

**Annual Report**

**South Carolina**

**Department of Natural Resources**



**Fiscal Year**  
**July 1, 2001 – June 30, 2002**

**SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES**  
**2001-2002 ANNUAL REPORT**

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**NATURAL RESOURCES BOARD**

**SC DEPARTMENT OF NATURAL RESOURCES BOARD**  
**CHAIRMAN**

Dr. Joab M. Lesesne, Jr.

**VICE-CHAIRMAN**

Dr. Julius L. Leary

**MEMBERS**

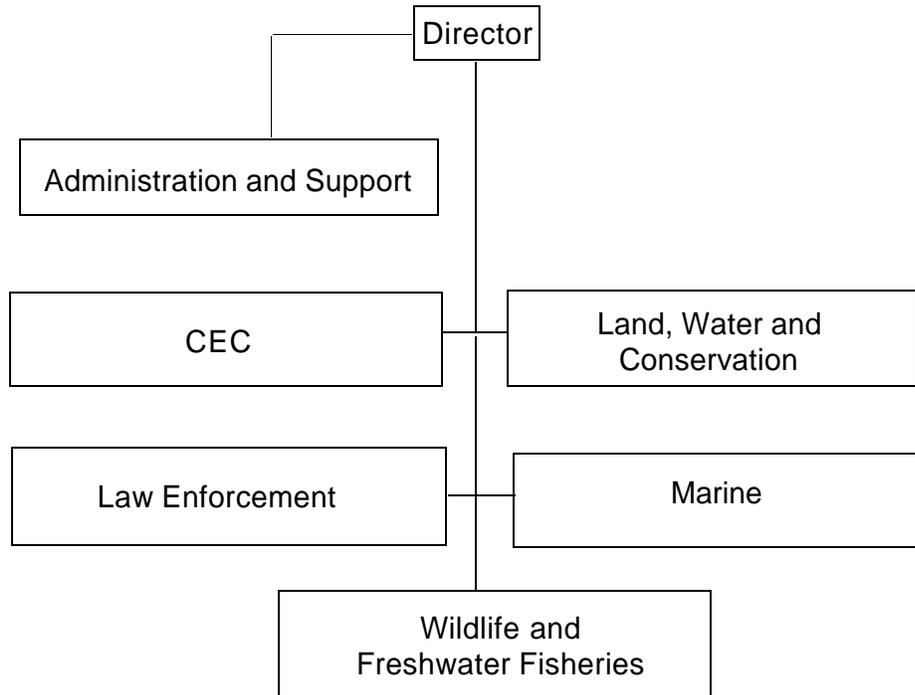
Mr. Danny L. Ford  
Ms. M. Russell Holliday, Jr.  
Mr. Ben Gregg  
Dr. Douglas A. Rucker  
Mr. D. Malloy McEachin, Jr.

**DIRECTORS**

John E. Frampton, Director, SC Department of Natural Resources  
Cary D. Chamblee, Associate Director, SC Department of Natural Resources  
Carole Collins, Deputy Director for Administrative Services and Conservation Education and Communications Divisions  
Alfred H. Vang, Deputy Director for Land, Water and Conservation Division  
Col. J. Alvin Wright, Deputy Director for Law Enforcement Division  
John V. Miglarese, Deputy Director for Marine Resources Division  
William S. McTeer, Deputy Director for Wildlife and Freshwater Fisheries Division

# 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:**

Lynn H. Youmans, Jr., Co-Chairman	Furman, SC
William S. Simpson III, Co-Chairman	James Island, SC
Whitmarsh S. Smith	Charleston, SC
Dr. Nadim Aziz	Clemson, SC
Lewis Walker	Sumter, SC
Marvin Davant	Columbia, SC
Oscar Stevens	Saluda, SC
Robert M. Rainey	Greenville, SC
Charles R. "Randy" Snow	Chapin, SC
Dr. John Mark Dean	Columbia, SC
Steve Kinard	Ridgeville, SC
Glenn C. Alexander	Van Wyck, SC
Thomas E. Garrison III	Pendleton, SC
J. Chalmers Dial	Moncks Corner, SC
Larry E. Nates	Gaston, SC
Patricia C. Edmonds	Greenwood, SC
James H. McLeod	Camden, SC
Webb M. Smathers, Jr., Ph.D.	Clemson, SC

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. It is also headquarters of the South Carolina Geological Survey. The State's 46 Soil and Water Conservation Districts receive staff, funding and guidance from the division, and the SCDNR Internet Home Page is also maintained by this division.

#### **ENVIRONMENTAL CONSERVATION SECTION:**

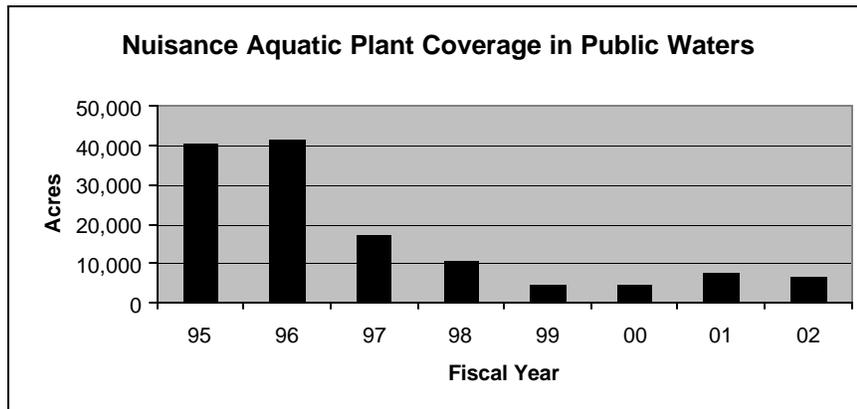
##### **Aquatic Nuisance Species Program**

The Aquatic Nuisance Species Program is a compilation of three program areas, the (1) Aquatic Plant Management Program, (2) Zebra Mussel Program, and (3) Shoreline Habitat Enhancement Program. All three program areas share common attributes of prevention, resource management,

public education, and research. Together, these programs protect and enhance the economic and environmental viability of our public waters by minimizing adverse impacts to municipal, industrial, and agricultural water withdrawals, electric power generation, navigation, water recreational activities, water quality, and indigenous aquatic life and habitat.

The South Carolina Aquatic Plant Management Program, the largest program area, was established by State law (Section 49-6-10) in 1990. The purpose of the program is to prevent, identify, investigate, manage, and monitor aquatic plant problems in public waters of the state. It further coordinates the receipt and distribution of available federal, state, and local funds for aquatic plant management activities and research. The Department of Natural Resources is designated as the agency to administer the program and works closely with the legislatively established Aquatic Plant Management Council (Section 49-6-30), in developing and implementing annual aquatic plant management plans, establishing management policies, and coordinating research activities. Funding for the program is cost-shared between Federal, State, and local (public and private) sources, as available. No state appropriated funds were received in FY 2002.

During FY 2002, program staff published and disseminated “Zebra Mussels in South Carolina: The Potential Risk of Infestation”. Due to state budget cuts, the Shoreline Habitat Enhancement Program was discontinued. Aquatic plant management operations were conducted on 25 water bodies at a cost of \$508,075 using Federal and local funds. The ultimate success of the program is measured by the presence of aquatic nuisance species in the State’s public waters. During the past year, the total area infested with nuisance aquatic vegetation was 6,690 acres. This represents a 10% decrease in coverage from FY 2001 and is an 84% decrease from peak coverage in 1996. No zebra mussels were found in state waters during FY 2002.

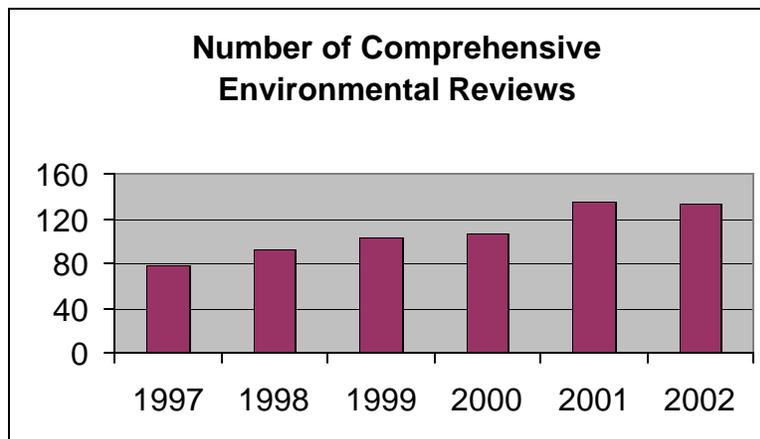


### Environmental Review

The purpose of the Environmental Review Program is to coordinate the 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 cuts have led to a reduction in the number of comprehensive reviews conducted.



### **Flood Mitigation**

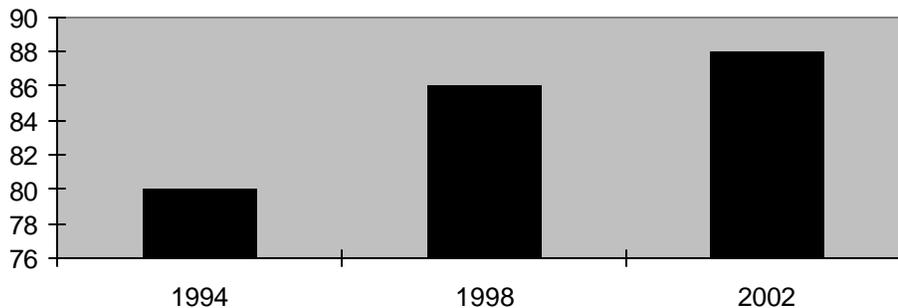
The Flood Mitigation Program is a compilation of the Community Assistance Program, State Support Services Element (CAP) and the Flood Mitigation Assistance (FMA) Programs (Planning, Technical Assistance, and Projects) for a total of four grants from the Federal Emergency Management Agency (FEMA). These programs provide technical assistance to communities in administration of the National Flood Insurance Program (NFIP) and financial assistance in flood mitigation planning and projects that reduce flood losses. South Carolina ranks sixth in the nation for flood insurance policies in effect and sixteenth in the nation for repetitive loss properties. South Carolina has over 134,000 flood insurance policies in effect.

The South Carolina Flood Mitigation Program was established by a letter of designation by the Governor and is principally funded through the FEMA. The agency's charge can be found in the State Water Resources Planning and Coordinating Act and the Soil and Water Conservation Districts Act.

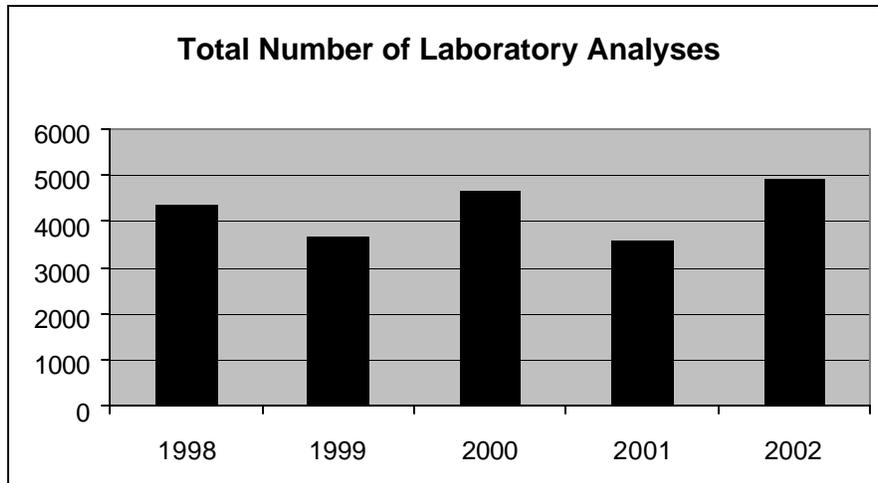
During FY 2002, the program received \$173,610 in CAP funds and \$432,300 in FMA funds from FEMA. Program staff trained over 400 community and related industry officials and provided technical assistance to over 2,000 citizens and received over 1,000 website visits. The primary indicator for program effectiveness is the number of communities with flood hazard areas that participate in the NFIP and implement required floodplain management practices. The number of participating communities is at an all time high of 200, which represents 88% of all eligible communities. The state began preliminary plans for a new Flood Map Modernization Initiative, which will depend on funding from Congress through FEMA. It is estimated to be a \$57M Program, which will be administered by the state in cooperation with FEMA.

### **Laboratory Services**

**Percentage of Community Participation in NFIP**



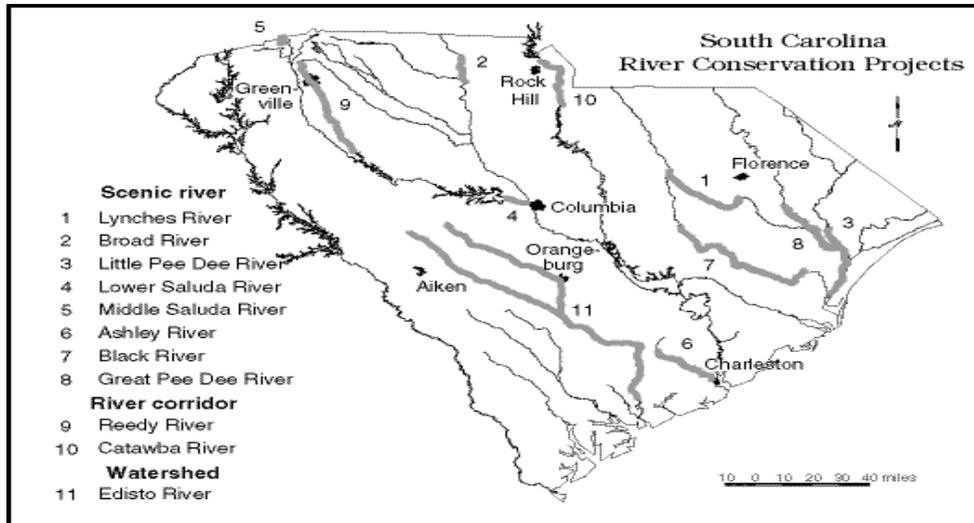
The Laboratory Services Program provides timely and accurate water quality and related analyses to support resource management programs throughout the Agency. During FY 2002, the laboratory conducted 4,927 analyses on 425 total samples (190 water samples, 173 sediment samples, 24 tissue samples, and 38 other samples) from all DNR resource management divisions. This represents a 36% increase in the number of analyses from last year and the highest workload in the past five years. Quality assurance and quality control measures were maintained.



### **Land and Water Stewardship**

The Land and Water Stewardship Program has several programs in the area of Planning and Resource Management. These programs include the Watershed and River Corridor Planning Program, the South Carolina Scenic Rivers Program, and the Natural Resources Planning Initiative. Each of these programs has a strong community-based planning component, and a key measure of customer satisfaction and mission accomplishment is the level of participation in planning projects. During FY 2002, over 1000 constituents were directly involved in projects ranging from scenic river advisory councils to river corridor projects to planning assistance in communities such as Great Falls. Other measures of mission accomplishment and involvement are the completion of resource management plans and the designation of new State Scenic Rivers. Draft management plans were completed for two scenic rivers and a 70-mile segment of the Great Pee Dee River was designated as a State Scenic River. Another measure is the involvement in Scenic River Advisory Councils. Currently, over 70 individuals are involved in river management through advisory councils. All of the active projects in this program area were administered in FY 2002 for approximately \$16,000. This represented a decrease of approximately 35% due to budget cuts in both the River Program budget and a significant cutback in planning programs.

In FY 2002, the Land and Water Stewardship Program had three primary programs in the area of technical assistance, education and outreach. This represents a significant cutback as well as the elimination of some programs compared to FY 2001 due to budget cuts. In FY 2002, the Adopt-a-Landing Program was dropped, SC River News switched from hard copy to an electronic publication, many public outreach activities were curtailed and technical assistance programs were severely cut. However, on a positive note, Beach Sweep/River Sweep involved over 7000 participating volunteers, removing approximately 35 tons of trash from South Carolina's waterways. The Natural Resources Stewardship Program recognized two developments with Environmental Stewardship Awards. All of these programs were administered with expenditures of approximately \$8,000.



### Geological Survey

As in the past two years, the activities of the South Carolina Geological Survey (SCGS) continued to be determined by the legislatively described duties. Those duties include: mapping, gathering of surface and subsurface data, involvement in regional planning and effective land use, economic development, and distribution of geologic information. Project objectives to satisfy those duties also continued to be developed on the basis of defining unique strengths, recognizing opportunities, identifying problems, and determining strategies. Project work was conducted under the established program areas: Land Use-Environmental, Tactical Support, and Education-Extension. The Land Use-Environmental Program gathers basic field data and produces geologic information from different regions of the State. The Tactical Support Program refines that information and creates geologic knowledge in a reproducible format. The Education-Extension Program then delivers this knowledge or asks for needed derivative products to be produced in the Tactical Support Program.

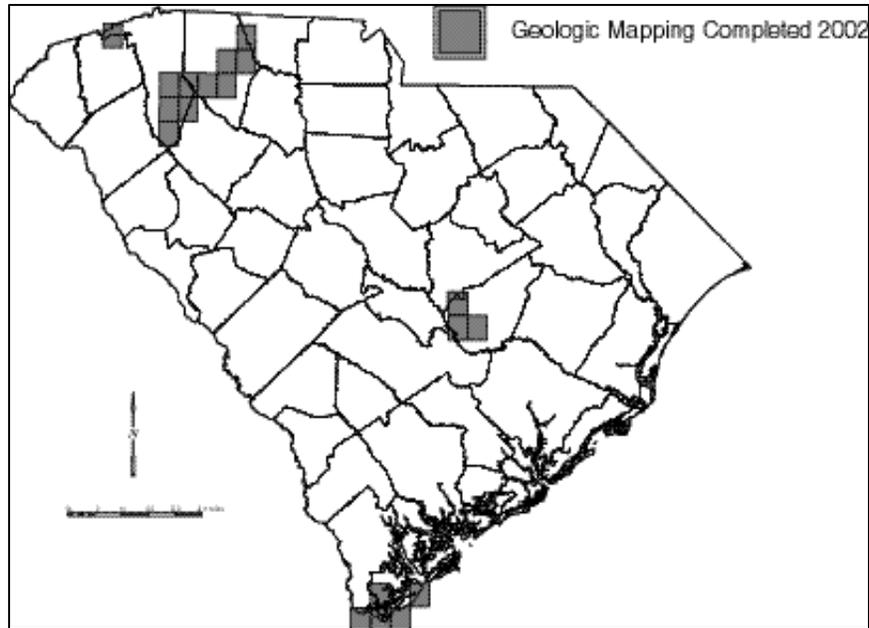
Under the Land Use-Environmental Program, mapping was conducted in three different regions and was supported either with state, National Cooperative STATEMAP Program, or National Park Service funds (See Figure). Along the southern coast, approximately 165 square miles (land area = ~2.75, 7.5-minute quadrangles) were mapped in the Bluffton area. Technical innovativeness resulted in mapping facies within depositional systems and in conducting analytical studies to age date those systems. 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. In the Lake Marion area, three, 7.5-minute quadrangles were field checked and refined. Those maps, and the ones presently being developed, will help in the analysis of what long-term effects the Charleston earthquake zone has had on the Lower Coastal Plain. Along the I-85 growth corridor in the Piedmont, approximately 360 square miles were mapped (land area = ~6, 7.5-minute quadrangles; 4.5 internally and 1.5 outsource). Internal mapping focused on establishing the physical relationships between the Laurens thrust stack to the southeast and the Six Mile thrust sheet to the northwest. Outsource mapping delineated the location of the Seneca

fault. Also in the Piedmont, Kings Creek quadrangle was mapped as part of the National Parks Program. This mapping is a combined project with the U.S. Geological Survey to inventory national resources of Kings Mountain National Military Park.

The Tactical Support Program was created to impact knowledge management and is the second step in data handling; map compilation is the first. Focus of the Program continued to be the development of digital electronic files of 1:24,000-scale maps. Seventeen 1:24,000-scale quadrangles were digitized this year. Value was added when cross-sections were included with the final electronic products. Nine Piedmont quadrangles also were reduced and compiled into a 1:100,000-scale map that covers an area of uranium contaminated groundwater. The Education-Extension Program also requested different derivative products for education. The number of power point presentations to compliment the required Earth Science teaching standards was expanded, and those presentations were made available to teachers on CD. Education graphics for bulletin boards also were reduced and placed on the web.

Under the Education-Extension program, twenty-two (22) classroom presentations were made on different earth science topics, and over 200 mineral kits were provided to schools throughout the state. In the office, other education graphics were printed upon demand as teachers called or visited the SCGS. Workshops and an education booth at the South Carolina Science Council meeting in Myrtle Beach also provided earth science information directly to teachers. General assistance was provided to 252 general walk-in or call-in customers. More specific help, not included in that number, was provided to the Department of Health and Environmental Control on the uranium project, the Emergency Preparedness Division on earthquake risk analysis, the South Carolina Building Code Council on earthquake awareness, and the Governor's office in general. Numerous consultants requested information on industrial minerals, i.e. materials for brick or cement. Map information and stratigraphic data were explained to a variety of walk-in and phone-in customers interested in earthquake hazard. Rizzo Consultants requested specific information and assistance with understanding the structural geology in the vicinity of Lake Murray dam; the dam is presently being retrofitted because of the potential of earthquake hazard. To assist the Carolina Geological Society, a Special Issue on the Inner Piedmont was published as Volume 43 of *South Carolina Geology*. Staff prepared, reviewed, and edited papers for that issue. The SCGS also participated in the Southeastern Section Meeting of the Geological Society of America with different co-authored abstracts on Piedmont topics.

Work in the Core Repository continued into a fourth year. Cores continued to be re-boxed into two-foot cardboard boxes to free up shelf space. A computer catalog is presently being developed. After lights and logging tables were added in a work area, the number of customers using the facility increased. Interest of many customers focused on the cores released by the completion of the Coastal Plain aquifer study, a combined project of the DNR Hydrology Section and the U.S. Geological Survey.



