and marine trade shows: the Grand Strand Boat Show, the Columbia Boat Show, the Charleston Boat Show,

the Greenville Boat Show and the SC Marine Association In-Water Boat Show. Participation in these events consisted of showcasing an interactive Touch Screen presentation, circulation of informational brochures and posters, and distribution of promotional give-away items.

A CVA message is an important component to the MRD's public education programs. The CVA coordinator assisted other DNR staff in many of the cruise and classroom education programs for students, teachers and the public during the FY 2002-2003. These included cruises in both the Charleston Harbor and the ACE Basin, salt marsh programs, tours of the MRD research facility, teacher workshops, boating safety classes and DNR camp programs.

The South Carolina Clean Marina Program continued to grow and improve. This program encourages marinas to use best management practices, including pumpout stations, to prevent pollution in the coastal waters of South Carolina. A Clean Marina Program focus meeting was held during the year to gather ideas and feedback from current clean marinas and those interested in the program. A presentation was also delivered during the annual SC Marine Association Luncheon to encourage marinas to participate in the program. Currently there are two inland clean marinas and six coastal clean marinas. The CVA coordinator is working with marinas, the SC Marine Association, the Department of Health and Environmental Control and others to improve the existing program by redefining the criteria and the process and creating a guidebook of best management practices for marinas to follow.

Boating Infrastructure Grant

The Boating Infrastructure Grant (BIG) program, administered by the US Fish and Wildlife Service, is a national competitive grant program that provides funding to states to construct and enhance facilities for transient recreational boaters who operate vessels 26 feet in length and over. During FY 2002-2003, four South Carolina proposals were approved providing federal funds in the amount of $744,738 to the DNR, the Harborwalk Marina in Georgetown, the Charleston Maritime Center and the Anchor Marina in North Myrtle Beach.

Compliance documentation and grant agreements for the five BIG project grants approved in previous fiscal years were submitted and received from the US Fish and Wildlife Service. Cooperative Agreements with the Charleston City Marina and the Charleston Parks and Recreation Commission for construction of transient docking facilities continued to be negotiated.

Saltwater License Program Website/Marketing

Annually, around 100,000 fishermen purchase a South Carolina Saltwater Fishing License, a trend that has remained relatively constant over the past few years. While this number is substantial, there is the potential to increase this number and even more importantly, increase awareness of this valuable program. To address the needs of South Carolinians and others who take advantage of our coastal resources, there is a growing demand for increased awareness and accessibility of fishing-related information.

During FY 2002-2003, the OPA marketing coordinator designed a Saltwater Recreational License Program website. The website is interactive, and it features numerous photos and videos on DNR projects so the public can see first-hand the programs that license sales support. The

website gives the public a graphical insight into the major saltwater license funded programs including artificial reefs, red drum stock enhancement, and oyster restoration and recycling. The public can purchase their license through the website, use the website to receive real-time news and information regarding natural resource rules and regulations, fishing reports, weather and tides information, boat landings and marina locations, DNR marine educational publications, and seafood recipes.

This year the OPA coordinated in the development of a Saltwater Vehicle License Plate. House Bill 3990 was signed into law in June 2003 creating a DNR saltwater fishing vehicle license plate. The proceeds from the license plate go directly toward the management and conservation of the state's marine resources.

The marketing coordinator conducted outreach to individuals and organizations at various events and meetings. These events include 6 fishing expos/boat shows. The coordinator made presentations to groups such as the Myrtle Beach Chamber of Commerce, Camp Wildwood, the Greenville Saltwater Sportfishing Club, and the Charleston Power Squadron.

Coastal Information Distribution System
During FY 2002-2003, Coastal Information Distribution System assisted in the coordination of updating and reprinting several existing publications including the following:

- South Carolina Rules & Regulations for 2003-2004
- Saltwater Fishruler
- South Carolina Artificial Fishing Reefs

These and other publications continued to be provided to the public throughout the year via distribution to tackle shops, marinas, and other retail outlets.

Wildlife Assistance Office
The Wildlife Assistance Office received a total of 1820 calls for FY 2002-2003. This was a 9% increase over last year with the largest increase in calls concerning topics on snakes and West Nile Virus. Calls concerning nuisance alligators numbered 190 for this FY. Of these calls, 70 (37%) were forwarded to the alligator coordinator for possible removal. All alligator calls forwarded fit the protocol of over 6 feet and were considered nuisance alligators.

Wildlife Rehabilitation Network
There were a total of 24 coastal rehabilitators and 16 coastal veterinarians that participated in the Wildlife Rehabilitation Network in FY 2002-2003. Seven of the primary rehabilitators cared for a total of 1438 wildlife species. Of these, 825 animals were released back into the wild, 476 died or were euthanized, 91 were transferred to a larger facility, and 46 are still being rehabilitated.

In March 2002, a wildlife assistance meeting was held in Columbia at the Clemson Sandhills facility. There were 30 + rehabilitators in attendance. The 2002 Palmetto Wildlife Rehabilitation Award was presented to Holly Reynolds of the Isle of Palms for her help in rehabilitating shorebirds, endangered species and also her assistance during the 1999 Oil Spill. A Palmetto

Wildlife Award was also presented to Bob McGin of Wildlife Rehab of Greenville for his rescue of injured wildlife and his assistance in reintroducing rehabilitated wildlife back into the wild.

Al Segars, DVM for the DNR presented a program on wildlife diseases. The program was extremely helpful in keeping rehabilitators up-to-date on disease descriptions and care, tips on keeping disease from spreading, and the importance of submitting specimens for documented results.

Coastal Reserves

The Coastal Reserves Program is responsible for coordinating and conducting division-level programs involving input from research and management units, providing field support in established reserves and managing/protecting representative coastal habitats through linked programs of research, education, and stewardship. Customers include the general public, teachers, students, researchers, and private landowners.

Capers Island

Over the last year Coastal Reserve staff upgraded the electrical lines leading to the departments facilities, replaced the dock pilings on the main public access floating dock in Capers Inlet, assisted a federal project to construct a weather station, maintained water control structures, hiking trails and managed visitation to the island.

July-02, 16 permits, 86 campers for 27 camping days.
August-02, 17 permits, 87 campers for 31 camping days.
September-02, 15 permits, 103 campers for 24 camping days.
October-02, 35 permits, 214 campers for 78 camping days.
November-02, 15 permits, 110 campers for 26 camping days.
December-02, 5 permits, 86 campers for 5 camping days.
January-03, 3 permits, 12 campers for 5 camping days.
February-03, 7 permits, 68 campers for 16 camping days.
March-03, 20 permits, 138 campers for 48 camping days.
April-03, 30 permits, 231 campers for 58 camping days.
May-03, 45 permits, 275 campers for 94 camping days.
June-03, 37 permits, 411 campers for 50 camping days.

Totals: 245 permits, 1,821 campers for 472 camping days.

Office Of Policy & Operations

The following activities were completed within the Office of Policy and Operations during FY 2002-2003:

1) Reviewed fixed operating costs associated with maintaining MRD facilities at Waddell Mariculture Center, ACE Basin Field Station at Bennett's Point, the SC Marine Resources Center, and Capers Island.
2) Completed efforts to brief the DNR Board on the pros and cons of maintaining a rhesus monkey breeding colony on the recently-acquired Morgan Island in the ACE Basin National Estuarine Research Reserve.

3) Developed the FY 2003-2004 federal budget request for the MRD. At the time of printing, this request was still pending further action by the Congress.
4) Continued to negotiate agreements with the College of Charleston and NOAA regarding shared use of facilities and infrastructure at the SC Marine Resources Center.
5) Provided support to the DNR Deputy Director for Marine Resources in areas such as constituent relations, facility operations, vessel operations, information technology, state and federal budget analysis, human resources, and policy analysis and evaluation.

Information Technology

In FY 2002-2003, the MRD's Information Technology (IT) Section was again faced with exceedingly difficult staffing circumstances. In FY 2002-2003, the already tremendously understaffed IT Section lost yet another employee – this time to transfer to another section within the division. Despite these obstacles user services were not only maintained, but were improved upon to significantly advance the ability of users within the MRD to use technology to more effectively accomplish their jobs. Significant MRD IT Section accomplishments in FY 2002-2003 are as follows.

1) Telecommunications System Replacement- Completed planning, installation, and transition of the MRD from an aging Siemens/ROLM telecommunications system to a new Avaya system managed by the state CIO. This major project to install a modern telecommunications system at MRD was undertaken in August 2002 and has proven to be a great success by giving users stable, full-featured phone service at a much reduced cost to MRD. It is estimated that the MRD may save as much as $60,000 per year with the new system vs. the old system.
2) Section Staffing and Reorganization- In April 2002, the IT Section's Communications Specialist III position (responsible for telecommunications) was transferred to the Office of Public Affairs due to budget cuts. Although still responsible for most telephone related maintenance, this is another significant reduction in IT Section staffing. After these personnel changes, the MRD IT Section now consists of only approximately 1.5 Information Technology personnel, 1.0 GIS personnel, and 0.5 telephone personnel to support all the IT needs of approximately 200 users in the MRD. IT staff also assisted and provided local support for other DNR divisions users located at the Charleston location.
3) User and IT Infrastructure Support- The IT Section assisted users with an estimated 50 to 100 HelpDesk and PhoneHelp technical support requests per month in addition to the following ongoing operational responsibilities: Ethernet network management; Internet routing and firewall management; IT project planning; purchasing recommendations and technology usage guidance; IT user training and classroom maintenance; management of E-mail, WINS, DHCP, RAS, VPN, Backup, NAS file and Intranet servers; software licensing support; web development; database development and programming; and GIS project support.
4) Virtual Private Network Installation- Installed and configured a Cisco Virtual Private Network (VPN) 3000 Concentrator to provide a LAN-to-LAN VPN "tunnel" from the MRD LAN to the MRD VLAN at the Hollings Marine Lab (HML) facility. Several related projects were also completed as part of the VPN installation including a reconfiguration of the entire Marine Resources Center WAN network infrastructure to improve the network connectivity for all institutions (MRD, CofC, MUSC, CCEHBR, and HML) that reside in MRD's server room; upgrading the hardware and operating system of MRD's Cisco 3620 Router to

accommodate new interface modules; and redesigning the MRD router/firewall configuration to assure network security and Internet connectivity.

5) E-mail Server Upgrade- Extensive hardware and software upgrades to MRD's e-mail server were completed to ensure that reliable e-mail service could be provided for the ever more demanding e-mail needs of MRD personnel. Improvements included hardware upgrades (installed additional processor, RAM, and hard drives), and software upgrades (changed RAID configuration, upgraded to Windows 2000 Server OS, upgraded IMail Server software version, added server-based Anti Virus e-mail scanning, and upgraded Retrospect backup software).

Physical Plant

The following activities were completed during FY 2002-2003:

1) Developed and implemented database for tracking all facility door keys.
2) Designed the replacement roofing system for the Administration area located at the CCEHBR building.
3) Continued refinements in the management of the HVAC system, which enabled savings in electric and gas costs.
4) Completed complex repairs to the variable speed drives that control the chiller condensing systems located in the Central Energy plant. Repairs were done in-house saving an estimated $10,000.
5) Continued refinements to the safety program, including on-time chemical/radiological inventory and disposal, training, and development of Standard Operating Procedures.
6) Completed certification of MRD staff in driver training, including the establishment of a certified instructor for MRD.
7) Completed certification of MRD staff in First Aid/CPR and safety, including the establishment of a certified instructor.
8) Removed all excess radiological material from MRD facilities at the Marine Resources Center.
9) Reduced HAZMAT material stored on site; completed review and updated Material Safety Data Sheets.
10) Developed and implemented agreement to share sewer costs with the Hollings Marine Lab.
11) Maintained 24/7 on-call status with a staff of three (down from four the previous year) with no calls missed or inaccurately diagnosed during the year.
12) Responded to 172 service calls (routine, urgent and emergency).
13) Certified the Vehicle Maintenance Facility located at Fort Johnston.
14) Designed and implemented a vehicle maintenance and repair database.
15) Coordinated planning and design with IT and OPA on a 911 building numbering system that will allow emergency personnel to locate injured personnel as well as providing delivery trucks and the general public facility locations.

Vessel Operations

MRD research vessels were underway 266.5 days in order to complete research, management, and education cruise goals. Staff coordinated logistical aspects of purchasing a new education vessel, the *E/V Discovery*. Daily vessel rates for all research vessels were increased to a level that will cover the salaries of the captains and crew so that the operation of research vessels requires

no state funding. The condition of the *R/V Anita* was assessed and it was determined that the MRD will require a new inshore/near-shore research vessel within the next few years. Federal funds to acquire a new vessel are being sought.

Office Of Fisheries Management

The Office of Fisheries Management (OFM) is responsible for management of the state's living marine resources and their associated habitats, while considering the economic and social benefits these resources provide, and the equitable utilization of fishery resources. This mission encompasses such responsibilities as: the regulation of fishing seasons, areas and methods; issuance of commercial and recreational fishing permits and licenses; management of public shellfish grounds; artificial reef construction and monitoring; finfish, shellfish and crustacean monitoring and assessment; the acquisition and analysis of statistical records of various fisheries; the review and assessment of environmental permits and other proposed activities in the coastal zone.

The OFM has customers who represent a wide variety of interests. Recreational and commercial fishermen represent the major consumptive user groups that interact on a daily basis with the OFM, however non-consumptive users such as environmentalists, developers, legislators and people simply interested in coastal resources routinely request information and advice regarding a variety of activities.

The OFM is composed of four Management sections (Environmental Management, Finfish Management, Shellfish Management and Crustacean Management), three support units (Statistics, Permitting, and Resource Economics) as well as several smaller programs including the Governor’s Cup Billfishing series, and the Turtle project. The OFM employs 37 individuals who range in educational background from MS degrees to high school graduates, each having a unique background and qualifications suited for his or her particular job function.

Marine Artificial Reef Program

During FY 2002-2003 the Marine Artificial Reef Program inspected and maintained aids to navigation on all artificial reef and wreck sites. Six new buoys were deployed. Nineteen separate artificial reef construction projects were completed on thirteen different permitted reef sites. Eighteen separate offshore field trips resulted in a total of 23 days of monitoring activities on the state's marine artificial reefs. Physical stability, structural integrity, and biological effectiveness of individual materials were assessed through diver observations, side scan sonar, and hull mounted sonar. A total of 37 SCUBA dives were conducted throughout the year on reef sites ranging from <10 to 120 feet of water. Diver assessments revealed continued colonization of fish and invertebrates on new and previously existing reef structures. Video, still and digital photographic records were obtained during diving activities whenever possible. A new, deeper water experimental reef site was established to examine colonization and production of snapper/grouper species in marine protected areas. Sampling also continued on the existing experimental reef site. Information on South Carolina's system of artificial reefs was provided to the general public through numerous news releases and feature news stories, television appearances, and public presentations. A new, full color artificial reef brochure was also produced. Several hundred phone and mail requests for reef locations or condition reports were responded to through the distribution of updated reef maps and GPS listings.

Individual reef construction efforts resulting from this project are summarized as follows:

Date	Material	Reef Site
17 July 02	50 Subway cars	Comanche Reef
30 July 02	Concrete X-units	Charleston 60’ Reef
10 Aug 02	50 Subway cars	Vermillion Reef
13 Aug 02	15 Shipping containers	Hunting Island Reef
15 Aug 02	15 Shipping containers	North Inlet Reef
19 Aug 02	15 Containers, 1 army tank	Y-73 Reef
24 Aug 02	80-foot Deck barge	Little River Reef
06 Sep 02	concrete and steel structures	Cape Romain Reef
07 Sep 02	50-foot Houseboat	Lowcountry Anglers Reef
21 Oct 02	14 Steel cable reels	Charleston 60' Reef
06 Nov 02	2 110’ Deck barges	Little River Reef
07 Nov 02	Concrete rubble	Lowcountry Anglers Reef
14 Nov 02	8 Steel cable reels	Charleston 60’ Reef
14 Jan 03	50 Subway cars	Betsy Ross Reef
11 Feb 03	50 Subway cars	BP-25 Reef
16 Apr 03	Concrete rubble	Little River Reef
21 Apr 03	Concrete rubble	Little River Offshore Reef
29 Apr 03	400 Concrete cones	New Experimental Site
17 Jun 03	11 Steel cable reels	Charleston 60’ Reef

Diadromous Fish Project

The major activity in the NMFS-funded Diadromous Fish Project during FY 2002-2003 was completion of the ninth year of tagging sturgeon in the lower Edisto River. About 2600 individual Atlantic sturgeon have been tagged in the lower Edisto River from 1994 – June 2003, with more than 50% tagged at age 1. Nearly 30% of these individuals have been recaptured within the lower Edisto during the course of subsequent survey effort. Furthermore, about 10% of tagged fish have been recaptured in the lower Edisto in at least one subsequent calendar year. Numerous recapture incidents, nearly 1100 since 1994, have justified high confidence in such age assignments at least up to age 5. Sturgeon tagging has yielded excellent growth and movement information on juvenile Atlantic sturgeon and, to a lesser extent, on adult and juvenile shortnose sturgeon. Data have been added to a developing data-set (beginning 1994) with hopes of determining changes in year-class strength that may be indicative of stock status changes or of responses to variable environmental conditions. A federally funded tagging study on American shad in the Waccamaw River was initiated to determine the fishing rate on pre-spawning females in the Winyah Bay watershed, where shad stocks were perceived to be in good condition based on commercial fishery catch per unit of effort reports. The study (spring 2003) was very successful as 1138 fish were tagged. Results of the 2003 tagging study indicate a healthy status for the Waccamaw-Pee Dee basin shad population. A survey of young-of-year American eel (elvers) was initiated in early 2000 as a mandated study under the ASMFC’s FMP for this species. As required, the survey was repeated in 2003. Sampling was conducted immediately below Goose Creek Reservoir for a six-week period using a single fyke-net as sampling gear.

Elver catches have been variable between years. A long-term data-set will be needed to make any assessments on relative elver abundance or on changes in year-class strength.

Dolphin Tagging Study

The dolphin tagging study was initiated in 2001 to begin mapping movements and migrations of dolphin fish along the US East Coast. The study consists of two tagging phases, one conducted by DNR biologists and the other by individual offshore fishermen. In addition to their movements, the study will attempt to assess the difference, if any, in tag recovery reporting rates between tags offering cash rewards and those offering only tee shirts. The study compares recovery rates for private boats, charter boats and commercial vessels.

Since its start, the project has signed up over 500 offshore fishermen from Key West, FL to Nantucket, MA to tag fish for this research. The project realized 632 dolphin tagged and released by volunteers with another 57 tagged by DNR biologists during FY03. Fish were marked and released from Key West to Hatteras, NC including the eastern Bahamas. A total of 21 tag recoveries were report during this period. The project has now collectively tracked dolphin from the Florida Straits to Rhode Island, a distance of over 1,200 miles. Three fish have exhibited movements of 664 miles, 705 miles and 798 miles in 26, 152 and 34 days respectively.

In an effort to keep the public and volunteers informed about the project, an Internet website was created, , which was visited over 4,000 times during its first year. A newsletter was distributed with 8 issues published during this period. The project has also been featured in articles in *Salt Water Sportsman*, *Sportfishing Report*, *Florida Sportsman*, *The Big Game Journal*, *Tide*, tournament magazines and numerous coastal metropolitan newspapers.

Crustacean Management

Crustacean fisheries, including primarily shrimp and blue crab, were below normal in this fiscal year. The relatively mild winter of 2001-2002 resulted in a return of a strong spawner stock compared to the previous year of very few spawners. Despite the good spring spawn, fall commercial landings of white shrimp (1,721,520 heads-off lbs) were 23 percent below average. Biologists believe the prolonged drought negatively impacted white shrimp abundance during summer and fall 2002 through the reduction of optimal nursery habitat. The occurrence of "brown gill disease" in fall white shrimp reduced the quality of shrimp and may have also contributed to the poor season. The overall impact of the disease is unknown, but some shrimp fishermen suggested significant mortalities occurred during September. The Department confirmed widespread infection rates but could not confirm mortalities. Preliminary laboratory studies did suggest that shrimp health was somewhat compromised by the melanization of the gills caused by the disease. An additional factor that could have contributed to low landings was a very poor price paid for shrimp, which reduced economic incentives to fish and probably resulted in less overall fishing effort.

The fall 2002 shrimp baiting season for white shrimp also saw a decline in the total estimated harvest. Only 1.11 million pounds (heads on) were harvested making 2002 the second poorest since records began in 1987. Overall average catch per trip was correspondingly low at 14.2 quarts per trip. The DNR sold 13,903 baiting licenses and there were an estimated 54,610

shrimping trips. An oil spill in Charleston Harbor caused most fishermen to temporarily suspend fishing until oil dispersed.

Brown shrimp commercial landings during summer 2002 were 919,621 pounds, which was somewhat below average. The drought in combination with relatively cool spring weather may have impacted brown shrimp stocks.

Blue crab landings also reflected a below average stock for this fiscal year. Commercial landings for calendar year 2002 were 4,360,580 pounds, or about 31 percent below the long-term average. Landings for the first six months of 2004 remained slightly below average. The decline in stock abundance has been largely attributed to the prolonged drought that negatively impacted juvenile nursery habitat. The poor catches and increasing conflicts among fishermen prompted the DNR to convene a committee of resource users to investigate the decline and offer suggestions. The committee worked with the DNR to propose a number of legislative actions. With the end of the drought in fall 2003, it appeared that recruitment of blue crabs was improving and stocks may return to normal levels in the following year.

Environmental Management

The Environmental Management Section (EMS) provides the DNR with thorough reviews, documentation, trend analysis and comments on anthropogenic and natural changes that could negatively affect the natural resources of the coastal zone, and is the Division's primary responder to environmental emergencies. The EMS also provides the Marine Resources Division with guidance in policy linked to environmentally related initiatives and issues in the coastal zone including permit applications, legislation, regulation, mitigation actions, watershed management, damage assessment, and habitat protection. During FY 2002-2003, EMS staff received and reviewed 1,482 permits compared to 1,695 permits during the previous year. Some of these permit reviews included the following:

Westvaco Corporation – EMS staff reviewed several permit requests to establish commercial mitigation banks. Such reviews involved extensive pre-project coordination during the mitigation instrument development process.

BHR Acquisition – This project is one of several large master planned projects reviewed this past year for the Buckwalter Tract located near Bluffton. This project involved significant restoration of freshwater wetlands as mitigation.

Grand Strand Water & Sewer Authority- A permit was requested for the expansion of an existing sewer plant that involved the filling of unique wetlands associated with the Socastee Savannah. Appropriate mitigation was negotiated for project impacts.

City of North Myrtle Beach – The City applied for several ocean outfalls to replace existing stormwater outfalls discharging on the beach. Concerns regarding water quality and live bottom resources were raised.

Morris Island Lighthouse – Staff reviewed the proposed Section 103 project submitted by the Corps to protect the existing structure. Issues regarding the protection of important cultural and natural resources associated with the proposed work and construction access were addressed.

Beaufort County Aviation Authority – Beaufort County applied for a permit to expand the existing Lady's Island Airport involving the placement of fill in tidal wetlands. Concerns regarding impact minimization and mitigation were addressed.

First Carolina Corporation - This project involved the development of a new C & D landfill in Jasper County. Issues regarding the protection of an existing eagle territory and a wading bird rookery were addressed.

Staff either chaired or participated in the following routine meetings: The Coastal Pesticide Advisory Committee, the statewide Mitigation Banking Review Team (MBRT), Interagency Review, Office of Ocean and Coastal Resources Management appellate panel, Marine Advisory Committee, Southeast Area Monitoring and Assessment Program (SEAMAP), and the Santee Cooper Partnership.

As part of DNR's role as a Natural Resource Trustee agency, EMS staff responded to the M/V Ever Reach oil spill, which resulted in the release of approximately 12,000 gallons of No. 6 fuel oil into Charleston Harbor and the extensive oiling of estuarine shoreline habitat. Staff conducted shoreline assessments for developing clean-up strategies, assisted in the recovery and rehabilitation of oiled seabirds, and participated in an evaluation of injuries to estuarine resources (including recreational shrimp baiting and shellfish harvesting) as part of a cooperative Natural Resource Damage Assessment. EMS staff also continued to serve on several ecological technical advisory groups for numerous Superfund Sites in coastal South Carolina. These include the Calhoun Park Area Superfund Site, the Koppers Superfund Site, the Macalloy Superfund Site, the Parris Island Marine Corps Recruit Depot Superfund Site, and the Columbia Nitrogen Site. Staff attended numerous meetings and provided written comments on several documents associated with the investigation of contamination and remediation of these sites. Staff also participated in the initial evaluation of injuries for potential Natural Resource Damage Assessments at the Koppers Superfund Site and the Macalloy Site.

Shellfish Management Section

The Shellfish Management Section (SMS) develops, implements and supervises initiatives necessary for the effective conservation and management of the state's shellfish resources. As authorized in the S.C. Code of Laws (Section 50-5-985), the season for harvesting oysters and clams opens from September 16 to May 15 unless biological or other conditions justify other times to open or close. This year the season for harvesting oysters and clams opened on September 16, 2002. Oyster season closed on May 15, 2003; however, due to moderate water temperatures and market conditions clam season was extended to May 31, 2003. During the 2002-2003 shellfish season a total of 85,602 U.S. bushels of oysters and 8,465,390 wild-stock clams were commercially harvested. Shellfish culture permit holders are required by state law to plant 50 U.S. bushels of seed oysters, shell or other approved cultch material for each acre under cultivation. Monitored planting on commercial shellfish culture permits in 2002 was 8,790 U.S. bushels of seed oysters, 11,018 bushels of shell, 22,556 bushels of approved cultch material, 44,166 bushels of *in situ* cultivation, 3,287 bushels of green shell and 183 bushels of seed clams for a total of 90,000 bushels. From January 1 through June 30, 2003, 136 bushels of seed oysters, 22,074 bushels of *in situ* cultivation, 11,172 bushels of approved cultch, 3,712 bushels of shell, 70 bushels of clams and 2,018 bushels of green shell for a six month total of 39,183 bushels were verified planted on culture permits. The 2003 whelk trawling season opened on March 7, 2003 and closed on April 8, 2003. Fifteen trawling permits were issued, however, only 5 were utilized in the fishery. A total harvest of 611 bushels of whelks was reported. The whelk fishery remains

depressed in certain areas and the slow growing gastropods will require additional time to become large enough for legal harvesting.

Planting recycled oyster and whelk shells on Public Shellfish Grounds and State Shellfish Grounds (recreational harvesting only) totaled 28,988 bushels. Six public harvesting areas were planted in: Mackay and Johnson Creeks in Beaufort County, Leadenwah and Folly Creeks in Charleston County and Oaks Creek in Georgetown County. The oyster shell-recycling program continues to collect recycled oyster shell, which is quarantined and planted to offset shell costs. This year, 12,000 bushels of recycled shell was received for planting from twelve public drop-off sites that have been established in Beaufort, Charleston, Colleton and Georgetown counties.

Fisheries Statistics

The Fisheries Statistics Section (FSS) is comprised of fishery-dependent data collection programs for both commercial and recreational fisheries. Funding for the programs within the FSS comes from several federal grants and state revenue funds. Funded by the Cooperative Statistics Program (CSP) of the National Marine Fisheries Service, the commercial section obtained commercial fisheries catch and effort data via a mandatory report submitted by 262 wholesale and shellfish dealers, voluntary weekly shrimp tickets collected from 20 major dealers, voluntary fish trip tickets submitted by 11 dealers, and landings reports required from approximately 360 participants in several special permitted fisheries (horseshoe crab, American shad, and shellfish escalator, among others). Port agents obtained shrimp size and species composition via routine visits to shrimp dealers during the trawl season. During the performance period, 126 offshore finfish trips were sampled for length frequency distribution, accounting for 15,149 measurements of priority species.

Recreational fisheries data was collected through the State Finfish Survey, mandatory trip reports from vessels and piers permitted under the Recreational Fisheries Conservation and Management Act, and several sportfishermen liaison projects. The SFS is funded entirely by Sport Fish Restoration Act funds (Wallop-Breaux). Recreational fishermen liaison projects included the Marine Gamefish Tagging project, the Master Angler project, the State Record project, the Sportfishing Tournament project, and the Billfish Survey project.

The State Finfish Survey is an intercept survey designed to collect catch/effort and length measurements of selected species. SFS intercept quotas for FY 2002-2003 were set by the Finfish Coordination Committee at 1,500 interviews and targeted species determined to be sheepshead, spotted seatrout, spottail bass, and summer and southern flounders. Personnel obtained 1,994 interviews representing contact with 4,132 anglers, most of who were in private boats. This exceeded the quota by 33%. The measurement quota for the combined target species as set by the Committee was 2,049 for the period. A total of 2,073 individual target species measurements were collected. SFS data was edited and key entered in-house and updated to in-house databases

Mandatory trip reports were submitted by 28 headboats and 304 charter vessels. Charter vessel trip reports were coded, key-entered, edited and archived. Monthly summaries were generated for use by fisheries managers. Mandatory monthly pier activity summary reports were received from 11 public fishing piers for this performance period. During 2002-03, 4,335 fish were tagged by over 665 participating anglers in the Marine Gamefish Tagging project.

Approximately 938 tag kits were issued. Over 13,000 anglers have participated in this project since its inception in 1974. During the year, anglers reported the recapture of 449 tagged fish. Seventy one percent of these fish were re-released. A red drum recaptured on November 9, 2002 was originally tagged in June 1994. Over the course of eight years the fish was recaptured four times. This represents the longest time at large for any species ever tagged as part of the public tagging program.

Resource Economics

Recreational and commercial fisheries are one of the major direct user oriented benefits derived from South Carolina's marine resources. The shrimp trawler fishery still represents the largest total dollar share of SC commercial fishery landings, but the total ex-vessel (dock-side) value of the 2002 SC shrimp landings declined to a level of about 54% of the 1997-2000, four-year average, mainly due to a continued depression of regional and national ex-vessel shrimp prices. This major decline in US ex-vessel shrimp prices is related to the unprecedented increase in US shrimp imports that continued through 2002, and very low ex-vessel shrimp prices have persisted through the first half of 2003. The US Department of Commerce is providing technical and financial resources to assist the SC shrimp industry in adjusting to the depressed ex-vessel shrimp price situation and the OFM resource economist has been assisting SC trawler owners and related small businesses in documenting and coping with this situation while working with the SC Sea Grant Extension Program and Clemson University researchers. Recreational harvesting of the state's marine fish and shellfish also affects the SC coastal economy because fishermen, especially non-coastal residents and out-of-state vacationers, purchase goods and services from coastal businesses related to their fishing trip. An estimate of the economic importance of outdoors recreational, including recreational saltwater fishing, and commercial activities (e.g. mariculture) directly related to the DNR's overall management responsibilities (e.g., law enforcement, education, administration, etc.) was prepared at the request of the DNR Executive Director's Office by the OFM resource economist. It was estimated that DNR's management responsibilities in 2001 were coupled to a total sales impact of about $2.5 billion, which generated approximately 49,000 jobs for the SC economy, and marine fisheries accounted for 27% of this total sales impact.