## **Hydrology**

The Hydrology Section maintains a statewide surface and ground water monitoring network in cooperation with the U.S. Geological Survey. Information collected from such networks 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 state is currently in its fifth consecutive year of drought. Stream flows and ground-water levels are at historical lows throughout most of the state owing to the duration and severity of the drought. The report "Multiyear-Drought Impact on Hydrologic Conditions in South Carolina, Water Years 1998-2001" summarizes the effects that this unprecedented drought has had on the state's water resources.

The Section continued to collect and analyze data in an effort to disseminate valuable information to the general public and other agencies regarding the status of the state's surface and ground water resources. Staff worked directly with the state's water users and were responsible for: 1) preparing water management strategies for maintaining stream flows capable of sustaining industrial and municipal operations during the drought in the Pee Dee and Savannah Rivers; 2) providing technical assistance and information on declining ground-water levels to municipalities and residents that rely solely on ground water for their water supply; 3) providing information and technical assistance to agricultural organizations regarding potential sources of ground water for irrigation purposes and locating suitable sites for irrigation wells; and 4) providing information about water availability to municipalities that are exploring conjunctive uses of surface and ground water.

Staff hydrologists are working with the Farm Services Agency to assist farmers with the location of irrigation wells. Staff are working with the U.S. Geological Survey to delineate and map the principal aquifers of the Coastal Plain. The Section also helped draft legislation that calls for the creation of the Savannah River Compact that, if enacted, will give the state authority in allocating water resources of the Savannah River Basin.

During the past fiscal year, staff measured water levels of 385 wells constructed in the Black Creek and Middendorf aquifers to determine if water levels in these aquifers have significantly declined due to pumping and drought conditions. Historical ground-water levels of 282 wells were compiled to show long-term trends in aquifer storage and the effects of prolonged droughts on our ground-water resources.

Staff hydrologists, along with other scientists in the DNR, are involved with the FERC re-licensing of the Santee Cooper hydroelectric facilities. The Section has developed a HEC-5 numerical model and is currently evaluating various management alternatives for Lakes Marion and Moultrie. At stake are the fish and wildlife habitats of the lakes and of the Santee and Cooper Rivers, and water supplies for municipalities and industries in the Charleston area.

With the aid of geophysical soundings and a series of salinity tests, staff hydrologists identified construction problems with the Yawkey Wildlife Center's newest domestic-supply well. Breaks in the well casing allowed brackish water to seep into the well, contaminating a deep aquifer and the Center's old well. To protect the integrity of the aquifer, the Section implemented a restoration cleanup program and recommended a solution for abandoning the problem well.

To improve the level of understanding of how climate affects water resources, the Section installed a weather station (rainfall, temperature, barometric pressure, humidity, wind speed, wind direction, and solar radiation) at Clark Middle School in Orangeburg that is coupled with three observation wells. The station is monitored by the State Climatologist's Office, and data are accessible to students through a landline installed by the school district.

Granby Dam was built on the Congaree River at the turn of the 20<sup>th</sup> century to provide navigation access up to Columbia. It has not been used for many years but remains in place as a short dam and open-lock passage that is used by boaters to bypass the dam when river levels are low. A recent proposal to remove the dam has raised concerns about what effect removing the dam would have on local water levels and navigation through that stretch of the river. Funded by the U.S. Fish and Wildlife Service, staff hydrologists are evaluating the impact of the dam on the river and how stage and flow would change if the dam was removed.

The report "Ground-Water Resources of Kershaw 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 Richland Counties.

Staff hydrologists continue to maintain a statewide ground-water monitoring network, which currently consists of 50 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; to collect geophysical data from wells to delineate aquifers and identify water-bearing zones (data from 14 wells were collected in the past year); to site wells in the Piedmont region, using geophysical instruments (12 wells were sited in the past year); to investigate interactions between surface and ground water; to collect hydrologic data from new wells; and to update our database that consists of 35,000 well records.

### **Office of Climatology and Southeast Regional Climate Center**

The fourth year of drought in the southeastern U.S. challenged the resources of the Office of Climatology. In June 2002, worsening conditions required the declaration of a severe drought for all South Carolina counties. Following public hearings and testimony to the House and Senate sub-committees by the Office of Climatology, new drought regulations were passed by the State legislature on May 7, 2002.

Monitoring the drought required daily review of climate reports from South Carolina and neighboring states, including interaction with other state and federal agencies. The Office of Climatology analyzed climate reports and placed climate indices, graphs, charts, and other information on web sites for access by local, state, and federal agencies, water suppliers, businesses, industries, media, and public. The Office of Climatology contributed information to the weekly National Drought Monitor.

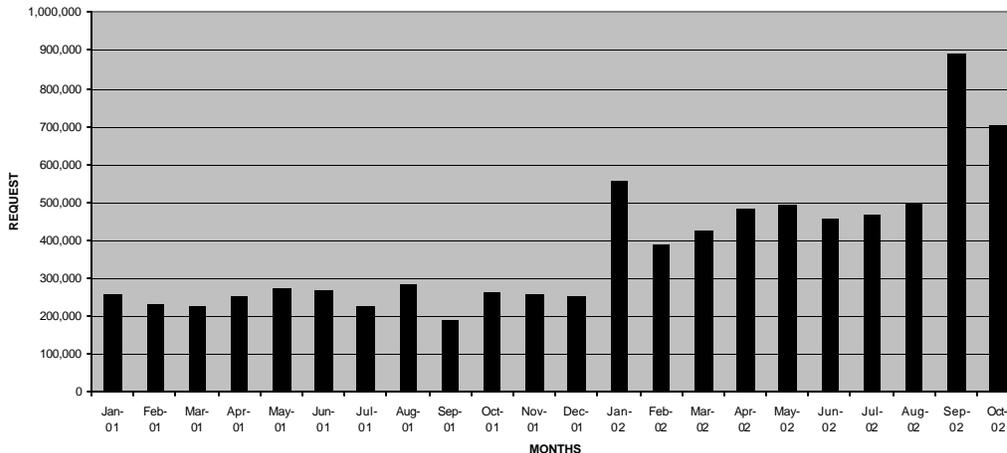
The South Carolina Drought Response Committee convened several times during the year requiring coordination of schedules, meeting places, agendas, organization, and logistics. Following the decision of the Committee on changes in the drought status, press releases were issued and the climate office was responsible for up to 2500 mail-outs. This usually resulted in 30-50 additional media inquiries. The Governor, with approval of the Senate and requiring coordination and administrative assistance by the Office of Climatology, filled many Committee vacancies.

To meet the needs of a diverse and geographically broad customer base, the Office of Climatology takes advantage of funding opportunities from a variety of sources. In addition to state appropriated funds (28%), the SCDNR uses federal research grants from the National Oceanic and Atmospheric Association (68%), and program income from the sale of value-added climatic products (3%). State budget cuts caused a study on hurricane climatology to be displayed on a web site instead of being published. It also cut travel to professional meetings that are a valuable resource for new ideas, research, and technology.

Current and historical climate products for South Carolina and other southeastern states are obtained, quality assured, and maintained on data archives to support the climate information needs of various economic sectors in the states and territories. Indicators for organizational effectiveness are near-real time information acquisition, innovation rates, revenue efficiency, and legislative compliance. Information acquisition increased by 1.5% for NOAA sources. Information distribution has been effectively transitioned to e-technology processes with a net gain in customer satisfaction. Innovation rates are 13% reduction in manual-offline processes

and 11% increase in automated information distribution such as web based. Program income increased by 11%; hence productivity, average revenue generated per item, increased by 28%. Total client interactions, including person-to-person, web-based, *et cetera*, increased by 32%.

CLIMATE SECTION WEB REQUESTS



## **CONSERVATION DISTRICTS SECTION:**

### **Technical Assistance**

DNR-Conservation Districts Staff provides technical assistance through conservation districts to the public. Technical duties of staff include planning and installation of soil and water conservation practices, promoting wildlife habitat, monitoring soil erosion, assessing sediment and storm water problems and conducting clinics and workshops. Through conservation programs in the districts, \$12.4 million in federal cost share assistance has been provided for installation of Best Management Practices. This year, an additional 253,621 acres were placed under a conservation plan in South Carolina, bringing the total to 7.9 million acres under 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.

### **Conservation District and Watershed District Assistance**

The Division provides program management assistance in the implementation of the Soil and Water Conservation Districts Law and the Watershed Conservation Districts Law. Division staff attended soil and water conservation district board meetings, watershed conservation district board meetings, and training sessions providing direct assistance to the 230 district commissioners, 185 watershed directors, district employees and other citizens. There are 37 Watershed Conservation Districts in the state with a combined total of 1,232,654 acres. Division staff provided direct assistance such as district commissioner and watershed director training, grant writing, and program management. During the 2001-02 Session of the SC General Assembly, staff tracked 29 bills relating to natural resource conservation and provided periodic

updates and guidance to the conservation districts. Staff continues to assist with Web page development, updates and design for conservation districts.

### **Nonpoint Source Program**

The Nonpoint Source Program includes education, training, demonstration of best management practices (BMPs), and technical assistance on the selection and design of BMPs to control and prevent nonpoint source pollution (NPS). The state program is implemented pursuant to Section 319 of the federal Clean Water Act, which requires each state to identify NPS problems and to implement preventive and corrective actions. In FY 2001-02, Department staff provided technical assistance towards water quality protection and management projects, assisting ten conservation districts with EPA Clean Water Act Section 319 grants which resulted in \$457,000 for NPS cost share projects; coordinated a NPS training workshop for eleven conservation districts eligible for funding; coordinated a bi-state meeting on water quality issues in the Catawba River Basin for ten conservation districts in North and South Carolina; and assisted the Greenville Conservation District in initiating a local cost share program directed towards NPS pollution control.

### **Drought and Water Use**

On drought related issues, DNR cooperated with the USDA-Farm Service Agency on a \$500,000 cost-share project to install wells in the Ridge area for the purpose of providing irrigation water. Staff coordinated and participated in several public meetings on water use issues in the Savannah River basin, in cooperation with Anderson, Pickens and Oconee Counties and the Upper Savannah Council of Governments. Staff also coordinated a public meeting sponsored by the Jasper Conservation District on ground water issues. Staff monitors drought conditions statewide on an on-going basis.

### **Land Protection Programs**

Conservation Districts Section staff participated in four Farm and Forest Land Conservation Training Workshops in cooperation with Clemson University, the American Farmland Trust and several other agencies. The workshops offered an opportunity for land professionals to discuss land use issues and effective conservation tools for farm and forest landowners. Staff and conservation districts are assisting land trusts and other individuals and groups with land protection efforts. Staff assisted the Pee Dee Land Trust in its first efforts to protect land in the 5 county area including 668 acres on the Scenic Lynches River. At the direction of the Advisory Committee, staff has become involved with the South Carolina Land Trust Network to partner on creating an inventory of conservation easements and providing information to the state's citizens on the value of easements.

### **Conservation Equipment Program**

Sixty-six (66) units of conservation equipment such as no-till drills, tree planters, and drip irrigation machines are made available to the general public through the conservation districts. 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 jointly with assistance from federal, state, and private agencies.

### **Public Outreach**

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. The purpose of the Council is to initiate outreach efforts to identify and educate small, minority, and underserved individuals on the programs and services of the state and federal agencies. To accomplish this, the Council has been conducting Outreach Workshops throughout the state. These workshops, while targeting underserved groups, are open to anyone. During FY 2001-02, five Outreach Workshops were held covering 17 counties. Workshops will be held across the entire state by the end of 2003. The average attendance at each workshop has been approximately 100 citizens, including many 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 of the S.C. Association of Conservation Districts.

Division staff coordinated the Third Annual Governor's Summit on Agriculture and Natural Resources, which was held on Thursday, February 7, 2002 at the Adam's Mark Hotel in Columbia. The 2002 Summit was the result of an on-going process involving leaders from the state's leading agricultural, conservation and natural resource management organizations, government officials and academia. The purpose of the Summit was to establish dialogue among farmers, policy makers, educators and others and to review the state of the State regarding agricultural and natural resources conservation policies. It was designed around a strategic planning approach through which participants were called on to reach a consensus on specific policy recommendations as they related to broader issues.

Summit participants attended informative, presentation-based sessions: Homeland and Bio-Security of South Carolina Livestock and Crops; Regulations of the State's Livestock Industries; Water Use and Conservation; Property Rights and Land Preservation; and Alternative Sustainable Crops. DNR staff was responsible for monitoring group discussions, recording comments and reporting results at the closing session.

### **Outdoor Education**

Division staff was involved in the planning and installation of outdoor classrooms and nature trails at 15 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 Bamberg Outdoor Classroom and Nature Trail, the Conservation Station in Richland County, the Blue Heron Nature Trail in Jasper County, the Lynch's Woods Park in Newberry, Playcard Environmental Center in Horry County, the Adair Environmental Center in Laurens County, and the Roper Mountain Center in Greenville. The Florence District worked in cooperation with Florence County to fund and build a boardwalk at the Lynches River County Park. Some other outdoor education programs conducted and /or sponsored by conservation districts include Hunter Education, Beach/River Sweep, Farm Safety Camp, Arbor Day and Earth Day events.

### **Educational Programs for Students and Teachers**

Staff conducted the annual Governor's Institute for Natural Resource Conservation at Lander University in June. High school students sponsored by their local conservation district from across the state attended the week-long workshop. Delegates 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 SC Conservation Districts Foundation and coordinated and staffed by DNR with assistance from Lander University faculty and staff.

The 6<sup>th</sup> Annual SC Envirothon state competition was held at the Clemson Education and Research Center in Columbia. 130 High School students representing 21 counties competed in the areas of aquatics, soils, forestry, wildlife, and biodiversity. James Island Christian Academy won 1<sup>st</sup> place and represented the state at the International Envirothon held in August. Division staff coordinated this event with assistance from the SC Envirothon Steering Committee, DHEC, Conservation Districts, Santee Cooper, USDA-NRCS, the Forestry Commission, Soil and Water Conservation Society, Richland School District 2 and the Department of Education.

Seventy students representing 27 conservation districts attended the 2001 Carolina Coastal Adventure (CCA) held on the shores of Lake Moultrie. The students studied coastal and water issues and were treated to an excursion on the DNR research vessel at Ft. Johnson.

### **Project WET (Water Education for Teachers)**

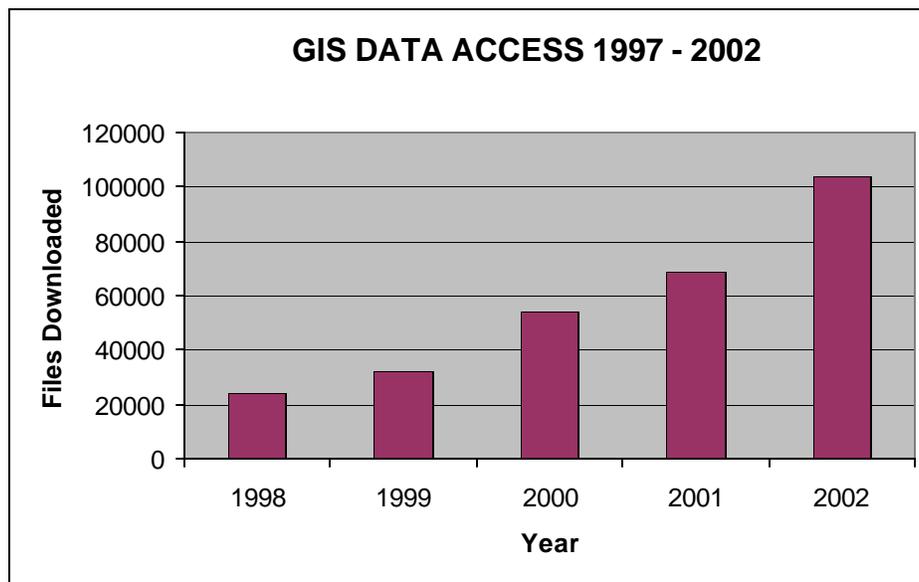
Staff conducted 26 Project WET six-hour training workshops for teachers statewide, with approximately 1,820 professional educators attending. DNR staff also coordinated three Water Education Day ("Make a Splash With Project WET" Water) events in Beaufort, Orangeburg and Greenville counties. Over 1,500 fourth and fifth grade students, teachers and administrators attended these one-day events. Students participated in learning stations where DNR personnel and other natural resource professionals presented water resource and conservation activities.

## **NATURAL RESOURCES INFORMATION MANAGEMENT & ANALYSIS SECTION:**

All 1:24,000-scale natural resource data layers including soils, wetlands/land use, Digital Line Graphs (contours, hydrography, transportation and boundaries) were completed through final quality assurance/quality control (QA/QC) for South Carolina. Between 1989 and 1996, these data were digitized from hardcopy map sources through Joint Funding Agreements with various federal mapping agencies responsible for their development. Since 1996, the DNR has provided edge matching and feature attributing with relevant information for use in natural resource management. Establishment of joint funding initiatives for the primary data layers resulted in substantial cost savings to the state and insured that data base development was compliant with Federal Geographic Data Committee (FGDC) standards.

Statewide 1:12,000-scale Digital Orthophoto Quarter Quadrangles (DOQQs) also were completed during fiscal year 2001-2002. The data are orthorectified scanned color infrared photographs with each photo covering approximately 14 square miles. The DOQQ development was coordinated by the DNR with contributions from 25 state, federal, and local government agencies as well as from several private corporations.

All GIS data have been converted to Arc export format or MrSid format 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 more than 250,000 map files.



NRIMA staff completed the South Carolina GAP Analysis (SCGAP) biodiversity mapping project. The SCGAP was a cooperative program with the US Geological Survey, Biological Resources Division for the purpose of creating a digital inventory of South Carolina's biodiversity. The program created four primary types of data. The first was a digital land cover of the state derived from Landsat Thematic Mapper satellite data combined with ancillary data such as soils and National Wetlands Inventory wetlands. These data were used to identify

significant vegetation types in the State.

The second data base consisted of a series of 454 terrestrial species potential distributions based on county of occurrence and preferred habitat. County occurrence and habitat affinities for each species were obtained from library and museum records. The land cover was used to model the potential animal distributions based on the habitat affinity information. In addition, composite species richness maps were generated for mammals, reptiles, birds, amphibians and total species.

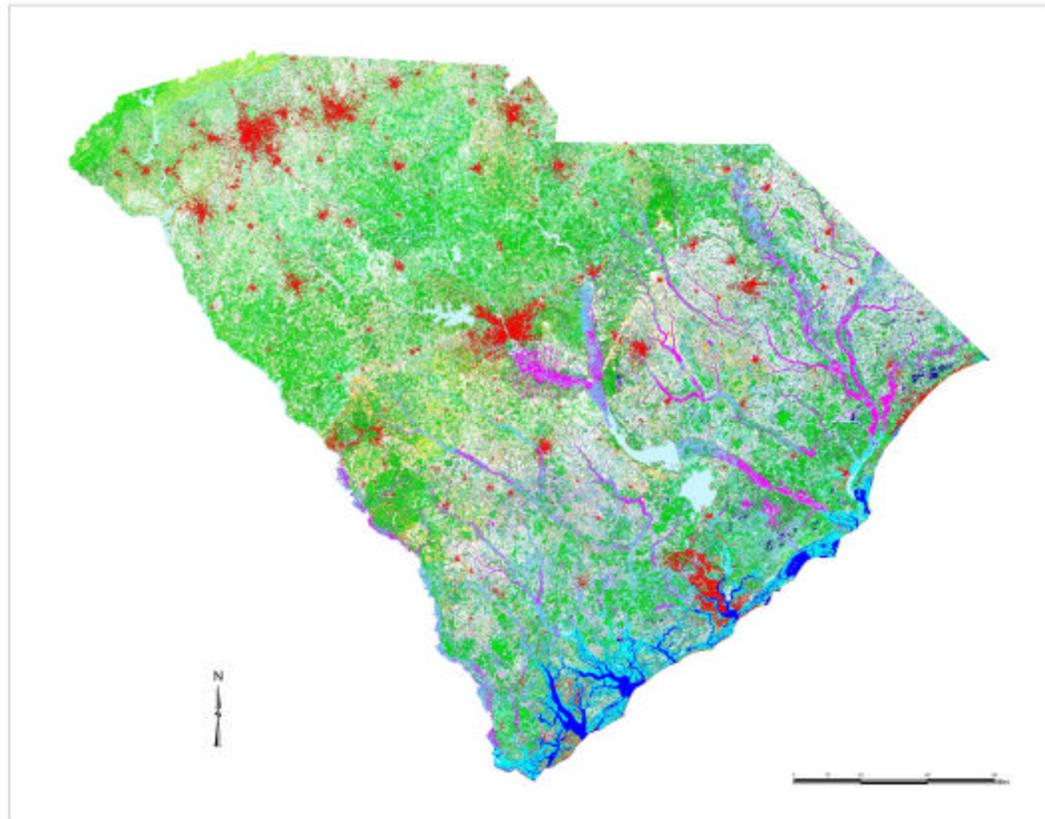
The third data set, conservation lands, were compiled from public land records and entered into the GIS. These included properties owned or managed by state, federal and local agencies and various conservation organizations. For each property information was recorded regarding its conservation and protection status.

The final data generated by the SCGAP project are analysis results that identified the protection status of significant vegetation and habitat and potential species distributions throughout the State. The data will be used to assess the integrity of South Carolina's natural landscape, document the distribution of biodiversity within the state, provide baseline data for land-use change studies, and provide fact-based information for conservation planning. All data were compiled on CD-ROM and will be distributed through the USGS Fish and Wildlife Cooperative Research Unit at Clemson University. Data also will be made available through the DNR GIS Data Clearinghouse.