Turtle Project

In this fiscal year, the EMS had oversight of a federally funded project to develop an index of abundance for sea turtles using trawl nets. This regional study conducted between St. Augustine, FL to Georgetown, SC, used five different vessels to trawl for sea turtles with large mesh nets. The second summer of field activity began in May 2002. Four vessels were used to capture 249 loggerhead, 12 Kemp's Ridley and 2 green turtles at 742 sites. The overall catch rate was similar to, but slightly higher than previous years. Valuable size and health data were recorded for each turtle, and blood samples are taken to assess sex, subpopulation status, and health. The program is funded through 2003, and as a final product, an index of abundance will be established. This index will be useful in trend analysis in future years.

Governor's Cup Billfishing Series

The 2003 Governor's Cup Billfishing Series encompassed 4 tournaments. There were 539 boat trips made, of which 401 were surveyed. A total of 90 billfish were hooked, 68 landed (successfully brought to the boat), 61 tagged and released, 3 released without tags and 4 retained. Sailfish dominated the catch with 41 successfully brought to the boat and tagged and one

released without a tag. Five white marlin were captured with all tagged and released. Blue marlin comprised the second largest portion of the catch with 16 individuals tagged and released, 2 released without tags, and 4 brought in for weighing. The four blue marlins that were retained averaged 451.5 lbs and 109 inches LJFL. Average sizes of blue marlin from previous years ran much smaller (389 lbs, 406 lbs, 410 lbs, and 361 lbs) for 1999-2002 respectively. No sizes were available for white marlin and sailfish since all were released alive. Ninety-four percent of the billfish caught by Series participants were returned to the water alive. The rate of billfish retained during tournaments was 6%, compared to 1% during the 2002 Series. During 2003, two events saw ten or more billfish caught with one event having 42. Biologists and technicians with the Fisheries Statistics Section of the OFM conducted an intensive creel and catch-per-unit-of-effort survey throughout the Series. The study collected detailed information from 91% of the boat trips. From all boats interviewed, the survey documented 1,471 fish of non-billfish species caught. More dolphin (1060) was caught than any other species, with most boats landing five or fewer dolphin. Boats catching wahoo and yellowfin tuna usually landed only one wahoo and/or four or less tuna.

Marine Resources Research Institute

The Marine Resources Research Institute (MRRI) provides the scientific expertise and facilities to support the Marine Division's resource management and educational programs. MRRI scientists work closely with the Office of Fisheries Management (OFM) to conduct research and monitoring programs to assess the condition of our coastal resources. Institute staff is also involved in developing methods to restore degraded resources and habitats, as well as mariculture technology for producing seafood. Much of the restoration and mariculture research is conducted at the James M. Waddell Mariculture Center located in Bluffton, SC. Finally, the MRRI serves as a seaside research and educational facility for many academic institutions including the College of Charleston, the Medical University of South Carolina, Clemson University, South Carolina State University, and the University of South Carolina. MRRI scientists participate in educational programs at these institutions as adjunct faculty, providing guidance and financial support for graduate and undergraduate students. Staff also assist in primary, secondary and informal educational programs by teaching classes, serving as mentors to students conducting research projects, providing curriculum materials and presenting lectures to civic groups and the public. Accomplishments for the Institute's research and educational programs during FY 2002-2003 are described below.

Fisheries Research Programs

The primary responsibility of MRRI fisheries research programs is to conduct monitoring and assessment projects that evaluate the status of stocks of economically valuable species. These projects also: (1) develop and evaluate new technology and methods for determining the status and trends of fish populations; (2) conduct research to determine factors influencing the abundance and distribution of key fishery species; and (3) conduct programs with OFM staff to assess the effectiveness of management actions and evaluate management alternatives.

Coastal Surveys

In FY 2002-2003, MRRI staff continued to monitor the status and trends of offshore reef fish populations as part of the DNR-National Marine Fisheries Service (NMFS) *Marine Resources Monitoring Assessment and Prediction Program (MARMAP).* Monitoring of catches from North Carolina to Florida taken by the DNR Research Vessel *Palmetto* indicated that black sea bass catch-per-unit-effort (CPUE) remains high after a steady increase since 1996. The CPUE of red porgy has increased from an average of 0.77 fish caught per trap per hour in 1997 to 1.35 fish caught per trap per hour in 2002. After an increase in CPUE for vermilion snapper to 4.5 fish caught per hour in 2000, CPUE decreased to an average of 3.5 fish caught per trap per hour. There was a slight decrease in the mean length of vermilion snapper during 2002; however, the mean length during 2000 through 2003 was larger than any other years sampled by MARMAP. There were slight increases in the CPUE of white grunt and gray triggerfish during 2002. Monitoring work is still underway for 2003.

Life history studies conducted on red porgy, vermilion snapper, black sea bass, wreckfish and greater amberjack provided data such as maximum age, size at age, spawning season and fishing mortality, that have been incorporated into stock assessments by the South Atlantic Fishery Management Council. These fishes are generally long-lived and slow growing, and spawn over several months from spring through summer (winter-spring for wreckfish). A study is in progress to validate the ages of several deepwater species by measuring the level of radiocarbon present in the core of the otolith of some specimens.

In 2002, MRRI scientists participated in the National Oceanic and Atmospheric Administration (NOAA) Ocean Exploration expedition, “Islands in the Stream”. During these research cruises, submersible dives, sonar surveys and plankton stations were conducted on deep reefs at the shelf edge and upper slope. Reef fishes and their habitats and associated invertebrates were described, and educational materials were developed from the expedition.

Further multi-beam sonar mapping was conducted at the Charleston Bump, an important deepwater fishing ground. Additional satellite tagging of sharks and recreationally-caught billfish was also conducted. Preliminary results indicate that sharks and billfishes move considerable distances away from the Charleston Bump during the summer, and some species undergo daily vertical migrations in the water column. The project provided samples of dolphin and swordfish to the SC Department of Health and Environmental Control (DHEC) for mercury analysis and samples (otoliths, gonad tissues and DNA) of these species and barrelfish and red bream to projects conducting life history and genetic studies of deepwater fishes.

MRD coastal fisheries survey data are being used to build a comprehensive database and Geographic Information System, that will provide maps of distribution of species and habitats and will aid in locating those areas that support high abundances of fishes, or that are important spawning and nursery areas. Over 30 years of data are being used to build the database, which will be made available on the Internet as summaries and map images in 2004.

MRRI staff continued to monitor the status and trends of coastal fishes, crabs, shrimp, horseshoe crabs, sea turtles, mantis shrimp and squid from Cape Hatteras, NC to Cape Canaveral, FL through the NMFS/MRD Southeast Area Monitoring and Assessment Program-South Atlantic

(SEAMAP-SA) in FY 2002-2003. The SEAMAP-SA Shallow Water Trawl Program collects samples for determining age and reproductive condition of weakfish, Atlantic croaker, and southern kingfish. In 2002, overall abundance was low. The spot, a numerically dominant species in trawl catches, reached record low abundance in 2002. White shrimp abundance also decreased in 2002, a trend noted each year since 1999, when the white shrimp catch peaked. In Spring 2003, however, abundance of these species increased notably. Record numbers of southern kingfish and near record numbers of smooth dogfish were collected in Spring 2003.

SEAMAP continues to provide opportunities for scientific and educational institutions in the southeast by providing specimens to many state and federal projects, as well as for graduate student research. SEAMAP has made a concerted effort to assist the new Southeastern Regional Taxonomic Center with their efforts to assemble an invertebrate collection spanning the entire South Atlantic Bight.

Development of remote offshore storm surge and fisheries video techniques continued. MRD scientists cooperated with physical oceanographers and technicians from the University of South Carolina to deploy offshore buoy-mounted instruments that will measure weather factors used to make predictions on storm surges associated with hurricanes. This Carolina Coastal Ocean Observing and Prediction System (Caro-COOPS) will be upgraded in the future with instruments that will assist in fisheries assessments. The data will help us understand the movement of fish to and from spawning grounds, and relating ocean conditions to fish production. By measuring oceanographic conditions while simultaneously monitoring fish by remote video camera, the CaroCOOPS and associated projects will provide data for modeling fish responses to oceanographic conditions.

Inshore Recreational Fish Surveys

Monitoring of recreationally important estuarine species (red drum, black drum, spotted seatrout, southern flounder, and sheepshead,) continued along the South Carolina coast in the following areas: Bull's Bay/Cape Romain, Wando River, Ashley River, Charleston Harbor, and Ashepoo-Combahee-Edisto (ACE) Basin. Changes in our sampling included discontinuation of efforts in the Cooper River and an addition of a monthly effort in Winyah Bay. During FY 2002-2003, red drum was the most numerous species encountered in trammel net surveys, and an increase in spotted sea trout abundance was observed as they continued to recover from the extreme cold of the 2000 winter temperatures.

Surveys of the fish community within the low salinity reaches of five South Carolina estuaries continued during FY 2002-2003. Electrofishing was used to sample these areas and derive indices of relative abundance of fishes, in particular red drum, in portions of the North Santee River, the upper Cooper River, the upper Ashley River, the upper Edisto River, and the Combahee River. The Edisto and the Combahee Rivers are being surveyed in cooperation with researchers conducting work in the ACE Basin National Estuarine Research Reserve. The drought experienced in the southeast over the past few years produced higher than average salinities during the first several years of this survey; however, precipitation throughout the state since the winter lowered the salinities in our sampling areas significantly. During FY 2002-2003, 88 species were collected by electrofishing. The three most abundant species were striped mullet,

Atlantic silversides and spot. Red drum were among the top ten most numerous species in the survey.

During FY 2002-2003, the Freezer Fish Program obtained 706 fish carcass donations, most of which were of red drum (N = 198) and spotted seatrout (N = 175), to estimate the age and size of the harvested populations of recreationally important species. In addition to gathering age and growth data, sampling freshly caught specimens from tournaments allowed assessment of maturity and fecundity of species targeted by recreational anglers. In the 2002 – 2003 tournament season data was collected from 246 flounder, 231 spotted sea trout, 131 sheepshead, 30 black drum and 21 red drum.

Staff provided DHEC with fillets of legal-sized spotted seatrout, red drum, and southern flounder captured during regular trammel net sampling in estuarine areas. These samples were used to determine concentrations of metals in edible tissues of the fish. In addition, red drum and striped bass with lesions, collected in Winyah Bay and the Cooper River, were sent to researchers at DHEC and Virginia Institute of Marine Science to investigate the presence of mycobacteria.

Collaborations continued with collegiate faculty and students on studies of sheepshead, diamondback terrapins, parasitic fauna associated with estuarine finfishes, and kidney function of stingrays.

Adult Red Drum Research

Bottom longline sampling in the Charleston Harbor vicinity produced a total catch of 414 adult red drum, with continuing studies to evaluate the loss rate of two types of external tags. Forty-two of the adult drum were recaptures with about equal representation from project-tagged fish, the Angler Tagging Program and sub-adult tagging in estuaries. The recaptures from this year continue to reinforce previous observations that the adults exhibit very limited migratory behavior, with no significant north/south movements noted. Twenty eight adult drum were retained for broodstock that are being utilized by the Mariculture Section for red drum stock enhancement activities.

Coastal Shark Research

Participation continued in the Cooperative Atlantic States Shark Pupping and Nursery Survey (COASTSPAN) program. Sampling was conducted with longlines and gillnets in estuarine areas from Bulls Bay to St. Helena Sound and in conjunction with red drum longline sampling aboard the R/V Anita. A total of 2,728 sharks were captured during this fiscal year. The majority of these sharks were Atlantic sharpnose (60 %), which were not tagged because of prior tagging projects on this species. The majority of the remaining 1,079 sharks were tagged and released. Bonnethead and finetooth sharks were observed in about equal abundance, making up 9.0% of the catch each. Scalloped hammerhead, sandbar blacknose and blacktip were also important species in the estuarine sampling. The majority of these sharks were newborn pups or 1-2 year-old juveniles. Life history work by graduate students has been completed on the blacknose shark and is in progress on the finetooth shark. Tag returns form bonnethead sharks are being utilized for a study of site fidelity and migratory behavior in this species.

Longline CPUE series (1995-2002) was used in both the large and small coastal shark stock assessments conducted by the NMFS. Samples were provided to shark researchers from Clemson University, University of South Carolina and Mote Marine Laboratory's Center for Shark Research.

Sturgeon Research

Shortnose and Atlantic sturgeons once supported a valuable fishery in South Carolina. The shortnose sturgeon is an Endangered Species, and the fishery for Atlantic sturgeon is closed in all U.S. waters. A sturgeon telemetry project conducted in the Pee Dee River confirmed repeated occupation of a previously identified spawning site and two summer habitat areas (in the Waccamaw and Black rivers). This was especially informative because of flow differences between years (one drought year and one flood year). Data suggest that all Winyah Bay shortnose sturgeon are probably a single population, rather than separate populations in each river. These data are also being used regionally and nationally by other state and federal agencies as part of management plans to protect these rare and valuable resources.

Crustacean Research Programs

Shrimp and Blue Crab Monitoring

Tidal creeks were sampled biweekly during spring and summer for juvenile shrimp and blue crab, to predict commercial catch and management strategy. Size data were used to predict when shrimp move into areas open for commercial trawling and when they reach a harvestable size. Sampling in July-August of 2002 indicated below average numbers of juvenile white shrimp in the tidal creeks near Charleston. Creek sampling for juvenile brown shrimp in May and June 2003 produced variable numbers of juvenile brown shrimp, at normal sizes for that time of year. Blue crab juveniles appeared to be below average in number in spring, as were catches of adults later in the summer. Additional samples were taken in fall 2002 to document abundance of young blue crab.

Larger water bodies were also sampled to monitor sub-adult and adult shrimp and blue crab on a routine basis. Catches of white shrimp in sample trawls in the fall of 2002 were below average until December, as drought conditions prevailed. In the spring of 2003, catch rates of white shrimp indicated that cold winter water temperatures had decimated populations, but adequate numbers had survived to produce an average fall crop, if weather conditions are favorable. Brown shrimp catches were variable in research trawls in 2003, having probably been negatively impacted by heavy rains during postlarval ingress in early spring. Based on this information, the commercial shrimp season was delayed.

Blue crab captured by research trawls remained below average in spring of 2003, but improved over 2002. Although additional sampling and analyses are needed, the decline in blue crab in the open waters appears to be related to severe drought conditions that persisted in 2001-02.

Sampling of blue crab stocks using crab traps fished in a standardized manner was conducted in each of the major estuaries. The goal of this project is to determine stock trends and identify whether trawling studies are accurately sampling the blue crab population. Catch rates through 14 years of the survey have suggested relatively stable stocks of blue crab. Catch rates in 2002

were below the 14-year average, as drought conditions probably kept blue crabs higher up in the estuaries, and overall abundance was below average. This has been a major concern of commercial fishermen since summer of 2001. Additional pot samples were collected in coastal rivers in summer and fall of 2002 to examine distribution and abundance of crab due to higher salinity/drought conditions, which indicated that many crabs had moved upriver of the state-designated fishing lines.

Horseshoe Crabs

Data on horseshoe crab have been recorded from regular trawl sampling since 1995. A compliance report was submitted for the fourth year to the Atlantic States Marine Fisheries Commission detailing observations made from sampling, monitoring a biomedical facility, and conclusions made from an MRRI study. A planned survey of spawning horseshoe crab was suspended due to budget cuts and lack of personnel to carry out the survey.

Shellfish Research Programs

The primary responsibility of the shellfish program is to conduct research and related monitoring to assess shellfish resources and habitats. During FY 2002-2003, efforts included: (1) developing better monitoring and assessment tools for native oyster populations, including novel remote sensing approaches; (2) synthesizing data on oyster reefs as critical habitats; (3) evaluating of shellfish restoration efforts, (4) monitoring shellfish disease; (5) continuing a statewide community-based oyster restoration program; and (6) assessing boat-wake impacts on oyster resources.

M**onitoring and Assessment**

Staff continued examining recruitment, growth, and survival of oyster spat as an indicator of recruitment potential and relative site quality focusing on sites that have been recently restored. Staff also completed a pilot program to develop a cost-effective assessment tool using digital imagery from aerial photography. A related study funded by the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET) with the University of South Carolina and an industry partner seeks to develop an automated mapping technique for monitoring and managing shellfish distributions using differential spectral characteristics.

Working with the OFM, staff continued to assess state and public shellfish grounds to evaluate success of management strategies and prioritize restoration efforts. As part of the May River Baseline Assessment, staff evaluated natural oyster populations, recruitment and oyster diseases at eleven sites along the May River.

During late summer/early fall 2002, a limited disease assessment was completed at six sites along the coast of SC. Dermo infections were present at all six sites with infections higher at the sites in the central portion of the state (Charleston County). MSX infections were not observed again at the northern sites (Georgetown County) or at the southern sites (Beaufort County). At the three sites in Charleston County, MSX infection levels ranged from 8% to 24%. Overall along the coast, infection levels were higher than last year where infections ranged from 4% to 8%. Staff also initiated a small-scale study to survey cultured and wild clam stocks in SC to determine the presence or absence of quahog parasite unknown disease (QPX) and to increase diagnostic ability to examine and identify QPX. Wild and cultured clams (N = 90) from two SC

clam permit holders were collected and histopathologically prepared for microscopic examination. QPX has not been observed in the samples processed to date.

Staff completed a limited study to evaluate quarantine methods to minimize the risk of transmission of Dermo disease from planting of imported oyster shell. After one month of quarantine, Dermo levels had dropped by 99%, and declined to only 0.005% of the original 'parasite levels' by the end of the 3.5 month study. Staff has recommended that quarantine durations exceed one month or more, thereby dramatically reducing the risk of spreading Dermo through shell planting. The impact of different climatic conditions, size of shell pile and other factors during quarantine should be more closely evaluated.

Staff evaluated disease levels and marsh erosion at sites with different levels of boating activity. For FY 2002-2003, all fieldwork on the impact of boat wakes on shell stability and marsh erosion was completed. Staff observed marsh erosion at four sites in Inlet Creek for 37-50 months, documenting an average loss of between 90-158 cm. Marsh erosion was observed at nine additional sites for 4-16 months, recording overall losses of 13-104 cm. Staff worked with Hilton Head Island City planners to evaluate erosion within sites with heavy and low boat wake zones. In addition, staff completed year 1 of a two-year project funded by FL Sea Grant to evaluate the impacts of boat wakes and diseases on the intertidal oysters in the Canaveral National Seashore. The goal of the project is to maximize resource sustainability and intertidal oyster restoration efforts.

Finally, staff is in the final stages of data compilation from the multi-year Oyster Restoration Program (ORP) defining ecological functions of intertidal oyster reefs in South Carolina. Results from this study are being used to help establish criteria for successful oyster reef restoration.

Oyster Restoration Program

In 2002, there was more than 36,000 ft^2 of new shell habitat at several sites across the state. A community-based program continued to restore and enhance oyster habitat (SCORE), using more than 1,000 citizens, who have contributed over 6,000 volunteer hours to this program since its inception in 2000. In 2002, 18 new reefs were constructed and nine existing reefs were modified. Volunteers also assisted in sampling the new and modified reefs to determine recruitment and growth. More than 50 citizens have been trained and equipped to monitor water quality at SCORE sites on a weekly or biweekly basis and enter the data online at an interactive website. A grassroots shell recycling program in the Hilton Head area recycled and bagged over 1000 bushels of shell in the 2002-03 season which will supply the shell for all reef-building in Beaufort County in 2003. Reefs constructed under this project are located in a wide array of environments and serve as research platforms to improve our knowledge of oyster reef development and reef/shoreline interactions. These results will enable staff to improve site selection and restoration outcome in our larger scale oyster restoration efforts

Southeastern Regional Taxonomic Center

The Southeastern Regional Taxonomic Center (SERTC) made considerable progress towards achieving its objectives of becoming an important regional taxonomic resource at the MRRI,

with its collection focused on estuarine and marine organisms of the South Atlantic Bight (SAB). A scope of work is now in place for a third year of funding.

SERTC obtained specimens of preserved and fresh organisms from a variety of sources, and repositories of invertebrates and fish continue to be developed, curated and catalogued at the MRD and at the Grice Marine Laboratory (GML). The invertebrate collection at MRD has been organized, and additional space dedicated to storage and rough sorting of samples was obtained in an outlying building at Fort Johnson. New equipment for curation, microscopy, photography and general laboratory use was purchased. The invertebrate literature collection has grown rapidly, and currently 1500 references have been entered into the Procite software program. A digital image library of roughly 1300 images has been established and is expanding. Progress has been made on the development of the relational database chosen for the management of the invertebrate collection. The SERTC website was developed and launched in June 2003. The website will soon be linked to the SERTC collection and literature databases, providing details of SERTC holdings to the wider community.

Staff continued to enter the fish collection onto a customized SPECIFY database, with 500 lots of specimens catalogued. A fish literature collection was also maintained and catalogued. Around 1600 larval fish collected from the Charleston Bump area were identified and photographed, and they will be included in the GML collection.

SERTC formed a partnership with the National Benthic Inventory Laboratory (NBIL) to share taxonomic information. Specifically, information from the NBIL databases on SAB collections will be included in the SERTC database, providing more scope to the SERTC database and wider exposure of the NBIL collections. SERTC staff also produced checklists and illustrated keys to the Tanaidacea and Mysidacea of the SAB (two crustacean groups that are perceived as hard to identify) and validated preliminary identifications of much of the crustacean material in the SERTC collections. Assistance from expert systematists was received in the identification of problematic specimens, and exchange of specimens has been initiated with several researchers in order to undertake genetic analyses that may be helpful in resolving several taxonomic questions of interest. The tissue bank for genetic evaluation continued to grow, with 100 lots of mainly decapod crustaceans now stored. SERTC staff continued to increase the frequency of interactions with other scientists, managers and private citizens seeking assistance regarding the identification of specimens, donations of collections held elsewhere, and issues related to regional biodiversity, such as invasive species and ballast water discharge.

Environmental And Wetland Habitat Research Programs

The Environmental Research program conducts studies to evaluate the consequences of human-related activities on marine and estuarine resources. Research emphases during FY 2002-2003 included: (1) continuing a major state-wide monitoring program, and several associated studies, to assess the condition of South Carolina's estuaries; (2) continuing development of new approaches to identify pollution stress in estuarine and marine populations; (3) evaluating the impact of other (non-polluting) anthropogenic activities on critical habitats and communities; (4) monitoring algal communities and blooms in South Carolina waters, and (5) conducting several

water quality and wetland studies in the ACE Basin NERR. Information produced by MRRI scientists is used by the MRD Environmental Management Section and other Divisions of the DNR to comment on various permit requests and to develop policy positions related to water quality, sediment quality and land use issues.

Estuarine Habitat Quality Studies

The primary objective of the South Carolina Estuarine and Coastal Assessment Program (SCECAP) is to evaluate overall estuarine habitat quality and biotic condition throughout the state's coastal zone in a manner that is integrated with and complementary to the DHEC Water Quality Monitoring Program. Sites are selected each year to represent both open water (rivers, bays and sounds) and tidal creek habitats (important nursery areas) using sampling methods that permit staff to quantify the percentage of each habitat type that meets, or does not meet, a desired level of quality. Approximately 60 sites are sampled each year to measure water quality, sediment quality, and biological condition. The fourth year of sampling was completed in the summer of 2002 and 2003 sampling was initiated for this program. All samples collected in 2001 and 2002, except for the 2002 contaminants, have been processed. A report describing the results of the 2001 – 2002 sampling period will be prepared in FY 2003-2004.

An Assessment of Habitat Quality of Tidal Creeks Used by Recreationally Important Finfish Species was continued this year as a companion program to SCECAP. FY 2002-2003 marked the fourth and final year of data collection for this study, and a final report summarizing the findings of the three-year study will be submitted in FY 2003-2004. This study has investigated the relationships among various environmental and habitat parameters with biological metrics. The findings from this study will allow predictions of changes in fish and crustacean communities based on environmental perturbations, such as increased land development, land use changes, hydrodynamic alterations, and nutrient loading. Resource managers can use data generated by this study as a useful tool in managing finfish and crustacean populations by facilitating the identification, management, and protection of critical South Carolina tidal creek habitats.

Another companion study to SCECAP in FY 2002-2003 was a study funded by the Town of Bluffton entitled *A Baseline Assessment of Environmental and Ecological Conditions in the May River, Beaufort County, South Carolina*. This study was designed to assess the environmental quality of the May River ecosystem before the area surrounding the river undergoes a surge of suburban development. Sites include seven open water (river), three large tidal creek habitats (creeks > 50 ft wide), and six headwater tidal creek habitats (creeks sections which dead end into the upland). A comprehensive sampling effort was conducted at each site in 2002-2003 to measure water quality, sediment quality, and biological condition. The environmental data collected include basic water quality parameters and measures of sediment composition and sediment contaminant levels. Biological response measures include assays that measure sediment toxicity and sampling to assess the condition of the bottom-dwelling biota, plankton, and demersal finfish and crustacean assemblages. Sampling and most sample processing were completed in this fiscal year. The final report is expected to be finished in the fall of 2003.

The Land Use – Coastal Ecosystem Study (LU-CES) completed its third year to assess estuarine conditions in the Okatee River, an area of rapid development. The goal of the study is to

understand the effects of human induced changes in land use patterns on coastal resources and identify the ecological processes that control the condition of tidal creeks and estuaries. U.S. Geological Survey has placed instruments to measure stream flow in two tidal creeks. Beaufort County's role in the LU-CES project is to evaluate the land use and impervious surface in the watershed surrounding each creek in 1994, 1999 and 2002. MRRI is providing technical support, laboratory space, and housing at the Waddell Mariculture Center for all LU-CES researchers, as well as analyzing and preparing written documents on processes controlling water quality and the benthic (bottom dwelling) community in two creeks. In addition, a number of experiments are being conducted in the laboratory to determine the tolerances of estuarine worms to low dissolved oxygen, a trace metal (copper), and a representative fossil fuel (fluoranthene). Initial results from the study indicate that: (1) water quality in the two tidal creeks is very dynamic; (2) the land use and amount of impervious surface are different between the two creeks and changing rapidly, but not as different as expected; (3) oligochaete worms, one of the essential food sources of shrimp, have very high productivity in the two tidal creeks; and (4) the dominant oligochaete worm is extremely tolerant to low dissolved oxygen and fluoranthene and the dominant polychaete worm is more sensitive than the oligochaete to low dissolved oxygen and fluoranthene.

The Tidal Creek Monitoring and Reporting Program was initiated to assess the stormwater runoff entering the tidal creeks in the Charleston Harbor Estuary and then convey the information to the public. Four tidal creeks representing various levels of suburban/urban development were chosen for this study. Three sites were monitored in each creek during storm events, as well as some dry events. A broad suite of parameters are monitored, including nutrients, biological oxygen demand, suspended sediments, trace metals, fecal coliforms, and limited sampling for organics. Four seasons were sampled during this fiscal year. Three of the seasons were completed in FY 2002-2003 and the last season (summer) will be completed in early FY 2003-2004. A web site was developed to provide text and data obtained from this project. In addition, DNR has participated in a number of outreach events for this project.

ACE Basin NERR Research Program

During FY 2002-2003, MRRI continued biological and environmental quality monitoring efforts to define trends in the ACE Basin National Estuarine Research Reserve (NERR). Differences in historical (1995-2001) and current water quality data indicated higher salinities in 2002 occurring due to the drought. Nutrient monitoring has been established as part of the NERR Systemwide Monitoring Program. A telemetry system that allows real-time access to the data from the weather station at Bennett's Point and YSI datalogger on Mosquito Creek was installed and will be online in August 2003. Atmospheric deposition of contaminants was also monitored through a cooperative program with the Environmental Protection Agency and the National Atmospheric Deposition Program.

The ACE Basin NERR initiated the Land Use component of the Systemwide Monitoring Program in July 2002. High-resolution imagery and historical aerial photography were acquired to conduct change analysis work in the ACE Basin. Staff is developing maps of the current land cover of study areas on Bailey, Jehossee and Morgan islands and in the Town of Edisto Beach and Bennett's Point. In preparation for the conducting change analysis, the historical

photographs were scanned and geo-rectified to 1994 NAPP photography. Preliminary land cover maps, using the high-resolution, multi-spectral imagery have been developed.

As the result of the ACE Basin NERR partnership with SC State University (SCSU), the reserve acquired hyperspectral imagery during June 2003. We also collected plant samples for biomass and pigment content analysis, monitored leaf temperature, LAI (Leaf Area Index), reflectance and radiance levels from and from each study area. The results from the sample analyses will be used to assess the ability of hyperspectral data to measure stressed plants, plant biomass content, plant pigment content and to identify vegetation types.

The ACE Basin NERR participated in a habitat classification pilot project this summer to test the two habitat classification schemes developed by the NOAA Fisheries. Our findings indicated that neither scheme adequately captured all of the habitats, habitat degradations, or habitat gradients present at the four evaluation areas. Both schemes had some merit, and attempts to combine these merits into a single scheme would improve the quality of the final product. As a result of the participation in the pilot study, the ACE Basin NERR has been asked to participate in a more extensive habitat classification study which will likely begin in fall 2003.

The oligohaline and tidal freshwaters sections of the Combahee and S. Edisto Rivers have been surveyed monthly since May 2001. Analysis of the data collected from May 2001-December 2002 were completed in January 2003. The Reserve developed land cover maps for electrofishing study sites in the Ashepoo, Ashley, Combahee, Cooper, North Santee, and South Edisto rivers, GIS distribution maps for several species, including red drum, and habitat maps for all surveyed areas.

The drought conditions in the State prompted the Reserve to begin a monthly survey of salinity levels in Ashepoo, Combahee, and South Edisto rivers. During the early part of 2002, the freshwater line was approximately 17 river miles upstream from the legal freshwater/saltwater divide. High salinities were common in the Ashepoo River at the Highway 17 Bridge, which is over eleven miles upriver from the legal saltwater/freshwater line. The South Edisto River was least impacted by the drought. The ACE will continue to monitor the salinity levels monthly near the saltwater-freshwater line, and the data will be used to evaluate the relationship of fish species distribution and salinity.

The ACE Basin NERR conducted a one-year study (August 2002-June 2003) to evaluate the occurrences and impacts of non-indigenous, invasive, and nuisance species in the Reserve. Four additional Reserves, including North Inlet/Winyah Bay NERR in Georgetown, participated in this study. Preliminary findings indicate that the invasive crab *Petrolisthes armatus* (Green porcelain crab) was most abundant at the study sites.

The ACE Basin NERR initiated a study to characterize the environmental conditions on Morgan Island, including water quality, aquatic fauna communities, and land cover. Water samples and fecal samples were collected in June and August 2002 to assess the origin of the bacteria (i.e. monkeys, birds) in the waters surrounding the island. The multi-spectral aerial imagery acquired as part of the Land Use Initiative will be use to characterize the plant communities on the island. Beginning March 2003, the Reserve staff deployed YSI data loggers in the two major creeks

(Morgan and Bass creeks) for 48 hours each month. Staff began collecting oysters from Bass Creek and Morgan Creek in April 2003 to identify gene expression signatures that represent stressed individuals.