The South Carolina Gap Analysis Program was primarily funded through USGS/BRD National Gap program through the Clemson University Fish and Wildlife Cooperative Research Unit. Additional funding and in-kind support were provided by the US Fish and Wildlife Service, the US Environmental Protection Agency, and the South Carolina Department of Natural Resources. Substantial cooperation and assistance was provided by staff at the University of South Carolina, Clemson University, College of Charleston, Winthrop University, Coastal Carolina University and Furman University, Clemson University Fish and Wildlife Cooperative Research Unit, US Fish and Wildlife Service, US Forest Service, The Association for Biological Information and the Southeast GAP Alliance.

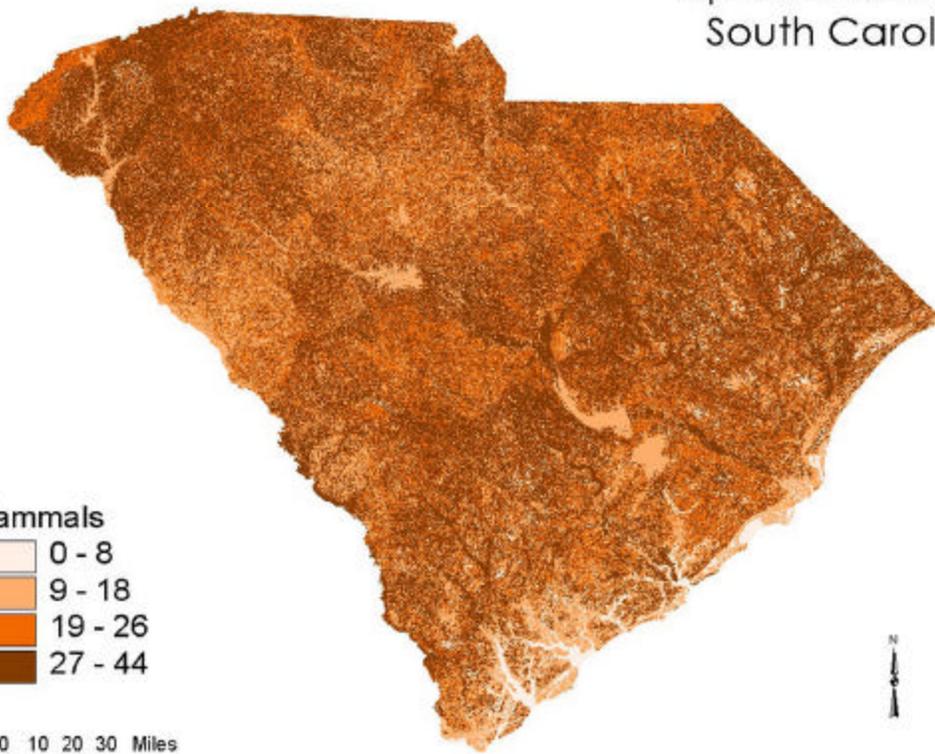
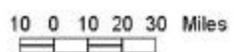
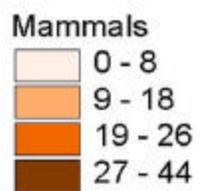
# South Carolina General Land Cover

## SC GAP Analysis



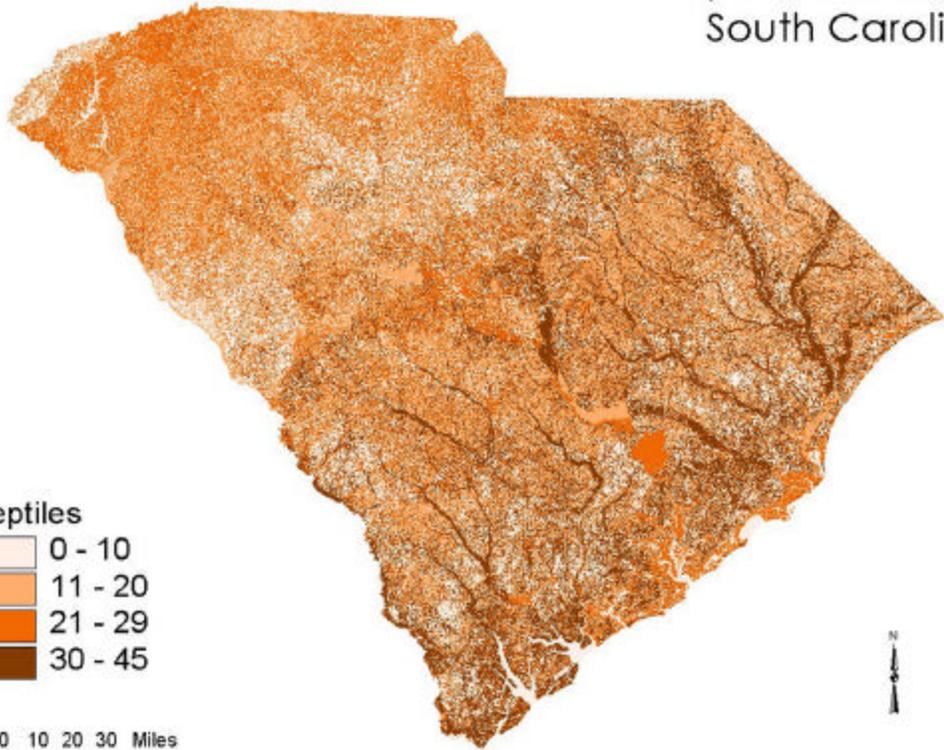
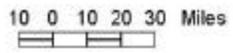
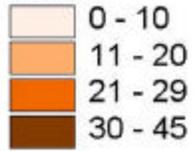
Aquatic vegetation	Marine water	Sandy bare soil
Beach	Maritime forest	Swamp
Bottomland/floodplain forest	Marsh/emergent wetland	Urban development
Closed canopy evergreen forest/woodland	Mesic deciduous forest/woodland	Urban residential
Cultivated land	Mesic mixed forest/woodland	Wet evergreen
Dry deciduous forest/woodland	Needle-leaved evergreen mixed forest/woodland	Wet scrub/shrub thicket
Dry mixed forest/woodland	Open canopy/recently cleared forest	Wet soil
Dry scrub/shrub thicket	Pine woodland	
Fresh water	Pocosin	
Grassland/pasture	Rock outcrop	

# Species Richness South Carolina



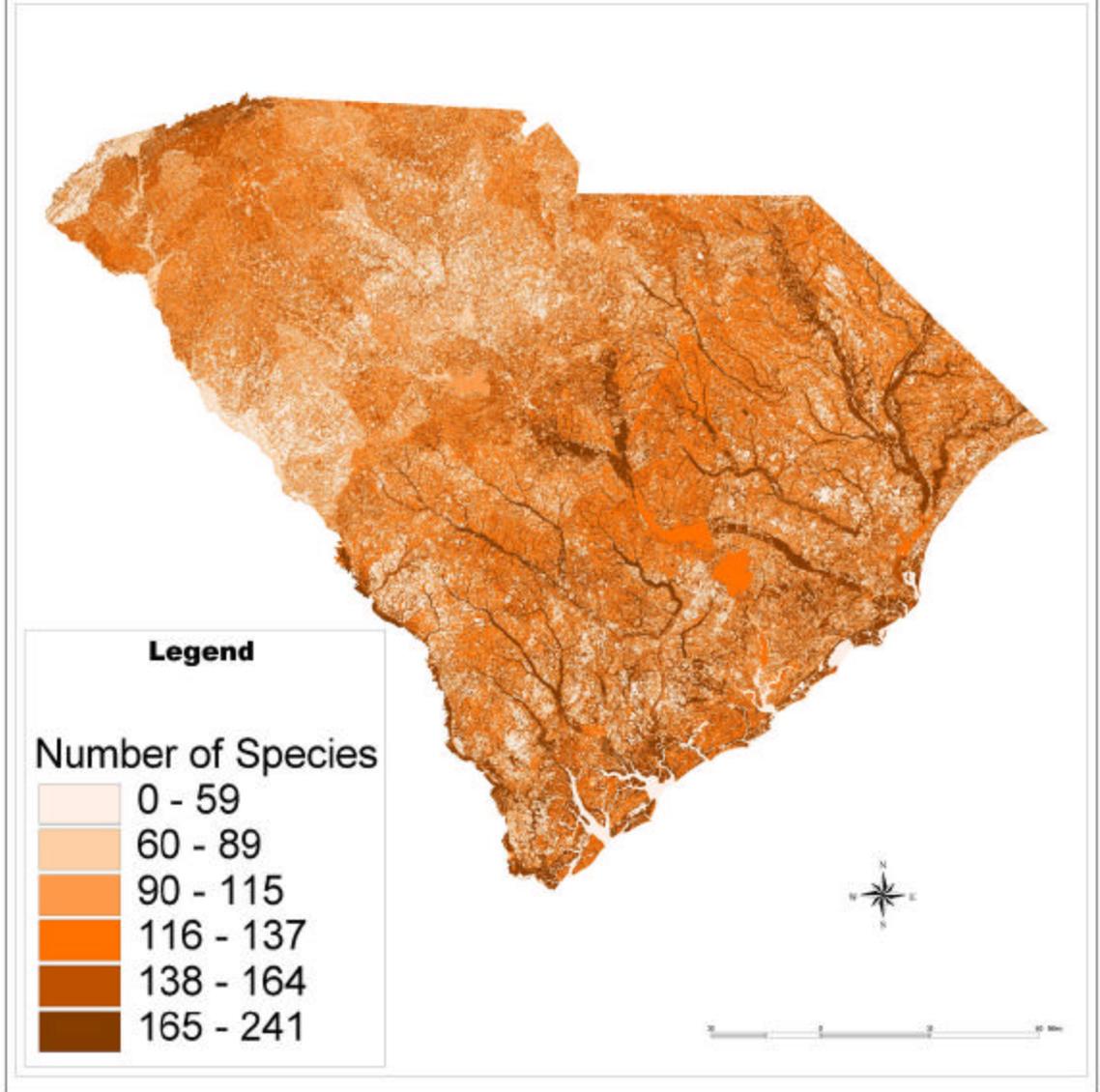
Species Richness  
South Carolina

Reptiles



# Predicted Species Richness

## SC GAP Analysis



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 2001-2002, the Center fulfilled 4,023 requests for maps, aerial photos and other cartographic products related to natural resources. Staff participated in SCMAPS workshops and other educational activities.

Four new servers were purchased and installed to enhance data processing capabilities of the Division. IBM F50 and B30 servers were obtained to provide Oracle and GIS/remote sensing support and to replace the previous web server. A Dell 2550 server was installed to improve office automation and desktop publishing services. A Dell 6250 server was installed to provide Internet Map server capabilities to the agency. This system will allow DNR staff and the public to access map information through the Internet without downloading files to their personal computers. Each of these items will provide additional computing capabilities but will reduce long-term maintenance costs by at least \$125,000 over the next five years.

**SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF MARINE RESOURCES**

**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. Vessels have trawl capabilities and are able to support extended cruises. U. S. Coast Guard licensed captain's 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 180 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. This is done to fulfill the goal of fostering a seafood farming industry throughout the state's coastal areas. 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 Conservation, Education and Communications Division, the Land and Water Conservation District Division, the Law Enforcement and Boating 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 or to arrange a tour of the facilities contact the Office of Public Affairs at (843) 953-9300.

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

**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
Daniel E. Henderson	Ridgeland
Benjamin H. Gregg, Jr.	Columbia

**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
William L. Hiott	Charleston
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

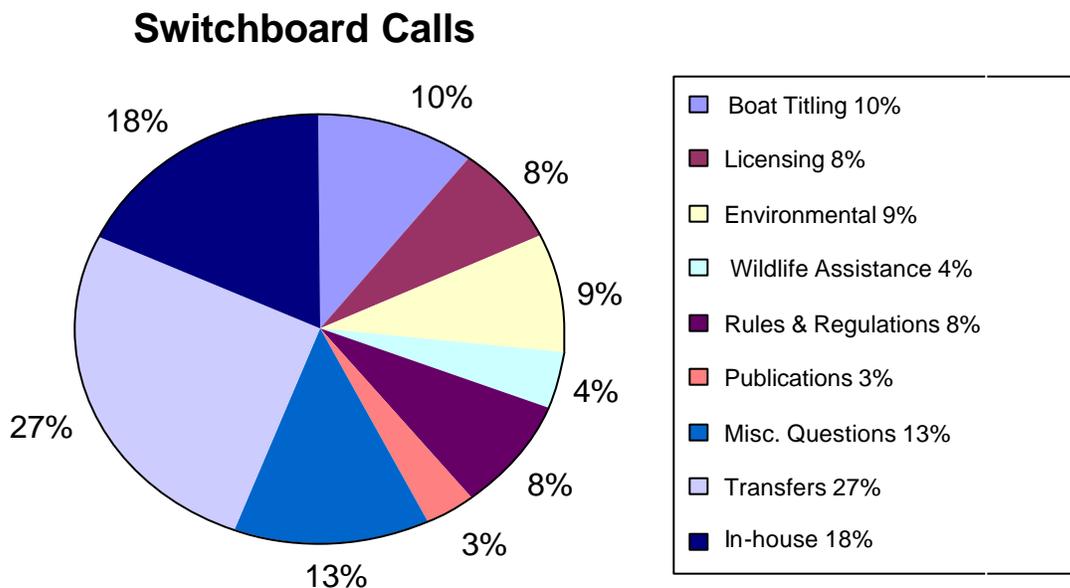
## OFFICE OF PUBLIC AFFAIRS

The Office of Public Affairs 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 Communications 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 Office 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 we use in our management and research endeavors,
- and what user groups can do to protect and conserve these resources.

### Public Assistance

The Office of Public Affairs 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. We also offer a number of informative brochures, maps, etc. for this purpose. During FY 2001-2002, the office 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 2001-2002, the Office of Public Affairs Media Relations Coordinator wrote 70 news releases. News release topics included various season openings/closings and summaries, MRD studies, coastal law enforcement cases, new regulations, ECO-Project activities, S.C. Governor's Cup Billfishing Series, meeting announcements, etc. The coordinator was designated as a field editor for the *South Carolina Wildlife Magazine* and, among shorter articles, wrote the feature article "Perception of a Predator" about sharks and "At Your Service" column on Karen Swanson. Several large media events were planned including the deployment of 50 New York subway cars on an artificial reef (footage aired on national television), Governor Hodges' ceremonial signing of the red drum bill, turtle and shark/red drum tagging, the Sustainable Seas expedition, red drum stock enhancement, rescued sea turtles, oyster restoration and recycling programs, etc.

The coordinator helped reporters gather information and interview DNR employees for newspaper articles, radio shows and TV news stories including this year's popular topics such as shark attacks, homeland security, requirement of leatherback TED's, nuisance alligators, and the DNR's purchase of Morgan Island. The coordinator persuaded national television channel Outdoor Life Network (OLN) to visit the MRD for the red drum segment of a show called "Gray's Sporting Journal". This year, the Media Relations Coordinator began writing a monthly column for the maritime publication the *Water Log*.

## **Education**

During FY 2001-2002 educational activities were substantially reduced due to agency budget cuts. Approximately 4,000 students, teachers and members of the public participated in educational tours, cruises, classroom programs and special events. Participants represented the entire state of South Carolina. Approximately 30 educational cruises and 21 classroom 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. Another 369 teachers participated in 8 teacher workshops at the Marine Center in Charleston and in the ACE Basin. Additionally, the Marine Education Program participated in large outreach programs including the Southeastern Wildlife Exposition, Palmetto Sportsman's Classic and National Hunting and Fishing Day.

A slide presentation was designed to show how coastal areas are being impacted by development, the species found in the coastal areas and how the department is working to solve the problems created by loss of habitat. This presentation was presented to the Seabrook Island Natural History Society.

## **Eco (Educate Colleton Outdoors)-Project**

The Gaylord and Dorothy Donnelley Foundation continued its financial support of the ECO (Educate Colleton Outdoors) – Project for the third year. 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.

For FY 2001-2002 the Donnelley Foundation contributed funds, which provided for the following:

1) Transportation costs and site fees for field trips including:

- |   |              |
|---|--------------|
| a) 2 field trips to Edisto Beach State Park | 120 students |
| b) 1 field trip to Westvaco Nature Trail    | 18 students  |
| c) 9 field trips to the ACE Basin           | 231 students |
| d) Leadership Colleton                      | 20 students  |

**TOTAL: 389 students**  
**20 teachers**

2) Teacher workshop fees and materials costs to:

- |   |             |
|---|-------------|
| a) ECO-Project for Teachers   | 34 teachers |
| b) Wild and Crafty Weekend  | 1 teacher   |
| c) Wet, Wild and Wacky Workshop   | 2 teachers  |
| d) COASTeam (Coastal and Ocean Awareness<br>for Southeastern Teachers) Workshop | 7 teachers  |
| e) South Carolina Marine Educator's Association                                 | 4 teachers  |

**TOTAL: 48 teachers**

3) After school Programs

- a) 4 Enviroscape Presentations
- b) 1 Crab Study
- c) 2 Shark Presentations

4) Sponsorship of three students to attend Camp Wildwood

5) 6 Backyard Habitat Projects

- a) Nature Trail at Colleton Middle School

- b) Butterfly Garden/Fish Pond at Colleton Middle School
  - c) Butterfly Garden at Colleton Middle School Annex
  - d) Carolina Fence at Forest Circle Middle School
  - e) Wetland Habitat/Garden at Ruffin Middle School
  - f) Butterfly Garden/Bird Sanctuary at Colleton County High
- 6) Aquarium salt water tanks and supplies for 6 schools
- 7) Personnel, transportation costs, printing costs, postage

### **Clean Vessel Awareness Campaign**

The Clean Vessel Act (CVA) 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 two statewide and regional boat and marine trade shows: the Charleston In-Water Boat Show and the 2001 Marine Trades Expo and Conference. 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.

The South Carolina Clean Marina Program continued to grow, adding two inland clean marinas in addition to the seven existing coastal clean marinas. This program encourages marinas to use best management practices, including pump-out stations, to prevent pollution in the coastal waters of South Carolina.

### **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 2001-2002, five South Carolina proposals were approved providing federal funds in the amount of \$2,345,125 to the Department of Natural Resource, the Charleston City Marina and Charleston County Parks and Recreation Commission. Of these funds, approximately \$100,000 has been encumbered in a cooperative agreement with the Charleston City Marina. The remaining funds had not been encumbered by the end of the FY due to problems associated with federal granting guidelines related to program income.

A workshop was held in May to provide practical information to coastal marina owners and operators, and city and county planners regarding federal funding opportunities available through the Boating Infrastructure Grant (BIG) program. Regional and national representatives from the

US Fish and Wildlife Service attended to assist with presentations. Approximately 40 marina owner/operators were in attendance.

### **Wildlife Assistance Office**

The office received a total of 1611 wildlife assistance calls for FY 2001-2002. This represents a 10.5 percent increase over the previous year and a 54 % increase from FY 1991-1992. Alligator protocol was changed in May of 2002 and a total of 38 calls were forwarded to Regional Marine Biologist. Calls were handled in a timelier manner with no problems on referrals from this office.

### **Wildlife Rehab Network**

There are a total of 20 coastal wildlife rehabilitator facilities with 5 being primary. The South Carolina Center for Birds of Prey, Island Bird Rescue, Keepers of the Wild. All except two are Federally permitted, with their Federal permits pending. Number of wildlife species received 1146; of these 767 were released, 337 died or were euthanized and 42 are still being rehabilitated.

### **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.

Goals of the program for FY 2001-2002 are:

- successfully compete for federal funds to continue operation and management of the ACE Basin NERR
- establish a System – Wide Monitoring Program (SWMP) in the NERR
- complete construction of the Bennett's Point field station;
- initiate construction of an interpretive center in partnership with SC PRT
- acquire strategic lands within reserve boundaries
- manage coastal properties for public use while maintaining natural qualities

### **Management and Operations**

The reserve successfully competed for over \$21 million during this past FY for land acquisition, construction and operations of the ACE Basin NERR. Management was coordinated with the various partnerships established in the reserve and community input was received through advisory committees and subcommittees. The permit system for overnight use of public lands continued without problems; manpower, equipment, facilities and supplies were in place to

provide management. Distribution of public access continues to be a top priority and key to the successful management of reserve resources. A total of 250 permits were issued for overnight usage of Capers, Otter and other reserve areas. The average length of stay was 2.5 days and the number of people was 1838, for a total of 4595 man-days of use within the reserve program. This does not include daytime use for the reserve complex of 16,150 acres.

The ACE Basin NERR continued in its 10<sup>th</sup> year of funding through NOAA and is part of a national network of state owned and managed coastal protected areas to promote informed management of the nation's estuarine and coastal habitats. The Bennett's Point field station was completed during this period and is now in operation as the primary platform for staging research and education. The partnership with SC PRT continued to be successful with the beginning of construction of the Edisto Interpretive Center. The plan is to complete the project in June of 2003.

### **Research and Monitoring**

The research and monitoring component of the reserve program is coordinated through the Marine Resources Institute. The SWMP project continued with a focus on monitoring a suite of water quality and atmospheric variables over a range of spatial (local, regional, national) and temporal (minutes, hours, days, months, years) scales. Data collected in this program are indicative of habitat quality for numerous estuarine species and they also establish health criteria and determine human uses.

### **Habitat Protection**

The program continued to protect land through acquisition of key lands and waters within established boundaries. Major acquisitions this FY included Morgan Island and North Williman Island. Management plans for these tracts are being compiled and should be finished during the next FY.

### **Coastal Training Program**

This NERR initiative (CTP) is designed to extend and increase the capacity of reserve staff to conduct targeted training programs for specific audiences on key coastal management issues affecting estuarine environments. During this FY, reserve staff conducted needs assessments, market analyses, and worked on an action plan. A CTP Advisory Committee was established in cooperation with the North Inlet/Winyah Bay NERR. Staff worked to foster local and national partnerships and coordinate efforts in training and outreach for coastal decision-makers. We plan to implement the Plan during the next FY.

## OFFICE OF POLICY & OPERATIONS

- Oversaw complete review of fixed operating costs associated with maintaining Marine Resources Division (MRD) facilities at: Waddell Mariculture Center, ACE Basin Field Station at Bennett's Point, the SC Marine Resources Center, and Capers Island.
- Completed effort to eliminate DNR Board policy 601.01 "Enforcement of the Three-Mile Line" by working with other DNR staff and representatives of the commercial shrimp trawler fishery. Implementation of this policy had been hampered by outdated technology and the uncertainty associated with the use of radar for position finding. As a result of our working with representatives of the commercial shrimp trawler industry, the DNR Board unanimously agreed to rescind this policy and delegate authority to DNR staff to open discrete areas of the outer territorial sea to roe shrimp trawling under certain specific conditions.
- Developed the FY 2003 Federal budget request for the Marine Resources Division. At the time of printing, this request was still pending further action by the Congress.
- Negotiated agreements with the College of Charleston and the National Oceanic & Atmospheric Administration regarding shared use of facilities and infrastructure at the S. C. Marine Resources Center.
- Co-chaired the DNR's Morgan Island Task Force in their review of evaluating the long-term options for the management of this recent addition to the ACE Basin National Estuarine Research Reserve.
- 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 2001-2002 the MRD's IT Section was faced with extremely difficult circumstances yet managed to move forward and accomplish much. In FY 2001-2002 the already understaffed IT Section lost two valuable employees.

To cope with this loss, two personnel changes occurred within the section. The previous Database Administrator I was hired as Applications Analyst II and assigned responsibilities of "IT Director" for the MRD IT Section. Also, a Wildlife Biologist II was reassigned to the section to provide user technical support and additional GIS services. After these personnel changes, the MRD IT Section now consists of only 4 personnel.

Despite the difficult circumstances and significant staffing shortages that faced the IT Section in FY 2001-2002, 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. The following were significant accomplishments in FY 2001-2002:

- **Section Reorganization** – In response to the personnel issues and changes that the IT Section faced in FY 2001-2002, a long-term project was undertaken to review the current state of MRD’s IT/Telecom/GIS Section, to better define their role at MRD, and to improve the quality of services provided. In addition, they began the process of organizing and documenting standard operating procedures, policies, emergency plans, and support information to ensure knowledge redundancy in case of emergencies. To meet the critical need for a documented “knowledge base” of IT support information, an Intranet web site (built using HTML) was designed and has begun being populated with information. The site will only be available for viewing by IT staff and select administrative users. Once completed, this project will contain documentation of items such as software maintenance contract information, equipment inventories, WAN and LAN network topologies, firewall and switch configuration files, server configuration and settings documentation, network troubleshooting procedures, server support and warranty information, backup plan, hurricane plan, and contact information for all vendors, support providers, and MRD operations-related staff. It is anticipated that this project will take a year or more to complete.
- **User Support** – The IT Section received and completed 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, Backup, FTP, NAS file and Intranet servers; software licensing support; and GIS project support.
- **Bennett’s Point Network** – Completed planning and installation of an always-on 768Kbps ADSL Internet connection and 10/100 Base-T Ethernet network for all computers at the newly constructed Bennett’s Point field station. Computers can now connect to the Bennett’s Point Local Area Network (LAN) to exchange files, share resources such as printers, and connect to the Internet for e-mail and web.
- **Waddell Network** – Completed planning and installation of an always-on 512Kbps ADSL Internet connection and 10 Base-T Ethernet Local Area Network for all computers at the Waddell Mariculture Center. Users previously had no network facilities and had to reach the Internet through individual dial-up modems. With the completion of this project, users not only have network facilities and a fast Internet connection, but dropping dial-up service has resulted in a monthly cost savings for Waddell.
- **File Server** – Completed installation, configuration, and migration to new 240 GB Quantum SNAP Server (Network Attached Storage device) as a replacement for MRD’s old file server Megalodon. The project was a complete success with both a storage availability and performance increase.
- **Data Management** – Provided MS Access database design and development services and SAS programming services including completion or maintenance of the following projects: Turtle Trawl;

Vehicle Maintenance; MRRI Accomplishments; MRRI Scheduling; Crust. Mgt Juvenile Trawl; Crust. Mgt Blue Crab; SFS Fisheries Interview Data; NMFS Longline Logbook Database for MARMAP; Speedy Mailers; and Shrimp Baiting survey random selection.

- **Web Development** – Provided web development and maintenance services for several web pages on the MRD Intranet and DNR public web site including: the Governor’s Cup Billfishing Series web site, Natural Resources News Archive web site, MRD Employee of the Year Intranet site and numerous other MRD Intranet updates. The MRD Intranet site and all information was also moved to the new file server for greater availability and performance.
- **All-MRD “Listserv”** - Installed and configured Internet standards-based “Mailing List” support on MRD’s IMail E-mail Server. This additional feature was added to improve the efficiency of “multi-recipient “ e-mailing communications within the MRD. Completion of this project now allows a select group of personnel to send “All-MRD” e-mails directly from their desktops without IT Section assistance. “All-MRRI”, “All-MRRI-PIs”, and “All-Waddell” mailing lists were also created.
- **AntiVirus** – A volume license purchase of over 115 McAfee AntiVirus software licenses was coordinated for MRD users. This project was undertaken to ensure that MRD desktop computers are protected from Viruses, Worms, and Trojan Horse programs. This project has resulted in significantly improved Virus protection MRD-wide and significantly reduction in user time required to maintain software installations.
- **Telecommunications Planning** – Planning for the complete replacement of the MRD’s outdated Siemens/ROLM telephone system began in FY 2001-2002.

### **Physical Plant**

- Database developed for tracking all facility door keys.
- Carpeting and repainting of the interior of the Center for Coastal Environmental Health & Biomolecular Research (CCEHBR) building under budget and ahead of schedule.
- Continued refinements in the management of the HVAC system, which enabled savings of over \$48,000 in electric and gas costs from the prior year.
- Substantial repair to the support columns for the Eltzroth administration building.
- Continuing refinements to the safety program, including on-time chemical/radiological inventory and disposal, training, and development of Standard Operating Procedures.
- Completion of certification of MRD staff in driver training, including the establishment of a certified instructor for MRD.

- Completion of certification of MRD staff in First Aid/CPR and safety, including the establishment of a certified instructor.
- Removal of all excess radiological material from MRD facilities at the Marine Resources Center.
- Reduction of HAZMAT material stored on site; complete review and update of Material Safety Data Sheets.
- Development of agreement to share sewer costs with the Hollings Marine Lab.
- On call with a staff of four, 24/7, 365, and not one missed call or inaccurate diagnosis of a call during the year.

### **Vessel Operations**

SCDNR-MRD Research Vessels were underway 264.5 days in order to complete research, management, and education cruise goals. Fleet size was reduced from 5 vessels to 3 with the sales of the *R/V ACE* and the *R/V Carolina Pride*. This reduced operation costs, but caused scheduling conflicts and substantially increased demands on the aging *R/V Anita*. Criteria for scheduling Education Cruises both here and in the ACE Basin have been established. Projected vessel user needs at MRD were assessed and the Division will require a new inshore/near-shore research vessel within the next few years if usage is to continue at the current level.

### **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 includes such responsibilities as: the regulation of fishing seasons, areas and methods, issuance of permits, management of public shellfish grounds, artificial reef construction, finfish, shellfish and crustacean monitoring and assessment, the acquisition of statistical records of various fisheries and the review and assessment of environmental permits.

The OFM has customers that 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 environmentalist, developers, and others interested in coastal resources routinely request information and advise regarding a variety of activities.

The OFM is composed of four (4) major sections (Environmental Evaluations, Finfish Management, Shellfish Management and Fisheries Statistics) and 3 sub-sections (Permit

Coordination and Compliance, Turtle Project and Resource Economics). The OFM employs 34 individuals that range in educational back from PhD's to high school graduates, each having a unique background and qualifications suited for their particular job function.

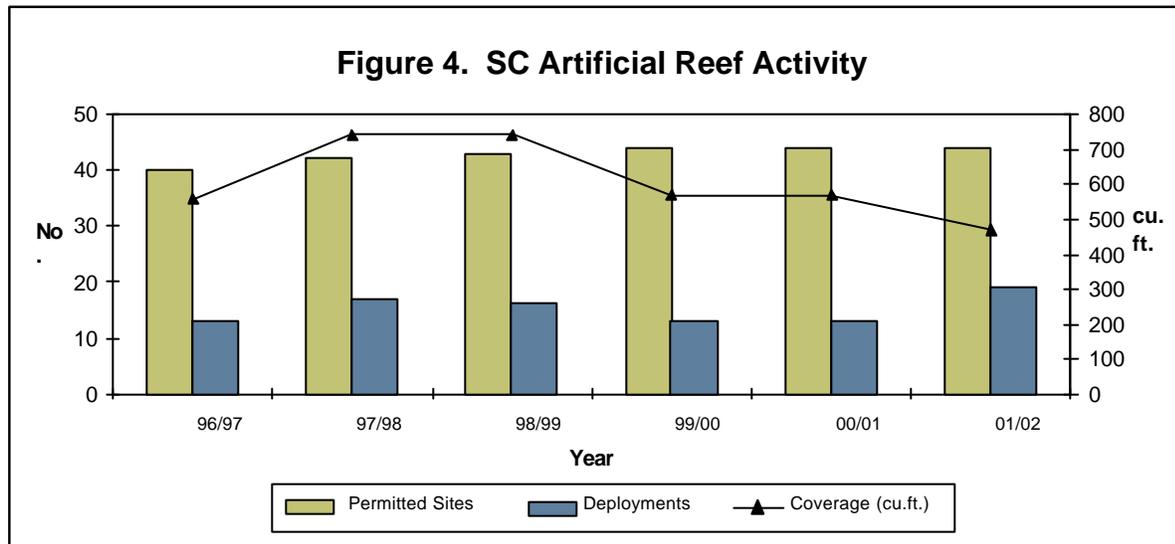
### **Finfish Management Section**

During FY 2001-2002, the Marine Artificial Reef Program maintained aids to navigation on artificial reef and wreck sites. Eleven new buoys were deployed. Nineteen separate artificial reef construction projects were completed on seventeen different permitted reef sites (Table 1). Seventeen separate offshore field trips resulted in a total of 27 days of monitoring activities on the state's marine artificial reefs (Figure 4). 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 22 SCUBA dives were conducted throughout the year on reef sites ranging from 10 to 120 feet of water. Diver assessments revealed rapid colonization of fish and invertebrates on several new and experimental reef designs. Video, still and digital photographic records were obtained during diving activities whenever possible. Sampling continued on an experimental reef site that was established in order to document colonization, immigration, and production on artificial reefs. Underwater surveys were also completed on a new experimental reef site in deeper water, which will be established in order to examine the potential of small-scale artificial reefs as marine protected area. Several hundred phone and mail requests for reef locations or condition reports were also responded to through the distribution of updated reef maps and GPS listings. The Reef Program was one of the recipient's of this year's Coastal America Partnership Award for a reef-building project conducted with the SC Army National Guard and the Charleston Air Force Base.

**Table 1 Artificial Reef Activity 2001-2002**

<b>Date</b>	<b>Material</b>	<b>Reef Site</b>
16 Aug 01	80-foot deck barge	Little River Reef
22 Aug 01	100 concrete Z-units	Georgetown Nearshore Reef
24 Aug 01	100 concrete Z-units	Will Goldfinch Reef
04 Sep 01	120-foot fuel barge	Will Goldfinch Reef
05 Sep 01	106-foot fuel barge	Greenville Reef
28 Sep 01	32 shipping containers	Edisto 60' Reef
03 Oct 01	25 concrete Reef Balls	Charleston Nearshore Reef
24 Oct 01	100 concrete Z-units	Fripp Island Reef
24 Oct 01	100 concrete Z-units	Beaufort 45' Reef
24 Oct 01	100 concrete Z-units	General Gordon Reef
25 Oct 01	106-foot fuel barge	Beaufort 45' Reef
30 Oct 01	20 shopping carts	Capers Reef
09 Nov 01	3 Army tanks, concrete rubble	North Edisto Nearshore Reef

20 Nov 01	28 shipping containers	Edisto Offshore Reef
29 Nov 01	32 shipping containers	Ten Mile Reef
06 Dec 01	120 concrete cones	Hunting Island Pier Reef
12 Feb 02	120-foot deck barge	Charleston 60' Reef



The major activity in the NMFS-funded Diadromous Fish Project during FY 2001-2002 was completion of the eighth year of tagging sturgeon in the lower Edisto River. Sturgeon tagging has yielded excellent growth and movement information on juvenile Atlantic sturgeon (2342 animals tagged and 677 individuals documented as recaptured), and to a lesser extent, on adult and juvenile shortnose sturgeon.

An ACFCMA-funded tagging study on American shad in the Santee River was initiated to determine the fishing rate on pre-spawning females in the Santee, where shad stocks were perceived to be in good condition based on tagging studies in 1991 and 1992. The study was very successful as over 4,000 fish were captured for tagging.

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 2001 and 2002. Sampling was conducted immediately below Goose Creek Reservoir for a six-week period using a single fyke net as sampling gear. A long-term data set will be needed to make any assessments on relative elver abundance or on changes in year class strength.

**Shellfish Management Section**

The Shellfish Management Section (SMS) develops, implements and supervises initiatives necessary for the effective management of the state's shellfish resources. The following activities were conducted during FY 2001-2002:

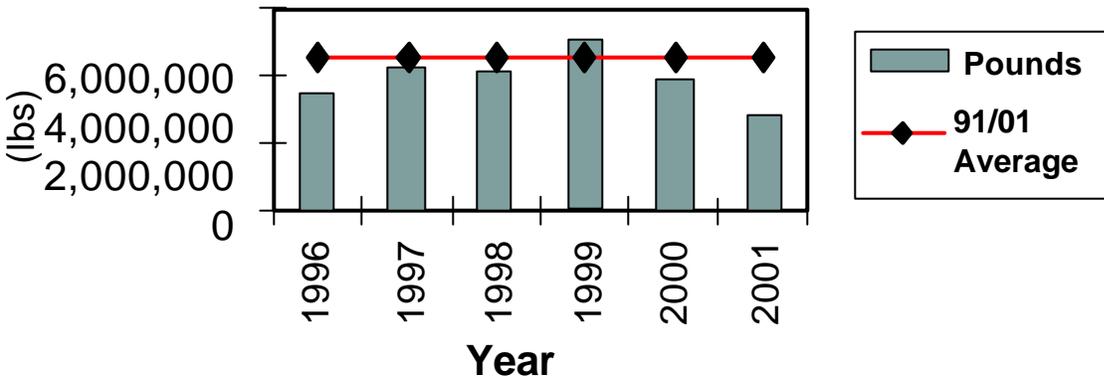
The season for harvesting oysters and clams, as authorized in the S.C. Code of Laws, Section 50-5-985, opens annually on September 16 and closes on May 15 unless biological or other conditions warrant other times to open or close. This year the season for harvesting oysters and clams opened on September 16, 2001. Oyster season closed on May 15, 2002; however, due to moderate water temperatures and market conditions the clam season was extended to May 31, 2002. During the FY 2001-2002 shellfish season a total of 83,844 U.S. bushels of oysters and 8,295,177 wild-stock clams were commercially harvested. All shellfish culture permit holders are legally required to plant 50 U.S. bushels (Section 50-5-940) of seed oysters, shell or other approved culch material for each acre under cultivation each calendar year. Recorded planting on commercial shellfish culture permits in 2001 was 11,534.0 U.S. bushels of seed oysters, 11,109.5 bushels of shell, 22,406.2 bushels of approved culch material, 42,787.8 bushels of *in situ* cultivation, 2,225.0 bushels of green-shell and 22.0 bushels of seed clams for a total of 90,084.5 bushels. From January 1 through June 30, 2002, 614.5 bushels of seed oysters, 21,686.5 bushels of *in situ* cultivation, 10,242.0 bushels of approved culch, 3120.0 bushels of shell, 56.0 bushels of clams and no green-shell for a six month total of 35,719.0 bushels were verified as planted on culture permits.

The 2002 whelk trawling season opened on 25 February 2002 and closed on 31 March 2002. Forty-five trawling permits were issued with 21 utilized. A total harvest of 2,626.7 bushels of whelks was reported. The whelk fishery remains over-harvested in certain areas and the slow growing gastropods will require additional time to become large enough to be legally harvested. Planting of shucked shell on public shellfish grounds totaled 11,200 bushels during this reporting period. Of this total approximately 4,867 bushels were shucked Gulf coast oyster shell; 4,333 bushels were processed Georgia whelk shell and 2000 bushels were South Carolina shucked oyster shell. Four public grounds were planted; Bull and Mackay Creeks in Beaufort County, Hamlin Creek in Charleston County and Oaks Creek in Georgetown County. During 2002, 15,000 bushels of shucked Gulf coast oyster shell, 11,000 bushels of shucked whelk shell and 2000 bushels of South Carolina oyster shell were purchased for planting.

### **Fisheries Statistics Section**

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. The section obtained commercial fisheries catch and effort data via a mandatory report submitted by 260 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 300 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 this season commercial shrimp trawler landings were down approximately 1M lbs.

**Figure 5. Commercial Shrimp Landings**



During the year, 166 offshore finfish trips were sampled for length frequency distribution, accounting for 22,577 measurements of priority species. Recreational fisheries data collection was accomplished by 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 2000-2001 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 whom 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.

Mandatory trip reports were submitted by 26 headboats and 302 charter vessels. Charter vessel trip reports were coded, key-entered, edited and archived. Monthly summaries were generated for use by fisheries managers.

During FY 2001-2002, 3,582 fish were tagged by over 838 participating anglers in the Marine Gamefish Tagging project. Approximately 874 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 378 tagged fish. Seventy one percent of these fish were re-released. A gag grouper caught off Ft. Pierce, FL in May was originally tagged 6 ½

years earlier, 12 miles off Charleston. This represents the longest time at large for any species ever tagged as part of the public tagging program.

### **Environmental Management Section (EMS)**

The 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 2001-2002, EMS staff received and reviewed 1,695 permits compared to 1,524 permits during the previous year. Some of these permit reviews included the following:

*Palmetto Bluff* - This project represents the first of a multi-phase development on a 22,000-acre tract of land located on the May River in Beaufort County. The project involved extensive pre-project planning and interagency coordination.

*Carolina Bays Parkway (CBP) Modifications* - Staff reviewed several modification requests to the CBP, including interchange modifications and additional access points. These modifications raised the issue of mitigation for secondary development impacts.

*Southern Conway By-pass* - This project involves the construction of a new location roadway to be constructed between the City of Conway and the southern portion of Horry County. The highway would transverse a number of state and federally owned properties and result in significant secondary development impacts.

*Cooper River Bridges* - A permit to replace the existing bridge spans was reviewed and commented on. Several project modifications were negotiated to minimize and compensate for project impacts.

*Robert Ashley* - This project involves the placement of clam mariculture pens within the boundaries of the Cape Romain National Wildlife Refuge. The project raised controversy over conflicting uses and mariculture operations within the refuge.

*S.C. Public Railways* - This project included impacts to 104 acres of freshwater wetlands to accommodate the construction of a vehicle manufacturing plant. The project involved extensive interagency coordination prior to and during the permitting process. A significant mitigation proposal was negotiated to offset project impacts.

As part of SCDNR's responsibility as a Natural Resource Trustee agency, EMS staff participated in 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.

### **Turtle Project**

In this fiscal year, the EMS conducted a federally funded project to develop an index of abundance for sea turtles using trawl nets. This regional study conducted between St. Augustine, Florida and Georgetown, South Carolina, 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.

### **Resource Economics**

Commercial fisheries represents an important part of South Carolina's natural resources. In 2001, commercial fisheries had an estimated total economic (sales) impact of nearly \$40 million and generated about 1,300 jobs, mainly in the rural coastal areas of South Carolina.

The SC shrimp trawler fishery generates the largest share of commercial fishery landings. Unfortunately, the value of the SC shrimp landings declined in 2001 due to a combination of a below-average harvest and lower shrimp prices. The decline in the harvest was mainly due to the impact of severe winter weather on the SC over-wintering white shrimp stock.

Recreational harvesting of the state's marine fish and shellfish is also important to the SC coastal economy. Using SC economic survey results of recreational anglers and secondary data, an economic impact analysis database and software has been developed for estimating the economic impacts created by recreational fishing related expenditures. A preliminary estimate of the overall economic impacts of recreational and commercial activities was prepared. For 2001, it was estimated that SCDNR's overall management responsibilities were associated with a total sales impact of about \$4.0 billion, which generated about 70,600 jobs for the SC economy. Recreational fishing and hunting activities accounted for about 35% of the sales impact.