Pollution and Toxicology Studies

An Evaluation of Polycyclic Aromatic Hydrocarbon (PAH) Runoff from Highways into Estuarine Wetlands of South Carolina was completed during in FY 2002-2003 to assess the concentrations and potential toxicity of polycyclic aromatic hydrocarbons in estuarine habitats adjacent to selected South Carolina highways. Twenty-six sites were sampled in salt marsh, tidal creek, and tidal mudflat habitats to measure PAH concentrations along transects away from the highways. Two locations immediately adjacent to road berms were identified as having PAH concentrations that were likely to cause toxicity in animals. Toxicology assays utilizing three different species of estuarine animals (worms, clams, and amphipods) were performed on sediments from the two locations with only one species, the juvenile clam, showing toxicity at one of the sites. Overall, the study demonstrated that PAH contamination from highway runoff can reach levels of concern in estuarine habitats; however, the effects are not widespread and appear to be limited to those habitats immediately adjacent to road berms.

The Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET) research program, initiated in 1999, was completed in FY 2002-2003. This study involved evaluating a suite of cellular biomarkers, physiological or biochemical indicators of contaminant exposure or effects, in three dominant estuarine species [oysters, grass shrimp, and mummichogs (mud minnows)] during winter and summer periods. These kinds of cellular biomarker tools are essential for characterizing sublethal effects and the impacts of long-term chronic exposures. This work was conducted primarily in the ACE Basin and other non-polluted sites in order to develop a database of the biomarkers for non-polluted conditions. These studies have provided important new information regarding seasonal and species-specific differences in the biomarkers, which will facilitate interpretation of data on the indicators collected from degraded and polluted sites by monitoring and impact assessment efforts. A methods handbook, detailing the various approaches for the different species, was finalized and is now available on the CICEET website. An assay using lysosomal destabilization, a biomarker of cellular damage, continued to function as a very valuable indicator of pollutant exposure and effects. The results also suggest that the level of glutathione, an antioxidant that destroys free radicals, may be another valuable indicator of stress.

The SC Sea Grant Study, initiated in 2000, was designed to evaluate the effects of pollutants on reproduction in oysters and marsh mussels. Relationships between cellular stress indicators of bivalves from polluted and unpolluted sites and successful production of healthy larvae were studied in FY 2002-2003, and some important relationships between biochemical responses of the parents and impacts on successful embryonic development have been identified. It was found that normal embryonic development is almost completely blocked when sperm and eggs were from parental oysters having lysosomal destabilization rates that exceeded 35%. Moreover, sperm and eggs from parents with low glutathione levels also were much more susceptible to pollutant exposures. These studies suggested that successful reproduction in mussels from the Charleston Harbor area is very poor, a finding that could have serious implications for mussel

populations and habitat quality. These studies will contribute to understanding the potential long-term effects on populations exposed to chronic low levels of pollutants.

Some of these biomarker tools were also used to determine the potential effects of oysters oiled by the Ever Reach oil spill that occurred in October 2002. Samples were collected immediately after the spill, and again at five and eight months after the spill. Elevated lysosomal destabilization rates and poor reproduction were observed in oysters from oiled sites, especially those from the Parrot Creek area. Tissue samples were also taken for oil contaminant analyses, and efforts are currently being made to obtain funds to get the samples analyzed. While it is recognized that the scope of this spill (estimated at approximately 12,000 gallons) is relatively small, it is important to realize that periodic smaller spills may subtly, but seriously, impact fish and shellfish populations, as well as estuarine habitats.

Harmful Algal Bloom and Phytoplankton Research Projects

The Algal Ecology research initiative was established in 2000 to determine the status of algal (i.e., phytoplankton) communities in South Carolina estuaries. These communities form the base of estuarine food webs and ecosystem health is dependent on their composition (e.g., nutritious vs. non-nutritious species) and productivity. Many of these species can form harmful algal blooms (HABs), which produce toxins and can have adverse effects on shellfish, finfish, and humans.

In FY 2002-2003, MRRI's Algal Ecology Laboratory continued to cooperate with the National Ocean Sciences-Charleston Laboratory, SC Sea Grant, and the University of South Carolina on the South Carolina Harmful Algal Bloom Program (SCHABP). The objectives of the SCHABP are to: 1) determine the distribution of harmful algae in SC; 2) determine seasonal and annual trends in HAB prevalence in SC waters; 3) determine the environmental factors that favor HAB formation in SC estuaries so that future effects on ecosystem and human health can be predicted; 4) maintain the statewide surveillance system for harmful algal bloom detection; 5) expand upon current communication and education efforts, to continually improve understanding and awareness of HAB issues among resource managers, community officials, coastal users, and the general public; and 6) ensure the continued operation of the South Carolina Task Group on Harmful Algae. Over the past 3 years, the SCHABP has significantly advanced understanding of the ecology and impacts of these blooms and provided critical information to state agencies charged with protecting environmental and human health. Furthermore, the SCHABP has become internationally recognized for its contributions to HAB research.

SCHABP surveillance efforts now target tidal creeks, open estuaries, brackish and freshwater ponds, certain freshwater lakes/reservoirs, and coastal waters. The most common HABs in SC tidal creeks are caused by a dinoflagellate that has produced dense blooms ("red tides") in estuaries from Myrtle Beach to Hilton Head over the last five years. The program focuses on the development of molecular probes to enhance identification and detection of this species, understanding the environmental factors that favor bloom formation, and determining its adverse effects on shellfish such as oysters.

Staff is also examining the distribution and toxic potential of HABs in brackish or freshwater ponds associated with residential areas or golf courses. Pond HABs were found to be widespread

in Charleston, Mount Pleasant, Kiawah Island, and Hilton Head Island. Thus far, potentially harmful algal species have been observed in 37 of 45 SC brackish-to-marine ponds sampled, and in 250 of 285 total samples collected. Relatively high abundances of HAB species (i.e. blooms) were estimated in 21 of these ponds. HAB species associated with SC fish kills included species known to kill fish and produce neurotoxins that have been linked to human illnesses. It is noteworthy that *Pfiesteria piscicida* was detected by DNA-based PCR assays in sediments from 34 of 55 detention ponds sampled on Kiawah. The likelihood that these were cysts has implications to the effects of dredging on increasing the distribution of this species.

Oyster studies were conducted in FY 2002-2003, to identify evidence of toxin production and effects. Increased toxicity and increases in key protein biomarker responses were observed in conjunction with the blooms that occurred periodically in ponds on Kiawah Island. Additional field and laboratory studies were also conducted for large blooms in Bulls Bay and Shem Creek that occurred during the spring. Increased toxicity was observed with native oysters and also with oysters exposed to field-collected waters from the bloom. The use of these oyster biomarker techniques in conjunction with the algal studies provide some of the first successful efforts to develop biological response indicators to determine the potential impacts of HABs on estuarine organisms.

The Algal Ecology Laboratory is also involved in studying the source of toxin causing avian vacuolar myelinopathy (AVM), a disease that has resulted in the death of bald eagles and many other birds in southeastern reservoirs since 1994. The disease is caused by a neurotoxin that affects eagles through ingested diseased prey (e.g. coots). However, the source and identity of the toxin is still not known. Based on the possible involvement of toxic algae, the Algal Ecology Laboratory joined the research effort, leading a multi-institutional effort to test the hypothesis that the toxin causing the disease comes from cyanobacteria epiphytic on *Hydrilla,* an exotic submerged freshwater plant associated with disease occurrence.

Coastal Ocean Studies

Beach erosion continues to be a major problem for large portions of the SC coastline. Beach nourishment projects provide protection for beachfront property and restore the recreational value of the beaches. During FY 2002-2003, staff provided input on the planning efforts for Folly Beach, Pawleys Island, and Hunting Island nourishment projects.

The Environmental Research Section also continued to be involved with activities to evaluate the effects of open water disposal of sediments. The Charleston Ocean Dredged Material Disposal Site (ODMDS) is a repository for uncontaminated sediments dredged from Charleston Harbor shipping and entrance channels. The large-scale *Environmental Assessment of the Charleston Ocean Dredged Material Disposal Site and Surrounding Areas*, was conducted in 2002 upon completion of the Charleston Harbor Deepening Project. Sample processing of benthic, sediment, and sediment contaminant samples has been the focus of this project in FY 2002-2003, with a final report to be completed in FY03-04.

The third year of a five-year project, *An Environmental Monitoring Study of Hard Bottom Reef Areas Near the Charleston Dredged Material Disposal Site*, was completed in FY 2002-2003. The goal of the reef monitoring study is to identify any impacts to the abundance, diversity,

condition, and area extent of these critical finfish habitats. A trend of increasing silt/clay content in surface sediments was observed at reef sites near the ODMDS. Preliminary findings do not indicate that reef fishes or invertebrate communities have been negatively affected by disposal activities.

Mariculture Programs

During 2002 several projects were undertaken to improve the capabilities of our Waddell Mariculture Center (WMC) facilities including adding catch basins to five ½-acre ponds to increase red drum fingerling production capacity; addition of automatic generators to provide an increase life support redundancy for shrimp production experiments; and electrical circuits on the pond were upgraded to meet OSHA employee safety requirements.

New Species Culture Development

Cobia collected from the wild in 2002 and 2003 were held indoors and conditioned by temperature and light manipulation to spawn. Females that had suitable-sized eggs received hormone injections to induce spawning. These fish produced approximately 14 million eggs, however no viable larvae were produced. In mid June, a collaborative effort resulted in approximately 100,000 cobia larvae being available for stocking in nursery ponds at WMC. Unfortunately, no fingerlings were produced. High pond temperatures and predacious insects are believed responsible for the poor pond production results. Remaining broodstock were consolidated and transported to Charleston where they are being conditioned for spawning trials next spring.

Refinement of Commercial Shrimp Culture Techniques

Marine shrimp production continues to be an important segment of mariculture in SC. Recent research has focused on improving the environmental and economic sustainability of this industry. DNR has been a leader in developing technologies to mitigate environmental impacts of coastal mariculture by improving feeds and feeding, filtration and sedimentation technologies, and reducing or eliminating water exchange. Research on manipulation of the microbial ecology of advanced shrimp production systems has focused on development of carbon and nitrogen budgets and effect of filtration technologies on target crop production and water quality. Successful demonstration of increasing survival, growth and production has established the technical and biological feasibility of advanced super-intensive production systems. During the past year a model for the analysis of financial feasibility was developed and is being studied to further focus research efforts and to explore commercialization opportunities. A series of marketing studies and initiatives were implemented to increase awareness of SC farmed shrimp, to explore the potential of direct marketing to improve revenues for SC farmers, and to define the potential size and scope of fresh shrimp markets available to SC growers.

Studies to evaluate the ability of producing two crops per year were completed and strategies are being transferred to the private sector. The results have been quite promising and ongoing studies continue to document biological feasibility and commercial advantages, including reduced risk, which is crucial for small family-based farms in the coastal zone. Basic research on potential of marine shrimp farming in low salinity waters in SC is continuing in experimental-scale studies. Research is focusing on improving survival and growth of Pacific white shrimp

postlarvae in low-salinity and mixed-salt environments to better define minimal requirements for inland culture. Studies on the physiological effects of low salinity and mixed salt environments have been initiated with the aim of developing cost effective alternatives for rearing of shrimp away from the coastal zone.

Red Drum Stocking Study

During the 1990's, a trend of declining abundance was observed for juvenile red drum throughout SC. Between 1999 and 2001, 600,000, 1- 2 inch red drum were stocked annually in the Ashley River to examine whether stocking could be used to supplement wild fisheries. Between 2000 and 2002, the Wando River was also stocked with over 1.9 million fish. Monitoring of the results indicate that hatchery fish make up a large percentage (Ashley 75%, Wando 40%) of the legal-sized fish in each river. In addition, the contribution appears to be additive, resulting in an increased abundance (up to four times) over what would have been expected without stocking. This effort was expanded in 2002 and a coast-wide stocking effort was initiated that will shift among various estuaries in the state on a biannual basis. During 2002 red drum were also stocked in the May River in Beaufort County and Murrells Inlet on the border of Georgetown and Horry counties. More than 1.8 million red drum were released in 2002.

Mariculture Extension Activities

Although funding to support extension activities has been limited, the number of requests by SC aquaculturists, recreational fishermen and private communities has increased. The higher number of requests for information pertaining to water quality, weed control, species selection, permitting issues, and culture techniques can be attributed to increased coastal development. Many of these requests for information have been filled by phone, e-mail and visits to DNR facilities. Staff continued to support the state's aquaculture industry by providing the latest information for culturing a variety of marine and freshwater species. This support aids culturists with permitting information, species selection and production management.

Marine Genomics

The MRRI Fisheries Genetics Laboratory continued genetic studies of red drum, red porgy, scup, southern flounder, Atlantic croaker, tomtate, French grunt, shrimps and shrimp viruses in FY 2002-2003. Studies of red drum have focused upon documenting the application of genetic tags to assess the contribution of hatchery-reared fish to the wild stock. These DNA fingerprints provide accurate assessment of the overall contribution and are being improved by the incorporation of additional markers.

Analysis of genetic variation in tomtate is proceeding and will be completed in 2004. Studies of southern flounder and Atlantic croaker have yielded few surprises, as these species appear to be genetically similar along the Atlantic Coast. These data will be contrasted with previous studies of red drum when the survey is complete. Studies of scup are quite interesting, having found no evidence of genetic differences along the Atlantic Coast or Gulf of Mexico, even though biologists have traditionally believed that at least two and possibly three species are present in the region.

Studies on crustacean viruses continued with an increasing number of federal grants. Over 4000 genes have now been sequenced in shrimp, and sequences will be used to assess disease resistance in cultured Pacific white shrimp and the effects of environmental stress on wild local white shrimp. A new diagnostic tool for white spot virus was developed during the year and is being field-tested. Collaborative studies with MUSC on the study of marine shrimp immunity and to explore viral diseases in wild and farmed shrimp continued at the Hollings Marine Laboratory. Using the genomics approach, researchers now have enhanced opportunities to better understand relationships between shrimps and infectious pathogens, thus improving the outlook for disease risk assessment and disease management. Opportunities for developing intellectual property stemming from this research are being explored in cooperation with the Medical University of South Carolina.

Additional genetic studies on oysters have resulted in the investigation of over 2000 individual genes, which should considerably advance abilities to assess oyster health in South Carolina. These arrays were generated through staff efforts and the contributions of colleagues around the country and in France. The arrays also contain genes from *Perkinus* (a parasite that is deadly to oysters) and will permit the rapid screening of individual oysters for infection levels of this parasite.

Educational Programs And Activities

MRRI staff contributed significantly to the education of the state's citizens (students, teachers and the general public) in the ocean sciences. This support has expanded extensively beyond the original mandate to support the South Carolina's colleges and universities through seaside facilities.

Graduate, Undergraduate, High School and Public Education

During FY 2002-2003, MRRI staff acted as full faculty and adjunct faculty on academic committees, in advising graduate student's research (approximately 30 at present), and in teaching specialty graduate courses. Many collaborative educational activities took place with the faculties of the College of Charleston, Medical University of South Carolina, University of South Carolina, Clemson University, South Carolina State University and several other regional academic institutions. Staff mentors also guided special projects by undergraduate and high school students. The Waddell Mariculture Center continued a summer internship program for two undergraduates, which included minority students in 2003. Presentations by staff at professional meetings and to general audiences (teacher workshops, science fairs, etc.) complemented traditional Department and Division level educational activities (Southeastern Wildlife Exposition, Sportsman's Classic, etc.).

Minority Training and Recruitment

In FY 2002-2003, MRD's Minorities In Marine and Environmental Science (MIMES) program continued to provide opportunities for undergraduate students to conduct independent research projects guided by mentors from MRD or one of the other agencies at the Marine Center. One student returned for a second summer of advanced research funded by SCSU. Funding was received from two external sources (National Science Foundation and NOAA's Coastal Ocean Program), which supported six students with research projects and one with a fisheries

policy/management project. This summer, the program was evaluated by an expert in internship projects to make recommendations for any necessary improvements. The MIMES program received very positive review comments from both students and mentors. A total of 58 minority students have participated in the summer training project to date.

The Waddell Mariculture Center also maintained a summer internship program for undergraduates in 2003. The last year of the SC Sea Grant funded minority student internship program was successfully completed in cooperation with Savannah State University.

Marine Resources Library

The Marine Resources Library (MRL) added 854 new titles and 278 added volumes during the past year. The net growth of the book collection gives MRL a total of 24,868 volumes, representing 22,626 unique titles. The number of new titles added to the library in FY 2002-2003 represents a 17.5% increase over the previous year and is indicative of the CofC's continued funding for new acquisitions and of the progress the MRL cataloging staff is making toward cataloging the backlog of gift titles and the monographic series that were shelved in the periodical stacks. Because the library continued receiving funding for periodical binding from all three agencies, 188 bound journal volumes were added to the collection; the net growth of the bound periodical collection now gives MRL 8,914 bound journal volumes. Following collaboration with researchers, the librarian completed the weeding of the book, journal, and reference collections to remove outdated and/or duplicate materials; this improves the quality of the collections and provides much-needed shelf space even though the net growth of the book and journal collections was lower for the year.

Despite statewide budget cuts, the library maintained all current journal subscriptions for 2003. Now MRL receives 283 serial titles through subscription, exchange donation, and the Federal/State Depository System. In an effort to increase the number of electronic journals and databases accessible to the researchers at the Ft. Johnson Campus, the librarian began participating with other NOAA libraries to negotiate joint licenses for resources thereby reducing the subscription costs for each participating library.

The library continues to participate in the IAMSLIC Duplicate Exchange Program and in the exchange of DNR publications with 82 exchange partners throughout the world. The scanning project that is creating the DNR/MRD data, educational and technical reports in PDF format and making them available online from the MRL web page is continuing. The MRL Webmaster has developed an Access Database for the DNR/MRD publication series that will enable authors to update entries and receive publication numbers online. The database will be available on the MRD intranet in September 2003.

During the past year, the library circulated 2,171 books to library users, and library staff answered a total of 2,705 reference and directional questions. The librarian presented twelve bibliographic instruction classes that reached 187 students. The interlibrary loan staff placed 1,144 borrowing requests for MRL users (a 21% increase over the previous year). The staff responded to 1,520 lending requests from other libraries (a 30% increase over the previous year).

Office Of Regional Management

The Office of Regional Management (ORM) was created in December of 2001. The goal of the ORM is to support regional marine fisheries management activities. Responsibilities assigned to the ORM include:

1) representing the state of South Carolina on the South Atlantic Fishery Management Council,
2) representing the state of South Carolina on the Atlantic States Marine Fisheries Commission,
3) providing liaison with the National Marine Fisheries Service, the South Carolina General Assembly, and constituent groups,
4) administering the marine mammal program,
5) and providing backup to the Marine Resources Division Director.

The ORM director served as a voting member of the South Atlantic Fishery Management Council (SAFMC) and as the Council chairman during this FY. He also served as the Governor's Appointee Commissioner to the Atlantic States Marine Fisheries Commission (ASMFC) and as chairman of the Coordinating Council of the Atlantic Coastal Cooperative Statistics Program (ACCSP). The Coordinating Council is the policy body for the ACCSP and includes all of the state marine resources directors of the coastal states from Maine to Florida. He also worked with the General Assembly and various fishery constituent groups on marine fisheries management legislation and served on the National Marine Fisheries Service's Bottlenose Take Reduction Team and Atlantic Large Whale Take Reduction Team. The ORM works closely with commercial and recreational fishermen, environmental groups such as the Coastal Conservation Association and the S.C. Wildlife Federation, the S.C. General Assembly, and senior level managers in other states to carry out regional inter-jurisdictional fisheries and marine mammal management activities. ORM activities are supported with state funds, federal funds, and federal grants.

During FY 2002-2003, the ORM director worked on the following SAFMC fishery management plans and plan amendments.

1) Sargassum Fishery Management Plan – the council submitted this plan to the Secretary of Commerce for final approval and implementation. The plan, which was recently approved, establishes a management unit for this important essential fish habitat and sharply limits the amount of Sargassum that can be harvested in the south Atlantic region to 5000 pounds per year in a restricted area off the coast of North Carolina.
2) Marine Protected Areas – the council is moving forward with the development of marine protected areas as a management tool to help conserve and rebuild over fished deep-water species in the snapper/grouper management complex. There are currently three such areas being considered for designation off South Carolina.
3) Amendment 13 to the Snapper/Grouper Fishery Management Plan – this amendment addresses measures to prevent over fishing for species contained in the management unit, such as harvest and/or possession of certain species and spawning season closures; includes options affecting snapper/grouper fishing permits, black sea bass pot regulations, the Oculina Bank Experimental Closed Area, and bycatch requirements.

4) Dolphin/Wahoo Fishery Management Plan – this plan establishes commercial permits, prohibits the sale of fish caught recreationally, sets recreational bag limits of 10/dolphin/person/day and 2/wahoo/person/day, establishes commercial trip limits (the commercial trip limit off South Carolina would be 3,000 pounds for dolphin and 500 pounds for wahoo), and caps the commercial dolphin landings for the southeast region at 1.5 million pounds or 13% of the total landings, whichever is greater.
5) Calico Scallop Fishery Management Plan – this plan is designed to increase the commercial scallop yield while minimizing impacts to habitat and establishes a permit system to collect better data from harvesters. The plan also limits harvesting areas including closed areas around the Oculina coral banks found off Ft. Pierce, Florida. Vessel monitoring systems will be required on calico scallop vessels in order to monitor their fishing locations relevant to closed areas.
6) Shrimp Fishery Management Plan – council is working on Amendments number 5 and 6 to the plan. Amendment 5, which was recently approved, establishes a limited entry fishery for rock shrimp off Florida east coast and south Georgia, requirements for rock shrimp permits and operators' licenses, and vessel monitoring systems for vessels fishing rock shrimp off Florida and Georgia. Amendment 6 addresses over fishing definitions as required by the Sustainable Fisheries Act for white, pink, brown, and rock shrimp. It will also revise the way new bycatch reduction devices are approved for the fisheries. Other options considered for Amendment 6 further address sea turtle mortality and include nighttime closures and a reduction in allowable net sizes.

During FY 2002-2003, the ORM director worked on the following ASMFC fishery management plans and plan amendments.

1) Atlantic Sturgeon – the Sturgeon Management Board met to discuss the status of states' compliance with the mandatory requirements of the sturgeon fishery management plan (FMP) as currently written. All states were determined to be in compliance with the FMP.
2) Atlantic Menhaden – the Menhaden Management Board met to review reports from the Atlantic Menhaden Technical Committee and the newly formed Advisory Panel. The Board charged both bodies with a number of tasks to provide guidance in the event that future management measures are necessary. Included in these tasks was a charge to evaluate current fishing practices and the magnitude of the harvest of age-0 menhaden. The Technical Committee was also charged to provide more information to justify a proposed change to the biological reference points in Amendment 1, prioritize potential management options, and evaluate the age structure of the population. The Board recommended that social and economic impact analyses be conducted in order to evaluate any new management measures for both the menhaden fisheries and other fisheries that may be impacted by changes in the menhaden population.
3) Shad and River Herring – the Shad and River Herring Management Board has been focusing on two major issues, the phase-out of the shad ocean intercept fishery (which is required to be in place by January of 2005) and modifying Amendment 1 and Technical Addendum #1 to the Shad and River Herring FMP. These modifications will specify revised biological reference points that will be used to manage the American shad fishery.
4) Red Drum – the South Atlantic State/Federal Fishery Management Board approved Amendment 2 to the red drum FMP. This amendment requires states to establish state-specific management measures aimed at achieving a 40% spawning potential ratio. South

Carolina elected to achieve this level by reducing the daily bag and size limits to 2 fish measuring between 15 and 24 inches total length.

5) Weakfish – the Weakfish Management Board approved Amendment 4 to the weakfish FMP for public hearings. The draft amendment contains six issues including biological reference points, bycatch reduction, reference periods for stock assessment purposes, creel limits, age/size structure, and data collection.
6) Horseshoe Crab – the Horseshoe Crab Management Board voted to support efforts to obtain Congressional support for a 5-year horseshoe crab benthic trawl survey and reviewed the annual state compliance reports and found all states in compliance with the mandatory management measures contained in the FMP.
7) Spiny Dogfish and Coastal Sharks – the Management Board approved a public hearing draft of the Spiny Dogfish FMP. The draft plan contains an extensive series of proposed options for interstate management of this species in both state and federal waters. Proposed management measures include harvest levels, trip limits, alternative fishing seasons, and a variety of quota allocation systems. This species has been managed through a series of emergency actions the last two years while the plan is being developed. These emergency actions close state waters to the harvest, landing and possession of spiny dogfish when there is a closure in federal waters.
8) Atlantic Croaker – the South Atlantic State/Federal Fisheries Management Board has recommended the development of an amendment to the Atlantic croaker FMP that will conform to the standards and procedures of the Commission's Interstate Fishery Management Program.

Responsibility for marine mammals was transferred from the Wildlife Diversity Section within the Wildlife and Freshwater Fisheries Division to the ORM in the MRD this FY. The ORM director, working with a Division veterinarian, has been administering and operating the state's marine mammal stranding network to record information on stranded marine mammals and to rehabilitate those that can be rehabilitated and to euthanize those that can't be saved. The ORM director submitted a grant proposal to the Prescott Grant Program to fund continuation of the marine mammal stranding network. NMFS has informed us that they have recommended that the grant be approved in the amount of $86,690 in federal funds. Both the ORM director and the veterinarian participated in a project by sponsored by NOAA and by Harbor Branch Oceanographic Institute to obtain data from bottlenose dolphin for a health evaluation and risk assessment. Four bottlenose dolphins were captured in the Charleston Harbor area. These animals were tagged and samples were taken for health screenings.

During FY 2002-2003, the ORM director participated in a number of meetings as a member of the Bottlenose Dolphin Take Reduction Team and the Atlantic Large Whale Take Reduction Team. These teams, established by the NMFS, are required by federal law to develop draft take reduction plans within 6 months of being established. The plans are aimed at reducing the incidental mortality and serious injury of the Atlantic coastal stock of bottlenose dolphins and Atlantic large whales in commercial fisheries to below the potential biological removal level for the stocks.

The ORM director represented the agency at several meetings with the NMFS during this period including a meeting of the Marine Fisheries Initiative (MARFIN) Review Board, a national

meeting of state marine fisheries directors to discuss new federal legislation and initiatives that will impact marine fisheries and habitat, and a regional meeting to discuss the disbursement of federal assistance funds to the shrimp industry.

Wildlife & Freshwater Fisheries Division

Wildlife and Freshwater Fisheries Advisory Committee:

M. Russell Holliday, Jr., Chair	Galivants Ferry
Ed Muckenfuss, Vice Chairman	Summerville
Jim Steele	Hartsville
Dr. Tom Eleazer	Columbia
Obie Stokes	Florence
Darrell R. "Randy" Brewer	Greer
Benjamin R. Lee, Jr.	Lexington
Milton L. Brazell	Edisto Island
Dr. Everard O. "Rod" Rutledge	Charleston
Charles M. Culbertson, II	Greenville

The Division of Wildlife and Freshwater Fisheries develops and implements programs that protect, conserve and manage the wildlife and freshwater fish resources of South Carolina. Division programs are divided among three sections: Wildlife Management, Freshwater Fisheries and Wildlife Diversity. With main offices at 1000 Assembly Street in Columbia, the Wildlife and Freshwater Fisheries Division also has offices throughout the state.

The Wildlife Management Section protects, manages and enhances the state's game species, their habitats, and associated wildlife for the public's benefit of present and future generations and ensures the best possible hunting opportunities for the sportsmen and sportswomen of South Carolina.

The section is responsible for the development, operation and maintenance of the state's Wildlife Management Area (WMA) Program, which has an objective of providing affordable public hunting and a quality outdoor experience for the citizens of South Carolina. Through department-owned WMA lands, the section provides a long-term intensively managed habitat base for the protection, enhancement and utilization of a wide variety of wildlife species.

Wildlife Management Section staff provides technical assistance to private landowners, and public and private entities to enable them to effectively and efficiently manage, enhance and/or control wildlife on their property and to maximize the benefit of renewable resources through applied management programs. Species-specific programs are administered for deer, turkey, small game, waterfowl, furbearers and alligators. Focus Area wetland and wildlife initiatives, such as the ACE Basin Project, are coordinated by the section, as well as cooperative projects among government, public and private entities.

The Freshwater Fisheries Section has among its objectives the protection, enhancement and conservation of South Carolina's inland aquatic resources, and to provide recreational fishing opportunities for the state's citizens. The section has five components: hatcheries, district operations, state public fishing lakes, research, and the office of anadromous fisheries coordination.

Section activities are directed to provide the information and services needed to maintain and improve South Carolina's freshwater fishery resources. Technical assistance is provided to landowners requesting advice on the management of their property. Fish are produced (at cost) in state hatcheries for private pond owners. All public water fish kills are investigated and those caused by unnatural events are pursued to recover damages suffered.

Seventeen public fishing lakes are maintained for anglers' enjoyment. Seven fish hatcheries produce the species and numbers of fish necessary to maintain productive fishing opportunities. Access and other angling improvements are developed and maintained to enhance angler convenience and success. Essential biological data are collected, analyzed, and reported with appropriate management recommendations. Anadromous fish populations are monitored and enhanced through operation of the St. Stephen Fish Lift.

The Wildlife Diversity Section includes the state's Endangered Species Program and Heritage Trust Program, both established during the 1970s to protect and enhance a variety of declining species and diminishing habitats.

The Endangered Species Program supports over 40 different research, survey and monitoring projects as well as recovery initiatives for federal and state-listed threatened and endangered species. Both rare species and species of concern are checked periodically for alterations in population levels and other indicators of degradation. Field biologists work with other scientists, industries, schools, environmental groups and private landowners to decide the best possible course of action for those species for which survival is already dependent solely upon human efforts. Revenue from both the Check for Wildlife on your state income tax form and the Bald Eagle license tag support these projects.

The Heritage Trust Program inventories, evaluates and protects significant features considered the most outstanding representatives of our state's natural and cultural heritage. The program currently manages more than 80,000 acres in 69 heritage preserves statewide. Staff works with property owners through conservation easements and tax-deductible real or personal property donations. Each preserve safeguards one or more rare plant and animal species or historical/archaeological sites. Regional Wildlife Diversity offices are in Clemson, Columbia, Georgetown, Green Pond, Rock Hill and Charleston.

Wildlife Management Environmental Programs Office

Program Name: Wildlife Management- Environmental Programs Office

Goals: To protect, enhance and restore the State's fish and wildlife resources, aquatic and terrestrial habitats, outdoor recreation and associated natural resource values for present and future generations.

Objectives: To meet goals by actively participating in environmental permitting, hydroelectric project licensing, environmental studies, public education, policy formulation, and interagency coordination.

Key Results:

Environmental Permits - Staff reviewed 421 environmental permit applications related to commercial and residential development. Permits reviewed and commented to include USACE 404 wetlands and section 10 navigable waters permits, State 401 water quality certification permits, mining permits, State navigable waters permits, NPDES permits, 208 plans, and Duke Power permits. The number of pond permit applications reviewed dropped significantly from the previous year.