### **Permit Administration and Compliance**

It is the function of the Fisheries Permitting and Compliance Section to administer the Department's statutory and regulatory authority to permit effort to harvest marine resources. Falling into four general categories of harvest allowance, private management, importation and experimental, a total of 6,007 permits were issued during FY 2001-2002. (Table 2)

Table 2. Fisheries Permit Issuance, FY 2001-2002

<b><u>CATEGORY</u></b>	<b><u>PERMIT TYPE</u></b>
Harvest	
State Ground Permit Cards	264
State Ground Permit Decals	1520
Culture Ground Permit Cards	390
Culture Ground Permit Decals	1931
Culture Ground Personal Limit Cards	263
Hydraulic Escalator	44
Scratch Rakes	20
Hand Gathering - Shellfish	5
Hand Tongs	5
Herring Nets	23
Patent Tongs	2
Clam Possession (Hard)	9
Clam Possession (Undersized)	9
Elver Fyke Nets	3
Eel Dip Nets	5
Eel Pots/Traps	1
Whelk Trawling	46
Horseshoe Crab Trawling	5
Horseshoe Crab (Hand)	29
Horseshoe Crab (Possession)	9
Blue Crab Trawl	51
Shark Permits	78
Game Fish Harvest	0
Game Fish Mariculture	2
Mariculture Cards	40
Mariculture Decals	208
Shad Nets	295
Total Permits Issued	5,257

**Private Management**

Culture Permits - New	1
Culture Permits - Renewals	40
Culture Permits - Continuances	61
Mariculture Permits - New	12
Mariculture Permits - Renewals	4
Mariculture Permits - Continuances	16

Planting Variances	47
Joint DHEC Shellfish Relay - Hydraulic	10
Joint DHEC Shellfish Relay - Hand	3
Oyster Seed Removal	0
Washed shell	6
 Total Permits Issued	 200

#### **Importation**

Sponge Crabs	0
Indigenous Shellfish Importation	9
Non-Indigenous Shrimp Importation	15
Undersized Blue Crabs	0
 Total Permits Issued	 24

#### **Experimental**

Drag Dredge	2
Educational Drag Dredge	1
Scientific Collection Permits	501
S.C.O.R.E. Permits	14
Commercial Display	1
Experimental	1
 Total Permits Issued	 520

#### **Exploratory**

Special Exploratory	6
Total Permits Issued	6

Grand Total Permits Issued 6,007

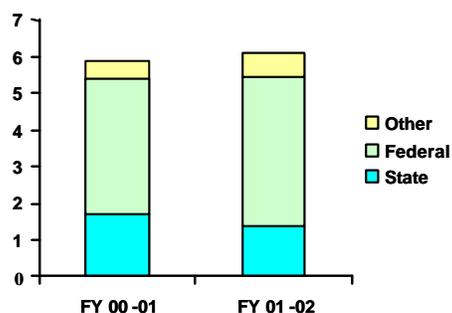
### **MARINE RESOURCES RESEARCH INSTITUTE**

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 (WMC) located in Bluffton, SC. Finally, the MRRI serves as a seaside research and educational facility for many academic

institutions including the College of Charleston (COC), the Medical University of South Carolina (MUSC), Clemson University (CU), South Carolina State University (SCSC), and the University of South Carolina (USC). 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.

In order to accomplish most of the major program goals, the MRRI relies heavily on extramural support through grants, contracts, and interagency agreements rather than on state funding. A summary of the Institute’s grant development and success rate is summarized in the following table and a comparison of total dollars expended by funding source is shown in the figure compared to last year. In comparison with last year, both the number of proposal submitted and the dollar amount were higher this year than last year (FY 2000-2001: 47 proposals submitted totaling \$14,279,567) and the actual expenditures in FY 2001-2002 reflect an even greater reliance on extramural support to accomplish our mission. As state operating budgets become even tighter, Institute staff will strive to further increase our extramural support wherever possible to accomplish state objectives.

<b>Summary of FY 01-02 Grant Activities</b>			
	<b>Number of Proposals</b>	<b>% of Total (excl. pending)</b>	<b>Dollar Value of Proposals</b>
Approved	35	74	\$5,917,450
Denied	12	26	\$8,087,033
Pending	3		\$3,242,091
<b>Total</b>	<b>50</b>	<b>100</b>	<b>\$17,246,574</b>



A summary of the major accomplishments completed within the Institute’s research and educational programs during FY 2001-2002 is 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,

- (3) and conduct programs with OFM staff to assess the effectiveness of management actions and evaluate management alternatives.

## **Coastal Surveys**

In FY 2001-2002, MRRI staff continued to monitor the status and trends of offshore reef fish populations as part of the SCDNR-National Marine Fisheries Service (NMFS) *Marine Resources Monitoring Assessment and Prediction Program (MARMAP)*. Standardized sampling of reef fishes from North Carolina to Florida aboard the SCDNR Research Vessel *Palmetto* indicated that black sea bass catches remain high after a steady increase since 1996. The catch of red porgy has increased from an average of 0.87 fish caught per trap per hour in 1997 to 1.85 fish caught per trap per hour in 2001. After an increase in catch of vermilion snapper (4.5 fish caught per hour) in 2000, catches decreased to an average of 3.2 fish caught per trap per hour in 2001-2002.

Life history studies conducted on red grouper, gray triggerfish, blueline tilefish, knobbed porgy, wreckfish and greater amberjack provided data such as maximum age, size at age, spawning season and fishing mortality. These data have been incorporated into stock assessments and management plans by the South Atlantic Fishery Management Council.

In 2001, MRRI scientists participated in the National Oceanic and Atmospheric Administration (NOAA) Ocean Exploration expedition, "Islands in the Stream". During these research cruises, submersible and remotely operated vehicle dives were conducted on deep reefs at the shelf edge and Charleston Bump.

Further bottom mapping was conducted at the Charleston Bump, an important offshore fishing ground. Additional tagging of swordfish with satellite tags was also conducted, and plankton samples were collected to look for evidence of local spawning. Oceanographic studies indicated an area of upwelling downstream of the Bump that results in increased productivity at shelf-edge reefs, and large numbers of dolphin (mahi mahi) larvae were noted in this area. Few billfish larvae were collected. Analysis of the commercial pelagic longline data showed that the Charleston Bump is an area of concentrated fishing effort and a high frequency of billfish catches; however satellite tagging of swordfish showed that most move considerable distances away from the Charleston Bump during the summer.

MRRI staff continued to monitor the status and trends of coastal fishes, crabs, shrimp, horseshoe crabs, sea turtles, mantis shrimp, and squids from Cape Hatteras, NC, to Cape Canaveral, FL, through the NMFS-MRD *Southeast Area Monitoring and Assessment Program-South Atlantic (SEAMAP-SA)* in FY 2001-2002. Abundance was generally higher than the ten-year average during summer and fall 2001 but slightly below average during spring 2002. Atlantic croaker and spot continued to help drive overall fish abundance; however, they played a slightly less significant roll in spring 2002 than usual. Record numbers of Atlantic sharpnose and bonnethead sharks were collected in spring 2002.

In 2002, SEAMAP expanded its scope to begin gathering information for determining age and reproductive condition of weakfish, Atlantic croaker, and southern kingfish. All tissues collected for Atlantic croaker and weakfish during 2001 have been processed and read. Age 0 and 1 fish predominate the catch for both species.

### **Inshore Recreational Fish Surveys**

Monitoring of recreationally important estuarine species (red drum, black drum, spotted seatrout, southern flounder, and sheepshead,) continued in six estuarine areas along the South Carolina coast: Bull's Bay/Cape Romain, Wando River, Ashley River, Charleston Harbor, Cooper River, and Ashepoo-Combahee-Edisto (ACE) Basin. Fifty-seven species were caught during trammel net surveys.

During FY 2001-2002, red drum was the most numerous species encountered in trammel net surveys. Data were obtained on 4,217 red drum, approximately twice the number sampled last year. In addition to an increase in the average catch per set (almost five fish per set), the frequency of occurrence in the trammel net samples increased over 15% from the previous year. Trammel net sets also caught more schools of 10 or more red drum. These trends indicate that the 2000-year class (fish spawned during August-September 2000) is relatively strong in comparison to those of recent years.

Last year we saw the effects of the 2000 winter temperatures on the spotted seatrout population in our waters. This year we are witnessing their recovery. Data on a total of 1,256 trout were obtained during our FY 2001-2002 trammel net surveys. Based on historical data, the recreational fishery should improve with the growth of the 2001-year class (spawned during May-August 2001) into the legal slot.

Surveys of the fish community within the low salinity reaches of five South Carolina estuaries continued during FY 2001-2002. An electrofishing boat 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 upper section of the Edisto and the Combahee Rivers are being surveyed in cooperation with researchers conducting work in the ACE Basin National Estuarine Research Reserve. During FY 2001-2002, eighty-seven species were collected by electrofishing.

During FY 2001-2002, the Freezer Fish Program obtained 724 fish carcass donations. Since its inception in 1995, the program has provided filleted skeletons (racks) of thousands of fish. The racks are used to estimate the age and size of the harvested populations of recreationally important species. The program currently maintains chest freezers at seven locations. Most of the racks donated in FY 2001-2002 were of sheepshead and spotted seatrout.

The cooperative agreement initiated with SCDHEC during FY 98-99 continued during FY 2001-2002. Staff provided SCDHEC 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, staff assisted

SCDHEC personnel in obtaining samples to determine concentrations of mercury in king mackerel in our summer coastal population.

### **Sturgeon Research**

Shortnose and Atlantic sturgeons once supported a valuable fishery in South Carolina. The shortnose sturgeon is now endangered, and the fishery for Atlantic sturgeon is closed in all U.S. waters. In FY 2001-2002, a new sturgeon telemetry research project was initiated in the Pee Dee River. A spawning site in the upper river was identified by collection of eggs, and two summer habitat areas were found (in the Waccamaw and Black rivers). During this project, biological information on sub-adult Atlantic sturgeon is also being incidentally collected. These data are being used regionally and nationally by other state and federal agencies as part of management plans to protect these rare and valuable resources.

### **Savannah River Estuarine Fish Survey**

This program continued to provide new information on the seasonal occurrence and distribution of juveniles and adult fishes in the Savannah River estuary. This two-year survey is being conducted in cooperation with the University of Georgia to help establish dredging windows, which will have minimal impact on fishery resources.

### **Finfish Genetics Studies**

The MRRI Fisheries Genetics Laboratory continued genetic studies of red drum, flounder, scup, and croaker FY 2001-2002. The red drum data indicated that a single stock occurs from FL to SC. Red drum broodstock were also genetically typed. Studies of red grouper, black grouper, scamp and dolphin (mahi mahi) were completed during FY 2001-2002. Studies of red grouper indicated that populations from North Carolina, Florida, and Mexico constitute one genetic stock. Studies of black grouper indicated genetic differentiation between the Caribbean and Bermuda. These separate populations are probably self-recruiting with only occasional exchange between areas, suggesting the need for continued regional management approaches.

## **Crustacean Research Programs**

### **Juvenile 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. Sampling in July-August of 2001 indicated below average numbers of juvenile white shrimp in the tidal creeks near Charleston. Creek sampling for juvenile brown shrimp in May and June 2002 produced average to above average numbers of juvenile brown shrimp, at normal sizes for that time of year. Blue crab juveniles appeared to be average in number in spring, but catches of adults later in the summer were well below average due to severe drought conditions.

## **Sub-adult and Adult Shrimp, Blue Crab and Horseshoe Crab Monitoring**

The Research Vessel *Anita* was used to monitor shrimp and blue crab on a routine basis in the State's larger creeks, rivers and open waters to provide information on shrimp as they begin migrating toward the ocean. This sampling was supplemented by trawling with outboard motorboats in the central and northern coastal zones of the state. Sampling data are important in determining the commercial shrimping season's opening and closing dates for the areas from the beaches to three miles offshore. Catches of white shrimp in sample trawls in the fall of 2001 were below average, as drought conditions prevailed. In spring of 2002, catch rates of white shrimp indicated that sufficient quantities would spawn to allow an opening of shrimp season in May. Brown shrimp catches were about average in research trawls in 2002. Numbers of blue crab captured by research trawls were well below average in spring of 2002, as were horseshoe crab.

### **Blue Crab Potting Surveys**

Staff has conducted a survey of blue crab stocks since 1988 in which crab traps are fished in a standardized manner in each of the major estuaries. The goal of this project is to determine stock trends and if trawling studies are accurately sampling the blue crab population. Catch rates through 13 years of the survey have suggested relatively stable stocks of blue crab. Catch rates in 2001 were well below the 13-year average, as drought conditions probably kept blue crabs higher up in the estuaries, and overall abundance was below average. This became a major concern of commercial fishermen later in the summer of 2002.

### **Horseshoe Crabs**

Data on horseshoe crab has been recorded from regular trawl sampling since 1995. A compliance report was submitted for a third year to the Atlantic States Marine Fisheries Commission (ASMFC) detailing observations made from sampling, monitoring a biomedical facility, and conclusions made from an MRRI study.

Continued research on horseshoe crab life history was funded through federal grants. Horseshoe crab spawning surveys and egg collections were conducted in St. Helena Sound on Harbor Island, SC in April and May 2001 in order to evaluate whether or not delaying the commercial hand-harvest results in greater spawning success. We found that most of the spawning activity occurred on large intertidal sand flats near the spawning beach. It is unclear what percentage of the horseshoe crab population spawns multiple times, but because some crabs spawn many times within a season, some of the crabs harvested may have spawned previously. Nevertheless, our results indicated that during April when density of newly laid eggs was highest, significantly more eggs were collected in the delayed harvesting treatment. These findings suggest that waiting until after predicted high tide to begin hand harvesting would allow females to deposit eggs.

## **Shrimp Diseases**

Studies on crustacean viruses continued in FY 2001-2002 with two projects supported by NMFS, U.S. Department of Agriculture (USDA) and the National Science Foundation (NSF). The NSF and USDA funds have contributed to the expansion of our collection of expressed gene sequences in shrimp. Over 4000 genes have now been sequenced and will be used to assess disease resistance in cultured Pacific white shrimp and the effects of environmental stress on wild white shrimp. A new diagnostic tool for white spot virus was developed during the year and will be field tested in FY 2002-2003.

## **Shellfish Research Programs**

The primary responsibility of the shellfish program is to conduct research and related monitoring to assess shellfish resources. During this FY, projects included:

- (1) developing better monitoring and assessment tools for native oyster populations and bed condition,
- (2) monitoring selected ecologically-and experimentally-important species, including invasive species,
- (3) technology and assessment methodology development to evaluate shellfish restoration, shell quarantine disease monitoring and mariculture,
- (4) development of a statewide community-based oyster restoration program to educate and involve the public in shell recycling, monitoring and resource/habitat restoration and enhancement,
- (5) ecological studies related to critical and nursery habitats in the state's extensive tidal creeks,
- (6) assessment of harvesting methods and related boat-wake impacts,
- (7) and development of several programs to assess intertidal oyster reef status using novel measurements and remote sensing approaches.

## **Oyster Reef Program (ORP)**

We are completing data analyses and synthesis from our multi-year Oyster Restoration Program (ORP) and Saltwater Recreational Fisheries Advisory Committee (SRFAC) projects designed to define the ecological functions of intertidal oyster reefs in South Carolina estuaries. These studies include determination of:

- (1) restoration methods and related oyster reef community development,

- (2) habitat value and utilization by organisms concurrent with reef development,
- (3) oyster disease status and trends,
- (4) and environmental conditions as they relate to disease.

Studies compared the use of oyster habitats by economically and ecologically important fish, crabs, and shrimp, including comparison of fish and crustacean populations on natural and constructed oyster habitats. Monitoring of intertidal oyster reef recruitment and succession was conducted to assess the health of these habitats and examine factors influencing the transmission of oyster diseases. We also conducted sampling to evaluate the relative value of oyster beds compared with marsh and mud flats as habitat for mobile finfish and crustaceans

Habitat sampling, regardless of season, revealed significantly greater diversity of fishes and crustaceans on the fringing marsh than either the oyster reef or mud flat. Fringing marsh and oyster reef samples had similar and significantly higher numbers and weights than mudflats. Overall, diversity and abundance in the marsh exceeded that found over mud, yet oyster habitat often matched the marsh in abundance, species number, and gross weight. Our studies support our hypothesis that oyster reefs approach marsh grass in importance as critical habitats, especially when one sums across their entire attendant ecosystem services (e.g., filtering, marsh shoreline stabilization, flow impacts, habitat).

As part of the ORP study, we sampled our two study sites monthly or bimonthly (after November 1998) during the seven-year study, examining the oyster diseases *Perkinsus marinus* (Dermo) and MSX (*Haplosporidium nelsoni*). This long-term dataset allowed us to begin to evaluate inter-annual and intra-annual disease patterns in South Carolina intertidal oysters.

Overall, MSX infections peaked in the summer and early fall months, as did *Perkinsus*, with inter-annual fluctuations observed from year to year. In two of these yearly cycles, MSX infection levels reached 20-60%; the other four yearly cycles never exceeded 10%. For FY 2001-2002, infection levels were quite low, ranging from 0-4%.

This program has been the genesis of many spin-off programs, grants and related opportunities. Staff is:

- (1) examining recruitment, growth, and survival of oyster spat as an indicator of recovery and recruitment potential on shell repletion and natural sites,
- (2) following recovery of manipulated sites after ‘simulated’ harvesting, repletion, and/or major population die-offs,
- (3) and examining the impact of boat wakes in tidal creeks and their interaction with shell replenishment stability and development. New techniques are being used in the SC Community Restoration-Enhancement (SCORE) Program and MRD restoration efforts,

and we began discussions with the NOAA Coastal Services Center (CSC) on novel methods for the evaluation of shellfish resources using remote sensing techniques.

### **Shellfish Monitoring: Current and Future Directions**

As part of continuing oyster habitat-resource studies we received SRFAC and other state funding to initiate a five-year program to evaluate and prioritize restoration of Public Shellfish Grounds (PSGs). We also began a limited monitoring program to assess the status of oyster habitat and resources, including population status and recruitment success, using previously developed methodologies. A plan was also developed for evaluating sites and scaling-up restoration methodologies (stabilizing materials, cultch, etc.) for use on State Shellfish Grounds (SSGs) and PSGs with OFM. SRFAC funding is being sought to initiate and expand this five-year program.

We received funding for a project through FL Sea Grant to evaluate the impacts of boat wakes and diseases on the intertidal oysters so that we can maximize sustainability and restoration efforts. Sampling was conducted in the Cape Canaveral National Seashore (CANA) and included scouting sites and evaluating oyster reefs. In addition, oyster populations at 18 sites were sampled to determine the presence of the oyster pathogens Dermo and MSX. Dermo was present in all of the oyster populations sampled. Tissues are being processed for MSX examination. This work will develop methods and tools for assessing intertidal oyster reef die-offs applicable to our oyster habitats.

For FY 2001-2002, work was completed on the impact of boat wakes on shell stability and marsh erosion. As part of this three-year study, we were able to observe marsh erosion at four sites in Inlet Creek for 21-33 months, and we documented an average loss of between 90-126" of shoreline. The relevance of this is that as oysters decline or disappear from shorelines, marsh and shorelines could be more heavily impact by waves (boat or wind generated).

### **Bivalve Disease Research**

In 2002, we undertook a study to evaluate and recommend quarantine methods and durations to minimize oyster disease (Dermo only) transmission from shell plantings. Live Texas oysters were deployed (shucked and whole) in simulated shell piles, each about 100 bushels. Prior to deployment, a subset of the oysters was processed for Dermo intensity to determine if infection levels would vary over time. All oysters sampled prior to deployment were positive for Dermo. The study was terminated after 3.5 months when little or no tissue remained. *Perkinsus* parasite burdens dropped by 99% within one month, and declined to only 0.005% of the original parasite load by the end of the study. Attempts to isolate and culture *Perkinsus* after two months failed. Based on the results of this study, we know that the quarantine of shell for one month or more can dramatically reduce the risk of spreading *Perkinsus* during restoration with oyster shell.

## **Community Based Oyster Restoration Program**

During FY 2001-2002, we continued a community-based program to restore and enhance oyster habitat. Funding has been received from NOAA Office of Habitat Restoration, NOAA CSC, SC Sea Grant, 5 Star Challenge Grant program, the Hilton Head Island Foundation, FishAmerica, and US Fish and Wildlife Service programs. Local partners in this effort included the Charleston Math and Science Hub, the South Carolina Aquarium, the South Carolina Coastal Conservation League, SC chapter of the Coastal Conservation Association, SC Wildlife Federation, Beaufort Marine Institute, USC, Low Country Institute at Spring Island, and Charleston County Parks and Recreation Commission.

Between 1 June and 15 August 2001, volunteers assisted in constructing 31 small oyster reefs at 11 sites from Murrell's Inlet to Hilton Head, using about 4,000 mesh bags filled with various shell treatments (whelk; Gulf of Mexico and SC washed oyster shell). A workshop co-sponsored by the Charleston Math & Science Hub introduced middle and high school teachers to concepts in oyster biology and ecology. These teachers then developed lesson plans which use oyster reefs as living classrooms. The lesson plans were tested during school field trips in the 2001-2002 academic year and are available on our website (<http://www.csc.noaa.gov/scoysters>). A volunteer monitoring program has been established and citizens and school groups have been trained to monitor reef status and water quality. We assisted a citizens group in establishing a shell recycling program in the Hilton Head area; this program collected and bagged more than 1,000 bushels of shell in the 2001-2002 season. In spring 2002, volunteers assisted in sampling the 31 reefs to determine recruitment and growth. In the summer of 2002, volunteers assisted in constructing 18 new reefs and adding new treatments (e.g., bags preset with hatchery spat) to nine additional reefs, again using shell bagged by volunteers. The volunteer monitoring program and school activities will be expanded in the coming year. Results are being employed in larger SRFAC shell restoration efforts in the coming year.

## **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 emphasis during FY 2001-2002 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. Information produced by MRRI scientists is used by the MRD Environmental Management Section and other Divisions of the SCDNR 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 third year of sampling was completed in FY 2001-2002 for the statewide monitoring program designed to annually evaluate the environmental condition of South Carolina's estuaries using a variety of physical, chemical, and biological measures. 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 SC Department of Health and Environmental Control (SCDHEC) 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 us 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. A comprehensive sampling effort is conducted at each site by SCDNR and SCDHEC to measure water quality, sediment quality, and biological condition. The environmental data collected include basic water quality parameters (e.g. dissolved oxygen levels, salinity, temperature, pH, nutrients, biological oxygen demand, fecal coliform concentrations) 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.

A technical and executive summary report summarizing 1999 and 2000 datasets was completed this year. Integrated measures of water quality, sediment quality, and biotic condition were combined into an overall assessment of habitat condition at each site and for the entire coastal zone of South Carolina. The integrated measure of habitat quality used for the 1999-2000 assessment of South Carolina's coastal zone indicated that approximately 12% of South Carolina's tidal creek habitat and 8% of the open water habitat was marginal in quality. None of the state's coastal waters were rated poor, based on the stations sampled in 1999 and 2000.

*An Assessment of Habitat Quality of Tidal Creeks Used by Recreationally Important Finfish Species* was continued this year as a companion program to SCECAP. This program is funded by the U.S. Fish and Wildlife Service. An interim report summarizing the findings of the first two years of the study was submitted in FY 2001-2002. The results documented some key relationships between juvenile fish abundance and diversity versus creek habitat characteristics. Future data collected during the third year of this study will allow further investigation of the relationships among various environmental and habitat parameters with biological metrics. Over time, these findings 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.