Environmental Coordination - Coordination on Environmental issues was provided for State and Federal agencies, Department and Division staff, and the public. Interagency coordination was provided at interagency meetings such as Mitigation Banking Review Team monthly meeting. Technical assistance on mitigation projects was provided through interagency correspondence and meetings. The office coordinated with DNR staff to develop consistent responses to environmental issues and assisted in DNR wetland mitigation efforts. Also, coordinated with the public on environmental issues such as wetland violation reports and mitigation. Presentations on environmental issues where made at public and professional meetings.

FERC Coordination / Hydroelectric Project Activities - Work was conducted on 11 FERC projects regarding pipeline projects, relicensing, shoreline management, operations and fisheries mitigation. Although the number of projects worked is less than previous years, the workload has increased due to the magnitude of the projects currently under review. Staff reviewed and made comments to hydroelectric project issues such as shoreline management plans, instream flow studies, water quality, fish passage facilities, recreation, endangered species and others. Projects worked on included the Augusta Canal, Columbia Canal, Lockhart, Saluda Dam, Santee Cooper, Catawba/Wateree Dams, and a SCG Pipeline project.

DOT Coordination - Work was continued on a five-year agreement with the Department of Transportation (DOT) to provide early coordination for, reviews of, and comments on all highway and road projects. Significant accomplishments include coordination with DOT on more than 46 projects ranging from minor road widening to new road alignments. Work was also completed on a Sandhills Mitigation Bank and developing mitigation opportunities in the Piedmont.

Scientific Research - Biological surveys were conducted on freshwater streams and stream health was evaluated using an index of biological integrity. Work was done on developing a fish community based index of biotic integrity for Piedmont streams in South Carolina. Assistance was also provided on other staff research projects.

Wildlife Management Section

Program Name: Wildlife Management

Goals: To protect and manage wildlife populations and their habitat for all citizens and to provide outdoor recreation including hunting and trapping.

Objectives: To develop and implement programs for the conservation, protection, management and utilization of the State's natural resources based upon scientific principles, resource monitoring, applied research, natural resource planning, public education, outreach, technical assistance and public involvement.

Key Results:

Significant accomplishments continued with operation of public hunting programs and the Wildlife Management Area Program. During FY 2002-03 1,032,269 acres of land were available to the public for hunting, and a total of 44,716 WMA permits were sold.

Harvests of 13,502 turkeys were recorded at department check stations. Turkey tags were issued to 48,003 hunters during the 2003 spring turkey season. Fifty-three public dove fields (2030 acres) were available across the state. 665 hunters participated in public waterfowl hunts with a reported harvest of 1,776 ducks.

The Wildlife Management Section's public relations activities continued to inform the public of management programs. Section staff made 328 public presentations before audiences of over 17,008 and assisted in the preparation of 58 news releases.

Research, survey, and population monitoring included 18 dove call counts, 59 quail call counts, 141 furbearer routes, 10 waterfowl routes, goose surveys, bear surveys, mink surveys, mast surveys, rabbit hunter survey, turkey survey, quail brood survey, fox squirrel survey, and alligator surveys. Banding and trapping activities included 1773 ducks and 1273 geese. A minimum of 3,335 wood duck box checks were performed during the year.

Technical assistance accomplishments included data analysis for over 1,500 hunt clubs, 543 management plans prepared, technical advice to other agencies on 333 occasions, 1,596 nuisance wildlife complaints handled including 605 nuisance alligator complaints, and 4 environmental notice reviews.

Youth hunting opportunities were provided for deer, raccoon, dove, ducks and turkey.

Hunts for the mobility impaired were provided at the Webb Center, Region IV (Francis Marion) and on industry and private lands in Newberry County.

Agricultural and habitat management accomplishments included 3,087 acres mowed, 7,472 acres disced, 9,338 acres prescribe burned, 4,786 acres fertilized, 104 acres limed, 2,202 acres treated with herbicide, and 109 acres of perennials and 3,513 acres of annuals planted. Dikes mowed

included 2,261,278 feet and 679 miles of roads were mowed or scraped. Over 656 miles of boundary were posted with 4,550 WMA signs and 807 misc. information signs were posted throughout the state.

In addition to the contribution of Regional and Statewide Projects to the summary accomplishments listed above, the following are project specific accomplishments important to the overall goals of the Wildlife Management Section:

Wildlife Region I
On the Jocassee Gorges, 22.2 miles of roads were refurbished, 4,572 tons of rock were spread, 112 broad base dips were refurbished or created, 5 bubble drains were created, 1.5 miles of roads were cleared and 6 miles of roads were seeded and fertilized.

The Bear protocol was approved and distributed and the bear DNA study was initiated with Ga., TN, NC and USFS.

The Southern Appalachian Black Bear Working Group and the Southeastern Association of Game and Fish Black Bear Committee approved timber prescriptions for bear.

A Lake Hartwell Goose survey was completed in partnership with GA DNR and the Corps of Engineers.

The Lloyd G. Webb Natural Resources Office was given the Bootsie Manning Wildlife Habitat Education Award by the SCWF.

Wildlife Region II
The old leaking drain in the Russell Creek Reservoir was replaced with aluminum pipe with help from the Heavy Equipment Section. The exposed areas on the dam were planted, and the pond was stocked with fish.

Four miles of access or logging roads were scraped, and 88 tons of crusher-run rock was spread. 21 barricades were erected on the Mason Tract and USCOE WMA lands. Sixty tons of crusher-run rock was spread on the Greenwood office parking lot and drainage problems were corrected. Forty tons of crusher-run rock was also spread at the Key Bridge Work Center.

A shed roof was constructed over the field office trailer at Bordeaux Work Center.

The Region II office building's roof was repaired, and new shingles were installed by a contractor.

The front wall sheathing was replaced and a rodent resistant seed storage facility was constructed at Key Bridge Work Center.

D.O.E. Project
As primary manager of the Crackerneck Wildlife Management Area and Ecological Reserve, continued implementation of the Comprehensive Management Plan. Timber has been sold for the Compartment 1 prescription, but harvest has been delayed by inclement weather. The Compartment 3 timber prescription is almost finalized.

Negotiated with the U.S. Department of Energy to reopen Crackerneck to public utilization after closure occurred due to the Iraq War, and submitted a proposal to the USDOE that would allow Crackerneck to remain open to public use during heightened security alerts.

The USDOE was assisted on 32 occasions with their site use system.

Serving on the U.S. Forest Service - ID Team entailed 7 meetings and three field inspections to review natural resource prescriptions.

Served on the Set-Aside Task Group and Deer Control Group committees.

Provided the USDOE with the Crackerneck Harvest and Utilization Report after each hunt season and non-consumptive use period.

Compiled a recent history of utilization at Crackerneck for Westinghouse, who is doing an economic analysis of SRS benefits to local communities.

An annual accomplishment report as well as future recommendations for Crackerneck were provided to the USDOE. The final technical report at the end of the five-year contract was provided to the USDOE and the SCDNR was awarded a new five-year contract.

Wildlife Region III
Special hunts that included youth dove hunts at three sites, youth deer hunts at five sites and a two day mobility impaired deer hunt at nine sites were conducted within the region in cooperation with the U. S. Forest Service, International Paper Company, Bowater Incorporated and several private landowners.

Wildlife habitat management and enhancement practices were conducted at existing DNR owned properties in Chester, Chesterfield, Laurens, Union and York counties.

Cooperative agreements with local chapters of Quail Unlimited, The National Wild Turkey Federation and other interested groups were continued to cost-share wildlife management practices on DNR owned lands or other WMA lands. Assistance was provided with local and regional events such as fishing rodeos, JAKES events and Women In The Outdoors programs.

Wildlife Region IV
Constant contact was maintained with U.S. Forest Service personnel to review post Hugo interim strategies and to review project notifications. Coordination meetings were held with the U.S. Forest Service concerning proposals for deer hunting with dogs on the Francis Marion Hunt Unit.

In order to expand hunting opportunity and control feral hog populations, special hog hunts were held in February on the Waterhorn WMA (117 hunters, 21 hogs harvested) of the Francis Marion.

Staff assisted U. S. Forest Service with 4 mobility impaired deer hunts and 4 youth hunts on Tibwin special use area. Sixty hunters harvested 15 deer on the mobility-impaired hunt and 60 youth hunters took 6 deer.

The quail management initiative was continued on the Canal WMA in cooperation with the Small Game Project and the Williamsburg Chapter of Quail Unlimited.

One experimental fall quail call count was conducted in conjunction with the Small Game Project on Canal WMA.

Two miles of high tensile fence were erected around dove fields to reduce deer damage to crops on Canal WMA.

An equipment shed was constructed on Santee Dam WMA.

A wildlife and timber management education trail was maintained on Santee Cooper Wildlife Management Area. A number of spur trails to the S.C. Palmetto Trail on this area were also maintained.

A longleaf pine planting and wildlife opening development program was continued on Santee Cooper Wildlife Management Area in cooperation with the S.C. Public Service Authority and the Orangeburg Chapter of Quail Unlimited.

A white marsh control program and experimental planting of waterfowl food plants was evaluated in conjunction with the Water Resources Division and Santee Cooper on Santee Cooper WMA.

On Sandy Beach Waterfowl Area the pump was refurbished and new hydraulic lines were installed. Santee Cooper continued spraying aquatic vegetation in Stoney Bay.

Five hundred and nine tons of gravel were spread on roads and dikes throughout Sandy Beach.

The Edisto River WMA boundaries were surveyed, posted, and painted; gates were built and installed and a parking lot was built on the property.

Firelines were created and a burn plan was written for Edisto River WMA in conjunction with the S.C. Forestry Commission

Staff assisted Forestry Commission with writing a management plan for the newly acquired WeeTee WMA in Williamsburg County.

Development of two focus areas (CAWS and Santee Cooper) under the auspices of the North

American Waterfowl Plan was continued.

Staff visited Santee National Refuge concerning on-the-ground assistance and management activities on the refuge. This included commenting on the Biological Review for the area as well as banding waterfowl (493 banded) on Pine Island and Cuddo Units.

Wildlife Region V

Public use opportunities including wildlife seminars, wildlife conservation and educational programs, and field trips were provided for 27 organized groups totaling 785 persons visiting Webb WMA. Numerous other visitors were hosted informally.

The SOLO Focus Area project was continued with work in landowner education, public information and resource evaluation completed. Considerable assistance was provided to the Forest Legacy program and other Agency Land Protection efforts. The Corps transfer agreement was reviewed.

Detailed technical assistance was provided to USMC MCAS Beaufort, USMC Parris Island, Colleton County Sanctuary in Walterboro and the TNC Savannah River Flows project.

One timber sale was held on Palachucola with total revenue of $16,374. It was a sale of 55,251bf of saw timber and 63.67 cords of pulpwood to clear-cut the footprint of the shooting range. Longleaf pine seedlings were planted on 15 acres on Webb.

The following research projects were continued at the Webb Center: Warm Season Grass Demonstrations; Herpetological Survey Project; Painted Bunting Nesting Project, and, Rattlesnake Competition Project.

Considerable renovation was performed on the Mistletoe Grove House on Palachucola. This included painting, interior work, plumbing and step construction.

Renovations continued in the Webb lodge with refinishing of wood surfaces and painting of rooms. Surplus furniture was picked up from the Richardson Landing house in Bonneau and was installed in the Webb Lodge. Two block dwellings were re-roofed and a porch awning was constructed on the biologist's residence.

Six gates were erected on Webb and Palachucola. Two informational kiosks were erected and construction was begun on a shooting range complex at Webb.

Wildlife Region VI

A youth deer hunt was conducted on Poinsett Gunnery Range in Sumter County. A very successful and well-attended youth dove hunt was held on Manchester State Forest during which 30 participants harvested 213 doves. Project personnel also assisted LE and the FWF Section with fishing rodeos and Wildlife Technician Martin assisted with BOW Workshops at Clemson Univ. and Lake Hartwell.

Continued to work closely with the Small Game Program and SC FC personnel to develop

habitat recommendations on approximately 1,900 acres at the Bland Tract on MSF.

ACE Basin Project, Donnelley and Bear Island WMA's
Replaced 2 water control structures and repaired 9,000 linear feet of dike on Bear Island WMA.

Donnelley WMA: Produced the FY-2004 Richard B. Russell Management Plan, herbicided 50 acres of undesirable vegetation to encourage the growth of upland wildlife food plants and completed the FY-2003 timber sale.

Produced 2 issues of ACE Basin *Current Events*.

Waterfowl Project and Santee Coastal Reserve
The Project Leader continued to provide technical assistance to private organizations, individuals, and other government agencies.

The Mid-Winter Waterfowl Index was coordinated, the aerial portion was flown, and the results submitted per new software.

The Waterfowl Status Report was compiled and distributed.

The Waterfowl Project directed and coordinated the statewide banding of waterfowl. Banding supplies and records were maintained for statewide waterfowl banding.

Research efforts included the capture and outfitting of 10 pintail hens with satellite transmitters in order to learn more about the migration, staging, and nesting areas for this species. A web page was constructed and the results of the tracking were posted on the web page on a weekly basis.

Samworth and Santee-Delta
Samworth and Santee-Delta WMAs continued to provide quality public hunting opportunities. On these areas a minimum of 1,881 man-days of public waterfowl hunting was afforded during 2002-2003. Project personnel continued to direct efforts toward expanding multiple use opportunities on both areas.

There was continued development of Winyah Bay Focus Area (WBFA) including Task Force and Land Protection Committee meetings, special events, coordination of resource and planning documents, news releases and coordination with other focus areas. Additional acreage was added to Waccamaw NWR. Additional private land conservation easements tracts have been identified, and work was continued to protect vital acreage through efforts of partnering conservation organizations. An additional 7 private land conservation easements were finalized.

During 2002 minimum documented production of wood ducks though the Statewide Wood Duck Nest Box Project was approximately 21,000 hatchlings.

Phragmites communis control efforts were continued on Santee-Delta WMA for the 10th year of treatment of small outbreaks sprayed by ground application. Aerial application also was available in 2002.

Deer Project

Supervised and administered the Antlerless Deer Quota Program (ADQP) which lead to the issuance of 81,159 tags to 1,998 cooperators. The reported harvest on the 4.08 million acres enrolled in this program in 2002 was 75,382 deer (31,608 bucks & 42,774 does). Continued the process of streamlining the ADQP by implementing additional changes in the renewal process and continued development of a new style of tag and packaging.

Cooperated with the Licensing Division to supervise and administer the Individual Antlerless Deer Tag Program that lead to the issuance of 144,879 tags to 41,488 participants. Changed the number of tags available from a choice of 1 to 4 tags per applicant to either 2 or 4 tags per applicant and contacted, by mail, the 2,840 program participants that this change affected.

Initiated and completed the 2002 Deer Hunter Survey which revealed that an estimated 319,902 deer (158,634 bucks and 161,269 does) were harvested in South Carolina in 2002. The survey involved 21,515 Big Game Permit holders and included development of a survey, mailing list database, printing, mail-out, data entry and editing, and statistical analysis. This survey also revealed that deer hunters harvested an estimated 22,181 hogs and 14,874 coyotes in 2002.

Completed year 1 of a 2 year cooperative study with Clemson University entitled "Neonatal White-tailed Deer Mortality and Movements in the Coastal Plain of South Carolina" in Georgetown and Williamsburg counties. This included the capture, marking, and subsequent monitoring of 18 fawns. There were 3 mortalities and a Kaplan-Meier survival rate of 0.85. An abstract from this study was accepted for presentation at the 26th Annual Meeting of the Southeast Deer Study Group.

An abstract related to the study entitled "Mortality, Emigration and Antler Development in a Population of White-tailed Deer" that was completed in 2001 was accepted for presentation at the 26th Annual Meeting of the Southeast Deer Study Group.

In conjunction with Region V staff, completed a survey to determine hunter attitude related to certain aspects of the deer draw hunts on Webb and Palachucola WMA's. This survey was conducted by mail, involved 2,600 applicants from 2001, and required a mail-out, data entry and editing, and statistical analysis. The results of the survey lead to implementation of a restrictive buck harvest on the two WMA's.

Continued to work in the area of urban deer management and control, which included providing technical assistance to 3 communities, 2 of which implemented programs for the first time. During 2002 and at the request of various property owners' associations, management plans were reviewed leading to the issuance of 7 permits to lethally reduce deer herds on resort residential areas in the state.

At the request of the Southeast Cooperative Wildlife Disease Study (SCWDS), coordinated among Section biologists related to the SCWDS surveillance program for hemorrhagic disease (HD). HD was evident in 23 of 46 counties and most active in the coastal plain.

Expended considerable effort related to chronic wasting disease (CWD). Developed information for DNR Board, SC General Assembly, constituents, and the media. Coordinated with Regional personnel to implement an active surveillance program for CWD that required procurement of sampling equipment, training of Regional personnel, collection and submission of samples. A total of 103 samples were submitted for screening with uniformly negative results. Completed and submitted a grant to USDA-APHIS-VS in order to receive federal funds to offset the costs associated with active surveillance for CWD in 2003.

Scheduled and administered antler scoring sessions across the state in sufficient numbers to meet public demand. This included 15 regional sessions and a three-day event at the Palmetto Sportsman's Classic. Approximately 340 sets of antlers were scored during these activities and data editing/entry, and issuance of certificates was completed for 128 new entries. Completed the hard copy publication "South Carolina Deer Antler Records 2001-2002" and made arrangements for it to be posted on the department web site.

Worked with Conservation Education and Communications (CEC) personnel to post new and updated material on the department web site. This included a new "Deer News" listing, the 2001 Deer Harvest Report, antlerless deer tag applications, information on aging deer and antlerless deer harvest, and updated deer and hog density distribution maps.

As state representative to the Southeast Section of the Wildlife Society's Deer Committee, the Deer Project supervisor attended the Deer Committee and Deer Technical Committee meetings.

Provided technical assistance related to deer management to property owners in numerous counties. Project supervisor served as ADQP biologist for Richland and Lexington counties which included reviewing applications, setting quotas, and deer data analysis for cooperating clubs.

Supervised the permitting process for the sale of venison in restaurants. Issued 2 permits for the sale of venison in restaurants.

Supervised the permitting process for captive deer. Issued 8 permits for the possession of pet deer, renewed 10 permits, and provided written information to 16 other individuals.

Wild Turkey Project

A restoration site in Colleton County was stocked with 14 turkeys, 15 turkeys were put on Yawkey Wildlife Center in Georgetown County, and a supplemental stocking of 11 birds was made on Bull Island TRS. A total of 49 turkeys were sent to Texas to assist Texas Parks & Wildlife with their restoration efforts in east Texas.

Continued to work with the S.C. State and local chapters of the NWTF and completed at least 30 different projects funded through the Super Fund. NWTF Super Fund money was used as part of the match for Forest Legacy acquisition of the Wee Tee tract in Williamsburg County.

Summer turkey survey forms were mailed to cooperators with survey to begin July 1. Last years reproduction data were fair to good with an average poult to hen ratio of 2.9 poults per hen. Assistance was provided to Law Enforcement staff in handling wild turkey related cases and served as an expert witness in 4 jury trials for turkey bait violations.

Efforts were coordinated with DHEC and Clemson Poultry Diagnostic Lab in dealing with an avian cholera outbreak in a domestic turkey operation in Fairfield County. Protocol was established for disposal of carcasses and poultry litter to reduce possible spread to wild turkeys.

Small Game Project

Implemented a successful mourning dove banding study in conjunction with USGS, USFWS, 25 additional participating states and the technical committees for the three mourning dove management units.

Provided extensive assistance in the planning of the 4000-acre Martintown Ecosystem Restoration Project in the Longcane Ranger District of the Sumter National Forest, which should greatly improve small game habitat and hunting opportunity in that area.

Provided technical expertise and small game habitat enhancement recommendations for the Pee Dee Research and Education Center's Agroecology Focus program.

Small game habitat management projects continued on McBee, Canal, Sandhills State Forest, Fant's Grove, Santee Cooper, Manchester State Forest, Crackerneck and Webb Wildlife Center WMA's and the Champion Quail Demonstration Area in cooperation with Regional Biologists. Quail Unlimited funds were solicited and utilized for many of these projects.

Assumed Department responsibility for USDA Farm Bill Program coordination duties and State Technical Committee representation.

Two overnight quail habitat management seminars were conducted at Webb Wildlife Center, attended by 56 sportsmen and women.

Continued the coordination, analysis and reporting for the Bobwhite Quail Whistling Cock Survey, Quail and Rabbit Hunter Surveys, Quail Brood Sighting Survey, Fox Squirrel Sighting Survey and Fall Covey Count Survey.

Completed an experimental bobwhite quail whistling cock survey to examine potential bias associated with time of year on calling rates of male bobwhites, produced a final report, and made appropriate changes to the survey protocol based on the results of the survey and analysis of historical data.

Edited and distributed a list of South Carolina's WMA Public Dove Fields, and made the list available over the DNR web site.

The Project Supervisor served as the Department representative on the Eastern Management Unit Dove Technical Committee and as Chairman of the Southeast Technical Review Committee for the Webless Migratory Game Bird Research Program.
Licensed and monitored activity for bird dog, rabbit, and squirrel dog field trials. Twenty-eight other types of permits or licenses were issued (quail recall pens, rabbit enclosure, etc.).

Furbearer Project
Furbearer populations were monitored through the 19th annual scent station survey, the 17th annual field trial survey and the annual commercial fur harvest survey.

Furbearer Project staff participated in national and international working groups to protect trapping as a wildlife management tool. Staff is serving on a national committee to develop trapping Best Management Practices. Furbearer project staff continued to successfully coordinate federally funded studies to evaluate the humaneness and efficiency of traps used in the southeastern United States.

The commercial harvest of furbearers in South Carolina was administrated and a report on the 2002-2003 harvest analysis was prepared. A permitting program was successfully administered which issued 1101 permits of 19 types.

Coastal flood tide surveys were conducted as a part of ongoing efforts to measure the abundance of mink in South Carolina's coastal marshes. Restoration of South Carolina's coastal mink population continued with the stocking of 42 adult and 35 infant mink into the North Inlet and Murrell's Inlet areas of Georgetown County. Research was conducted to develop new techniques for indexing marsh mink populations. This project was a cooperative effort with the College of Charleston and with the Kiawah Island Nature Conservancy. An article was written for the SC Wildlife Magazine on DNR's mink restoration effort.

A considerable amount of time was devoted to working with foxhunters, the DNR Board and the legislature to develop legislation to govern fox and coyote hunting enclosures.

Alligator Program
Responded to and evaluated over 650 alligator complaints from the public resulting in the capturing and processing of 175 alligators. Sold 110 alligator skins during the reporting period generating over $30,000 in total revenue. Revenue was distributed to agents and hide broker.
Issued 23 marketing permits to business establishments for the sale of alligator products. This generated $805 in revenue for the Alligator Program.

The Private Lands Alligator Harvest Program was continued for the eighth year. During the fall 2002 season, 10 properties applied to be in the program and 6 were permitted and trapped. A total of 153 tags were issued and 62 alligators were harvested.

The long-term research project implemented in 1994 that examines sex ratios of hatchling

alligators was continued for a seventh field season this past summer. During 2002, a total of 1,878 eggs were collected, and 60% hatched and were sexed and returned to their natal area. Collaboration with Dr. Jeff Lang from the Univ. of North Dakota was continued. Hatchling sex ratio for 2002 was 81% female. Data analysis continues. During the field season, over 250 people participated in educational activities pertaining to the research. Several media interviews were completed concerning the project.

Forest Stewardship

This reporting period, the Forest Stewardship Program had a total of 7 plans reviewed, 33 site visits, and 39 plans written. Approximately 175 FSP-related correspondences (telephone calls or letters/e-mails) were handled in the administration of the program. In addition, 8 wildlife presentations were presented. To date, 113 plans have been written since February 2001.

The Forest Stewardship Program Supervisor also designed and completed a revised folder for the program that included a template and inserts on CD-ROM. Implementation is still on hold due to SC Forestry Commission staff cutbacks.

Wildlife Diversity Section

Coastal Region – Tom Murphy, Charlotte Hope, Felicia Sanders, John Coker, Mark Spinks

Bald Eagle Monitoring - Eleven survey flights were conducted to monitor 216 breeding territories in 34 counties of South Carolina. A record number of 181 occupied territories were documented to produce 224 young. Thirteen new territories were located. Letters were sent to 209 landowners to inform them of the nesting activity of the pair(s) on their property as well as the general status of the bald eagle in SC.

The 25th annual Midwinter Eagle Survey was coordinated for the state as a part of a national survey coordinated by USGS. One hundred fifteen participants assisted with counts conducted during the first two weeks of January. Staff and volunteers surveyed thirty-six standardized routes consisting of 1,872 miles where 497 bald eagles were counted. Of the eagles reported, there were 395 adults, 100 immatures and two were of unknown age.

Seven sick or injured bald eagles were recovered and transported to the SC Center for Birds of Prey, now called the International Bird of Prey Center, for treatment. One adult and a sub-adult had wounds consistent with intra-specific fighting. One adult was shot. One adult recovered from the Santee Dam area on Lake Marion died and was diagnosed with West Nile Virus. A subadult found on Lake Thurmond, who also died was diagnosed with Avian Vacuolar Myelinopathy (AVM). One subadult and one immature came in with wing injuries. The immature is still pending but the subadult is not releasable and will be trained as an education bird for the International Bird of Prey Center. Documenting baseline sources of eagle mortality is essential to evaluating the effects of removing the species from the protection of the Endangered Species Act, which may be proposed in the near future.

Adult Mortality Rate - Observations were conducted to confirm the survival of six banded adult eagles in the breeding population. Four of the six were confirmed at their breeding areas. This long term monitoring program has documented an average 13% annual mortality rate for

adult eagles. The oldest known breeder in the population was a 24-year-old male who did not return this season. Mortality rates are the most important demographics in determining the status of a population. These rates need to be monitored before and after de-listing.

Collaborative AVM Study - We worked with SCDNR-MRD, SCDNR-LW&CD, Clemson University, USC, USFS, NOS, SWDS and COE on a variety of surveys relating to the occurrence of Avian Vacuolar Myelinopathy (AVM) disease. A total of twenty-one boat surveys and seven flights were conducted to monitor conditions associated with AVM on Lake Thurmond, Lake Murray, Lake Russell, Lake Juliette, GA and Woodlake, NC. In collaboration with Dr. Susan Wilde (MRD) we collected samples of submerged aquatic vegetation to document a correlation between the disease and a species of epiphytic blue-green algae found on the vegetation. Feeding trials conducted by Dr. Bill Bowerman at Clemson University in collaboration with DNR made the first direct link between the introduced aquatic plant, hydrilla and AVM disease in birds.

Surveys were contracted by SCE&G to monitor the effects of the Lake Murray draw down (to repair the dam) and the occurrence of AVM. These areas were surveyed to document the extent of use by eagles and coots, search for previously unknown bald eagle nests and record the distribution of submerged aquatic vegetation. These surveys were conducted in an attempt to evaluate the potential for AVM disease on this reservoir. There were six active bald eagle territories on Lake Murray.

Wood Stork Monitoring - Complete ground counts on 10 sites and an aerial count at one site documented a record high 1356 wood stork nests at 11 sites this year. Wood storks utilizing pine trees as nesting substrate was documented for the first time in the state at a new colony. Two nesting sites last used in 2000 and 2001 were again active. Two sites that had minor nesting last year, 9 nests and 4 nests, were not used this year.

The end of the drought resulted in an increase in nesting by other species at sites used by wood storks. Wood stork productivity estimates were obtained at only 7 sites because of the potential of catastrophic disturbance to the nestlings of these species. A total of 2058 young were estimated to have fledged from 940 sampled nests. Based on this sample, storks produced 2.2 young per nest. During both wet and dry years, chick production has remained above the 1.5 young per nest estimated to be required in a stable population. This suggests that adequate foraging habitat is available. This is unlike the south Florida colonies where nesting success is closely tied to rainfall. The primary impacts of drought are the loss of colony sites and abandonment of nests or chicks when a nesting site dries out during the nesting season.

Least Tern Monitoring and Management - A total of 57 least tern-nesting sites were surveyed this season, 33 were active, and 24 were inactive. Eighteen (55%) of the active sites were rooftops, 10 (30%) were beach sites, and 5 (15%) were man-made or spoil sites. One new rooftop-nesting site was documented. Total nest count censuses were conducted at 29 nesting sites (16 roofs, 8 beaches, 5 spoil), or 88% of the active sites. A total of 1526 nests were counted at these sites. Eight hundred sixty three nests (56%) were counted on rooftop colonies, 500 (33%) on beaches and 163 (11%) at spoil sites.

During 1998, the last year an intensive census was conducted, 1680 nests were counted. One thousand one hundred and forty six nests (68.2%) were on rooftops, 529 nests (31.5%) were on beaches and 5 nests (0.3%) were on a man-made site. The 2003 census reflects a decrease of 154 nests or a decline of 9%. This small decline is not statistically significant.
Letters were sent to building managers before the nesting season to request that roof maintenance be performed before the nesting season. All significant ground nesting site were posted with appropriate signs to minimize disturbance.

Colonial Nesting Wading Bird Monitoring and Management - Three hundred and nineteen wading bird nesting records were entered into the South Carolina Colonial Waterbird Database for the 2003-nesting season. A total of 192 wading bird-nesting sites were surveyed this year, 124 were active, and 68 were not active. A total of 186 sites were checked during five aerial surveys and ground surveys were conducted at 14 sites. Eleven new sites were documented. Aerial surveys are not accurate enough to analyze increases or declines, but it appears overall that nesting has rebounded from the effects of the drought. Last year only 51% of the wading bird sites surveyed were active, this year 65%.

Nesting Seabird Monitoring and Management - Seabird nesting continued at a level similar to recent years, but at reduced numbers when compared to recent higher nest numbers recorded for the state. Many nests on the Castle Pinckney colony were washed out during high tide events. Disturbance by humans at seabird nesting colonies continues to be a problem. All colonies were posted with appropriate signs, critical areas were roped off, and staff coordinated with SCDNR Law Enforcement Division to increase protection at these sites. The total seabird nesting effort of 9994 nests in 2003 is down from 21,865 nests of the same species in 1989 and is of critical concern. Pelicans repopulated the Bird Key Heritage Preserve with 536 nests.

A soft tick infestation (Ornithodoros sp.) was documented at several pelican nesting sites. A single nest can contain hundreds of ticks and result in nest abandonment, anemia in chicks or disease. All pelican nests were sprayed with 0.5% solution of Permectrin in order to control the ticks and prevent father nest abandonment.

NEST TOTALS FOR 2003 SEASON	
BLACK SKIMMER	899
COMMON TERN	23
EASTERN BROWN PELICAN	2564
GULL-BILLED TERN	239
ROYAL TERN	4779
SANDWICH TERN	1490
TOTALS	9994

American Oystercatcher Mid-Winter Survey - Statewide surveys were conducted by boat and ATV at high tide roost sites to document the wintering population of oystercatchers. These surveys include 998 washed shell rakes and barrier island beaches. A total of 3,704 oystercatchers were counted during these surveys. This is up from the 3,496 birds counted last year. The state supports a major proportion of wintering oystercatchers from the entire east coast population. The four-year mean winter population is 3,199 birds. During 2002, the Cape Romain Region supported 51 % of the state total and is clearly the most important area for

oystercatchers on the east coast. We also cooperated with Manomet Bird Observatory by providing ground truth information for their winter aerial surveys.

American Oystercatcher Nesting Surveys - Statewide surveys of territorial adult pairs were conducted during April and May. A total of 489 breeding pairs of oystercatchers were counted. This compares with 418 and 399 pairs the last two years. The Cape Romain area continues to support over half of the nesting and only 18% of nesting is south of Charleston. We continue to document low reproductive success as a result of nest depredation and over-washing of nests.

Manatee Monitoring and Technical Guidance - A total of 108 manatees were reported by the public during 2002. Peak numbers again occurred during July and August and Beaufort county continued to report the greatest number. Ten-year data summaries were prepared and work on a web page was initiated. Since 1993, over 900 reports of manatees have been documented in South Carolina.

Technical Guidance and Permit Reviews - Twenty-one site visits were requested to provide specific technical guidance for bald eagle territory management. As the human and eagle populations increase, the frequency and intensity of interaction has increased. Hundreds of DHEC and COE permits were reviewed to identify potential habitat alteration on bald eagle nesting habitat, wading bird rookeries or shorebird nesting sites.

Presentations
September 2002, AVM Working Group Meeting- Affects of AVM on the SC Bald Eagle Nesting Population
November 2002, AVM Information and Training Video for SCE&G employees
Winter 2003 Spring Island Property Owners Lecture Series
Winter 2003, Seewee Association Lecture Series
Winter 2003, American Business Women Association meeting
June 2003, College of Charleston, Grice Marine Graduate Summer Seminar Series

Publications
Sanders F., T.M. Murphy, and M. Spinks. 2003. Winter Abundance of American Oystercatchers in South Carolina. Accepted to Colonial Waterbirds.

Midlands Region - John Cely, Nicole Chadwick, Lex Glover

Red-cockaded Woodpecker Monitoring and Recovery - There are currently over 100 active groups on state lands in South Carolina including properties managed by the Department of Natural Resources, the State Forestry Commission, and Parks, Recreation, and Tourism. Over 90 of these groups are breeding groups. DNR staff carried out population monitoring for red-cockaded woodpeckers on these state lands. Monitoring included cavity surveys conducted from January through March and nest surveys conducted from April through June. Survival rates and group composition from the previous breeding season were conducted from July through December. Over 800 trees on state properties were surveyed over the winter to determine activity status and management needs, and over 20 new trees were identified, marked, and entered into geographic information system files. Over 60 active groups of red-cockaded

woodpeckers were monitored during the breeding season. More than 60 chicks were banded. Recovery efforts on state lands consisted primarily of cavity management through the use of artificial cavities and mechanical treatment of hardwood midstory to enhance habitat for red-cockaded woodpeckers. Eight artificial cavities have been installed on state lands so far this year.

Nine properties were monitored for RCW activity status and/or breeding status during the 2003 breeding season. These properties are Sandhills State Forest (SHSF), Longleaf Pine Heritage Preserve (LPHP), Webb Wildlife Center (WWC), Yawkey Wildlife Center (YWC), Santee Coastal Reserve (SCR), Cheraw State Park (CSP), Hampton Plantation State Park (HPSP), Santee State Park (SSP), and Manchester State Forest (MSF). A private consultant monitored Lewis Ocean Bay Heritage Preserve (LOB). Most properties were monitored to determine the number of potential breeding groups. Sandhills State Forest and Cheraw State Park were monitored more intensively because of their designation as part of a recovery population of RCWs.

Sandhills State Forest is monitored intensively. All groups are monitored for nests and all birds are banded as chicks or after fledging. Over 70 chicks and 3 fledglings were banded during the 2003 breeding season. The population has continued to increase over the last decade with more breeding groups and fewer solitary males. The population goal for SHSF is 127 groups.

Safe Harbor Update - The SC Safe Harbor Program has been an overwhelming success since its inception in the spring of 1998. The program was designed to provide incentives to landowners to manage their property in such a way that benefits both the landowner and the RCW. During the 2003 fiscal year, 7 properties totaling 44,839 acres and 57 groups of RCW's were enrolled in the program. As of June 30, 2003, the program has 82 enrollees in 19 counties with 323,362 acres and 259 groups of RCWs. This number accounts for over half of the RCW groups known on private land. Participants have grown a total of 17 above baseline RCW groups. Over 88,000 acres have been committed to management for RCWs: over 80,000 acres prescribed burned, over 50,000 acres mechanically treated, over 18,000 acres chemically treated, and nearly 3,000 acres restored from off-site species to longleaf pine. Groton Plantation was enrolled this year accounting for over 20,000 acres and 55 of the baseline groups currently enrolled in the program. Staff continues to maintain the database and offer technical support to participants.

Thirty site visits were conducted to properties enrolled in Safe Harbor. During the visit, management actions were evaluated and population status was determined. Additionally, technical support was available to landowners. Two baseline surveys for RCWs were completed for landowners in Chesterfield County. Annual surveys were sent out to all Safe Harbor participants. Over 75% returned surveys and data is currently being compiled.

Swallow-tailed Kite Investigations - During the field season of 2003, staff located 20 nests in Horry, Georgetown, Charleston, Berkeley, and Dorchester Counties. For 19 nests with known outcomes, 9 (47%) were successful, fledging at least one bird, and 10 failed. Twelve chicks were produced and an average of 0.63 young were produced per active nest and 1.33 chicks were

produced per successful nest. This compares to the previous 5-year average of a 60% nesting success with 0.9 young per active nest and 1.5 young per successful nest.

Ten chicks were radioed in 2003; since 1998 we have radioed 47 kites, 44 young and 3 adults. The first-year survival rate, based on returning radioed birds, for the period 1998-2003, is 58% (19 of 33). This is a conservative estimate since not all second-year kites (i.e. those hatched the previous summer) may return to South Carolina. However, through coordination with other states, especially Florida and Georgia, periodic efforts are made to search for birds from other states. As an example, we located 5 birds in the outer coastal plain of South Carolina during 2003 that originated from Georgia.

Second-year kites arrived in the state later than adults and did not breed. Although some were initially located at their natal sites, most were not, but were found in large bottomland forests in association with other kites, both breeders and non-breeders. Major kite "centers" included the Savannah River, Edisto, Francis Marion National Forest-Santee River, Black River, and Great Pee Dee- Waccamaw Rivers. The total breeding population is estimated at 120-170 pairs but counting non-breeding adults and recently fledged young, the total number of kites in South Carolina in late summer could range from 460-660 birds.

Migratory Birds

Painted Bunting – This was the second, and final, year of a Clemson research project funded through CARA. The two study sites, Webb Wildlife Center and Spring Island Resort, have buntings nesting in two different habitats: fields and field edges for the former and the more traditional maritime forest/marsh for the latter. A total of 24 nests were found in 2003, with 12 at Spring Island and 12 at the Webb Center, bringing the total for the two years to 57 nests. Overall, the nesting success for buntings at Spring Island, where most nests were located in Spanish moss, was nearly twice as high as at the Webb Center, where nests were placed in saplings and shrubs.
A general vegetative description of bunting habitat was conducted at 80 perch sites, 40 at each study area, and is currently being analyzed, along with characteristics of each nest site. Predation on bunting nests was investigated using 60 artificial nests.

SAMBI (South Atlantic Migratory Bird Initiative) and Southern Blue Ridge Birds - Developed tentative population and habitat goals for 12 high priority coastal landbirds as well as developed a high-priority state list for 27 species for all three of the state's physiographic regions. Provided input for a joint Southeastern/Northeastern Partners in Flight Working Group Meeting concerning management and research issues for birds of the Blue Ridge. A novel approach to estimating continental bird populations, and hence establishing population goals, was developed by the Cornell Laboratory of Ornithology. As an example, Cornell estimates the total robin population to be 35 million birds and the cerulean warbler population at 500,000 birds.

IBA (*Important Bird Area*) - This program of the National Audubon Society and the American Bird Conservancy seeks to identify key areas for supporting significant bird populations throughout the United States. As a member of the South Carolina IBA committee, the DNR prepared three IBA nominations during the year: Bomb (Lunch) Island in Lake Murray (the

largest documented purple martin roost in the country), the Santee Coastal Reserve, and the Yawkey Wildlife Center. Currently there are 18 IBAs in South Carolina.

Breeding Bird Survey (BBS) – conducted three breeding bird survey routes in the state. The BBS is a long-term USGS sponsored-project that monitors many of the nation's songbird population trends.

Swainson's Warbler – this is a pass-through telemetry project to Dr. John Gerwin of the North Carolina Museum of Natural Sciences, who has been conducting research for several years in a high-density breeding warbler population along the Great Pee Dee River floodplain in Marion County at Britton's Neck. Unfortunately excessive flooding during the spring and summer prevented access to the study area and no activity was conducted this year.

Monitoring Avain Productivity and Survival (MAPS) – The same flooding that cancelled the Swainson's Warbler project also affected the MAPS long-term banding station (since 1991) at Congaree Swamp National Monument. Due to flood conditions, no activity was conducted for this project during the year. However, a second MAPS banding station was initiated at the McCrady National Guard Training Site at Fort Jackson.

Technical Guidance - Participated in a refuge review for the newly-created Waccamaw National Wildlife Refuge; recommendations for high-priority migratory bird management, monitoring, and research issues were discussed. Reviewed two manuscripts for publication in the Chat, bulletin of the Carolina Bird Club.

Education/Outreach - Field workshops coordinated by Clemson University Faculty and the Department of Natural Resources were led for both teachers and students. Children from the Governor's School for Science were led on a field trip to learn about the ecology and conservation of red-cockaded woodpeckers and endangered species issues. South Carolina teachers were also introduced to red-cockaded woodpeckers at the Sandhills State Forest during a talk and field demonstration for a South Carolina Teacher's Workshop organized by Greg Yarrow of Clemson University. A field demonstration was conducted at the SC Tree Farm Committee 2002 Field Tour and Awards Ceremony. Over 100 individuals were given information about RCWs and the Safe Harbor Program. Presentations were made to both the Kershaw County Landowners Association and Chesterfield County Landowners Association in two separate meetings. Attended the annual Plantation Managers Association Meeting at Brosnan Forest in Dorchester County and presented information about the Safe Harbor Program. Over 30 individuals were given information about RCWs and the Safe Harbor Program at these meetings. The 4th RCW Symposium in Savannah Georgia was attended and a presentation was made on South Carolina's Safe Harbor Program. Nearly 400 people attended the Symposium. A field demonstration and talk was given for the 3rd year in a row at the Quail Symposium at Webb Wildlife Center. Participants were given information about red-cockaded woodpeckers and the Safe Harbor Program. A poster with information about the Safe Harbor Program was presented at the Sportsman's Classic in Columbia.

Work continued on the Safe Harbor Brochure and Web Site throughout the year as time permitted. Both should be complete by January 2004. Over 10 requests for information about

the Safe Harbor Program were answered and information packets were mailed. Assistance was provided on 2 properties with endangered species violations. Participated in mitigation efforts on privately owned land in Williamsburg County. Supervised the creation of two red-cockaded woodpecker recruitment clusters at Webb Wildlife Center.

Conducted a bird-banding demonstration at the Teacher's Workshop, Webb Wildlife Center and presented eight other banding demonstrations for students and the general public. Presented eight bluebird nest box programs, four backyard bird feeding programs, one hummingbird program, three raptor presentations, and led four bird/nature walks.

For the Arthur T. Wayne Society, sponsored two field trips for Society members, created criteria for state listing, and compiled a state list.

Wrote six general interest *Urban Ecologist* articles for South Carolina Wildlife magazine.

Handled a total of 621 requests for wildlife information, including nuisance wildlife calls.

Partnership with Clemson University's Sandhills Research and Education Center (REC)

Continued our aggressive educational and hands-on educational approach with Clemson and the Richland County Conservation District through the following programs and presentations:

- Conducted a week-long Junior Naturalist Camp
- Assisted with a 6-week Master Wildlifer satellite broadcast attended by nearly 50 Richland County landowners and managers
- Assisted with two programs conducted for the Dept of Juvenile Justice
- Led three nature walks, presented two raptor programs and gave ten native wildlife programs
- Enlisted the support of a student and two adults for maintaining the native wildlife exhibit and assisting with bluebird box monitoring
- Monitored more than 150 bluebird boxes on the site and nearby properties
- Manned a "bird booth" and Live Critter Corner for Clemson's Sparkleberry Fair
- Assisted a boy scout with an Eagle project
- Wrote a weekly News from the Field column, distributed to staff and friends of the program, on natural history events at Sandhills REC.

Wildlife Permits - Issued 49 scientific collecting, depredation, salvage and special purpose wildlife permits. Assisted with a state wildlife rehabilitators meet in Columbia, reviewed several applications, and issued two rehabilitation permits. Conducted three falconry facility inspections and issued/renewed nine falconry permits. Replied to more than 75 requests for wildlife permit information.

Reports and Presentations - An article on South Carolina's Safe Harbor Program was completed for publication in the Proceedings of the 4th Red-cockaded Woodpecker Symposium, which was held in Savannah, GA in January 2003. A presentation was given at the Summer Meeting of the South Carolina Chapter of The Wildlife Society (TWS) about red-cockaded

woodpeckers and the Safe Harbor Program in South Carolina; a presentation on bottomland hardwoods and migratory birds was presented at the winter meeting of TWS.

An unpublished report, "Breeding Birds of Hobcaw Barony, 1973-78" was re-edited and sent to the Clemson forester at the Baruch Institute in Georgetown. Two short notes published in the Chat, the bulletin of the Carolina Bird Club, were "Recent Records of Limpkins from South Carolina" and "House Wrens Nest in Columbia, Richland County, South Carolina."

Mountain Region – Mary Bunch, Rob Harrison

Big-Eared Bats and Bridges Candidate Conservation Agreement Project: A cooperative project continued with the U.S. Forest Service and Clemson University to evaluate use of highway bridges by all bat species, with particular emphasis on Rafinesque's big-eared bats (*Corynorhinus rafinesquii*). No federal C-1 species were discovered in this project, however numerous *C. rafinesquii* roosts were found. None were found to use the predominant slab bridge type, rather the bats were found under T-beam and multi-beam bridges, which are no longer the favored bridge design by highway engineers.

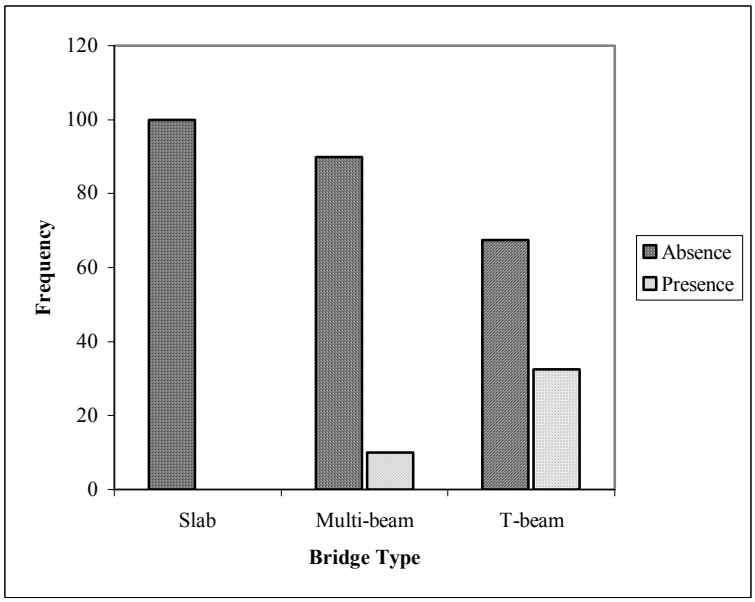


Figure 1. Distribution of Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) roosts under highway bridges in South Carolina, 2002. Rafinesque's big-eared bat demonstrates a highly significant relationship between bridge type and occupancy ($P < 0.001$).

Contact was made with SCDOT regarding this project and bridge numbers of bridges occupied by big-eared bats was provided to the SCDOT maintenance engineer. The SCDOT is willing to incorporate structures to be added to new bridges that are replacing occupied T-beam and multi-beam bridges.

Heritage Survey and Inventory - Staff visited two potential protection project sites in Greenville County; one is a potential wetlands mitigation site. Bats were harp trapped at one site on Chestnut Ridge Heritage Preserve; two red bats, a common species, were captured. A 100-mile winter Bald Eagle survey route on Lake Hartwell was done, with assistance from law enforcement, during January 2002. Staff monitored Peregrine Falcon (*Falco peregrinus*) productivity at Table Rock. Three chicks in down were observed. This is the second year that chicks were produced late in relation to clutches of the previous 11 years. It is the 15th year adults occupied this territory; they have produced young 14 out of 15 years.

Jocassee Gorges - Staff participated in four Jocassee Gorges Education and Outreach Working Group meetings and two Jocassee Gorges Management and Research Working Group meetings. A staff member chairs a subcommittee to review the Palmetto Trail within the Jocassee Gorges. The department has an MOU with the Palmetto Trail, Palmetto Conservation Foundation, for a trail within the Jocassee Gorges starting at Table Rock State Park. To date the subcommittee has approved, pending changes, one segment of the proposed trail route (Table Rock State Park to US 178) and recommendations for segment two (US 178 to Cleo Chapman Highway) are complete but not yet approved by DNR.

Technical Guidance - Technical assistance was provided to researchers at the following institutions: Delaware State University, the University of Georgia, Furman University, the University of Kentucky, Clemson University, Dickinson College in Carlisle, PA, and Georgia Southern. Assistance covered various species including green salamanders, woodrats, kestrels, bats, telemetry, and bunched arrowhead plants. Technical assistance was also provided to the following: US Fish and Wildlife Service, US Forest Service, US Army Corps of Engineers, US Department of Navy, SC Forestry Commission, the Greenville County Planning Commission, Paris Mountain State Park, The Nature Conservancy, and several wildlife control operators. Comments were given at an impromptu meeting, regarding the latest draft plan for the Sumter National Forest (emphasis on the Andrew Pickens District). Input was provided to SCPRT regarding their Comprehensive Interpretive Plan for the Mountain Bridge Wilderness Area and specific plans for Santee State Park limestone sinks. Staff contributed to a Conservation Planning Meeting hosted by The Nature Conservancy regarding the NC and SC Escarpment Region.

Information and Education - Staff handled 400 requests for information on bats, nuisance wildlife and miscellaneous wildlife questions. Outreach included four interviews given to various media sources, which included News Channel2 in Charleston, the National Wildlife Federation, Southern Living, and The State newspaper on topics including bats and the Jocassee Gorges. Programs on bats, and trail planning were presented to the Fort Hill Garden Club, and a senior recreation class at Clemson University, respectively. A staff member provided instruction at a bass fishing class and tournament for BOW participants.

Wildlife Assistance - Two barred owls, a Cooper's hawk, and a red-tailed hawk were transported for rehabilitation. Most calls were regarding bats (interestingly, we had two calls about bats entangled in fly paper), A big brown bat was removed from a bedroom in Central, and a fur sample was submitted to CIET for toxicological analysis. Numerous calls were about dead

birds, groundhogs, large cat sightings, injured or nuisance raptors, wading bird depredations on koi ponds, geese, and woodpeckers.

Publications and Reports - Menzel, J.M , M.A. Menzel, W. M. Ford, J.W. Edwards, S.R. Sheffield, J.C. Kilgo, and M.S. Bunch. 2003. The Distribution of the Bats of South Carolina. Southeastern Naturalist. 2: 121-152.

Preserve Management - Maintenance (including trail work where applicable) and inspections were conducted on all upstate heritage preserves which include: Ashmore, Bald Rock, Belvue Springs, Blackwell, Brasstown Creek, Bunched Arrowhead, Buzzard Roost, Clear Creek, Eastatoe Creek, Glassy Mountain, Laurel Fork, E.R. Chandler, Chestnut Ridge, Watson-Cooper, and Wadakoe Mountain Heritage Preserves.

Activities at Bunched Arrowhead Heritage Preserve were typical of most preserves. Furman student projects continued at the experimental fields at the preserve. Several management issues at Bunched Arrowhead Heritage Preserve were: 1) The chain link fence was repaired at the preserve after a neighbors tree fell on it; 2) Problems with unattended dogs were reported to Greenville County animal control; 3) A small plot in a field at the preserve was planted with native grass (Indian grass and Split-beard bluestem) plugs (provided by the SC Native Plant Society) by staff; 4) An encroachment (a fence) was discussed with a neighbor and the fence was moved in a timely manner.

A Toyota Tapestry grant project, started in FY02 with Eastside High School (teacher James Sikes), Greenville County for a cooperative project between Wildlife Diversity Staff and the school studying smooth coneflowers at Buzzard Roost Heritage Preserve was finished. The final report can be found at this website; www.villagegreen.net/vg/teachers/sikes/tapestry. Results on the five smooth coneflower plots indicate that prescribed fire increased coneflower flowering and health. This project has shown that fire is not an adequate control of mimosa; seedlings continue to emerge from the seed bank. The seed source (adult mimosa) was removed in 1994, and three prescribed burns at the site (one prior to killing two adult trees) have not eliminated the pest; new mimosa plants and some stump sprouts continue to erupt in one coneflower site.

A total of five new scientific research permits for work on heritage preserves were approved in this office. There are numerous outstanding permits for multiple year projects. A volunteer Furman intern checked nest boxes at Bunched Arrowhead Heritage Preserve. Kudzu and / or English ivy control at Bunched Arrowhead and Belvue Springs Heritage Preserves continued. Potential mitigation sites (potential Heritage Preserve additions) were discussed with Piedmont Natural gas regarding a new pipeline in Greenville County.

Sea Turtle and Marine Mammal Research and Management – Sally Murphy, Joan Seithel

Loggerhead Turtle Nest Protection and Management - There are now 19 nest protection projects involving over 500 individuals including state, federal, and private citizens. These projects survey almost half of the 303-km coastline of South Carolina every morning during the sea turtle season, protecting over 60% of the nesting effort. Staff made 30 site visits to ensure state guidelines were being followed. The annual Sea Turtle Training Workshop was held in

April at Ft. Johnson with over 60 volunteers attending. Guest speakers include the stranding coordinator for the North Carolina Wildlife Commission and two staff member of the South Carolina Aquarium.

Loggerhead Turtle Population Monitoring – Staff conducted a statewide aerial beach surveys on a five-year cycle since 1980 as an index to the nesting population. During 2003, four aerial surveys were conducted. The statewide nesting estimate for 2003 was 3,639 nests. This is over 1,000 nests above the previous year and is typical of the cyclic nature of loggerhead nesting. Nesting estimates for 2000, 2001, and 2002 were 3,374, 2,636, and 2,618, respectively. This was one of the highest nesting seasons since 1999.

Sea Turtle Stranding and Salvage Network (STSSN) - Eleven aerial surveys were made to document sea turtle carcasses on remote islands. On the northbound route over near shore waters from the north end of Hilton Head Island to Murrell's Inlet, staff also counts live sea turtles and bottlenose dolphins along with trawlers. Fifty-eight loggerheads and 4 leatherback turtles were counted during this time period. An extra aerial survey was made on 10 June, the opening day of shrimping season to count trawlers. There were 210, which is well below the 344 counted in 2002.

Staff biologists coordinate the 40+ volunteers who gather data on dead sea turtles to determine the temporal and spatial distribution of sea turtle mortality in South Carolina. Weekly stranding totals are sent to the National Marine Fisheries Service (NMFS) Miami laboratory for inclusion in the national database. During 2002, 114 dead turtles were reported. Through June 30 2003, 84 have been recorded. Staff handled an unusual number of stranded sea turtles in the spring of 2003. Forty-four were recorded in May, which is the highest total since 1980, the year that standardized records began. Many of the loggerheads are emaciated and covered with barnacles, indicating that they have been "sick" for an extended period. The cause(s) for this unusual event is still being investigated. Post mortem exams were performed on 36 sea turtle carcasses during this reporting period.

Aerial Surveys for Leatherback Turtles - Six weekly aerial surveys, parallel to the coastline at 1.5 and 3.0 nautical miles, were flown during April and May and June to document the distribution of leatherback turtles during their spring migration. The aircraft that was used for these surveys crashed on April 14th. Because another twin-engine aircraft was not available, the offshore transect line was not flown on all survey dates. The number of leatherback observations (53) was much lower than in 2002 and may be related to the relative abundance of cannonball jellyfish. A major manuscript on this species has been completed and will be submitted to a peer-reviewed journal.

Research - Staff attached satellite transmitters to five new adult female loggerhead turtles at Cape Island, Cape Romain National Wildlife Refuge on the night of 7/8 July 2003. Three of the turtles headed north, one went south and one went east. Unusually cold water along the mid and south Atlantic may have affected the movements of the more northern turtles. The two that were near the Outer Banks of North Carolina showed movement to the south as if it were their fall migration. One moved back north to her original location, but the other one set up a secondary foraging area southeast of Cape Fear, which is typical of winter behavior.

Maps of the turtles' movements are prepared by the Caribbean Conservation Corporation and can be viewed on the Internet at: http://www.cccturtle.org/sat-southcarolina.htm They also appear on http://www.seaturtle.org/tracking/ where there are daily updates.

Major Consultations on Permits - Fifty-seven permits were issued for stranding and salvage of marine mammals and sea turtles; 19 permits were issued to sea turtle nest protection project leaders; 13 scientific collection permits were issued.

Educational Projects - Three issues of *Loggerheadlines* were produced during this reporting period and sent to a readership of 185. In addition to the news on strandings, rehabilitation, necropsy and nesting in South Carolina, other regional stories were also featured and the South Carolina Marine Turtle Conservation Program now has an official web site. The site provides extensive information about the program, news and events, and SC DNR research. It also provides resources to the South Carolina volunteers as well as links for the tracking studies. A new book, "Biology and Conservation of the Loggerhead Turtle", published by Smithsonian Press is now available. Two staff members are co-authors of a chapter. In partnership with the South Carolina Aquarium, a rehabilitated adult female loggerhead turtle was released at Edisto Beach. Over 200 adults and children came to see the turtle off, along with TV and print media.

Presentations - Slide presentations were made to Camp Wildwood III and a class at the College of Charleston graduate school. Staff provided a briefing to the South Atlantic Fisheries Management Council on sea turtle biology and discussed collaborative projects with the curator of the Bermuda Aquarium.

Meetings - Two staff members attended the Recovery Team's Stakeholders workshop in Silver Spring, Maryland. Staff attended and participated in an Atlantic States Marine Fisheries Commission Workshop on "Working Towards Greater State/Federal Cooperative Efforts in Marine Endangered Species Management", including defining elements of successful state/federal partnerships. Staff attended a 3-day Sea Turtle Stranding and Salvage Network meeting in Atlanta to discuss concerns and issues relative to the network in the Northeast and Southeast regions.

Marine Mammal Stranding Network - Activities consisted of transferring expertise and administrative support to the Marine Resources Division, who is now responsible for the network

Reptile and Amphibian Research, Survey & Management – Steve Bennett, Wade Kalinowsky

Rattlesnake Project - Nine adult timber rattlesnakes (2 male and 7 non-gravid females) and one eastern diamondback rattlesnake (non-gravid female) were implanted with radio transmitters and located daily during the 2003 field season. Fewer eastern diamondbacks were telemetered this year due to difficulty in capturing them during the spring. Flooding and higher than average temperatures in February may have forced diamondbacks from hibernation earlier than normal, thus making them more difficult to find and capture. Timber rattlesnakes did not emerge from hibernation until late spring, when most survey efforts were concentrated. Therefore, timber rattlesnakes were encountered readily. The study animals were implanted with transmitters in

early April, and the transmitters will be removed in March 2004. Vegetation analysis was conducted on locations at which telemetered snakes spent a minimum of 24 hours. Over 150 random plots were accumulated this year alone.

New individuals were captured and pit tagged for identification for both species, including 21 timber rattlesnakes (15 adults and 6 juveniles) and four eastern diamondbacks (1 adult and 3 juveniles). Unlike last year, there were three recaptures of timber rattlesnakes. Mortality rates were low, with only one male timber rattlesnake falling victim to predation. The necropsy report on this individual concluded that death was due to infection from injuries resulting from trauma. However, it is uncertain what animal inflicted the injuries. Three DOR (dead-on-road) timber rattlesnakes and two DOR eastern diamondbacks were collected within the study area. The stomach contents from these snakes were removed and will be analyzed in the future. Stomach contents were also removed from rattlesnakes that were collected throughout the coastal plain.

Gopher Tortoise - Initiated a study of the gopher tortoise, a state endangered species, during FY 03. The study is being funded under the State Wildlife Grants program and is taking place at the Tillman Sand Ridge, near the town of Tillman.

The Tillman Sand Ridge is a fluvial ridge located parallel to the Savannah River. Two specific tracts on this ridge comprise the study sites, the Tillman Sandridge Heritage Preserve (TSRHP) and the Public Service Authority (PSA) tract. TSRHP is a 900-acre preserve, of which approximately 300 acres consist of upland sandhill habitat, the preferred habitat of the tortoise. The PSA tract is approximately 1000 acres of which approximately 800 acres consist of upland sandhill habitat.

The TSRHP tract has been managed for the longleaf pine community, with management consisting of prescribed burning, particularly during the growing season, and removal of the scrub oak/hardwood under story. The PSA tract has been logged, with virtually all pine removed and is fire suppressed with a dense under story of scrub oak. Both sites support a sizeable tortoise population, based on anecdotal observation for the PSA tract and a population estimate developed for the TSRHP. We currently estimate that 125 adult tortoises comprise the TSRHP population. Tortoises at TSRHP are spread throughout the preserve.

The PSA tract is currently managed for hunting under a private lease, though owned by the Public Service Authority. Tortoises at the PSA tract occur in the open areas found along roads, rights-of-way and other man-made openings such as food plots.

The goals of the tortoise project are to document the life history traits of the tortoise at the sites, including movement patterns, seasonal habitat use, home range size and reproductive ecology. In the spring of 2003 sixteen tortoises, four each of both sexes for a total of eight animals per site, were fitted with radio transmitters. These animals have been tracked three times weekly with all burrow locations being identified using a global positioning system. At each tracking a data set including the location of the animal, its disposition (in the burrow, on the apron of the burrow, or out of the burrow) and weather conditions are recorded.

Home Range analysis for tortoises will be based on the minimum convex polygon (MCP) and will be calculated using the Animal Movement Extension for ArcView. The MCP for the male tortoise is larger than that of the female tortoise, indicating more burrows used during the active season and greater overall movement.

Marine Corps Air Station Survey - The Beaufort Marine Corps Air Station (MCAS) is a 5,444-acre military installation located in Beaufort County managed by the Department of Defense. The majority of this acreage is developed, but it does support remnant upland pine forest, mainland maritime forest and estuarine communities. SCDNR initiated a survey of amphibians and reptiles, with a focus on rare and endangered species, at this facility during FY03. The primary sampling technique employed at MCAS is that of cover objects. Twenty sample sites representing different community types and locations were selected and cover object arrays were established at each site. Each array consists of 20 cover objects, half of them wood, half metal, alternating between each type. Arrays in forest interiors are arranged as crosses, with 10 cover objects comprising each arm of the cross. Arrays along ecotones are arranged parallel to the ecotone. Cover objects are checked once weekly.

Additional sampling consists of dip netting in wetlands, call counts for breeding frogs and general field surveys. To date 24 species of amphibians and reptiles have been documented from the MCAS, including no rare or endangered species.