Sampling efforts for the SCECAP study and Tidal Creek Project (TCP) were integrated with 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 developments. The project is being conducted in association with U.S. Geological Survey (USGS) and National Ocean Service Charleston Laboratory.

### **Pollution Assessment and Toxicology Studies**

In addition to the SCECAP, Tidal Creek Habitat, and May River Studies described above, which include an assessment of contaminants at estuarine sites located throughout the state, several site specific studies were conducted by staff to evaluate the effects of anthropogenic stress on estuarine habitats and biota. One study assessed the effects of human induced changes in land use patterns on coastal resources, and incorporated bioassays to study the tolerance of organisms to representative trace metals and fossil fuels. Staff completed another study to assess the cumulative effects of docks on tidal creek and salt marsh ecosystems. Dock shading effects were small when evaluated from the perspective of individual creeks, but when the total number of docks in the state are considered, impacts grew to the order of 150 acres of affected habitat. Another study focused on the possible impacts of fuel and oil runoff from South Carolina roadways into adjacent salt marsh habitats, and will incorporate bioassays in the coming year. Staff was also involved in a variety of toxicology studies during FY 2001-2002 to develop and evaluate methods for determining pollution exposure levels and effects. These studies involved several methodologies, including laboratory toxicity testing, cellular biomarkers, and the evaluation of *in situ* benthic condition in relation to sediment contaminant levels.

The *Land Use – Coastal Ecosystem Study (LU-CES)* completed its second year to assess estuarine conditions in the Okatee River, an area of rapid development. Sampling for this study began in December 2000 and will continue into 2003. 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. The project is funded by the South Carolina Sea Grant Consortium and includes researchers from University of Georgia, Skidaway Institute of Oceanography, Clemson University, USC, USGS, National Ocean Service (NOS) Charleston Laboratory, Beaufort County, and SCDNR. In particular, SCDNR is performing cooperative research with USGS and Beaufort County. Initial results from the study indicate that:

- (1) water quality in the two tidal creeks is very dynamic,
- (2) the land use and impervious surface are different between the two creeks and changing rapidly,
- (3) oligochaetes worms, one of the essential food sources of shrimp, have very high productivity in the two tidal creeks (0.09-9 grams of carbon per square meter per year),
- (4) and the dominant oligochaete worm is extremely tolerant to low dissolved oxygen and fluoranthene, and the dominant polychaete worm is more sensitive than the oligochaete.

A study entitled “*Evaluation of the Impacts of Dock Structures on South Carolina Estuarine Environments*” was completed this fiscal year through funding from SCDHEC and the NOS Office of Ocean and Coastal Resource Management (OCRM) to assess the impacts of docks on critical habitats (i.e. tidal creeks and salt marshes). The objective of this study was to evaluate the cumulative effect of docks on tidal creek and salt marsh ecosystems. The study was composed of three parts:

- (1) a *Spartina* shading study that evaluated the impacts of dock shading on the dominant marsh plant in South Carolina,
- (2) a small tidal creek study that evaluated dock impacts on small tidal creek nursery habitats,
- (3) and a large tidal creek study that evaluated dock impacts on larger tidal creek nursery habitats.

We determined that shading effects from dock structures decreased the stem density (an indicator of vegetation productivity) by 71% in the Charleston Harbor area of South Carolina. South Carolina is characterized by large expanses of salt marsh. Dock shading effects were small when evaluated from the perspective of the amount of marsh that occurs within specific tidal creeks, in coastal counties, or statewide. However, the impacts of dock shading are larger when considering the total number of docks (i.e., approximately 7,000) permitted in the last decade, which resulted in the loss of salt marsh equivalent to approximately 60 ha (150 acres).

A project initiated in FY 2001-2002, funded by the South Carolina Department of Transportation, will evaluate the potential environmental impacts of burned and unburned fuel and oil (polycyclic aromatic hydrocarbons or PAHs) that may build up in the sediments of salt marsh habitats immediately adjacent to South Carolina roads. The salt marsh habitats of interest are composed of mudflats, grass flats, and shallow tidal creeks. Scientific studies have indicated that the combination of PAH and UV radiation levels in these areas may be toxic to salt marsh animals because UV light greatly enhances the toxic effects of PAHs. The final results of this study will help document the interaction of high PAH and UV levels on estuarine animals as well as help evaluate the environmental impacts of South Carolina roadways on salt marsh habitats.

The use of biomarkers (physiological or biochemical indicators of contaminant exposure or effects) is being evaluated in bivalves and other estuarine organisms. One program funded in 1998 by CICEET has involved evaluating a suite of cellular biomarkers in three dominant estuarine species (oysters, grass shrimp, and mummichogs) during winter and summer periods. 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 also 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 produced in FY 2001-2002.

## Beach Nourishment and Dredging Studies

Beach erosion is 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 2001-2002, staff provided input on the initial planning efforts for Folly Beach and Pawley's Island nourishment projects and completed a final report on monitoring efforts for the *Myrtle Beach Renourishment Project*. The report summarized the physical and biological effects of nourishment activities at one offshore sand borrow area, and was completed as a joint effort by MRRI and Coastal Carolina University's Center for Marine and Wetland Studies. Our findings indicated that the borrow area was filling at higher rates than many borrow areas previously studied in South Carolina. Sediment characteristics were not altered for a significant period of time, and biological communities in the area recovered to pre-dredging conditions during the monitoring period. Based on these findings, additional dredging for nourishment quality sand could occur at the area, but assessments of the site are recommended to ensure that depths and sediment characteristics do not change over time.

The Charleston Ocean Dredged Material Disposal Site (ODMDS), located seven miles off Charleston, is a repository for uncontaminated sediments dredged from Charleston Harbor shipping and entrance channels. A large-scale assessment of ocean disposal activities was completed in 2000, approximately midway through the Charleston Harbor Deepening Project (1999-2002), and funded by the U.S. Army Corps of Engineers (USACE). Staff completed a final report in FY 2001-2002 on this interim assessment, which summarized the benthic infaunal, sediment composition, and sediment contaminants at the disposal site. In addition, final reports were also submitted to SCDNR by:

- (1) the U.S. Geological Survey and Coastal Carolina University on bathymetric, side scan sonar, and sub-bottom profiling data,
- (2) the Center for Applied Isotope Studies at the University of Georgia on a rapid geochemical characterization of the disposal site and surrounding areas,
- (3) and the University of South Carolina on the mobility and transport of disposal sediments.

The second year of a five-year project, *An Environmental Monitoring Study of Hard Bottom Reef Areas Near the Charleston Dredged Material Disposal Site*, funded by the USACE was completed in FY 2001-2002. The goal of the reef monitoring study is to identify any impacts to the abundance, diversity, condition, and areal 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 at the disposal site.

Following the completion of the Charleston Harbor Deepening Project (2002), a post-assessment survey of the Charleston ODMDS was initiated through USACE funding in FY 2001-2002.

Physical and biological conditions at the ODMDS will be studied in FY 2002-2003 and compared to baseline and interim assessment findings.

### **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. HABs have been increasing around the world over the last two decades, and in many areas, these problems have been linked to increases in nutrient loading from human activities.

In spring 2000, MRRI's Algal Ecology Laboratory joined the NOS-Charleston Laboratory, SC Sea Grant, and USC to implement the South Carolina Harmful Algal Bloom Program (SCHABP), funded by NOAA. The SCHABP is the first statewide effort to assess the status of SC waters with respect to the distribution and potential environmental and human impact of harmful algal blooms (HABs).

The objectives of the program are to:

- (1) determine the distribution of harmful algae in SC tidal creeks, open estuaries, and freshwater and brackish ponds,
- (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,
- (6) and ensure the continued operation of the South Carolina Task Group on Harmful Algae.

The SCHABP has significantly extended our understanding of the distribution and ecology of HABs in SC estuaries and freshwater systems, and discovered several potentially or measurably toxic blooms (including *Pfiesteria*) never before reported in SC. In the short term, this project has provided the infrastructure for rapid detection and analytical evaluation of SC HABs. In the

long term, the SCHABP's goal is to develop an ecological framework for understanding environmental regulation of HABs in SC waters.

SCHABP surveillance efforts now target tidal creeks, open estuaries, brackish and freshwater ponds, certain freshwater lakes/reservoirs, and coastal waters. The most common HAB in SC tidal creeks are *Kryptoperidinium* spp., a dinoflagellate that has produced dense blooms ("red tides") in estuaries from Myrtle Beach to Hilton Head over the last four years. With the support of grants from SC Sea Grant Consortium and ECOHAB, our 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.

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 AEL joined the research effort last year. We are 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.

### **ACE Basin NERR Research Program**

During FY 2001-2002, MRRI continued biological and environmental quality monitoring efforts to define trends in the Ashepoo-Combahee-Edisto Basin National Estuarine Research Reserve (ACE Basin NERR). We are beginning to observe seasonal and annual variations in water quality in the Reserve. For example, the absence of hypoxic conditions during the winter of 2001 (January-March) is attributed to the lower mean water temperatures, compared to previous years (1995-2000). Nitrate and orthophosphate values are highest in the summer and fall and lowest in winter and spring, whereas, ammonium levels are highest in the fall and variable throughout the rest of the year. Chlorophyll-a levels are highest during spring and summer and lowest during fall and winter. In addition, tidal trends in nutrient and chlorophyll-a concentrations were observed at both sites. A strong tidal signature was evident in nutrient concentrations (lowest concentrations near high tide and highest values near low tide) at both monitored sites. As expected, the highest chlorophyll-a levels occurred during flood tides and lowest during ebb tides. We also noted that the difference between high tide and low tide levels is greater at the St. Pierre monitoring site, suggesting that the salt marshes adjacent to the site serve as a nutrient sink.

In FY 2001-2002, staff shifted their focus from bottom trawl surveys to the tidal freshwater fish communities that occupy the waters adjacent to the Reserve. A five-year study of these fish communities began May 2001 to ascertain the how fish populations in this habitat are affected by seasonal changes in the ambient environmental conditions. The study will complement the efforts of the Freshwater Fisheries Section, Wildlife and Freshwater Fisheries Division, to characterize important fisheries in the ACE Basin.

Due to the variations in the saltwater-freshwater boundary line observed during electrofishing surveys, the Reserve began monitoring changes in salinity/conductivity, dissolved oxygen, and pH at a fixed station on the three major rivers (Ashepoo, Combahee, and South Edisto). Starting in January 2002, salinity, dissolved oxygen and pH were measured every one meter, starting about 0.1 m from the river bottom. The data will provide valuable information about temporal and seasonal variations in water quality in the tidal freshwater zone of the rivers.

A National Atmospheric Deposition Program/National Trends Network (NADP/NTN) site went online in the ACE Basin NERR on December 31, 2001. The NADP/NTN is a nationwide network of precipitation monitoring sites designed to monitor geographical and temporal long-term trends in air quality. Staff from the Reserve collects precipitation from our station weekly and sends samples to the NADP Central Analytical Laboratory where they are analyzed for a host of parameters. As overall indicators of precipitation quality, pH and conductivity will be measured at the field sites and at the laboratory. The inorganic component of precipitation will be characterized by such parameters as sulfate, chloride, nitrate, ammonium, ortho-phosphate, sodium, potassium, calcium, and magnesium. Another NADP site was also established at the Marine Resources Center in March 2002. This site will be more representative of deposition in an urbanized area.

There have been a number of cooperative studies done in the ACE NERR over the past year. The Florida Geological Survey, in conjunction with SCDNR Geological Survey, continues to investigate sea level rise in the ACE Basin NERR. Clark Alexander of the Skidaway Institute of Oceanography (SKIO) expanded his investigations of the sedimentation processes in the ACE Basin to include St. Helena Sound. Geoff Scott (NOS Charleston) collected the oysters to quantify the levels of contaminants in oysters in the ACE Basin Reserve.

### **Water Quality Synthesis of the National Estuarine Research Reserve System**

Water quality data collected as part of the National Estuarine Research Reserve's System-Wide Monitoring Program (NERR SWMP) between 1995-2000 were recently analyzed. The report includes six chapters that examine sampling methodology among NERRs, seasonal and inter-annual trends, relationships between land use and subsequent water quality, characterization of daily variability in parameters, metabolic processes, and the associated effects of the passage of tropical systems on water quality. Major findings of these analyses include the re-affirmation that climate, specifically seasonal precipitation and evapo-transpiration patterns, are especially important in controlling water chemistry in shallow water bodies. Tidal influence is also an important control on metabolic processes, particularly during the warmest months of the year when many systems regularly experience low dissolved oxygen conditions. Land-use patterns within the watershed are dependent upon, but also subsequently influence, water quality. For example, in low salinity areas, agricultural land uses are more successful; however, increased agriculture is associated with increased turbidity due to the removal of natural vegetative sediment traps. This report was compiled by MRRI with additional contributions from MUSC,

USC and the Center for Environmental Diagnostics and Bioremediation at the University of West Florida.

### **Mariculture Programs**

During recent decades, many wild fishery resources have been exploited by recreational and commercial sectors at non-sustainable levels. Consequently, many fisheries are depressed and various regulations are in place to attempt restoration of these over-harvested resources. Seafood products and supplies have also varied as a direct result of the changes in fishery landings. Since its inception, MRRI has focused research on development of tools to increase fishery resources as well as the development of new farmed seafood products. Research areas include:

- (1) development of environmentally sustainable technology for producing seafood products,
- (2) utilization of hatchery-produced organisms as surrogates for wild counterparts to improve fisheries assessment evaluations and ecosystem management,
- (3) testing the potential of increasing fishery resources through releases of hatchery produced fish,
- (4) and technology transfer of important findings to the private and other public sectors. In addition, MRRI's mariculture program routinely provides animals, expertise, and holding facilities to various universities and state and federal programs.

### **New Species Culture Development**

Cooperative programs with a number of other institutions from throughout the nation continued to focus on development of culture techniques for southern flounder and black sea bass. In addition, during this past year federal funding was also obtained to study production of cobia. All three species are harvested recreationally and commercially in SC. Using controlled environment systems and hormonal injections, black sea bass were conditioned to spawn. Control of volitional spawning of flounder continued to be problematic. However, black sea bass obtained from the wild and those held in captivity were spawned several times during the year. Fingerlings were produced from a partnership with a private company on several occasions. Most of the fingerlings produced were distributed to collaborators in other institutions for diet and environmental tolerance experiments. Some black sea bass were retained at MRRI to study the preference of black sea bass to various artificial habitat designs.

During summer 2001, adult cobia collected from Port Royal Sound were volitionally spawned in an outdoor tank at the Waddell Center. Spawning occurred within 48 hours after capture and over 1 million larvae were produced. These larvae were stocked in ponds. Five weeks later, approximately 25,000 cobia, average length five inches, were harvested. Some fish were restocked in ponds to learn about environmental tolerances and growth rate. During the 13-week

experiment, the fish regularly encountered temperatures over 90° F and oxygen levels below 3 mg/L. However, in spite of these harsh conditions, the fish grew at a phenomenal rate and at harvest in October fish were over 13 inches long and weighed nearly ¾ lb. In an effort to better understand juvenile habitat selection, about 1,500 cobia juveniles were tagged and released in several locations in Port Royal Sound. To date, three of these tagged fish have been recaptured at locations as far south as Cocoa Beach, Florida.

During spring 2002, additional cobia broodstock were captured. Although a number of fish spawned and fry were stocked in ponds, no cobia were produced. High water temperatures and disease infestations affected the broodstock while high pond temperatures and predacious insects are believed responsible for the poor pond results. This program will be continued into the next year.

### **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. SCDNR 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. Studies on the microbial ecology of zero exchange pond-based systems provide the basis for improving efficiency and increasing carrying capacity. New federal funding has been obtained to explore use of advanced filtration systems to maximize waste treatment in land based production systems. These technologies can be applied in the advanced greenhouse enclosed raceway-based super-intensive bios cure production systems under development at the WMC. Current efforts are focusing on demonstrating technical feasibility while developing financial feasibility and sensitivity analyses to promote commercialization opportunities in SC. Research aimed at completing development of technologies for cryogenic storage of sperm is ongoing with the aim of establishing a cryobank for the preservation of high health and genetically selected seed stocks for the assurance of the long-term viability of seed supplies.

Studies to evaluate double cropping strategies and farming of marine shrimp in low salinity waters have continued over the past year. Double cropping 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. Research on the potential of marine shrimp farming in low salinity waters in South Carolina has met with significant bottlenecks associated with biological feasibility, cost, and concerns of increasing salinity of SC groundwater. Research is now focusing on small-scale studies in cooperation with Clemson University to improve survival and growth of Pacific white shrimp postlarvae in low-salinity and mixed-salt environments to better define minimal requirements for inland culture.

### **In-State Shrimp Hatchery Initiative**

An expansion of in-state shrimp hatchery capabilities was completed during FY 2001-2002. With funding from NOAA, a biosecure greenhouse designed to produce high health broodstock was constructed at the WMC. Additionally, infrastructure improvements were carried out to enhance maturation and larval culture capabilities at the Center. Two commercial hatcheries received equipment to expand their production capabilities and capacities. SC is now in a position to produce postlarvae for in-state growers as necessary. Although high health seed supplies were adequate during FY 2002, this hatchery capability can help avoid the introduction of non-native shrimp diseases into SC waters, as well as increase supplies of high quality shrimp seed to SC farmers at times of seed shortages.

### **Red Drum Stocking Study**

During the 1990's, a trend of declining abundance was observed for juvenile red drum throughout SC. Since fall 1999, red drum have been stocked annually in the Ashley River to examine whether stocking could be used to supplement wild fisheries. Since 1999, approximately 600,000 1-2 inch red drum have been stocked each fall. Through fall 2001, a total of 1.8 million red drum juveniles have been released in the Ashley River. During 2000 and 2001, the Wando River was also stocked with over 800,000 fish. The results obtained to date clearly indicate that stocked fish make up a large portion (Ashley 75%, Wando 40 %) of the legal size fish harvested in each of these rivers. In addition, the contribution appears to be additive, resulting in an increased abundance over what would have been expected without stocking. These studies are continuing and the information obtained is being used to formulate plans for a coast wide stocking program that will eventually release red drum into estuaries of each of the coastal counties. These releases will initially target areas of high fishing pressure.

### **Mariculture Extension Activities**

Due to funding limitations, on-site extension activities were limited during the year. However, whenever possible, information requests by SC growers were filled by telephone or by electronic format. Assistance was also provided to communities as needed on aquatic weed control, water quality issues and fish species selection associated with coastal impoundments.

### **Southeastern Regional Taxonomic Center (SERTC)**

Substantial progress has been made toward achieving the initial objectives of establishing the SERTC, which serves as a specimen repository, library, and training facility for taxonomic research on aquatic fauna of coastal and marine habitats of the southeastern US Atlantic states. A Scope of Work is in place for the second year of funding, and additional funding for the third year is presently being considered by Congress.

Preserved invertebrate voucher specimens are being assembled in the SERTC lab from a variety of sources, including ongoing collection programs, as well as archived voucher specimens from previous projects. The process of assessing the condition of this material and verifying

identifications of specimens has been initiated, with the assistance of in-house experts on identification and taxonomy, and invertebrate taxonomists subcontracted on the grant. Specific information on the collection data for these specimens is being gathered for inclusion into a relational database (SPECIFY) that will be used to manage this biological collection. A parallel collection of invertebrate specimens, frozen or preserved in 95% ethanol so as to be suitable for extraction of DNA, is also being assembled to provide material for future molecular phylogenetic work. Project personnel visited Dr. Richard Heard at the Gulf Coast Research Laboratory's museum collection, to obtain taxonomic literature and assess methods of curating and managing the SERTC collection. Dr. Heard has also made two trips to Charleston to fulfill parts of his obligation to verify specimen identifications and assist in collection development. Literature on several taxonomic groups has been systematically organized in preparation for entry into a reference database, and efforts are underway to obtain additional current taxonomic literature from primary authors, as well as from technical libraries such as that of the Smithsonian's National Museum of Natural History.

The fish holdings at the Grice Marine Laboratory of the College of Charleston are being catalogued and curated under the supervision of Dr. Tony Harold, and substantial progress has been made on entering information on the fish taxonomy literature into Procite bibliographic software. Larval fishes collected near the Charleston Bump have been identified and will be entered into the ichthyoplankton collection that is housed at the Grice Marine Laboratory.

Discussions have been held regarding future collaboration with the Center for Coastal Environmental Health and Biomolecular Research (NOS Charleston Laboratory) and the Charleston Museum, and a number of other collaborations are underway, involving the loan of specimens belonging to the SERTC collection. Subscriptions to several list-serve groups pertaining to taxonomy and natural history collections have been initiated, and SERTC has joined the Society for Preservation of Natural History Collections. Interviews have been conducted for filling two grant-funded positions on this program, including an Assistant Marine Scientist and an hourly technician.

### **Educational Programs And Activities**

MRRRI staff continued to provide significant contributions to the education of students, teachers and the general public in marine and estuarine science. MRRRI's original support of the South Carolina's colleges and universities was through seaside facilities. This support has greatly expanded through extensive collaborations between scientific staff and faculty at the State's institutions of higher learning.

#### **Graduate, Undergraduate, High School and Public Education**

Close educational relationships have continued between the MRRRI staff and scientists and COC, MUSC, USC, CU, SCSU and several other regional academic institutions. During FY 2001-2002, MRRRI staff contributed as full faculty and adjunct faculty to academic committees, in advising graduate student's research (approximately 30 at present), and in teaching specialty

graduate courses. Undergraduate and high school students also were advised and/or mentored in special projects. The Waddell Mariculture Center initiated a summer internship program for undergraduates, which included minority students in 2002. Staff participated in teacher workshops, science fairs, and in presentations at professional meetings and to general audiences, as well as many SCDNR and MRD educational activities (Southeastern Wildlife Exposition, Sportsman's Classic, etc.). Staff contributed to the development of an NSF proposal to establish a *Southeast Center for Ocean Science Education Excellence* (SECOSEE). This project has been funded and a Center will be established in Charleston.