Flatwoods Salamander - SCDNR initiated a project in FY02 to develop a Safe Harbor Program for the Federally Threatened Flatwoods Salamander. This project continued into FY03, however little activity took place due to weather constraints. The prolonged drought suffered by the Southeast created conditions unfavorable for flatwoods salamander breeding to occur. The ephemeral ponds required by this species for breeding habitat did not recharge until late winter of 2003, not in time for the fall breeding Flatwoods Salamander. Staff did attend meetings with the US Fish and Wildlife Service and the Forest Service to develop survey strategies for this species at the Francis Marion National Forest. Staff did survey the historic breeding pond at SCDNR's Santee Coastal Reserve in case some animals bred late. No flatwoods salamanders were found during this survey.

General Herpetofaunal Surveys - Cover object sampling arrays were established at the Tillman Sandridge Heritage Preserve, Congaree Bluffs Heritage Preserve and Aiken Gopher Tortoise Heritage Preserve. Sampling arrays consist of 20 or more cover objects, either wood or metal, in linear or cross-shaped alignments located at different community types, ecotones or areas of these preserves. Locations of all arrays have been recorded using a Global Positioning System. Systematic sampling at these arrays will begin during late winter of 2004.

Monitoring of the gopher frog population at SCDNR's Santee Coastal Reserve was accomplished during the winter of 2003. Male gopher frogs were heard calling during February. A subsequent visit in May to sample gopher frog tadpoles was unsuccessful. The gopher frogs had either metamorphosed early or had not successfully bred this year, despite the presence of calling males.

Legislative/Regulatory - Staff worked with expert professional and non-professional herpetologists to develop recommendations for a Venomous Reptile permit in South Carolina. This was done at the request of a legislator who was interested in exotic pets and the issues surrounding their possession in South Carolina. The recommendations developed by the expert committee were provided to the legislator but have not been acted upon to date.

Staff initiated an Emergency Regulation to protect seven species of freshwater turtles from commercial harvest in the state. During FY 03 staff was made aware of a large commercial harvest of freshwater turtles that were being shipped to Asian food markets, primarily by brokers located in Louisiana. Experts advised staff that freshwater turtles, due to their particular life histories, might not be able to withstand this level of harvest over time. During this time North Carolina protected their freshwater turtles from commercial harvest, an act that would have resulted in South Carolina becoming more of a target for commercial collection of turtles. An Emergency Regulation prohibiting the commercial take, possession and transport of seven species of freshwater turtles went in to effect on June 20, 2003.

During FY 03 staff issued twenty-two permits for possession of spotted turtles under the new spotted turtle regulations.

Herpetology Education and Outreach - During FY 03 staff worked on a number of projects related to herpetology. Two posters, one for resale and one for limited distribution were produced. The limited distribution poster presents the SCDNR amphibian and reptile conservation program detailing the listing process, land protection efforts and other conservation initiatives. This poster is being distributed to amphibian and reptile conservation partners such as Riverbanks Zoo, Alligator Adventure, Edisto Serpentarium, Cypress Gardens, The Savannah River Ecology Laboratory and others for their use in displays and outreach programs.

The poster produced for resale depicts all of South Carolina's venomous snakes and presents information on their identification, habitat, range, and conservation.

In addition to the posters staff wrote two articles on amphibians and reptiles for the South Carolina Wildlife Magazine, one on mating and reproduction in frogs and the other on amphibians and reptiles as pets. Staff also prepared displays on amphibian and reptile conservation for the Carolina Exotic Pet Show and for SCDNR's Palmetto Sportsman's Classic.

Presentations - During FY 03 staff gave presentations on amphibian and reptile related conservation issues to the following groups: SC Department of Transportation, Charleston Audubon Society, and the Coastal Carolina Herpetocultural Society. In addition staff led a field trip to the Tillman Sandridge Heritage Preserve for the SC Wildlife Federation.

Heritage Program Natural Areas Survey, Inventory and Habitat Protection Planning – Bert Pittman, Kathy Boyle, Julie Holling

Great Pee Dee River - In cooperation with the U.S. Fish and Wildlife Service over fifty river miles of bottomland hardwoods and limestone bluffs were surveyed and recommended for protection by the S.C. Heritage Trust Program. Populations of two species of federal concern,

Rhododendron eastmanii (May white azalea) and *Silene ovata* (Blue Ridge catchfly), plus several other vascular plants of state concern were documented. In addition, a series of limestone bluffs, springs, sinks, and a historically significant fossil site was surveyed along the Great Pee Dee River in Florence County.

Due to the underlying karst topography, the upland hardwood forests are largely intact along the bluffs of west bank of the river from U.S. 301 to just upstream of the Georgetown-Williamsburg county line. The presence of calcium carbonates in the soil provides conditions for the locally unusual-- *Carya ovata* (shagbark hickory) to the globally rare-- *Silene ovata* (Blue Ridge catchfly) vascular plant species; all rediscovered along the rich, hardwood bluffs overlooking the Great Pee Dee River south of Florence. Originally discovered by Dr. Larry Swails of Francis Marion University in the early 1980's, this member of the Pink Family is rare throughout its range. Later, a second population was documented in another ravine in the same general area. What is so unusual about the Great Pee Dee populations is that this species typically inhabits rich slopes, cove forests, and montane oak-hickory forests in the southern Appalachian and Interior highlands, excluding the mountainous districts South Carolina. Thus, the Great Pee Dee populations are both geographically and ecologically disjunct and from other known populations in the high mountains of our sister states, Georgia and North Carolina. Biogeographical analysis points to the critical role of the larger southern rivers like the Great Dee Pee in maintaining migration routes for plants and animals since the Ice Age. These stands may be some of the best-conserved and diverse hardwood stands in the Pee Dee region.

Concurrent with the survey of marl and limestone hardwood bluffs of the Great Pee Dee River, the Marsh Furniture Tract on the east bank of the river was also evaluated as a potential protection project for the S.C. Heritage Trust Program. Initial observations noted (1) the aeolian sandy ridges, which would have historically supported longleaf pine communities and associated rare species, have been converted to loblolly pine plantation silviculture and (2) some significant-sized tracts of bottomland hardwoods have been clear-cut. However, some large tracts of bottomland along the river and Carolina bays on the sandy upland ridges remain. These findings suggest that there are opportunities for protection of a significant stretch of the river using a combination of protection strategies for the marl and limestone hardwood bluffs to the west and the sand ridges and bottomlands of the Marsh Furniture Tract to the east. Additional survey work will be necessary if this site is to be judged significant as to rare plants, animals, or important community types.

Lake Marion and Upper Santee Swamp - In collaboration with the S.C. Geological Survey, botanical and geological documentation was presented to the S.C. Heritage Trust Board for the protection of Cave Hall near the shore of Lake Marion in Calhoun County. Cave Hall is one of the classic sites of American geological science with its readily accessible and well-preserved limestone and marl exposures. Used by the father of modern geology, Charles Lyell, in the mid-19th century in the development of his concept of the Eocene, an epoch of the early Tertiary, this site helps to correlate the geological history across much of the Coastal Plain of the Southeast. In addition, the limestone spring and cave system provide habitat for two rare plant species: *Rhododendron eastmanii* -- May white azalea, an endemic, wild azalea species of federal concern and *Campanula americana* -- American bellflower, a species of state concern.

Limestone springs and caves are extremely rare in South Carolina, and Cave Hall is one of only three known cave systems to occur in the state.

Jocassee Gorges - In cooperation with the U.S. Fish and Wildlife Service an intensive survey has begun for seven species of federal concern. Some of these species typically grow in rich mesophytic forests and often are associated with limestone substrates, while others occur on similar substrates but in areas over bare rock outcrops or on very thin soils known as glades. Restricted to the Inner Piedmont and Blue Ridge physiographic provinces of the state, these plants occur on isolated outcrops, coves, and ridges derived from mafic geologic substrates (rocks high in magnesium and iron). Many of these potential sites are spread across a variety of county, state, federal, and private nonprofit properties-all with varying management missions and conservation goals. Because most botanical surveys have focused on the deeper ravines and gorges, the drier and more exposed plant communities have received only limited basic survey. Growing interest in recreational activities such as rock climbing, hiking, and off-road vehicular use will put increased pressure on these thin soil or rock outcrop habitats. In cooperation with the Clemson University Herbarium many new populations of five species of federal concern were documented in the Jocassee Gorges and the Andrew Pickens Ranger District of the Sumter National Forest. Although there is no limestone in the Gorges, there are localized pockets of high calcium soils, which provide small but highly significant areas of biodiversity. With six different species of trilliums counted so far in the coves around Wadakoe Mountain, this site may have one of the highest diversities for this group of showy wildflowers anywhere in the world. Close coordination between land managers and field scientists should lead to conservation management strategies beneficial for the species of concern.

The Piedmont - Preliminary botanical and ecological investigations were conducted on a potential Piedmont prairie in Chester County. An area of several hundred acres in extent over Iredell soils may have been left intentionally as native grassland for cattle grazing and mowing of "hay." Even though the present condition of the vegetation is very disturbed, there is enough native and open vegetation present that seems to indicate that there may have been a more natural grassland component indigenous to the area in the recent past. Additional ecological and historical investigations in the Chester-Fairfield York county area will be necessary in order to properly survey and document any extant remnants of what one early cartographer of the region referred to as the "Grand Savanna."

S.C. Plant Atlas – A major upgrade of the South Carolina Plant Atlas, a primary goal set by the professional botanists of the state in the mid 1980's, was launched on the World Wide Web (http://cricket.biol.sc.edu/herb/) with cooperation of S.C. Heritage Program, Clemson University, and the University of South Carolina. The S.C. Plant Atlas Project was originally conceived as a traditional, text-based hardcopy publication with the goal to periodically update the county distribution maps of the most comprehensive guide to the state's plants—the Manual of the Vascular Flora of the Carolinas published by A.E. Radford and others in 1968. As in this important contribution to the knowledge of the flora of the state, all records are based upon curated herbarium records, not anecdotal sightings, with many of the specimens annotated by specialists. With the failure to secure funding and the realization of the power and economy of personal computers to quickly distribute and update geographically based data sets, efforts were redirected to creating an online version of the Atlas. The present version includes major updates

with new county and state records, changes in biological nomenclature, and the addition of authority names. In addition, a computer program was developed to efficiently automate new data. And digital photographs of selected plant species were made, edited, and donated to the project.

There is and will be a variety of users to include the scientific, industrial, educational, regulatory, and general interest communities. Efforts were made to accommodate the needs of the various user groups dependent upon each cooperating institution's strengths, interests, and funding. The atlas has provided a foundation for these institutions to seek and successfully compete for extramural funding from industry and the U.S. Government to support "natural history" studies, curricula, and outreach.

SC-GAP - The vegetation layer developed by SC-GAP was evaluated. Originally conceived as a proxy measure to be used to predict vertebrate species distributions, checks were made analyzing the accuracy and ability of this layer to differentiate various vegetation types with vertebrate biologists identifying significant discrepancies in a subset of selected animal ranges. Based upon cooperation with the National Biological Service Section of the U.S. Geological Survey at Clemson University and SCDNR experts in remote sensing, a proposal was developed to re-evaluate the power of the GAP vegetation layer to predict vertebrate species distributions by accounting for patch size and proximity. Currently in planning is a GAP follow-up project that will correct some of the identified problems, as well as provide a geographic basis for State Wildlife Grant (SWG) species conservation plans.

Data Management and Geographic Information System (GIS) - The goal of data management and its graphical display (geographic information system) is to provide information on the status and distribution of South Carolina's rare and endangered species for (1) land protection and resource management, (2) permit review and mitigation, and (3) research. Data requests come from environmental consultants, the DNR staff, other government agencies, and cooperating organizations such as The Nature Conservancy and NatureServe. About 150 requests have been responded to this year. Most requestors are directed to the S.C. Heritage web site, which now services all “standard” data requests. The information available on this password-protected site is identical in content to the information previously provided on paper. Over 417 people have access to this web site, with 53 of those being added this year, and it has been accessed over 7200 times since it was brought on-line in June 1999. About 1200 of these visits were in this fiscal year. The use of the site continues to grow steadily.

Some requestors, whose requests cannot be met by the web site, are provided with information specific to their needs. Some data request highlights:

(1) for a Clemson University graduate student – provided EOR information on Ashmore, Chandler, and Watson-Cooper Heritage Preserves use in his thesis,
(2) for U.S. Forest Service. – provided updated T&E information covering the National Forests,
(3) for SCDNR preserve managers- provided GIS EOR information for Oconee, Pickens, and Greenville counties,

(4) for a local environmental consulting firm - provided shape files of EORs and Heritage Preserves located in Florence, Marion, and Dillon counties for use during a utility routing study and environmental review for transmission lines,
(5) for a professor of Anderson College – provided EORs and maps of *Shortia galacifolia* (Oconee bells) for use in a genetic study of this narrow endemic species,
(6) for a private researcher - provided information regarding locations of *Helianthus schweinitzii* (Schweinitz's Sunflower) regarding conservation efforts to protect habitat for the species.

Approximately 300 new EORs have been added to the Biological Conservation Database (BCD) for a statewide total EORs = ~9100. This data has come primarily from Wildlife Diversity staff and professors and other research staff at state universities. In addition to the EOR file, the site basic record (SBR) file continues to be updated as needed with new HTAB projects and Heritage Preserves. As new ancillary data is collected, these records are annotated as to protection status, physiographic province, watershed, etc.

Preserve Management - Increased management activities were focused on several Heritage Preserves in the Midlands: Congaree River Bluffs, Savage Bay, Rock Hill Blackjacks, and Forty Acre Rock Heritage preserves by making initial evaluations and developing work plans. By revising these and other preserve boundaries directly from plats with the use of ArcView scripts much more exact and clear demarcations of state and private property were made. Brochures for Savage Bay and Congaree River Bluffs are being developed. At Congaree River Bluffs, a loop trail as been cut and signed, the barn painted, the living quarters cleaned and furnished, and a field office set up. Conversion of the 3-bay garage to a classroom is underway. An outbreak of the invasive *Firmiana simplex* (Chinese parasol tree) at the foot of the bluff is about 90 percent controlled.

At Forty-Acre Rock a vandalized fence has been repaired and gates painted, campfire sites cleaned up, and all large trash items removed. Ongoing is removal of the large quantity of broken glass on the rock. The painting-over of the graffiti on the rock - with priority to hate messages - is also progressing. Vegetation sampling by South Carolina botanists and trash removal were carried out at Rock Hill Blackjacks and Savage Bay. In cooperation with the S.C. Department of transportation placing a directional sign for more convenient access by the public at Congaree Creek.

Technical Guidance and Presentations - Gave an invited presentation and expert panel discussion at the USC Law Center on the biodiversity and legal protection of isolated freshwater wetlands nationally and in the state of South Carolina; Provided botanical and ecological information for restoration / mitigation efforts at the Big Pine Tree Creek, Waccamaw River, Congaree Creek Heritage Preserves, and FERC re-licensing of Lake Marion. Provided plant identification materials and support to DNR staff conducting educational programs at the Saluda Shoals Park in Lexington County.

Consulted with federal, state, and academic botanists and ecologists on establishing a chapter of the Exotic Pest Council in South Carolina; Reviewed the botanical and vegetation aspects of the USFS Forest Management Plan for the Sumter National Forest; Conducted environmental site

survey for a portion of the new security fence being constructed around the Cantoment Area of Fort Jackson.

Provided technical support and background literature to U.S. Forest Service biologists interested in the restoration of canebrakes and Shortleaf Pine- Little Bluestem plant communities. Such systems are fire-maintained and may have been an important component of the Piedmont landscape, but now have been largely replaced by loblolly pine monoculture and hardwood succession.

Reviewed the vascular plant component of Cooperative Agriculture Pest Survey (CAPS) program, which has been enhanced due the Homeland Defense Initiative. The purpose of this group is to (1) develop a list of experts to be incorporated into a rapid response communication network, (2) identify exotic pests most likely to impact SC agricultural industry, (3) coordinate survey efforts and data collection, and (4) identify and develop educational materials needed to aid extension agents and create public awareness of suspected pests. The vascular plants identified as noxious invasives occurring or likely to occur in South Carolina are tropical soda apple, purple loosestrife, cogon grass, and giant mosquito fern.

Outreach and Education - For the 2003 Palmetto Sportsmen's Classic, developed and presented a set of interactive audio-visuals on the amphibians and aquatic habitats of South Carolina; Conducted a botany lesson and arts-and-crafts project for a youth group at Clemson's Sandhills Research and Education Center; Led field trips for the public to the Rock Hill Blackjacks, Forty Acre Rock, and Congaree River Bluffs Heritage preserves; Presented a program on the SC Heritage Program and the biology of the rocky shoals spider lily to the statewide meeting of the Garden Clubs of America. The ecological requirements and potential for planned restoration activities were also discussed; A presentation was given to the Upstate Chapter of the SC Native Plant Society on the SC Heritage Trust Program and the biology of the rocky shoals spider lily; Led two field trips the Congaree Swamp National Monument for their annual Earth Day Celebration, "NatureFest"; Led a field trip to the S.C. Nature Conservancy's Peach Tree Rock Preserve for an entomology class from Clemson University; Led field trip to the Landsford Canal State Park for the 2003 S.C. Native Plant Symposium held at Winthrop University. The rocky shoals spider lily was a central theme of field trips and presentations at the symposium.

Heritage Land Trust Land Protection and Management – Stuart Greeter, Chris Judge, Ken Prosser, Johnny Stowe, Jamie Dozier

Six protection projects were completed:

1. Little Pee Dee Heritage Preserve (HP) Addition (Horry County) - Found 10 miles west of Conway, this 200-acre site features a mature bottomland hardwood forest containing two lakes that provide feeding and nesting habitat for wading birds such as white ibis, egrets and herons. The tract borders the beginning of the Little Pee Dee designated as a "State Scenic River." The preserve, comprising 10,226 acres, contains four rare plant species and seven rare plant communities. It is open for paddling and river camping.

2. Ditch Pond HP (Aiken/Barnwell County) - Located four miles west of Williston, this property contains a Carolina bay first documented in 1973. Although 98 percent of Carolina bays in South Carolina have been altered from their natural state, Ditch Pond has remained intact. Besides a Carolina bay, seven rare plant species are found on the preserve. It comprises 296 acres.

3. Henderson HP Addition (Aiken County) - Acquired as a donation, this 9-acre tract will protect a core area within the preserve design and connect both tracts that form the preserve. Established by a gift of 198 acres in 1993, subsequent donated properties have exceeded $170,000 in value. The preserve, totaling 426 acres, is three miles northwest of Aiken and contains three rare plant species and four rare plant communities.

4. Wadakoe Mountain HP (Pickens County) - Found one mile west of Holly Springs in the Eastatoe Valley, this 37-acre tract is part of the Wadakoe Mountain area that has been studied by botanists for more than a decade. Unique soils in the region provide habitat for rare species not commonly found in the Southern Appalachians. Distinguished by rich, cove hardwood forests, the preserve contains nine rare plant species of concern. It adjoins the Jocassee Gorges Natural Area.

5. Waccamaw River HP Addition (Horry County) - Acquired as a donation, this 40-acre tract contains a mature stand of bottomland hardwoods and an oxbow lake surrounded by mature cypress. The lake provides a feeding area for waterfowl and wading birds such as great egrets and wood storks. A large wood stork rookery is two miles away. The preserve consists of 5,347 acres and contains eight rare plant species and one rare plant community. It is 12 miles northeast of Conway.

6. Poinsett Bridge HP (Greenville County) - Built in 1820, Poinsett Bridge is an arched stone bridge named for Joel R. Poinsett. A Charleston native, Poinsett was a prominent early resident of Greenville and a U.S. ambassador to Mexico. Listed in the National Register of Historic Places, Poinsett Bridge was part of the State Road from Charleston to North Carolina designed in 1817-19 by Poinsett, then director of the S.C. Board of Public Works. It is located off old U.S. Highway 25 near Camp Old Indian.

The average amount of acreage protected each year continues to decline. This appears to be the result of rapidly increasing property values, which seem to be escalating at a greater rate than revenues to the Heritage Land Trust Fund. Associated development pressures have placed several of our state's most significant archaeological sites in peril. Addressing these situations will be difficult and a number of professionals feel that South Carolina is looking at the last opportunity to protect certain types of cultural resources. There is also a need to expand and connect a number of existing heritage preserves, so functioning ecosystems can be protected in perpetuity.

Preserve Management (Midlands and Coastal counties):
Typical activities were: Prepare and update management plans, monitor rare species, restore habitats, maintain public access facilities, develop stewardship committees and provide guided tours of preserves. Sixty-nine heritage preserves now exist and management plans for all of

them have been completed, except for one recently acquired property. Assistance was also given on 25 other public land management plans and conservation projects. Successful monitoring of 13 different rare species and other species of concern was completed at various preserves.

Controlled burns were successfully carried out on 4,461 acres at 12 different preserves, to enhance rare habitats. Staff partnered with the US Fish and Wildlife Service, NC State University and the NC Forest Service to restore Atlantic white-cedar on Aiken Gopher Tortoise HP. Approximately 5,000 seedlings valued at $60,000 were donated for the project. Longleaf pine was restored to 90 acres at Tillman Sand Ridge HP and Woods Bay State Park HP. Wildfire management plans were completed for Victoria Bluff and Lewis Ocean Bay HP.

Archaeological surveys were conducted on Congaree Bluffs, Congaree Creek and South Bluff HPs. Mapping and testing was carried out at the Fig Island shell ring on Botany Bay Plantation. Samples were collected at Nipper Creek HP. For the sixth year, a two-week excavation was held at Great Pee Dee HP, which provided educational demonstrations and attracted hundreds of visitors. A yearly battle commemoration was held at Fort Lamar HP. A chemical spill that resulted in a DHEC prohibition on Congaree Creek HP two years ago has now been lifted. Planning for access facilities and a canoe trail has resumed.

Preserve managers provided 45 guided field trips for the public and are actively educating volunteers to carry out this task. Also, 10 presentations and lectures were given to a variety of groups. Staff answered more than 1,000 requests for information. Assistance was provided on 30 stories and 6 news releases regarding the state's heritage preserves and related environmental matters.

Property Acquisitions			
Name	**Acres**	**Date Acquired**	**Total Cost**
Little Pee Dee HP Addition	200	7-26-02	$ 195,675
Ditch Pond HP	296	10-17-02	316,450
Henderson HP Addition	9	12-16-02	3,467
Wadakoe Mountain HP	37	12-31-02	105,758
Waccamaw River HP Addition	40	2-03-03	8,742
Poinsett Bridge HP	114	2-07-03	412,568
Total	**696**		**$1,042,660**
Average Total Cost of $1,498 Per Acre			
Donated Value of $144,585			
Other			
Land Protection			$ 155,161
Capital Improvements			17,914
Preserve Management			422,430

Total	**696**		**$ 595,505**
Grand Total	**696**		**$1,638,165**

Freshwater Fisheries Section
Program Name: District Operations

Program Goal: The protection, conservation and enhancement of South Carolina's aquatic resource, and providing the citizens of South Carolina with recreational angling opportunities.

Program Objectives: To protect, conserve and enhance South Carolina freshwater fishery resources. To provide recreational angling opportunities. To support the management and conservation of these resources through the collection, evaluation and dissemination of the relevant data needed to make recommendations.

Performance Measures:

(1) Inputs:

Total cost:	$2,185,741
Personnel:	33 FTEs.
Major equipment:	42 vehicles; 82 boats; 1 tractor.
Facilities:	7 offices and labs
Demand:	445,386 licensed anglers; state population to recover resource damages; 793 private pond owners.

(2) Outputs:

- Conducted survey and inventory activities on 24 lakes and reservoirs in South Carolina.
- Conducted survey and inventory activities on 23 rivers and streams in South Carolina.
- Conducted 793 on site pond management consultations.
- Reviewed 48 environmental permit requests.
- Investigated 73 fish kill events.
- Maintained 157 fish concentration areas in South Carolina lakes and streams.
- Genetic evaluation of smallmouth bass from South Carolina reservoirs.
- Evaluate growth and survival of two different largemouth genetic strains in South Carolina ponds and lakes.

(3) Outcomes:

1. Survey and Inventory. The following are examples of results from implemented recommendations based on survey and inventory data.

a. Creel data collected from Savannah River impoundments has allowed the agency to support proposed changes in largemouth bass size and creel limits in the waters bordering Georgia. Survey data did not justify the proposal based on its biological need, but rather, the data indicated that there was wide public support

and that the harvest restrictions would cause no harm to the fishery. (Reference: Freshwater Fisheries District II, Annual Progress Reports, 1998)

A total of 85% of respondents to a licensed angler survey indicate satisfaction with the performance of the Freshwater Fisheries Section. These positive opinions come, in part, from management activities associated with this program's activities. (Reference: South Carolina Fishing License Holders Opinions and Attitudes Toward Fisheries Management and the South Carolina Department of Natural Resources, 1998). A survey of private pond owners indicated an over all positive opinion of the product provided (88%), and the staff.

b. A licensed angler survey that was completed during the previous review period continues to be used by the Section to develop programs and set priorities. This survey determined the attitudes, behavior, opinions and demographics of the State's freshwater anglers. Results of this survey have been used to justify the creation of an Aquatic Education Program to be administered by the CEC Division. The survey data were also used to confirm and strengthen the importance of the DNR hatchery program, with an emphasis balanced toward the anglers' preferences. Other important programs are being evaluated based on the results of this study. (Reference: South Carolina Fishing License Holders Opinions and Attitudes Toward Fisheries Management and the South Carolina Department of Natural Resources, 1998)

c. A survey of South Carolina youth (ages 8 to 18) was conducted to access their awareness of issues related to aquatic natural resources and recreational fishing. Evaluation of survey results is ongoing.

d. The survey of licensed anglers (mentioned in item b.) shows that freshwater anglers were satisfied with largemouth bass (81%), bream (87%), crappie (78%), catfish (87%), striped bass (76%), redbreast (60%), smallmouth bass (67%), brown trout (69%), and rainbow trout fishing (70%) in South Carolina. These anglers are of the opinion that during the past ten years the quality of fishing has improved, remained the same or declined at respective rates of 33%, 26%, and 26%. Improvements were attributed to cleaner water (20%), more fish (13%), improved management (12%) and increased access (9%). Those expressing an opinion of decline base this on over fishing (30%), too many anglers (16%), and pollution (16%). A total of 85% of the respondents are satisfied with the performance of the Freshwater Fisheries Section. These positive opinions come, in part, from management activities generated by recommendations based on the sound biological data from this program. (Reference: South Carolina Fishing License Holders Opinions and Attitudes Toward Fisheries Management and the South Carolina Department of Natural Resources, 1998)

e. Data resulting from this program are routinely used to recommend and implement fish harvest regulations designed to address the program's goal. These would include, but not be limited to: 21 inch and 5 fish creel limits on systems in the Santee Cooper drainage, largemouth bass size limits at selected agency public fishing lakes, set hook regulations on selected coastal plain rivers, and authorization to regulate largemouth bass fisheries in the Spartanburg City reservoirs.

f. Survey data from this program are being used to initiate a delayed harvest recommendation for trout on Chattooga River. This is in response to public requests and is based on biological justifications. (References: Freshwater Fisheries District I, Annual Progress Report, 1998)

2. Technical Assistance. Outcomes are for all aspects of technical assistance including the investigation of fish kills and providing technical assistance to private pond owners.

a. During this project segment all fish kills were investigated.

b. A second survey of private pond owners that requested and were provided technical assistance during the reporting period show highly acceptable levels of approval for the activity, employees' performance and results of implemented management recommendations. The survey also indicated improvements in performance of the program and acceptance by those receiving the service. Survey results were compared to a previous survey and showed the following responses:

- 97% indicated employees were courteous.
- 82% received the needed paperwork for a consultation.

- 94% indicated that the required paper work was clear.
- 96% indicated that employees were timely in responding.
- 98% indicated that employees were on time for an appointment.
- 98% said the employees were professional and attentive.
- 98% believe the employees offered advise based on their (the owner) needs.
- 95% said that the management recommendations addressed their problems.
- 96% said management recommendations were clear.
- 91% received follow up information to help them with their problem.
- 96% said that the written recommendations were clear.
- 84% carried out either all of the recommendations or some of them.
- 51% said that the recommendations were either successful (32%) or some of them were (29%).
- Those that did not carry out the recommendations were deterred by cost, labor or time. Only 2% said they could not understand the instructions.
- 57% requested a follow up call.
- 85% said the program was very important and 15% said it was moderately important.
- Most owners found out about the program from DNR, word of mouth or their extension agent.
- Results have been used to change those aspects of the program that need addressing.

  (Reference: Private Pond Technical Guidance Program Customer Survey, 2002)

3. Development Activities. Activities include improvements on selected bodies of water for access and fishing success.

a. Previously developed angler access and fish attractors give resource users a means to fish agency impoundments, access stream habitats and find productive fishing sites on unfamiliar bodies of water. These sites must be maintained to insure that the original intent and expenses are not lost. In those areas where observations suggest a need for additional access or attractors, managers take action to make needed improvements. Pre and post evaluations of this straightforward activity are not needed, and employee initiative is the predetermining factor in providing the service and, when needed, ceasing the service. A survey of licensed anglers indicates that 56% of the respondents feel that this program is one in which the agency should direct more effort and 26% recommend the same level of effort. Public interest in this type of fishery habitat enhancement activities has resulted in the access to $50,000 for the construction and deployment of new permanent fish attractor units in the Santee Cooper lakes. (Reference: South Carolina Fishing License Holders Opinions and

Attitudes Toward Fisheries Management and the South Carolina Department of Natural Resources, 1998)

4. The technical assistance provided by this activity gives the Section access to support services not routinely available. The centralization and coordination of the projects' support services insure a needed level of consistency and quality control between the projects and the many resource partners that the Section works with on a daily basis. Examples include, but are not limited to:

- Assuring that graduate students are obtained for projects needing specific bodies of work. This project assures that the research is well designed and completed as required. This project also assures that the research fits into the DNR's needs and is of the highest priority.
- This project coordinates the activities of regional cooperative units that provide services to the Section and its projects. The Southeastern Genetics Cooperative Unit, Southeastern Fish Disease Project, Clemson Statistical Cooperative Project and the regional effort to obtain FDA clearance to use selected chemicals are all projects that require coordination if their value to the agency is to remain.
- Access to specialized services at universities, other research institutions and through private industry is obtained by the activities of this project.

5. Research. All research is mission oriented.

a. Research on the genetic makeup of selected fish species is continuing. The identification of any distinct genetic characteristics is then used as part of the management decision-making process. Unique genetic stocks are left undisturbed by not taking immediate management action until it is determined that the best interest of the resource is considered. These data are used routinely to manage striped bass, black bass and trout resources. In addition, ongoing research on the performance characteristics of South Carolina's unique largemouth bass strains is providing information that was used to decide if segregated stocks of brood fish will result in healthier fish populations. Additionally, study of bluegill and smallmouth bass genetics will lead to new views for the management of these species.

b. The Section's large database of largemouth bass data has routinely been used to address localized areas of interest. This program is responsible for compiling, analyzing and reporting the findings of the data on a statewide basis. Upon completion of this project it is expected that discrete regional variations will lead managers to view the resource in a more holistic manner.

c. A study designed to compare various set hook configurations has been completed. The study was initiated to address agency concerns relative to a legislative change in the law that liberalized the means by which the devices could be used. The law was amended to address interests over the

presence of flathead catfish in coastal plain streams. The study determined if the liberalization of the law is a threat to coastal plain streams' sport fisheries and if it is effective in catching flathead catfish. The study indicates that live bait was not more effective that cut bait in catching flat head catfish; live bait did not increase the catch of game fish in this river system; and live bait did not remain on hooks and was often taken by gar.

(4) Efficiency:

Lake and reservoir survey and inventory activities were completed at an average cost of $22,148 per water body.

River and stream survey and inventory activities were completed at an average cost of $13,024 per water body.

On site pond management consultations were conducted at an average cost of $315 per pond or $97 per surface acre.

- Environmental permit requests were review for an average cost of $518 per review.
- Fish Kills were investigated at an average cost of $546 per event.
- Fish concentration areas were maintained at an average cost of $670 per site.

(5) Quality:

A survey of South Carolina's general population shows that, while 35% of the population does not know enough about SCDNR to rate its performance, 52% feel SCDNR is doing a good or excellent job managing the State's fishery resources. Only 1% of the general population rated SCDNR's performance as poor. A total of 85% of respondents to a licensed angler survey indicate satisfaction with the performance of the Freshwater Fisheries Section. These positive opinions come, in part, from management activities generated by recommendations based on the sound biological data from this program. (Reference: South Carolina Residents' Attitudes and Behaviors Toward Aquatic Resources, 2003; South Carolina Fishing License Holders Opinions and Attitudes Toward Fisheries Management and the South Carolina Department of Natural Resources. 1998)

Program Name: Hatchery and State Lake Operations

Program Goal: To maintain hatchery facilities in sufficient number and in proper repair as to allow for the production of various fish species of adequate number and size to meet program objectives. To provide DNR operated public lake facilities for recreational fishing opportunities.

Program Objectives:

- To propagate those species of fish in sizes required to accomplish fishery management objectives.
- To provide pond owners, at cost, largemouth bass, shellcracker and bluegill for private pond management purposes.
- To maintain and improve hatchery facilities.

- To provide quality fishing opportunities through management of water quality and fish population structure.
- To provide maintenance of DNR operated lake facilities.

Performance Measures:

(1) Input:

Total cost:	$1,846,164
Personnel:	33FTEs.
Major equipment:	43 vehicles; 25 boats; 7 hatcheries; 20 tractors.
Facilities:	7 hatcheries; 6 raceways; 118 hatchery ponds; 17 public fishing lakes
Demand:	445,386 licensed anglers. State population to restore species of concern; approximately 407 private pond owners.

(2) Outputs:

- Production of catchable and sub-catchable sized trout for stocking into public waters.
- Production of striped bass and hybrid fingerlings for stocking into public waters.
- Production of largemouth bass fingerlings for public water stocking and to provide fish, at cost, to private pond owners.
- Production of bluegill and shellcracker for public water stocking and to provide fish, at cost, to private pond owners.
- Maintenance and improvement of:
  - Six warmwater fish hatcheries with a total of 76 acres of water in 118 production ponds.
  - One coldwater fish hatchery with six production raceways and a hatching facility.
- Managed fertility and other water quality and treated aquatic weeds at 17 public fish lakes containing 1,507 surface acres of water.
- Maintained the support facilities (boat ramps, parking lots, picnic areas, trails, grounds, etc) at 17 public fish lakes.

(3) Outcomes:

1. Private Water Stockings

   a. A second survey of private pond owners who purchased fish for stocking into their pond during the reporting period continues to indicate highly acceptable levels of approval for the activity, employees' performance and the quality of the fish they purchased. Survey results showed the following responses:
   - 83% felt the cost of the fish was fair and 8% felt that the cost was too high.
   - Only 28% said that they would be willing to pay more for the fish they purchased.

- 49% were satisfied with the size of the fish and 88% were satisfied with the condition of the fish at the time of delivery.
- Only 3% felt that the number of fish they received was not accurate.
- 98% indicate the employees were courteous and helpful.
- 98% received good instruction concerning fish delivery, and 95% felt the delivery site was convenient.
- 97% said the program was important, and 97% would recommend it to their friends.

(Reference: Private Pond Stocking Program Customer Survey, 2001)

2. Public Water Stocking

a. South Carolina has a $17,400,000 trout fishery that serves an estimated 49,356 anglers. Due to the State's limited coldwater resources, only six streams have viable reproducing trout populations capable of sustaining limited fishing pressure. The remaining streams and reservoirs must be stocked with either harvestable size fish or, when conditions allow, fish that are less than six inches in length. The Walhalla State Fish Hatchery produced fish of quality and these were stocked based on sound biological principals, thereby, maintaining the fishery and its benefits. (References: The Economic Benefits of Freshwater Fishing in South Carolina, 2001; The Future of Trout in South Carolina, 1998)

b. South Carolina has a $93,900,000 striped bass and hybrid bass fishery that serves an estimated 138,298 anglers. While limited naturally reproducing populations exist in selected coastal rivers and Santee Cooper, the ultimate viability of the sport fishery is dependent on the "put-grow and take" stocking of fingerling striped bass. Hybrid striped bass do not provide any reproduction to the fishery; therefore, this fishery is totally dependent upon stocking. All of the DNR's warmwater fish hatcheries produce striped bass and/or hybrids that are eventually stocked in appropriate waters, by that, maintaining the fishery and its benefits.
(References: The Economic Benefits of Freshwater Fishing in South Carolina, 2001; Freshwater Fisheries District II, III, IV and V Annual Progress Report, 1975 - 1998; Hatchery Management Plan, 1993)

c. Following a major fish kill in public water, restoration stocking is often conducted with fish from DNR hatcheries. Since these events are unpredictable, hatcheries maintain an appropriate level of surplus fish in order to complete the stocking when needed. While data do not exist to quantify the success of these stockings, the rapidity with which the impacted area recovers is evident to the biological staff that conducts routine sampling in these areas.

d. As part of a multi-agency cooperative effort between the States of South Carolina, North Carolina, Georgia, Carolina Power and Light,

Georgia Power, Duke Power, US Fish and Wildlife Service, US Army Corp of Engineers and various other organizations, hatchery ponds were devoted to the research effort of culturing the robust redhorse. The robust redhorse is an imperiled species native to the Atlantic slope of the United States and up until ten years ago was thought to be extinct. SCDNR hatcheries are involved with the development of culture practices for the species with both phase one and phase two fingerling production. The products from these on going culture experiments are return for reintroduction into suitable waters in their native range.

3. Hatchery Maintenance.

a. All DNR hatcheries conduct routine maintenance to retain the financial investment, function, appearance and life of the facilities. As required, specific and significant maintenance is required to repair unanticipated damage or deterioration.

b. The Dennis Wildlife Center received significant improvements in facilities to maintain their usefulness and effectiveness.

4. Maintenance of DNR operated public fishing lakes provided a preferred public fishing opportunity. A 1998 survey of licensed anglers in South Carolina indicated that over 12% of the respondents usually fished in SCDNR public fishing lakes. A total of 61% felt that the agency should direct more effort toward this program. (Reference: South Carolina Fishing License Holders Opinions and Attitudes Toward Fisheries Management and the South Carolina Department of Natural Resources, 1998)

5. The assets and investments associated with the construction and/or development of agency-operated public fishing impoundments must be maintained if the structures and their public enjoyment are to continue. Without routine maintenance negative actions may include, but not be limited to:

- Increased liability associated to personal and property injury.
- Loss of initial investments if structures are not maintained.
- Loss of usage due to unsafe and unappealing conditions.
- Loss of dam certification that could lead to the loss of the impoundment.
- Loss of trust from those partners that share a cooperative agreement with DNR for management of their impoundment for public use.
- Loss of public support for the agency's fishing lake program.

6. Without proper maintenance of water quality, the DNR's public fishing impoundments would lose their ability to provide enjoyable and productive fishing experiences to the users of the resource. Maintenance of productive waters through fertilization is an essential component to managing intensively fished small impoundments, managing aquatic vegetation and managing the balance of fish populations. Water level and water quality must be maintained to insure that the fishery is not harmed by negative impacts associated with poor water quality

or fluctuating water levels. Management of aquatic vegetation is essential if the impoundment is to be accessed by anglers and if the fish population is to remain in a balanced healthy condition.

(4) Efficiency:

- Produced and stocked approximately 459,000 trout into public waters at an average cost of approximately $0.68 each.
- Produced and stocked approximately 3,812,000 striped bass fingerlings at an average cost of $0.13 each.
- Produced approximately 389,000 largemouth bass fingerlings at an average cost of $0.07 each.
- Produced approximately 6,252,000 bluegill, shellcracker and redbreast at an average cost of $0.07 each.
- Maintenance and management of 17 public fishing lakes was accomplished at an average cost of $242 per surface acre of water.

(5) Quality:

A total of 85% of respondents to a licensed angler survey indicate satisfaction with the performance of the Freshwater Fisheries Section. These positive opinions come, in part, from management activities associated with this program's activities. (Reference: South Carolina Fishing License Holders Opinions and Attitudes Toward Fisheries Management and the South Carolina Department of Natural Resources, 1998). A survey of private pond owners indicated an over all positive opinion of the product provided (88%), and the staff's performance (98%)(Private Pond Stocking Program Customer Survey, 2001).

Program Name: Cooper River Rediversion

(3) Outcomes:

1. Passage of Anadromous Fish Species.

a. The passage of migratory fish species (mostly blueback herring and American shad) provides an allochthonous source of prey for the predators of lakes Marion and Moultrie. Each body of water has its own carrying capacity that can be expanded only through outside influences. The influx of additional prey without having to artificially increase nutrients is a benefit to the reservoir's predators enabling them to maintain and exceed expected condition, growth and density. The passage of fish into Santee Cooper predates DNR's survey and inventory efforts and this project, but the system is the state's most fished and one that has the greatest reputation for angling success. These facts were among the justifications for the construction of the St. Stephen Fish Lift following the Corps of Engineer's Cooper River Rediversion Project. (References: U.S. Senate Document 88, Cooper River, South Carolina.

Program Goal: The restoration of anadromous fish passage into the Santee Cooper Lake system to levels that existed before the construction of the Cooper River Rediversion Project.

Program Objectives:

- To pass fish from the Santee and Cooper rivers into the Santee Cooper lake system.
- To evaluate and implement, through cooperation with the USACOE, modifications to improve efficiency of the St. Stephen's fish lift.
- To assure diadromous fishery issues are duly considered during the FERC re-licensing process for hydropower plants.

Performance Measures:

(1) Input:

Total cost:	$324,957
Personnel:	3 FTEs.
Major equipment:	7 vehicles; 8 boats.
Facilities:	St. Stephen Fish Lift
Demand:	445,386 licensed anglers.

(2) Outputs:

- Operate the fish lift at the St. Stephen Power Plant.
- Produce estimates of the number of fish passed at the St. Stephen Fish Lift and at the Pinopolis Lock.
- Monitor the effects of fish lift modifications on the number of fish passed.
- Provided input and conducted studies insure diadromous fish concerns were duly considered during the re-licensing of hydro projects in the Santee Cooper basin and the Savannah River.

(3) Outcomes:

1. Passage of Anadromous Fish Species.

   a. The passage of migratory fish species (mostly blueback herring and American shad) provides an allochthonous source of prey for the predators of lakes Marion and Moultrie. Each body of water has its own carrying capacity that can be expanded only through outside influences. The influx of additional prey without having to artificially increase nutrients is a benefit to the reservoir's predators enabling them to maintain and exceed expected condition, growth and density. The passage of fish into Santee Cooper predates DNR's survey and inventory efforts and this project, but the system is the state's most fished and one that has the greatest reputation for angling success. These facts were among the justifications for the construction of the St. Stephen Fish Lift following the Corps of Engineer's Cooper River Rediversion Project. (References: U.S. Senate Document 88, Cooper River, South Carolina (Shoaling in Charleston Harbor); South Carolina's Striped Bass, 1968; Rediversion Project Annual Progress Report, 1985 - 1998)

b. The passage of migratory fish species (mostly blueback herring and American shad) increases their available spawning area and spawning success, thereby contributing fish stocks to the Atlantic Coast fish populations. The Cooper and Santee rivers were impounded during the 1940's. The construction of Wilson and Pinopolis dams prevented selected anadromous fish species from using their historical spawning grounds, which effectively reduced their spawning success. These changes occurred before DNR's involvement in fish population monitoring. Passage of some anadromous fish did occur at the boat lock on Cooper River, however, the Cooper River Rediversion Project reduced the effectiveness of this pathway. Construction of the St. Stephen Fish Lift was justified and constructed on the premise that the reduced Cooper River passage could be supplemented by a fish lift on Santee River, and anadromous species would again be able to reach spawning areas.

The St. Stephen Fish Lift has been effective in passing as many as 1,900,000 anadromous fish to their historical spawning areas. Sampling has revealed that juvenile herring and shad are produced and out-migrate to rejoin Atlantic Coast stocks. The passage, spawning and eventual out-migration are important outcomes for this limited area of the fishes' range. Although their total contribution cannot be measured against the total Atlantic Coast population, its importance is judged to be relative to the habitat and number of adults using the system. (Rediversion Project Annual Progress Report, 1990 - 1998)

2. Evaluation of St. Stephen Fish Lift Modifications.

a. Inefficiencies at the St. Stephen Fish Lift resulted in a $4,500,000 modification to make improvements. These improvements are completed and early efforts have been made to learn how to effectively use the new attractant flow. Low water during the passage period complicated the process; however this modification seemed to make the lift more effecting than in previous efforts under similar water levels.

(4) Efficiency:

- Operation of the refurbished Pinopolis Dam lock during 2003 resulted in the passage of 1,775,763 herring units.
- Approximately 86,909 blueback herring and 298,902 American shad were passed at St. Stephen during the 2003 fish passage season.

(5) Quality:

A survey of South Carolina's general population shows that, while 35% of the population does not know enough about SCDNR to rate its performance, 52% feel SCDNR is doing a good or excellent job managing the State's fishery resources. Only 1% of the general population rated SCDNR's performance as poor. A total

of 85% of respondents to a licensed angler survey indicate satisfaction with the performance of the Freshwater Fisheries Section. These positive opinions come, in part, from management activities associated with this program's activities. (Reference: South Carolina Residents' Attitudes and Behaviors Toward Aquatic Resources, 2003; South Carolina Fishing License Holders Opinions and Attitudes Toward Fisheries Management and the South Carolina Department of Natural Resources, 1998)

Law Enforcement Division
FY 2002-03 Annual Report

Program Name: Law Enforcement Operations

Program Cost:		
	State:	$6,060,762
	Federal:	$211,758 (Safety Equipment Grants and Victims Assistance) $724,138 (Joint Enforcement Agreement)
	Other:	$5,172,463
	Total:	$12,169,121

Sustaining Goals:

1. Ensure the protection of life, property and natural resources through maintenance of a well-trained, professional natural resources law enforcement force appropriately distributed throughout the state. **(Strategic Goal 1: Management, Action Item 3)**

2. Continue to attract and retain talented employees available to carry out the agency's mission in a manner that includes career development and competitive compensation for staff. **(Strategic Goal 5: Internal Management and Operations, Action Item 6)**

3. Maintain, develop and implement technologies to enhance natural resources, stewardship and conservation (including, but not limited to, fish hatchery, aquaculture and aquatic population restoration and rebuilding technologies). **(Strategic Goal 2: Science and Technology, Action Item 3)**

4. Promote awareness of natural hazards and educate the public in ways to mitigate loss or injury. **(Strategic Goal 3: Education and Public Involvement, Action Item 3)**

5. Explore and develop applicable technological innovations to improve natural resources management, planning and customer service. **(Strategic Goal 5: Internal Management and Operations, Action Item 2)**

6. Continually evaluate efficient use of present funding and pursue new sources of funding for management, conservation and protection for the state's natural resources. **(Strategic Goal 5: Internal Management and Operations, Action Item 3)**

7. Educate the public about the state's natural resources and encourage them to make more informed contributions to the management, use, stewardship and enjoyment of our natural resources. **(Strategic Goal 3: Education and Public Involvement, Action Item 1 and Action Item 5)**

8. Emphasize the importance of education as a portion of every DNR employee's work responsibilities. **(Strategic Goal 3: Education and Public Involvement, Action Item 5)**

9. Expand habitat protection, restoration and conservation programs, emphasizing expanded acquisition and conservation easements for properties with high ecological value. **(Strategic Goal 5: Internal Management and Operations, Action Item 1, Action Item 2, and Action Item 5)**

10. Develop opportunities to promote diversity both within the agency and in its constituents to enhance participation in nature-related activities by all citizens of South Carolina. **(Strategic Goal 5: Internal Management and Operations, Action Item 5)**

11. Support local, regional and state efforts to conserve and sustain natural resources through comprehensive land use planning. **(Strategic Goal 4: Landscape Conservation, Action Item 2; Strategic Goal 5: Internal Management and Operations, Action Item 1)**

12. Provide for effective staff development and training in natural resources management, planning and customer service, including continuing education, leadership training, and formal education. **(Strategic Goal 5: Internal Management and Operations, Action Item 1)**

13. Acquire and incorporate social and economic, as well as biological and physical, data into policies and processes to manage the state's natural resources and provide information on the social, cultural, economics as well as ecological significance of natural resources to the public. **(Strategic Goal 1: Management, Action Item 5)**

14. Utilize public opinion surveys and the talents of the Department's Advisory Committees to gauge public opinion and educate the public on important natural resources issues. **(Strategic Goal 3: Education and Public Involvement, Action Item 6)**

15. Assess and communicate public interests, needs and knowledge as it relates to natural resources. **(Strategy 3: Education and Public Involvement, Action Item 2)**

16. Promote safe, ethical and responsible use of the state's natural resources. **(Strategy 3: Education and Public Involvement, Action Item 3)**

Program Objectives: Sustaining Objectives "Long-Term" Performance Measures:

1. To apprehend violators of state and federal game, fish, and boating laws.

2. To conduct criminal and accident investigations and enforce non-title 50 statutes to enhance public safety and environmental protection.

3. To increase interaction and coordination with outside law enforcement and regulatory agencies with similar or concurrent jurisdiction in resources protection and public safety in the areas of resource issues, intelligence information, and criminal statistics.

Program Objectives Results: Sustaining Results "Long Term Performance Measures Results"

1. Law Enforcement Case Load **(24,354)**

2. Law Enforcement Non-Title 50 Cases **(2,353)**

3. Law Enforcement Hours Assisting Other Agencies **(6,479)**

Program Objectives: Specific Objectives for FY 02/03:

Objective 1: Enact cost efficiency measures in order to most effectively manage division needs and to provide resource protection and/or services. (i.e. seek state/federal grants, reduce operating costs, reorganize/restructure elements of the Division either permanently or temporally to address the operational, administrative, and supervisory needs based on current/future personnel shortages) **(Strategy 5: Internal Management and Operations, Action 3; Strategy 1: Management, Action 3)**

Objective 2: Develop DNR's portion of the State Homeland Security Plan and the Coast Guards Port Facilities and Coastal Security Plan. Implement requirements as outlined in these plans and are prepared to implement other duties/responsibilities as tasked by the State Homeland Security Director/Council, State Emergency Management Division, SLED, and other appropriate agencies. **(Strategy 1: Management, Action 3)**

Objective 3: In an effort to enhance the public's awareness of the duties, responsibilities, and capabilities of the DNR Law Enforcement Officers and of the Division, Officers at all levels are encouraged to conduct presentations to the public at every opportunity available. Presentations may only address specific topics requested by the group (i.e. boating safety, hunting safety, day-to-day duties of an officer, etc…) or a complete overview of the Division (i.e. PowerPoint presentation/slide show). **(Strategy 3: Education and Public Involvement, Action 1, 3)**

Objective 4: In preparation for the planned draw down of Lake Murray, representatives from the Division (Marine Law Enforcement and Education Section, District Six and

District Two, DNR PIO, etc…) should meet with SCE&G, other enforcement agencies, and affected user groups to adequately address safety issues and other matters that will impact recreational use on the lake. **(Strategy 1: Management, Action 3; Strategy 3: Education and Public Involvement, Action 3, 4)**

Objective 5: In an effort to improve access to public shooting range facilities in the Midlands, DNR should build a shooting range at Styx to replace the primitive range currently located there. The facility will support live fire shooting activities (shotgun and rifle) included in the Hunter Education Program. In addition, the range will be available on a limited basis to the public and to support training needs of DNR and other law enforcement agencies as required. **(Strategy 3: Education and Public Involvement, Action 1, 3)**

Objective 6: In an effort to review all Division Directives and Agency Policies to ensure that all officers understand the intent of them and to verify that they meet the current needs of the Division, a systematic process to review and up-date each Directive and review each Policy will be developed and implemented. The schedule to review the Directives and Policies will be prioritized based on subject matter of the documents and their impact on day-to-day operations of the Division. **(Strategy 1: Management, Action 3; Strategy 5: Internal Management and Operations, Action 1)**

Objective 7: In response to one of the recommendations made by a group of DNR officers who were assigned to address issues that affect law enforcement officer safety and submit these recommendations through DNR channels to the Governors Task Force on Law Enforcement Officers Safety, the Division will study the need to equipment select DNR officers with firearms that have greater capabilities than current issued weapons. In addition to the recommendation made by this "working group", a number of DNR officers have requested that this issue be addressed also. In an effort to adequately address the issue, the Division will conduct a comprehensive needs assessment to include potential liability for the Department, training and certification requirements, type weapons needed, and sources of acquisitions and funding. **(Strategy 1: Management, Action 3)**

Objective 8: In an effort to hold individuals legally accountable for submitting bad checks to DNR to pay for licenses, permits and other services provided, and to recover the actual amount of the bad check issued and the direct/indirect cost to DNR to locate and prosecute these individuals, the Division is developing a cooperative agreement with the Department of Revenue (DOR) to address this issue. As part of this agreement DOR will withhold funds (actual amount), plus additional fees from tax refund checks of individual's known to have passed bad checks to DNR. Implementation of this plan would allow DNR to recover a portion of the $60,000 worth of bad checks that we currently have knowledge of that DNR has received. In addition, we will develop and implement an aggressive enforcement plan (within the scope of current laws dealing with fraudulent checks) to seek legal action against individuals that pass bad checks to DNR. **(Strategy 1: Management, Action 3)**

Objective 9: In an effort to significantly reduce the current backlog of warrants (approximately 800) issued by magistrates on cases made by DNR officers that have not been served, the Division will develop and implement a system to serve the warrants. If it is determined that the warrant cannot be served then steps will be taken to dispose the case through proper channels. **(Strategy 1: Management, Action 3)**

Objective 10: In an effort to meet the needs of DNR officers in the area of acquiring specialized equipment and other resources needed to perform their duties, the Division will aggressively seek out sources of surplus equipment (State and Federal) and private sources that may have surplus equipment or the means to donate equipment and supplies to DNR. **(Strategy 1: Management, Action 3; Strategy 5: Internal Management and Operations, Action 3)**

Program Results: Results for Specific Objectives for FY 02/03:

1. The Division has enacted cost saving measures to limit spending to only critical operational needs and has not filled any vacancies (currently have 54 officer vacancies) in two years. Most of the officer vacancies came about as the result of two retirement incentives programs that were offered by the agency. As result of one of the incentive programs, the Division permanently lost the 11 positions of the retiring employee. As the situation allowed, limited reorganization/restructuring was done to back-fill critical shortages (Training Officer, EMD/Communications Officer, and Homeland Security Coordinator) with the remaining responsibilities being assigned to existing staff as additional duties.

2. Homeland Security Plans are being developed for DNR's portion of the state plan. DNR is working closely with the Coast Guard on port security, to the extent that the Coast Guard has given the DNR an award for the DNR's help and precipitation. DNR has worked with SLED and other agencies to develop security plans for the states nuclear sites, and is in the process of implementing these plans through drills at the various sites around the state. The Coastal Security Plan is being put together right at this moment and should be ready by the spring. The DNR is working with state and federal agencies on a routine bases and along the coast on a daily bases guarding shipping and the ports.

3. Officers around the state have made contacts to arrange to present the Law Enforcement division PowerPoint presentation to county legislative delegations, sportsman's groups, hunt clubs, civic groups, schools, boy scouts, bass clubs, city councils, Rotary clubs, Kiwanis clubs, and other groups. To date, the PowerPoint presentation has been shown to 11 County Legislative Delegations, and 219 other groups and organizations.

4. Representatives of DNR Law Enforcement Division met with SCE&G's Lake Management Division and representatives from the adjoining Law Enforcement Agencies around Lake Murray to discuss safety issues created as a result of the draw down. DNR surveyed the waters of Lake Murray and identified 223 new hazards created as a result of

the draw down. Additionally, 159 of the existing 302 hazard buoys have been relocated to new GPS coordinates. DNR representatives investigated all reports of hazards from law enforcement officers and concerned boaters and took appropriate action where needed to properly identify the problem areas. Identification of new hazards will continue throughout the draw down to safeguard the boating public. District 2 and District 6 Officers have assisted SCE&G in monitoring ATV and other motorized vehicle use on the lakebed below the 360-degree contour to prevent property damage or lakebed damage below the 360-degree contour. Officers will check for such use, and issue warnings and or citations for violations. This has been addressed through media releases, and postings at various locations around the lake. DNR will track and maintain data on violations, and provide information to SCE&G as requested.

5. The Marine Law Enforcement and Education Section has completed construction of a new shooting range at Styx to replace the primitive outdated range that was there. A building for classroom use with appropriate facilities and a covered shed were also incorporated into the finished design. The range is actively being used for Hunter Safety classes and other Hunter Education related programs.

6. An "Action Plan" to address this Goal/Objective has been developed along with a "Directives/Policies" review schedule and accountability form. These document are listed below.

Law Enforcement
Directives and Policy Review
Plan of Action

It is every Law Enforcement Officers duty to understand and review the South Carolina Department of Natural Resources polices and Law Enforcement Division Directives. These policies and directives are the guidelines for our Department to operate in a professional manner and to remain consistent in our tasks and responsibilities.

By having these polices and directives in place gives our officers the information for procedures to limit liability to themselves and the department. Therefore as part of training on the district level, a schedule of these policies and directives are being compiled by the training staff for review at each district meeting on a monthly basis. If a district does not have a monthly meeting the information will be reviewed at the next meeting. A district training officer will be responsible for the review, documentation and any comments. The comments will be recorded and sent back to the training staff. The comments will then be forwarded to the Senior Staff for review and discussion. If any changes are necessary, the Senior Staff will make the decisions to change the directives if necessary. If a policy change is necessary, the requests for changes will be forwarded to the Executive Director and the Division of Human Resources.

Law Enforcement
Policy and Directive

Review Schedule

January 2003:	Policies:	Use of Force (301.01) Vehicular Pursuit (302.01)
	Directives:	Executing a Search Warrant (303) Obtaining a Search Warrant (307) Arrest without a Warrant (338)
February 2003	Policies:	Freedom of information (500.01) Sexual Harassment (704.05)
	Directives:	Show ups, Lineups (302) Interrogations and Confessions (305) Interviews, Pat down Searches (308)
March 2003	Directives:	Boating Accidents (344) Vessel Stops and Inspections (322) Evidence Control (314) Confiscated Property (340)
April 2003	Directives:	Emergency Custody of Juveniles (342) Juvenile Custody Procedure (343) Media Relations (349)
May 2003	Policies:	Leave Policy (702.01) Confidential Information (704.08)
	Directives:	Major Incident Scenes (309) Assisting Another Agency (310) Safety Equipment (350)
June 2003	Directives:	Confidential Funds (316) Code of Ethics (318) Employee Appearance (318.01)
July 2003	Directives:	Training (317) Training Instructors (317.01) Training Recruit (317.02) Training Supplemental (317.03) Training Civilian (317.04)
August 2003	Polices	DLEO Policy (300.01)
	Directives:	Hunting Incident (336) Opcon (319)

September 03	Directives	Law Enforcement Collision (301) Operation Game Thief (313) Records and Reports (320)
October 2003	Directives	Nuisance Wildlife (335) Telephone/Radio Recording (340)
November 03	Directives	Career Advancement (346) Hiring Procedure (347) Transfer Procedure (345)
December 03	None	Fellowship with Families of Officers.

South Carolina Department of Natural Resources
Division of Law Enforcement
Policies and Directives Review Data Form

Date:
_____

Location:
_____

Name: _____ District:
_____

Social Security Number:

_____

Polices Reviewed:

_____

_____

_____

Directives Reviewed:

_____

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_____

_____

___

COMMENTS:

_____

_____

_____

_____

_____

___

Officer Signature: _____ Training Officer:

_____

7. Response: The training section conducted defensive tactics, weapon retention, handcuffing and FATS decision making scenario training during the spring in-service for Jan., Feb., and March 2003. Based on input from DNR officers that were selected to respond to a survey from the Governors Task Force on Law Enforcement Officers Safety, the officers indicated the need to equip select DNR officers (determined by their job assignment) to be trained and issued a weapon with greater capabilities than our current issued handguns and shotguns. Based on this information a request was made by the agency Director and Division Deputy Director to the federal governments equipment surplus program for 40 surplus shotguns and 40 surplus long guns (M14 or M16 rifles). The department received 40 military surplus AR-15's/M-16's. Due to the fact that

policies and directives have not been established for use of these weapons and the funds needed to purchase ammunitions to conduct training on these weapons has not been available, the weapons have not been issued yet.

8. The agreement between DNR and DOR was initiated through the Law Enforcement Division and will be implemented for the first time in December of 2002. The day-to-day operations that must be conducted by DNR to utilize DOR's Debt Set Off Collection program are being administered by DNR Administrative Services. In the first attempt at this program 89 bad checks, over $25.00 each, contained enough information to be forwarded to DOR for collection. The amount of these checks was $4,822.00. Collection letters were sent out on a total of 176 bad checks. This included checks under $25.00 that were not eligible for the program. Of the letters sent out a total of $494.00 plus $275.00 in service fees has been collected. Future efforts by the DNR must include minimum standards for obtaining required information for this program to be effective.

9. 339 outstanding bench warrants were audited based on a pre determined age cut off. Of the 339 audited warrants, 86 were returned without the LE districts being able to locate the original warrant, 66 were determined to have been cleared prior to the audit, and the remainder contained an original warrant that either had to be re-issued for service or placed on the state wanted file on NCIC. In the year 2002 a total of 402 warrants were cleared by service or recall. The year 2003 will begin with a backlog of 526 outstanding bench warrants in the field awaiting service, and 327 outstanding bench warrants on the NCIC computer system for a total of 853 outstanding warrants.

10. Through grants awarded from the Department of Justice, the Division is in the process of procuring equipment for the officers in the field and the aviation section.