### **Minority Training and Recruitment**

During FY 2001-2002, the MRD Minority Internship and Training Program continued to be administered and supported by MRRRI staff and scientists. The internship program focuses on encouraging minority students to choose careers in marine or natural science, possibly, with the SCDNR. Each summer, MRD's *Minorities In Marine and Environmental Science* program provides opportunities for undergraduate students to conduct independent research projects guided by a mentor from MRD or one of the other agencies at the Marine Center. Students summarized their scientific efforts in professional written reports and oral presentations on the last day of the summer training. This summer, the program received a favorable review from the NSF sponsor with indication of continued support. One student, who returned for a second summer, is in graduate school at the University of Georgia and will co-author several papers on his research. During FY 2001-2002, funding from three external sources (NSF, NOAA's Coastal Ocean Program and the National Sea Grant office through SCSU) broadened the long-term support base of the project and supported six students with research projects and one with a fisheries policy/management project. A total of 52 minority students have participated in the summer training project to date.

### **Marine Resources Library**

The library added 704 new titles and 344 volumes during the past year. The net growth of the library's book collection gives MRL a total of 25,003 volumes; this represents 22,334 unique titles. The number of new titles added to the library in 2001-2002 represents a 16% increase over the previous year and is indicative of the progress the MRL cataloging staff is making toward cataloging the backlog of gift titles. Because the library continued receiving funding for periodical binding from all three supporting agencies, the bound periodical collection now totals 8,904 volumes.

Due to statewide budget cuts, the library had to cancel subscriptions to seven journal titles funded by SCDNR as well as the print format of several journals received electronically; however, we added one new journal title funded by COC to support research in animal genetics. Now MRL receives 283 serial titles through subscription, exchange donation, and the Federal/State Depository System. The Marine Resources Library Webmaster has developed a web page ([http://mrl.cofc.edu/Print\\_Journals.html](http://mrl.cofc.edu/Print_Journals.html)) for MRL's combined print and electronic journal holdings with direct links to the most current holdings for print titles and to the full-text for the electronic holdings.

The library continues to participate in the IAMS LIC Duplicate Exchange Program and in the exchange of SCDNR publications with 83 exchange partners throughout the world. The scanning project that is creating the SCDNR/MRD data, educational and technical reports in PDF format and making them available online from the MRL web page (<http://mrl.cofc.edu/pubs.html>) is 23% complete.

During the past year, the library circulated 2,215 books to library users. The library staff answered a total of 2,594 reference and directional questions. The librarian presented twelve bibliographic instruction classes that reached 231 students. The interlibrary loan staff placed 899 borrowing requests for MRL users—a 27% increase over the previous year; the staff responded to 1,058 lending requests from other libraries—a 39% increase over the previous year.

### **OFFICE OF REGIONAL MANAGEMENT**

The Office of Regional Management (ORM) was created in December of 2001. 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) and providing backup to the Marine Resources Division Director. The goal of the ORM is to support regional marine fisheries management activities.

The ORM director served as a voting member of the South Atlantic Fishery Management Council (SAFMC) and as the Council vice-chairman during this reporting period. 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. The ORM is comprised of one senior level manager who works closely with commercial and recreational fishermen, conservation 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 interjurisdictional fisheries management activities. ORM activities are supported with state funds, federal funds, and federal grants.

During this reporting period, 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 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 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 this reporting period, 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 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 which requires states to establish state-specific management measures aimed at achieving a 40% spawning potential ratio. We elected to achieve this level in South Carolina 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.

The ORM director represented the agency at several meetings with the National Marine Fisheries Service during this period including, a meeting of the Highly Migratory Species and Billfish Advisory Panel, a regional meeting to discuss changes in the requirements for modified turtle excluder devices in the shrimp trawl fishery; and a meeting to consider revisions to develop a listing action priority process for the Endangered Species Act.

During this reporting period, the ORM director participated as a member of the Bottlenose Dolphin Take Reduction Team established by the National Marine Fisheries Service. The team is required by federal law to develop a draft take reduction plan within 6 months of being established. The plan is aimed at reducing the incidental mortality and serious injury of the Atlantic coastal stock of bottlenose dolphins in commercial fisheries to below the potential biological removal level for the stock. Two South Carolina fisheries that impact bottlenose dolphin are the blue crab trap fishery and the ocean shad fishery. Changes in the way these fisheries are prosecuted as well as other territorial sea fisheries that interact with bottlenose dolphin have been developed and are contained in the draft plan.

The ORM director worked closely with the S.C. General Assembly and with fishery constituent groups such as the Coastal Conservation Association on several important pieces of legislation including a bill providing for technical changes in Chapter 5, saltwater fishing license amendments, shad seasons and fishing times, and the red drum bag and slot limits.

## **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 manage and conserve the wildlife and freshwater fishery resources of the state. 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. Wildlife Management offices are in Clemson, Columbia, Greenwood, New Ellenton, Union, Bonneau, Garnett, Georgetown, Florence and Green Pond.

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. Freshwater Fisheries offices are in Clemson, Columbia, Greenwood, Rock Hill, Bonneau, Barnwell and Florence.

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.

Sixteen 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 land-owners 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 75,000 acres in 54 heritage preserves state-wide, adding some 4,000 acres per year. 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 Diversity Section

### Mountain Region

Highlight: Heritage Preserve Management - Most of the unit's time and energy were devoted to maintaining and improving the 12 Heritage Preserves in the region. Parking lot construction on Chestnut Ridge Heritage Preserve at Oak Grove Road was completed and the lot at Bunched Arrowhead Heritage Preserve was resurfaced. A volunteer workday with one staff member, two interns, and four volunteers, involved stabilizing a steep bank with native willows along the South Pacolet River at Chestnut Ridge Heritage Preserve. Staff assisted a botanist with a white irisette monitoring project at Chestnut Ridge Heritage Preserve. A gate was erected at the new Ashmore Heritage Preserve addition, and the area was posted with appropriate signage. .

A Toyota Tapestry grant was awarded to Eastside High School (teacher James Sikes) in Greenville County to fund a cooperative project between Wildlife Diversity Staff and the school studying smooth coneflowers at Buzzard Roost Heritage Preserve. A volunteer workday with 4 volunteers and 3 staff members was completed at Buzzard Roost Heritage Preserve. Fire lines were constructed. A total of 7 scientific research permits for work on heritage preserves were approved in this office. A prescribed burn of 7.5 acres split into 5 plots was completed with assistance from the SCFC at Buzzard Roost Heritage Preserve. At Bunched Arrowhead Heritage preserve a minor trail re-route and bridge replacement was completed. Kudzu and / or English ivy control at Bunched Arrowhead and Belvue Springs Heritage Preserves continued.

Public safety issues are a growing concern at heritage preserves. A methamphetamine lab was discovered on the Chandler Heritage Preserve, and mobile/ temporary "meth" labs are a growing problem in the mountains and other remote areas.

Other activities: Carried out a 100-mile winter Bald Eagle survey route January 2001; monitored Peregrine Falcon (*Falco peregrinus*) productivity at Table Rock. Two chicks were produced this year at the eyrie. This is the 14<sup>th</sup> year adults occupied this territory; they have produced young 13 out of 14 years. Adult peregrines have been seen on the Toxaway River arm of Lake Jocassee; they may have nested in North Carolina.

A cooperative project with the U.S. Forest Service and Clemson University was initiated to evaluate use of highway bridges by all bat species with particular emphasis on Rafinesque's big-eared bats (*Corynorhinus rafinesquii*). To date surveys of Oconee and Pickens County bridges are complete and work started in Anderson and Greenville Counties. No big-eared bats were found using bridges as roosts in the upstate, however big brown bats and eastern pipistrelles did.

A terrestrial mammal trapping survey was carried out at the Charleston Naval Weapons Station under contract to the Station. Four bat species were captured, including a Southeastern Myotis. A total of 30 species were recorded.

Staff supported numerous Jocassee Gorges Working Group meetings and chaired a subcommittee to review plans for routing and construction of the Palmetto Trail within the

Jocassee Gorges. Staff monitored a known big-eared bat roost and 4 green salamander sites within the Jocassee Gorges.

#### Publications and Reports:

Louie, B., M. Bunch, and J. R. Harrison. 2001. Mammal Survey and Other Biological Assistance at NWS Charleston, SC. Unpublished Final Report by South Carolina Department of Natural Resources for the Naval Facilities Engineering Command. 26 pp.

Platt, S.G., and M. Bunch. 2000. Distribution and status of swamp rabbits in South Carolina. Proc. Annu. Conf. SEAFWA 54: 408-414.

### **Piedmont Region**

Summary: The Piedmont Region staff continued management of five heritage preserves (Forty Acre Rock, Rock Hill Blackjacks, Peters Creek, Savage Bay, and Segars-McKinnon). Several significant events or accomplishments were made including completion of SCDNR input to The Nature Conservancy in their development of a portfolio of significant areas in the Piedmont Region, WEB page development and updating for Rock Hill Blackjacks, Forty Acre Rock, Peters Creek, and Segars-McKinnon Heritage Preserves with links on the SCDNR WEB page, and compilation of Arcview GIS data for the above five Heritage Preserves, over two miles of trails were constructed by volunteers at Peters Creek Heritage Preserve.

Highlights: Technical Guidance and Education: Staff assisted Katawba Valley Land Trust and Nation Ford Land Trust in protecting open space, wildlife habitat, and cultural sites. Staff led the effort to get the Schweinitz's sunflower conservation easement site burned with assistance from the SC Forestry Commission, Winthrop Endangered Species Program, and Mecklenberg County Parks and Recreation Department. Consultations were held with York County and Duke Energy to conserve and manage populations of Schweinitz's sunflower that occur on their property or on their right-of-ways.

### **Midlands Region**

Highlight: Red-cockaded Woodpecker (RCW). Over 90 groups of woodpeckers on state lands, including 55 at Sand Hills State Forest, were monitored during the year. More than 800 trees on these properties were checked for activity status and management needs. Thirty artificial cavities were installed and 70 chicks were banded.

The RCW Safe Harbor Program continues to be an overwhelming success. Currently the program has 73 enrollees protecting and managing over 252,000 acres and 202 groups of woodpeckers. For the reporting year 24 properties with 80,000 acres and 4 woodpecker groups were enrolled. Currently there are more than 20 woodpecker groups above the baseline commitment. Annual surveys indicate that 77,000 acres are being burned on a 1-5 year rotation,

51,000 acres are being mechanically treated, and 18,000 acres are being chemically treated to maintain suitable habitat for RCWs. More than 3,000 acres have been restored to longleaf pine.

Other Activities: Swallow-tailed Kite Conservation - Thirty-five kite nests were located, a 100% increase over the previous best annual total. The Sandy Island-lower Great Pee Dee River region continued to be a hot spot for kite nesting activity, having 15 of the 35 nests. Nesting pairs on the Francis Marion National Forest, considered the state's primary nesting population, appeared to be down. Movement patterns of both adult and yearling kites suggest that nesting groups in the state function as one population rather than as discrete, isolated subpopulations.

Bird monitoring at Congaree Swamp National Monument. The longest drought in the state's recorded weather history was probably responsible for the second lowest capture rate – 9.7 birds per 100 net-hours – since the project's inception since 1991. The continued decline of shrub nesting birds – Hooded Warbler, White-eyed Vireo, Swainson's Warbler, Indigo Bunting, and Kentucky Warbler – at the site since numbers peaked between 1992-1995 is probably due to the elimination and thinning (from canopy closure) of shrub thickets created in canopy gaps by Hurricane Hugo in 1989. Under presettlement conditions, many southern bottomland hardwood forests were apparently “managed” by category 4 and 5 hurricanes that created shrub thickets and cane patches in canopy gaps; these thickets allowed understory birds to flourish for 10-15 years, after which canopy closure thinned and eliminated the understory.

Assisted with the development and field work for a graduate research project with Clemson University on Painted Bunting nesting success and productivity at two study sites, one in forest/agriculture habitat (Webb Wildlife Center), the other in maritime forest (Spring Island). More than 30 nests were found at both sites and the study will continue for another year.

Provided information on birds and West Nile Virus (WNV) to a meeting of state public health workers and served on a DHEC/WNV committee.

Midlands staff also supported numerous educational activities and demonstrations at Clemson University's Sandhills Research and Education Center, where its office is located.

#### Presentations

“The Red-cockaded Woodpecker Safe Harbor Program in South Carolina” abstract submitted to the RCW Symposium IV, Savannah, GA.

“Hurricane Affects on Bottomland Hardwood Birds: the Rise and Fall of the Hooded Warbler” Poster presented at the joint annual meeting of the Association of Field Ornithologists and Wilson Ornithological Society, 10-14 April, 2002, Ft. Myers, FL

## **Sea Turtle and Marine Mammal Research and Management**

Highlight: Sea Turtle Stranding and Salvage Network. 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, we also count live sea turtles and bottlenose dolphins along with trawlers. Fifty-three loggerheads and 43 leatherback turtles were counted during this time period. An extra survey was made on opening day of shrimping in state waters and 344 trawlers were counted. The average number of trawlers in 2001 was 86.3/flight, while in 2002 it was 39.6/flight. A Northern Right Whale cow and calf were spotted near Murrell's Inlet.

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 2001, 121 dead turtles were reported. Through June 30 2002, 72 have been recorded. One turtle, entangled in fishing line, was freed and released alive, while two more died shortly after stranding. Another live stranded turtle was stabilized at the South Carolina Aquarium but died three months later at the Sea Turtle Hospital in Topsail Beach, North Carolina. One Kemp's Ridley taken to Topsail was released after 2.5 months' treatment while a loggerhead required treatment for a year and was released in June 2002.

Thirty-three post mortem examinations were made of fresh dead sea turtles this fiscal year. Twenty-eight died of acute causes (died suddenly but otherwise healthy) and four from chronic conditions (long-term disease or injury). One could not be determined. A summary of necropsy data was presented to a group of Beaufort County shrimpers by the DNR veterinarian.

### Other Activities

Supported 20 nest protection projects on private and public lands 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.

Statewide aerial beach surveys were conducted on a five-year cycle since 1980 as an index to the nesting population. The mean for the three-year survey period is 2,876 nests. The previous mean for 1995-1997 was 3,007 estimated nests. Although this is not the extreme decline noted in the previous decades, it is still a downward trend.

Aerial surveys were flown during April and May to document the distribution of leatherback turtles during their spring migration. This is done as part of the federal contingency plan for the species. A total of 415 were seen, which is the highest recorded since these surveys began. Because of these high numbers and concentrations, for two weeks in April, the NMFS closed all South Carolina coastal waters out to 10 miles to shrimping unless the larger leatherback TEDs (Turtle Excluder Devices) were installed. The concentrations seen in April were still present in May. Therefore, the NMFS extended the requirement for leatherback TEDs until May 24<sup>th</sup>. Because of high strandings in Georgia, a federal emergency rule requiring leatherback TEDs

region-wide for 30 days was implemented that same day, thus providing additional protection until June 22.

A TED technology and enforcement workshop was organized and held at Fort Johnson in Charleston. Participants included Georgia and South Carolina sea turtle biologists, SCDNR Marine Patrol, USCG, NMFS law enforcement personnel and a gear specialist.

Wildlife Diversity and Marine Resources Division staff coordinated dialogues between sea turtle volunteers and the South Carolina Shrimpers Association toward introducing legislation in the General Assembly to require larger TED openings. The legislation was signed by Governor Hodges and became law on 20 May 2002.

The Marine Mammal Stranding Network documented 78 stranding events in 2001, including two animals that stranded alive and were euthanized. In 2002, there were 13 stranding events through June 30, including two that stranded alive. One Pygmy sperm whale was euthanized. A 32-foot sperm whale stranded in Myrtle Beach in April, but was pronounced dead shortly after stranding. Staff met with National Ocean Services (NOS) staff and Charleston County Rescue-Large Animal Unit to discuss ways in which they can be of assistance at marine mammal strandings.

#### Presentations at the 22nd Annual Symposium on Sea Turtle Biology and Conservation

Poster Presentation: “Characterization of Inter-nesting Habitat, Migratory Corridors, and Resident Foraging Areas for Loggerhead Turtles (*Caretta caretta*) from a South Carolina Nesting Beach Using GIS and Remote Sensing Applications” by DuBose Griffin and Sally Murphy.

Oral Presentation: “Comparison of Resident Foraging Areas Utilized by Loggerhead Turtles (*Caretta caretta*) from a South Carolina Nesting Beach Using GIS and Remote Sensing Applications” by DuBose Griffin and Sally Murphy.

#### Upper & Lower Coastal Regions

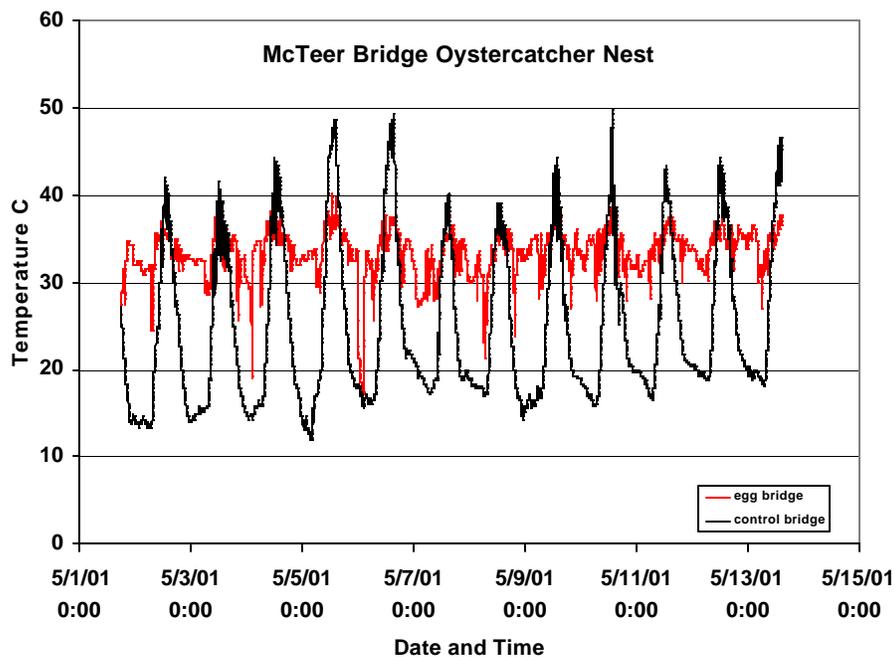
Highlight: American Oystercatcher Survey and egg floatation study: Statewide surveys were conducted by boat and ATV at high tide roost sites to document the wintering population of oystercatchers. These surveys include 998 washed shell rakes and barrier island beaches. A total of 3,496 oystercatchers were counted during these surveys. This is up from the 2,459 birds counted last year and similar to the 3,138 birds counted in 1999. The state supports a major proportion of wintering oystercatchers from the entire east coast population.

Statewide surveys of territorial adults were conducted during April and May. A total of 407 breeding pairs of oystercatchers were counted. This compares with 399 pairs last year. The Cape Romain area continues to support over half of the nesting and only 21% of the nesting south of Charleston. We continue to document low reproductive success as a result of nest depredation and overwashing of nests. A sample of 20 eggs were removed from 10

oystercatcher nests and placed in an incubator. These eggs were replaced with wooden eggs. One of the wooden eggs contained a temperature recording datalogger.

The eggs in the incubator were floated (placed in warm water) every three days. The buoyancy of the eggs reflects the age of the embryo. During this controlled study of known age eggs we were able to correlate the buoyancy of eggs with the age of the eggs. In the future we will be able to float eggs at newly found nests and determine the stage of development and estimate the probability of hatch. Piping eggs from the incubator were returned to the natural nest and the wooden eggs were removed. Adult oystercatchers readily accepted piped young and piping eggs at the nest site. This could prove to be a useful management technique for increasing chick production.

Dataloggers from the ten nests allowed us to document normal incubation behavior at a protected site. These data can be compared to data from less protected sites to document the effects of disturbance on nesting behavior.



### Other Activities

- Bald Eagle - Nine trips were made to monitor conditions associated with Avian Vacuolar Myelinopathy on Lake Thurmond, Lake Murray and the East and West Branches of the Cooper River. In collaboration with Dr. Susan Wilde (MRD) we collected samples of submerged aquatic vegetation and developed a correlation between the disease and a species of epiphytic blue-green algae found on the vegetation. On Lake Thurmond this fall, where this alga was most abundant, two American coots, three bald eagles and fourteen Canada geese tested positive for AVM. Four other eagle carcasses were found

on the lake were suspected to have died from AVM. No direct link between this algae and AVM has yet been established.

- Wood storks attempted to nest at 10 sites this year. Two sites used last year were dry and were not used. Only five of this year's sites were known to have fledged young. All nests (n= 119) at three sites were documented as empty, one site with 4 nests and one with 58 nests were not rechecked due to denial of access by the landowners. This year, 879 nesting attempts were estimated to have fledged 1468 young. During the 2001 nesting season, 1174 nests were estimated to have fledged 2077 young.
- A total of 60 least tern-nesting sites were surveyed this season, 35 were active, and 25 were not. Nineteen (54%) of the active sites were on rooftops, 12 (34%) were ground sites, and 4 (11%) were man-made or spoil sites. One new rooftop-nesting site was documented.
- 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.
- A total of 187 wading bird-nesting sites were surveyed this year, 96 were active and 91 were inactive. A total of 171 sites were checked during five aerial surveys and ground surveys were conducted at 13 sites
- Continued documentation of the use of state coastal waters by manatees is ongoing, with 82 reports from the public. Manatees arrive in April and remain here through October. Peak numbers are present from July through September. Beaufort and Charleston counties represent of the majority of reports

### **Botanical and Plant Community Conservation**

Highlight: Marl & Limestone site surveys. Plant ecologists have estimated that high calcium plant communities to be one of the most species-rich in world on a tenth-hectare spatial scale. During this study over 200 occurrence records of rare plant species were made across the S.C. Coastal Plain and over 200 potential sites were botanically surveyed. Two apparent old-growth sites on the Great PeeDee River were documented, with characteristics measured and charted. Over 3000 plant accession numbers were processed, with vascular plant vouchers curated in the University of South Carolina Herbarium representing 109 families, 324 genera, and 635 species. As additional documentation, a database of digital photos of significant sites and rare plants was created. Major highlights of the project include (a) 2 plant species of state concern once thought to be extirpated in the state (Ravenel's *Eryngo* and Savannah Nutsedge) were rediscovered. (2) For the first time in the state a wet marl savanna was discovered in the Francis Marion National Forest. Over a dozen new records for the May White Azalea, a South Carolina endemic species, were discovered. (3) Cave Hall, a limestone cave, spring, and geologic exposure of major historical and ecological significance was documented for protection by HTAB: 1 species of

state concern, 1 species of federal concern. And (4) a major, new limestone sink and cave system were documented along the Great Pee Dee River.