Grants awarded during FY02/03 are as follows:

Terrorism	$91,047
NCIC 2000	$38,670
Aviation GPS Navigational	$30,000
Body Armor Replacement Vest	$12,939
Total amount of funding:	$172,656

Program Name: County Fund Operations

Program Cost: State:
Federal:
Other: $196,090
Total: $196,090 (Total amount dispersed. DNR Law Enforcement does not have authority over how these funds are spend, funds are utilized by other divisions, state and county agencies)

Sustaining Goals:

1. Ensure the protection of life, property and natural resources through maintenance of a well-trained, professional natural resources law enforcement force appropriately distributed throughout the state. **(Strategic Goal 1: Management, Action Item 3)**

2. Continually evaluate efficient use of present funding and pursue new sources of funding for management, conservation and protection for the state's natural resources. **Strategic Goal 5: Internal Management and Operations, Action Item 3**

3. Maintain, develop and implement technologies to enhance natural resources, stewardship and conservation (including, but not limited to, fish hatchery, aquaculture and aquatic population restoration and rebuilding technologies). **Strategic Goal 2: Science and Technology, Action Item 3**

Program Objectives: Sustaining Objectives:

1. To utilize county funds to purchase equipment and services to support DNR Law Enforcement Field Operations. County funds are utilized to purchase approved items of equipment and services for patrol districts for which department revenue, state appropriations or federal funds are not available. The items of equipment and services are intended to support the specific and sustaining goals and objectives of the Law Enforcement Field Operations section.

Program Results: Results are included in the Law Enforcement Operations portion of the document.

Program Name: Hunter Safety

Program Cost: State:
Federal: $394,510
Other: $138,680
Total: $533,190

Sustaining Goals: 1. Ensure the protection of life, property and natural resources through maintenance of a well-trained, professional natural resources law enforcement force appropriately distributed throughout the state. **(Strategic Goal 1: Management, Action Item 3)**

2. Educate the public about the state's natural resources and encourage them to make more informed contributions to the management, use, stewardship and enjoyment of our natural resources. **Strategic Goal 3: Education and Public Involvement, Action Item 1 Action Item 5)**

3. Assess and communicate public interests, needs and knowledge as it relates to natural resources. **Strategy 3: Education and Public Involvement, Action Item 2)**

4. Promote awareness of natural hazards and educate the public in ways to mitigate loss or injury. **Strategic Goal 3: Education and Public Involvement, Action Item 3)**

5. Emphasize the importance of education as a portion of every DNR employee's work responsibilities. **Strategic Goal 3: Education and Public Involvement, Action Item 5)**

6. Support local, regional and state efforts to conserve and sustain natural resources through comprehensive land use planning. **Strategic Goal 4: Landscape Conservation, Action Item 2; Strategic Goal 5: Internal Management and Operations, Action Item 1)**

7. Promote safe, ethical and responsible use of the state's natural resources. **Strategy 3: Education and Public Involvement, Action Item 3)**

Program Objectives: Sustaining Objectives:

1. To ensure the needs of the public are being met by offering hunter education programs on a routine basis at locations throughout the state.

2. Review and update content and teaching methods utilized in conducting hunter education programs to ensure that the most effective means are utilized.

3. Maintain a sufficient number of volunteer instructors that are well trained and properly equipped to assist in conducting hunter education programs.

4. To continue legislative efforts promoting hunter safety.

5. Develop Public Service Announcements (PSA's) that promote safe and ethical hunting practices. Utilize various media outlets (television, radio and print) to broadcast PSA's.

Program Results: Sustaining Results A Long-Term Performance Measures:

1. Number of students certified. **(8,640)**

2. Number of hunting accidents. **(26)**

3. Number of fatal hunting accidents. **(2)**

Program Name: Boater Safety

Program Cost:

State:	
Federal:	$1,063,115
Other:	
Total:	$1,063,115

Sustaining Goals:

1. Ensure the protection of life, property and natural resources through maintenance of a well-trained, professional natural resources law enforcement force appropriately distributed throughout the state. **(Strategic Goal 1: Management, Action Item 3)**

2. Educate the public about the state's natural resources and encourage them to make more informed contributions to the management, use, stewardship and enjoyment of our natural resources. **Strategic Goal 3: Education and Public Involvement, Action Item 1 Action Item 5)**

3. Assess and communicate public interests, needs and knowledge as it relates to natural resources. **Strategy 3: Education and Public Involvement, Action Item 2)**

4. Promote awareness of natural hazards and educate the public in ways to mitigate loss or injury. **Strategic Goal 3: Education and Public Involvement, Action Item 3)**

5. Emphasize the importance of education as a portion of every DNR employee=s work responsibilities. **Strategic Goal 3: Education and Public Involvement, Action Item 5)**

6. Support local, regional and state efforts to conserve and sustain natural resources through comprehensive land use planning. **Strategic Goal 4: Landscape Conservation, Action Item 2; Strategic Goal 5: Internal Management and Operations, Action Item 1)**

7. Promote safe, ethical and responsible use of the state=s natural resources. **Strategy 3: Education and Public Involvement, Action Item 3)**

Program Results: Sustaining Objectives A Long Term Objective Measures:

1. Number of students certified. **(4,497)**
2. Number of boating accidents. **(120)**
3. Number of fatal boating accidents. **(22)**
4. Number of negligent operations cases. **(296)**
5. Number of boating accidents per 100,000 registered boats. **(31)**
6. Number of fatal boating accidents per 100,000 registered boats. **(5.7)**

CONSERVATION EDUCATION & COMMUNICATIONS

ADVISORY COMMITTEE

Danny Ford	Chairman
A. Pinckney Skinner, III	Florence
Carolyn Fair Randolph	Columbia
Robert E. Livingston, III	Newberry
Charles L. Wyrick, Jr.	Charleston
Charles Harrison	Columbia
Caroline Stephenson	Columbia
Jessie D. McCollough	Kingstree
Andrea Adams	Murells Inlet
Richard B. Peterson	Gilbert

The Division of Conservation Education and Communications (CEC), with offices in Columbia and Charleston, is staffed by 31 full-time personnel supporting all divisions and programs of the S.C. Department of Natural Resources. The Division's goal is to assure that information and education efforts are the result of proper planning and coordination, keeping in mind the needs of the public, agency goals, cost effectiveness, thorough review, accuracy and professional standards.

CEC provides the following agency-wide services: Conservation Education programs, Becoming an Outdoors Woman program, SC Reel Kids Program, publication advisement, coordination and design, art and graphics, duplicating services, agency mail room, *South Carolina Wildlife* magazine production, agency news releases, weekly fishing trend reports, news media assistance, writing and editing, spokesperson services, video production (training, documentary, public service announcements) and video library (free loan instate).

Education Section

Education Programs: The Education Programs of the Department of Natural Resources are a tool to support the outreach and partnering mission of the agency, encouraging public awareness of natural resource's role in the state's quality of life.

- Jr. Duck Stamp Contest –An art contest open to K-12 Students, where students must draw or paint waterfowl. Between 600 and 700 entries per year. Students will learn what types of waterfowl live in South Carolina and what types of habitats exist and the value of those habitats. Our partners are: SEWE, US Fish and Wildlife Service, Kitchens Mill Supper Club, Harry Hampton Memorial Wildlife Fund, USPS, Wild Goose Gallery, (Joe Garcia, Adele Earnshaw, Cynthie Fisher, Stephen Koury, Nicholas Wilson, Robert Hickman – Artist that

donate artwork). This program relies on donations and sponsors for support which amounts to ~$7,000.

- Conservation Education Program – A program where live animals are taken to school throughout the state. Over 126 program and ~15,000 participants during 02/03 school year. Our partners are: Schools around the state ($75 per visit), Harry Hampton Memorial Wildlife Fund, USC, Forestry Commission, PRT, York Elec., Santee Cooper Elec., Charleston Museum, Ducks Unlimited. This program relies on fees, donations and sponsors for support. Schools are charge $75 per visit which amounts to ~$9,500. USC donates food (mice valued at ~$5,000.)

- Camp Wildwood - A one-week residential outdoor natural resources education camp for high school students, with an emphasis on natural resource leadership training and development of outdoor skills. Our partners are: The Garden Club of South Carolina, Inc., The SC Wildlife Federation, Harry Hampton Memorial Wildlife Fund, USC, Wal-Mart, Dicks Sporting Goods, AC Moore, PRT, Forestry Commission, NRCS, Shakespear, Future Fisherman's Foundation. This program relies on donations and sponsors for support which amounts to ~$23,000 for the program.

- Jocassee Education Program - The Jocassee Gorges education and recreation program is working to support recreation activities that do not interfere with DNR's primary mission to maintain the essential natural character of the property. The program also seeks to capitalize on the rich educational opportunities afforded by the property, not only to support development of an ecologically literate public, but also to develop a knowledgeable and active constituency for the property. Our partners are: US Fish and Wildlife Service, Clemson Univ., Clemson Extension (Oconee, Pickens), 4-H, Friends of Lake Keowee Society, Westminster Elem. School, PRT, Forestry Commission, Harry Hampton Memorial Wildlife Fund. The U.S. Fish and Wildlife Service and sponsors provide the overall education and recreation grant funding.

- Project WILD, Aquatic WILD and Advanced WILD Workshop - Are interdisciplinary conservation and environmental education programs emphasizing wildlife. The programs are designed for Kindergarten through grade 12 educators. These programs focus on the natural interest that children and adults have in wildlife through hands-on activities that enhance student learning in all subjects and skill areas. Project WILD educational materials are provided to educators through practical, interactive workshops. Our partners are: National Project WILD (CEE), Forestry Commission, PRT, Wal-Mart, Riverbanks Zoo, Harry Hampton Memorial Wildlife Fund, AC Moore, USC, Cat's Meow, Dick's Sporting Goods, Participants, Future Fisherman's Foundation, US Fish and Wildlife Service. This program relies on fees, donations and sponsors for support which amounts to ~$15,000.

- Becoming an Outdoors-Woman (BOW) - is a program that offers opportunities for women to learn skills to be able to participate in outdoors activities such as hunting, fishing, kayaking, camping, etc. The hands-on, confidence building instruction is provided in a relaxed, non-intimidating atmosphere. Our partners are: Harry Hampton Memorial Wildlife Fund, Rocky Mountain Elk Foundation, Future Fisherman's Foundation, US Fish and Wildlife Service, SC Sea Grant Consortium, Clemson, Shakespeare, National Wild Turkey Federation, Wing & Point Shooting Preserve, Federal Cartridge Company, US Forest Service. Most costs for BOW activities are recouped from participant fees and donations. The revenue from these monies totaled ~$36,320 in FY 2002-2003.

- SC Reel Kids (SCRK) - is a program that combines fishing along with other aquatic activities in order to provide a comprehensive aquatic education experience. SCRK is designed to be fun, educational, and hands-on. The target age group for the program is youth under age 16. Our partners are: US Fish and Wildlife Service, Shakespeare, Paragon Plastics, Harry Hampton Memorial Wildlife Fund, Pro Bass Angler Jim Langston, Future Fisherman's Foundation. This program is funded entirely donations and sportfish restoration funds.

- The Reel Art contest - is an aquatic art contest that provides a chance for students to learn about and create artwork showing the diverse aquatic animals and aquatic habitats that exist in South Carolina. Students will learn what types of fish live in South Carolina waters and what types of aquatic habitats exist. Our partners are: US Fish and Wildlife Service, Shakespeare, Paragon Plastics, Harry Hampton Memorial Wildlife Fund, Pro Bass Angler Jim Langston, Future Fisherman's Foundation, Bender-Burkott. This program is funded entirely donations and sportfish restoration funds.

- Fishing 101 seminars - are offered 2 hour seminars where participants learn knot tying, how to rig a line, and casting and teach participants about the catch and release program. Our partners are: US Fish and Wildlife Service, Shakespeare, Paragon Plastics, Harry Hampton Memorial Wildlife Fund, Pro Bass Angler Jim Langston, Future Fisherman's Foundation, Piggly Wiggly. This program is funded entirely donations and sportfish restoration funds.

- Fishing Tackle Loaner Program – is designed so participants can check out fishing equipment from one of several South Carolina Fishing Tackle Loaner Program Sites. At an official FTLP site, you can borrow a rod and reel and tackle box. All FTLP sites also have information on how to get prepared for your first fishing trip with tips on fishing knots, rigging a line, and what kind of bait to use. There are currently 28 FTLP sites in South Carolina. Our partners are: US Fish and Wildlife Service, Shakespeare, Paragon Plastics, Harry Hampton Memorial Wildlife Fund, Pro Bass Angler Jim Langston, Future Fisherman's Foundation, Silstar, PRT, American Sportfishing Association. This program is funded entirely donations and sportfish restoration funds. Association.

Totals for 2002 / 2003			
Program	**Participants**	**Revenue**	**# Of Sponsors**
Jr. Duck Stamp	~700	$3,000	5
Conservation Ed. Programs	~15,800	$14,130	~126
Camp Wildwood	135	$22,900	3
Jocassee Education Prog.		~$50,000	
Project WILD / Advanced WILD	631	$10,000 $4,875	1
BOW	375	~$36,320	~57
Reel Kids		~$130,000	~10
Reel Art	~400		
Fishing Tackle loaner	28 sites		
Fishing 101	100/week		
Owl Pellets	4,600(orders)	$7,262	N/A
TOTAL	~17,541	~$278,487	

Other Education Activities:

Produce flyers, publications, brochures, web sites, etc.
Envirothon
SEED
PSC (Education Area & Camp Wildwood Pizza Booth)
National Hunting and Fishing Event
Teacher Conferences
Professional Meetings and Conferences
HOFNOD events
Teaching KATE Support
Governors Task Force on Environmental Education

Magazine Section

As a part of the Conservation Education and Communications Division, magazine section's primary function is to support the Department of Natural Resources' mission through the publication and promotion of *South Carolina Wildlife*, the DNR's nationally recognized bimonthly conservation magazine and flagship educational and public relations tool. *South Carolina Wildlife* informs the public of the value of the state's natural resources while acquainting them with the agency's programs to protect and manage these resources that affect our quality of life. Magazine section also is responsible for a variety of projects that range from maintaining the division's reference library to coordination of the annual Palmetto Sportsmen's Classic. These diverse efforts

support accomplishment of the goals that make up CEC's objective within the DNR's strategic plan.

Featuring articles on outdoor activities, natural and scenic areas, character profiles, conservation issues, wildlife-watching, outdoor humor and news, *South Carolina Wildlife* extols the natural resources of our state and promotes its historical and cultural values, encouraging tourism, visitation and conservation of our natural resources.

Among the 35 feature-length articles *SCW* published this fiscal year were numerous general-interest, outdoor-related features, along with agency-support features that dealt with such diverse topics as the need to purchase a hunting or fishing license to bring federal dollars into the DNR (article included a form to allow the hunter or angler to renew his or her license by mail); SC Reel Kids, encouraging parents to involve their kids in this award-winning program; the agency's Rivers program and Forest Legacy program as they relate to the Catawba River; offshore marine research concerning the Charleston Bump; the Junior Duck Stamp Competition; and the DNR's role in the environmental permitting process.

In addition, an entire special issue was produced and published as the January-February 2003 edition celebrating the 50th year of publication of *South Carolina Wildlife*. This special issue looked at the magazine's history of supporting the agency through change and growth, narrated from the perspectives of the magazine's four editors.

SCW staff worked with the Governor's Council on Beautification and Litter (Palmetto Pride) to produce 75,000 copies of a 16-page supplement, titled "Building Pride From The Ground Up!" These supplements were bound into the center of the March-April issues as well as made available for public distribution as stand-alone mini-magazines. This partnership was financially supportive for the magazine and upheld its mission of educating the public about issues that relate to the environment.

SCW continued to explore inter-agency cooperation, extending its agreement with S.C. Parks, Recreation and Tourism's State Park Service to publish feature articles that promote the outdoor interests of both agencies. SCPRT has included funding to cover the cost of such articles in its 03/04 budget.

Groundwork was laid for a partnership with S.C. ETV to produce a television show to be broadcast on the new digital South Carolina Channel as well as ETV's analog channel, to be called *South Carolina Wildlife* and promoting the programs of the DNR. The format of the program will follow the format of the magazine. Allen Sharpe, producer and editor of SCETV's award-winning *NatureScene*, will serve as advisor and consultant on the project, with first airing in the fall of 2003.

South Carolina Wildlife each year brings recognition to the agency and the Palmetto State for excellence in photography, writing and design through its participation in national competition. The magazine was named second in the nation for 2002 by the Association for Conservation Information (ACI), which brings together journalists and educators

from state and federal natural resources agencies nationwide. The magazine also won recognition for the feature "If Walls Could Talk." The column "For Wildlife Watchers" was presented a silver award by the International Regional Magazine Association. Budget constraints limited *SCW*'s participation in other competitions.

Editorial and marketing/promotions planning moved forward, with staff continuing a 12-to 15-month advance schedule and meeting bimonthly with coordinators from other divisions. Magazine subscription sales remained steady despite the economic downturn, with paid circulation averaging 51,000. The publication continues to achieve one of the highest renewal rates and per capita distribution of any in the 15-member magazine cooperative, formed many years ago to keep fulfillment costs to a minimum.

Since this was the final year in a five-year contract cycle for production of *South Carolina* Wildlife magazine, requests for proposals to provide pre-press (color separations) and print the magazine were sent out. Eight proposals were received and evaluated through a formal, team-based process, with the winning bid assuring competitive pricing to produce the publication. A one-year contract was agreed upon, with four one-year options to extend.

Magazine photography staff, whose primary responsibility is to provide the photographs that illustrate and support magazine articles and product-promotion materials, also are responsible for still photography used by the agency in research, outreach and public relations efforts. Photographers from the section regularly provide photo support and expertise to other divisions and agencies, including taking ID photos of DNR personnel and portraits of DNR Board members. Increased use of a digital camera provides technologically advanced possibilities for product presentation and posting of features on the *SCW* Web site, along with cost savings.

Layout and design capabilities were enhanced by the art director's and editorial assistant's successful interaction with the printer via computer technology, with these techniques being refined to take advantage of further advances. (See a sampling of photographs and text from issues of *SCW* on its Web page at *www.scwildlife.com*.) Each issue, including The Wildlife Shop products offering, is online, and past issues are available in the site's archives. Customers can subscribe online, and as soon as funding is available, online ordering from The Wildlife Shop will be enabled. Staff regularly receives the comments, questions and feedback from Internet visitors.

The Wildlife Shop experienced consistent sales and continued a high level of customer service, despite the loss of one staff member. As in previous years, Wildlife Shop products were carefully chosen for high quality and education potential, as well as unique appeal. Several children's clothing and natural resource, hobby-type toy items were added with success. Posters and palmetto-themed products proved especially popular. The demands of walk-in traffic reinforced the need to stock and sell lower-priced "impulse" items.

SCW's fall products catalog was again produced and distributed, as was a spring flier telling of special offers to preferred customers. Total sales rivaled that of last year. Digital-camera images were used in the catalog, reducing production costs. Volunteers took Wildlife Shop merchandise "on the road" during the winter holidays, offering employees at other state agencies the opportunity to shop in their own buildings.

Staff again participated actively in the license renew-by-mail effort, assisting to keep mailing costs to a minimum. All credit card charges for license renewals were processed through the Wildlife Shop's merchant number and terminals. A subscription offer was included on the form, which yielded approximately 4,000 subscriptions to *SCW*.

SCW again conducted its annual Young Outdoor Writers' Competition, encouraging fourth through twelfth graders to write essays about conservationists, both well known and not-so-well-known. The statewide winners and their sponsoring teachers were honored at a reception at the Palmetto Sportsmen's Classic in March and were addressed by noted naturalist Rudy Mancke. First-place winning essays in the three categories were published in the May-June issue of *SCW*. Judges for the competition were provided by the Coalition for Natural Resource Education and the Harry R.E. Hampton Memorial Wildlife Fund provided the awards.

With the ongoing support and counsel of the DNR Board and the CEC Advisory Committee, *South Carolina Wildlife* magazine continues its tradition as South Carolina's own magazine, portraying the best of the natural Palmetto State.

Marketing Section

The agency marketing section was formed during FY 2001-02. The section's three staff members have duties related to marketing various DNR programs.

Several *South Carolina Wildlife* magazine circulation and fulfillment functions are handled by the section, including complimentary and controlled subscriptions, bulk gift and corporate orders and limited retail issue sales. The section provides advertising, promotion and direct mail marketing support, interacts with the U.S. Postal Service on periodical and bulk mailing requirements and maintains bulk postal account balances.

In addition, support is provided for the S.C. Wildlife Shop, Becoming An Outdoors-Woman, S.C. Governor's Cup Billfishing Series, the S.C. Migratory Waterfowl Stamp Program and other agency projects. The section leader also acted as a member of the DNR Legislative Committee.

Based on a test conducted the previous fiscal year, the decision was made to send the entire licensee database a multi-purpose license renewal form in May of 2003. Marketing section coordinated the mailing. Response was high, and the project's success was largely attributable to excellent cooperation between the divisions of Administration and CEC.

Organization and administration of the annual Palmetto Sportsmen's Classic is also the responsibility of the CEC Division and is now administered under the marketing section. Held each March in Columbia at the S.C. State Fairgrounds, the Classic is a three-day regional outdoor event co-hosted by the DNR and the Harry R. E. Hampton Memorial Wildlife Fund. The 2003 Classic, in its 19th year, drew in excess of 40,000 participants.

Attracting people of all ages and emphasizing the appreciation, wise use and stewardship of South Carolina's diverse natural resources, the Classic seeks to increase public awareness of natural resources through interactive educational activities, seminars and exhibits as well as provide a forum for vendors to offer for sale the latest in hunting, fishing and other outdoor-related products. A variety of activities and attractions encourage interaction, build skills and generate enthusiasm for outdoor-related recreation, while promoting public awareness in helping conserve the Palmetto State's natural resources and quality of life.

The Classic is the DNR's principal public outreach program, and other state agencies plus public and private organizations exhibit, get involved and provide assistance to help ensure the viability of this unique outdoor event. The Classic provides exposure for many other DNR outreach programs, with special emphasis on SC Reel Kids and Take One - Make One. Special exhibits and activities draw public attention to these two worthy programs. Each year the Classic chooses specific educational themes to provide children with a hands-on educational activity while attending the event. For 2003, kids decorated hats to resemble animals such as ladybugs, deer, and turtles. Some 2,000 hats were created with the assistance of education specialists and volunteers.

DNR Communications Section

Over the past fiscal year the DNR Communications Section continued its primary programs in media relations, news media coverage, information and image distribution, and airing of agency public service announcements on radio and television. Plans are to maintain effective and cost-efficient communications for the upcoming fiscal year.
The Communications Section within the Outreach and Support Services Division provides overall news media, audio and video production services to all divisions of the agency and its cooperative projects with other government agencies, public utilities, organizations and private companies. It served the public through timely and widespread dissemination of needed information, and images.

Through news releases (distributed via e-mail, ftp news download site and the DNR Internet home page) and video and audio productions the DNR Communications Section:

- Informed and educated the public about the condition and value of South Carolina's natural resources;
- Provided a primary spokesman for office and field operations covering the agency as a whole;
- Planned and coordinated agency-wide public relations, employee awareness training and media relations training;

- Encouraged ethical and safe conduct among outdoors enthusiasts;
- Informed constituents of agency services, application deadlines and points of delivery;
- Provided information on outdoor recreational opportunities;
- Informed constituents of meetings, pending department actions and opportunities for public input; and
- Updated the public on state and federal laws and regulations.
- Began production of the SCETV program "South Carolina Wildlife."

Staffing: The DNR Communications Section includes six positions (public information and videography) in three offices; Columbia (headquarters), Clemson and Charleston. Services are provided agency-wide in news writing; agency spokesperson; television and radio production; news media coordination; video production; *South Carolina Wildlife* magazine support; script and speech writing; staff orientation; delivery of public statements; public speaking and education; and allied areas in support of all divisions and responses to inquiries from the public and the news media.

Media Relations: The communications director maintains a menu driven 24-Hour News Line that delivers breaking news and media sound-bites on demand via a toll-free number (877-SCDNR-11). The system receives 75 to 100 calls a month and has resulted in a noticeable increase in radio news coverage. By telephone, the communications director handled approximately 100 media inquiries per month and responded to numerous emergency situations that required on-the-scene media coordination and public information support to all agency divisions.

Video: Video staff began production of the SCETV monthly 30-minute TV program *South Carolina Wildlife*, scheduled to begin airing November 8, 2003, at 6 p.m. Video staff also produced numerous TV Public Service Announcements, educational, instructional, training videos and special projects. Significant video projects include PSA's on boating safety, the Palmetto Sportsmen's Classic and Oyster Shell Recycling. Other videos include Camp Wildwood, Take One - Make One, SCDNR 2003 update, Donnelly Deer Hunt Rules and Regulations and CEC and Administration name change video.

News Releases: More than 400 statewide and regional news releases and media notices were produced by the Communications Section working in partnership with all agency divisions and the executive office. The weekly news release package is distributed (by e-mail, ftp news download site and DNR Internet home page) to all news media with South Carolina readers or audiences (including media in border states and in the region); to DNR enforcement officers, agency staff, board and committee members and to requesting conservation groups and agencies.

Mail-free Distribution Goal: Staff continued to improve e-mail address lists of all S.C. news media, as well as regional media with SC interest, working toward the goal of total electronic news release distribution with no need to print paper copies or mail them by the standard mail system. Total e-mail news release distribution of weekly and special

news releases went into effect with the October 22, 2001 weekly agency news package. Mail-free news release distribution currently saves more than $10,000 in annual mailing costs alone. Associated Press state headquarters in Columbia has for several years been e-mailed custom- edited fishing trend reports each Thursday for immediate transmittal to AP members for publication in Friday and weekend editions. This version of the SCDNR fishing trends is widely used in the news media.

Digital News Photo Support: The digital news photo system for providing images to the media by e-mail was continued, and photos (with attached print quality files) supporting news releases were regularly posted with news releases on the DNR Web page. Frequent media photo requests - beyond images accessible on the web site - were handled promptly by e-mail. To facilitate their retrieval, digital images are organized by division, often section or program, with duplicate back-up storage on removable media (2 gigabyte Jazz disks).

Assistance to the DNR Executive Office. Communications staff covered monthly meetings of the S.C. Natural Resources Board, supporting all needs for news writing and distribution, as well as photography, before, during and after the meetings. Staff researched and wrote speeches for the Executive Office.

News on the Web Site: The quality of the hypertext news release package posted weekly on the DNR home page continued to improve by providing better formatting and supplementary photos and captions. Each digital photo has a "thumbnail" introduction supported by a second print quality 200 pixel per inch jpeg image file for downloading by news media. News releases prompt many requests from media for supporting digital images.

Support of Other Programs: Staff also worked to plan, support and promote agency programs such as Becoming An Outdoors Woman, Envirothon, Beach Sweep/River Sweep, Zero Tolerance for Litter weekend, Take One-Make One, the Palmetto Sportsmen's Classic, National Fishing and Boating Week, DNR Free Fishing Days, Camp Wildwood and National Hunting and Fishing Day.

Becoming An Outdoors-Woman Support: Communications Section staff worked throughout the year to support the agency's Becoming An Outdoors-Woman program with statewide news releases, video assistance, planning, logistics and workshop instruction. Videographer Glenn Gardner taught the photography class, provided sound system support and shot video for pending BOW video update. Program coordinator Greg Lucas taught two sessions of kayaking and two sessions of overnight backpacking/camping at both the fall and spring Becoming an Outdoors-Woman workshops at the Clemson University Outdoor Laboratory.

Jocassee Gorges Education and Recreation: Staff member Greg Lucas assumed the duties of Jocassee Gorges education and recreation coordinator at the Clemson DNR office in October 2002. These duties were in addition to his role with the Communications Section. Lucas coordinated and edited the twice-yearly DNR "Jocassee Journal" newsletter and chaired the Jocassee Gorges Education and Outreach Working

Group to communicate Jocassee Gorges research, recreation and other issues and concerns with project partners and the general public. Communications staff provided text, digital photos, review and other content needs for the "Jocassee Journal" newsletter.

The Jocassee Gorges Web site was updated as needed. The Web site offers information on all aspects of Jocassee Gorges and allows people to request Jocassee Journal newsletter subscription and Jocassee brochure. Requests routed to Lucas, who mailed out an average of about 30 newsletters and brochures per month. A Jocassee Gorges information card was created and printed to include in all mailings, which includes contact information and Jocassee Project Partners. The seventh edition of "Jocassee Journal was published in Spring/Summer 2003.

Lucas helped coordinate, with DNR education staff, the "Jocassee Adventure" teacher workshop held at Rocky Bottom Camp of the Blind and attended by about 20 teachers. He taught the "Wonders of the Jocassee Gorges" class offered by the Clemson University Lifelong Learning program, which offers a series of six weekly field trips into Jocassee Gorges. He helped teach Oconee Kids Environmental Education (OKEE) programs at the Piedmont Forestry Center with staff from the Oconee County Clemson Extension Service. Initiated a Jocassee Gorges 4-H Natural Resources Club for service-learning projects and outdoor recreation.

A $1.2 million grant application was prepared and submitted by Lucas to National Scenic Byways Program for Jocassee Gorges/Native American Interpretive Center in 2003. He also submitted a $50,000 grant proposal to the 2003 Recreational Trails Program for five projects involving Jocassee Gorges trail interpretation and access. This grant was not funded. Lucas filed quarterly reports to DOT on $100,000 Transportation Enhancement Program grant received in 2002 to begin first phase of Jocassee Gorges education center at Keowee-Toxaway State Natural Area. He met regularly with State Parks officials to plan renovations of Meeting House at Keowee-Toxaway. He worked with Friends of Lake Keowee Society to establish a cooperative partnership with the group on Keowee-Jocassee watershed issues. Lucas taught map and compass and wilderness ethics during weeklong session at 2003 Camp Wildwood, held at Kings Mountain State Park.

Graphics And Duplicating

Graphics: In the graphics design unit, the publications coordinator provides day-to-day supervision of all art- work and printed documents as well as defines job specifications for procurement. The assistant publications coordinator is responsible for verifying and coordinating internal workflow. In addition to these positions, this unit includes three graphic artists, all of whom design, layout and assist in the production of agency publications and special projects. This year three hundred fifty jobs were produced by this unit, supporting the Administrative Services Division with 74 jobs, Wildlife & Freshwater Fisheries with 128 jobs, CEC with 80 jobs, Land, Water and Conservation Division with 28 jobs, Law Enforcement with 31 jobs, and the Marine Resources Division with 9 jobs.

The objective of the section is to produce and distribute all necessary publications to the agency for: 1) Management, research and law enforcement goals, 2) Protecting and enhancing resources and habitat, and 3) Providing wildlife, fishing and general natural resources information to the public. Since the department is required to produce and distribute information regarding hunting and fishing rules and regulations and the use of wildlife management areas, this section prepares and updates any publications affecting those activities in the state. Typical of such publications are the annual combined hunting/fishing rules and regulations, turkey hunting regulations, migratory bird regulations and wildlife management area maps that require updating each year. The section also provides a wide variety of general information on individual wildlife species, management and research facilities, game management techniques, conservation, education, fishing, boating, and recreational outdoor sporting activities.

Duplicating and mail services: The duplicating and mail services center is staffed by two full-time employees with one hourly employee. Duties include all in-house duplicating, mail processing/distribution, and courier services. Staff processed approximately $187,036 in postage from the Dennis Building and ran over 1,370,800 impressions on its AB Dick presses.