#### Other Major Research and Protection Projects:

- Ditch Pond: compiled botanical, ecological, and geologic data documenting the significance of one of the few remaining Carolina bays on the Aiken Plateau- 6 plant species of state concern indigenous to the site were recommended for protection by HTAB. Re-visited site and documented changes.
- Wadakoe Mountain: compiled data for plants of state (27) and federal (3) concern, 16 new state records, and 1 species new to science in the mafic glade outcrops and high-calcium cove forests in the Eastatoe Valley were recommended for protection by HTAB.
- Preliminary floristic and ecological investigations were conducted on a major Piedmont prairie remnant in the Upstate, with two species of state concern collected and observed.
- Conducted six field surveys to evaluate Oglethorpe Oak, a species of federal concern, on the Piedmont Ranger Districts of U.S. Forest Service. This species is in steep decline due to disease and type-conversion of mixed-hardwood upland systems to pine monoculture. Several upland depression swamps were investigated that had been targeted with near-IR photography, and the utility of this technique in community delineation was evaluated. The HTAB-approved project “Troy Gabbro” was re-visited and changes to the site were documented.
- Conducted evaluations of three potential sites for maritime forest formations using near-IR photography and GAP vegetation data. Followed up with site visits to the Francis Marion National Forest and made management recommendations to U.S. Forest Service

#### Presentations:

- A staff member who is an officer for the Southern Appalachian Botanical Society, which publishes the scientific journal, Castanea, outlined the importance of Heritage Preserves as important refuges of biodiversity and as areas open to ecological research.
- At the Association of Southeastern Biologists meeting in Boone, N.C., discussed the importance of systematic collections in the documentation process of habitat and endangered species protection and management.

#### Herpetology Projects

Highlight: Rattlesnake Project. This project is being funded under WCRP and is taking place at the Webb Wildlife Center. A graduate student from Clemson is attempting to determine the differences in life history strategies between the eastern diamondback and the timber rattlesnake. This year eight rattlesnakes, four diamondbacks and four timber rattlesnakes were surgically implanted with radio transmitters and tracked at least four times a week. Vegetation sampling was done at each rattlesnake location for detailed habitat analysis. Dietary studies, using freshly killed (accidental, such as road kill) specimens were also done. This project is scheduled to continue for three additional years.

### Other Activities:

- Negotiated a two-year contract with the Marine Corps to provide a survey of the amphibians and reptiles of the Marine Corps Air Station (MCAS) at Beaufort, South Carolina. The project begins in FY03.
- All historic flatwoods salamander breeding ponds were visited during the spring of 2002 to determine if surveys could be carried out. Due to the persistent drought conditions no breeding pond contained water and survey efforts were suspended.
- Existing cover board transects at Tillman Sandridge Heritage Preserve, Aiken Gopher Tortoise Heritage Preserve and the Webb Wildlife Center were sampled as part of an ongoing survey for the pine snake, southern hognose snake and mimic glass lizard. Only one pine snake was recorded during this fiscal year.
- Among several education projects, a panel display was prepared on amphibian and reptile conservation in South Carolina. This display was initially exhibited at a two-day reptile show in Columbia. Following this show the display was exhibited for approximately one month at each of the following sites: Riverbanks Zoo, Greenville Zoo, South Carolina Aquarium and Alligator Adventure, a private reptile zoo located in North Myrtle Beach.
- Staff proposed changes to the official State List, including the addition of the Carolina Gopher Frog as State Endangered and the Spotted Turtle as a Species in Need of Management. In addition staff developed a new set of regulations governing the take, possession and sale of spotted turtles in S.C. These new regulations were passed by the General Assembly during this fiscal year. In addition, staff assisted law enforcement in an endangered species possession case involving the State Endangered gopher tortoise. Staff assisted with the seizing of these tortoises, the subsequent disposition of the tortoises and the follow-up investigation.

### Heritage Program Data Management and GIS

Project Goal: To provide information on the status and distribution of South Carolina's rare and endangered species for

- Ⓒ land protection and management
- Ⓒ permit review and mitigation
- Ⓒ research

Most data requests come from environmental consultants, but our own staff, other government agencies, and cooperating organizations such as The Nature Conservancy and NatureServe also submit requests. About 200 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 375 people have access to this web site, with 78 of those being added this year, and it has been accessed over 5600 times since it was brought on-line in June 1999. About 2000 of these visits were in this fiscal year. The use of the site continues to grow steadily.

## **Heritage Trust Program**

### **Land Protection**

Three protection projects were completed:

1. Congaree Bluffs Heritage Preserve (HP) (Calhoun County) -Containing steep, undisturbed bluffs bordering the Congaree River, this 201-acre tract contains significant stands of American beech, oak-hickory and bottomland hardwood forests. The number of woody plants on the bluff may exceed 200 species. Two rare plant species are also found on the tract. The preserve is 13 miles north of St. Matthews near Fort Motte
2. Ashmore HP Addition (Greenville County) - Found 30 miles north of Greenville, this 471-acre tract contains two headwater streams, one which provides a water source for the federally endangered mountain sweet pitcher plant. These plants exist only in North and South Carolina and one of the best examples is found at Ashmore. The preserve adjoins Caesar's Head State Park, Jones Gap State Park and our 253-acre Chandler HP.
3. Tillman HP Addition (Jasper County) - Bordering the Savannah River, this 459-acre property will help protect the largest gopher tortoise population in South Carolina. Characterized by upland longleaf pine, fields and cypress tupelo bottomland hardwoods, the tract provides habitat for 20 rare elements. The preserve is seven miles northwest of Tillman and now totals 1,422 acres.

Revenues to the Heritage Land Trust Fund have decreased while our average cost per acre of habitat protected has increased. Associated development pressures have placed several of the state's most significant archaeological sites in peril. Addressing these situations will be difficult, and many professionals feel that it may be the very last opportunity to protect certain types of cultural resources. Competing with these needs, the growing system of preserves means overall management costs are increasing. Failure to allocate sufficient management budgets from the Fund will lead to degradation of the resources the agency is charged with protecting.

### **Preserve Management (Midlands and Coastal counties):**

Typical activities were: to management plans, monitor rare species, restore habitats, maintain public access facilities, develop stewardship committees and provide guided tours of preserves. Sixty-six 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 30 other public land management plans and conservation projects. Successful monitoring of 15 different rare species and other species of concern was completed at various preserves.

4,475 acres on 14 different preserves were subjected to controlled fire to enhance rare habitats. Assistance was provided to the state Forestry Commission in suppressing 9 wildfires on or near heritage preserves. Draft wildfire management plans were completed for Victoria Bluff and Lewis Ocean Bay HP. Restoration of ecological communities was conducted on 9 preserves, which included planting native species and removing invasive exotics. More than 45,000 longleaf pine seedlings were planted on Lewis Ocean Bay and Little Pee Dee River HPs.

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 affected Congaree Creek HP two years ago has now been cleared of contamination. Planning for access facilities and a canoe trail have resumed.

Preserve managers have provided approximately 53 guided field trips for the public and are actively educating volunteers to carry out this task. Also, 19 presentations and lectures were given to a variety of groups.

<b>Property Acquisitions</b>			
<b>Name</b>	<b>Acres</b>	<b>Date Acquired</b>	<b>Total Cost</b>
Congaree Bluffs HP	201	7-19-01	\$919,481
Ashmore HP	471	9-13-01	614,927
Tillman HP Addition	459	2-08-02	1,466,266
<b>Total</b>	<b>1,131</b>		<b>\$3,000,674</b>
Average Total Cost of \$2,653 Per Acre			
Donated Value of \$311,859			
Other			
Land Protection			\$121,828
Capital Improvements			24,351
Preserve Management			487,038
<b>Total</b>	<b>1,131</b>		<b>\$633,217</b>
<b>Grand Total</b>	<b>1,131</b>		<b>\$3,633,891</b>

**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 493 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 slightly 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 were made at public and professional meetings.

FERC Coordination / Hydroelectric Project Activities

Work was conducted on 7 FERC projects regarding pipeline projects, relicensing, shoreline management, operations and fisheries mitigation. Although the number of projects worked on has reduced from previous years, the workload has not decreased 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, 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 51 projects ranging from minor road widenings to new road alignments. Work was also completed on developing mitigation opportunities primarily in the sandhills and 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 Project Accomplishments 2001-2002**

Significant accomplishments continued with operation of public hunting programs and the Wildlife Management Area Program. During FY 2001-02 1,057,433 acres of land were available to the public for hunting, and a total of 46,441 WMA permits were sold.

Harvests of 16,348 turkeys were recorded at department check stations. Turkey tags were issued to 45,154 hunters during the 2002 spring turkey season. Fifty-one public dove fields (2040 acres) were available across the state. 1,376 hunters participated in public waterfowl hunts with a reported harvest of 3,210 ducks.

<b>AGRICULTURAL</b>	<b>ACTIVITIES</b>		
<b>Annuals Planted</b>	<b>3204 acres</b>	<b>Perennials Planted</b>	<b>200 acres</b>
<b>Acres mowed</b>	<b>4951</b>	<b>Acres disced</b>	<b>6408</b>
<b>Prescribed burning</b>	<b>12196 acres</b>	<b>Fertilization</b>	<b>3841 acres</b>
<b>Fields limed</b>	<b>353 acres</b>	<b>Herbicide</b>	<b>2053 acres</b>
<b>Firelanes mowed</b>	<b>283 miles</b>	<b>Dikes mowed</b>	<b>1,893,780 linear ft.</b>
<b>Roads mowed</b>	<b>469 miles</b>	<b>Roads scraped</b>	<b>222 miles</b>
<b>WMA signs posted</b>	<b>2510</b>	<b>Boundary posted</b>	<b>332 miles</b>
<b>Other signs posted</b>	<b>1007</b>	<b>Waterlevel mgmt.</b>	<b>479 man days</b>
<b>SURVEYS</b>			
<b>Dove call counts</b>	<b>14 (21-mile routes)</b>	<b>Quail call counts</b>	<b>50 (5.5-mile routes)</b>
<b>Furbearer Census</b>	<b>141 (1.5 mile)</b>	<b>Waterfowl Routes</b>	<b>29 sites</b>
<b>Ducks banded</b>	<b>282 ducks</b>	<b>Geese banded</b>	<b>1106 geese</b>
<b>Woodduck boxes</b>	<b>1633 checked</b>		

<b>TECHNICAL</b>	<b>ASSISTANCE</b>		
Hunt club data	1500 clubs	Management plans	475 plans written
Other agency adv.	233 (66 man days)	Environ. Reviews	4
Nuisance wildlife	1778 calls	Focus area coord.	74 man days
Presentations	371 (16,439 people)	News releases	56
<b>FOREST</b>	<b>STEWARDSHIP</b>	<b>PROGRAM</b>	
Plans reviewed	5	Plans written	89

### **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: \$2,202,836
- Personnel: 34 FTEs.
- Major equipment: 42 vehicles; 82 boats; 1 tractor.
- Facilities: 7 offices and labs
- Demand: 486,529 licensed anglers; 710 private pond owners.

(2) Outputs:

- \$ Conducted survey and inventory activities on 29 lakes and reservoirs in South Carolina.
- \$ Conducted survey and inventory activities on 24 rivers and streams in South Carolina.
- \$ Conducted 710 on site pond management consultations.
- \$ Reviewed 48 environmental permit requests.
- \$ Investigated 73 fish kill events.
- \$ Maintained 190 fish concentration areas in South Carolina lakes and streams.
- \$ Evaluate larval growth and food habits of striped bass in Lake Marion.
- \$ Evaluate growth and survival of two different largemouth genetic strains in South Carolina ponds and lakes.
- \$ Tested a site-specific largemouth bass model capable of predicting size structure and other selected biological parameters.

(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)

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 assess their awareness of issues related to aquatic natural resources and recreational fishing. Evaluation of survey results is ongoing.

d. The survey of licensed anglers (as 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. The treatment and subsequent reduction of *Hydrilla* from the Santee Cooper Lakes created concerns among the public that largemouth bass reproduction and survival had been harmed. Under public pressure, the Section stocked largemouth bass and the stocking was monitored by sampling under the survey and inventory responsibilities of this program. The sampling indicated that the stocking was neither effective nor necessary. These results supported the Section's contentions that were voiced prior to the stocking, thereby, assuring the public that recommendation were being based on the best science available.

g. Survey data from this program were used to implement a delayed harvest program 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.
- \$ 77% carried out either all of the recommendations or some of them.
- \$ 61% 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, 2001)

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 than 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 \$14,565 per water body.
- \$ River and stream survey and inventory activities were completed at an average cost of \$18,640 per water body.
- \$ On site pond management consultations were conducted at an average cost of \$308 per pond or \$31 per surface acre.
- \$ Environmental permit requests were review for an average cost of \$870 per review.
- \$ Fish Kills were investigated at an average cost of \$670 per event.
- \$ Fish concentration areas were maintained at an average cost of \$643 per site.

(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 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)

**Program Name:** Hatchery and State Lake Operations

**Program Goal:** To maintain hatchery facilities in sufficient number and in proper repair 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, shellcrackers 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:	\$1,918,952
Personnel:	33 FTEs.
Major equipment:	43 vehicles; 25 boats; 7 hatcheries; 20 tractors.
Facilities:	7 hatcheries; 6 raceways; 118 hatchery ponds; 17 public fishing lakes
Demand:	486,529 licensed anglers. State population to restore species of concern; approximately 400 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 owner
- \$ Production of bluegill and shellcrackers 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.
- \$ Participated in the efforts to recover the imperiled robust redhorse by setting aside five ponds for the culture of the species as a part of a multi-agency effort.
- \$ 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 7% 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.
- \$ 95% 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 2001 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 138,300 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, therefore, maintaining the fishery and its benefits.

(References: The 2001 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 nine 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 returned 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 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 716,798 trout into public waters at an average cost of approximately \$0.32 each.
- \$ Produced and stocked approximately 1,794,482 striped bass fingerlings at an average cost of \$0.18 each.
- \$ Produced approximately 434,065 largemouth bass fingerlings at an average cost of \$0.07 each.
- \$ Produced approximately 6,919,031 bluegill, shellcrackers and redbreast at an average cost of \$0.07 each.
- \$ Improvements and repairs to facilities at the Walhalla State Fish Hatchery continue to occur. Priority repairs are focused on the hatchery's residences.
- \$ Maintenance and management of 17 public fishing lakes was accomplished at an average cost of 231 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

**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.

**Performance Measures:**

(1) Input:

Total cost:	\$221,703
Personnel:	3.5 FTEs.
Major equipment:	7 vehicles; 8 boats.
Facilities:	St. Stephen Fish Lift
Demand:	486,529 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

(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 first year 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:

- \$ The lock doors at the Pinopolis Dam were being replaced during spring 1998; operation of the refurbished lock during 2002 resulted in the passage of 2,062,243 herring units.
- \$ Approximately 421,117 blueback herring and 140,228 American shad were

passed at St. Stephen during the 2002 fish passage season.

(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)

## Law Enforcement Division

### Law Enforcement Advisory Committee

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The Division of Law Enforcement is responsible for enforcement of state and federal laws that govern hunting; recreational and commercial fishing; recreational boating; and other natural resources conservation concerns. The division, operating from its Columbia headquarters at 1000 Assembly Street, conducts South Carolina's hunter and boater education courses and investigates boating and hunting accidents. DNR enforcement officers regularly conduct search and rescue missions to outlying areas and assist other law enforcement agencies in investigations.

South Carolina's corps of natural resources enforcement officers are organized into eight districts covering groups of the state's 46 counties and a ninth district to cover coastal marine shoreline and waters out to the three-mile limit which is the state's territorial sea. District offices are located in Greenville, Anderson, Edgefield, Barnwell, Hampton, St. George, Ridgeland, Bonneau, Georgetown, Columbia, York, Florence, Conway, Port Royal and Charleston. District offices and the officers working out of them are connected by a 24-hour radio system with a primary station in Columbia. A 24-hour toll-free number - 1-800-922-5431 - is maintained for emergencies requiring immediate law enforcement assistance from a natural resources officer. Any person may call this number anonymously to report a conservation law violation or information that could lead to the arrest of a violator and become eligible for a cash reward through the OPERATION GAME THIEF PROGRAM.

**Program Name:** Law Enforcement Operations

**Program Cost:**

State:	\$6,847,244
Federal:	\$421,039 (Safety Equipment Grants and Victims Assistance) \$869,186 (Joint Enforcement Agreement)
Other:	\$6,370,213
Total:	\$14,507,682

- 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 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 (**27,787**)
2. Law Enforcement Non-Title 50 Cases (**2,590**)
3. Law Enforcement Hours Assisting Other Agencies (**5,597**)

**Program Objectives:** Specific Objectives for FY 01/02:

- 1: Enact cost efficiency measures in order to most effectively manage division needs and to provide resource protection and/or services. (i.e. seek grants, reduce spending, budget issues) (**Strategic Goal 5: Internal Management and Operations, Action Item 3**)
- 2: Interaction with other divisions within DNR on resource issues that have areas of significant enforcement responsibility. (**Strategic Goal 5: Internal Management and Operations, Action Item 3**)
- 3: Monitor investigative efforts in the illegal commercialization and/or importation of wildlife. Continue to investigate reports of illegal trafficking of wildlife and continue to monitor existing commercial operations for compliance in applicable state and federal laws. (**Strategic Goal 1: Management, Action Item 3; Strategic Goal 2: Science and Technology, Action Item 3; Strategic Goal 3: Education and Public Involvement, Action Item 3**)
- 4: Improve officer professionalism through continuing post employment training opportunities to provide well-trained officers (i.e. BUI training, Investigative training, Supervisory training, personnel matters training, FTO, etc) (**Strategic Goal 5: Internal Management and Operations, Action Item 1; Strategic Goal 1: Management, Action Item 3**)
- 5: Radio Frequency Plan - In an effort to enhance command and control and establish direct communications between DNR officers and SLED agents, both agencies radio systems will be programmed to allow them to communicate with each other. This feature will enhance officer/agency safety and improve operational effectiveness for routine assignments and in response to emergency deployments. (**Strategic Goal 5: Internal Management and Operations, Actions Item 2**)

6: National Marine Fisheries (Joint Project Agreement) - The Division will continue to patrol/enforce marine laws in accordance with this agreement. In addition, efforts will be directed towards renewal of this agreement and development of other funding sources to enhance coastal enforcement will be made. **(Strategic Goal 1 Management, Action Item 3; Strategic Goal 3: Education and Public Involvement, Action Item 1; Strategic Goal 5: Internal Management and Operations, Action Item 3)**

7: Victim Assistant Program - DNR will establish this program in order to assist victims of crimes, particularly those dealing with boating/hunting accidents. **(Strategic Goal 1: Management, Action Item 3)**

8: Warrant Tracking - Improve database to track warrants and service, compile with Records section. Utilize warrant service for possible restitution. **(Strategic Goal 5: Internal Management and Operations, Action Item 2)**

9: District Office Audits - Perform audits of district field offices to ensure compliance with Law Enforcement directives. Verify all funds from boat title and registration transitions, license sales, and confiscated equipment sales are properly documented, secured and transferred to appropriate authorities. **(Strategic Goal 5: Internal Management and Operations, Action Item 2)**

10: Litter Enforcement - DNR will continue to take an active role in litter enforcement throughout the state by conducting saturation patrols, participation in Zero Tolerance weekend, and increased enforcement efforts on the states waterways and at boat landings. **(Strategic Goal 3: Education and Public Involvement, Action Item)**

**Program Results:** Results for Specific Objectives for FY 01/02:

1. In an effort to meet shortfalls in both state appropriated and department revenue funds, the Law Enforcement Division had to enact numerous operational and personnel services cost cutting measures throughout the last fiscal year to meet budgets cuts. The following is a summary of the actions taken to meet these cuts:

- As result of attrition from retirements in the last fiscal that were not filled, retirements (buyouts and incentives) this fiscal years, and resignations, the Division currently has 46 sworn and non-sworn vacancies. As result of revenue position vacancies, the Division was able to change the funding source of some state appropriated positions to revenue to help reduce the total obligation of our state appropriated personal services.

\$1,400,000 (Savings realized in some portion of FY 01/01 for both state appropriated and department revenue funds)

- Utilization of additional “Drews Law” and Federal boating funds for personal services. Changed the current funding source of six law enforcement officers from state appropriated to revenue “Drews Law” or Federal boating funds. Four of the five positions that were changed from state appropriated funds to “Drews Law” are officers positions assigned to Lexington and Richland County that routinely conduct boating patrols on Lake Murray. The other position is in District 9, Georgetown County.

\$120,818 (Savings in FY 01/02)

- The Division only purchased 34 vehicles this fiscal year. Twelve of the vehicles were bought with federal funds with the remaining 22 purchased with the funds from the Water Recreation Funding Proviso. The Division would normally need to purchase 75 -85 vehicles each year to maintain the fleet on a four year/100,000 mile rotation plan.
- The Division has suspended all other major equipment and uniform purchases except on an as needed basis, or unless federal or grant funds are available.
- Reduced the overall LE Division fleet monthly mileage average to 1500 miles.

\$78,000 (Savings computed for last 6 months of FY 01/02)

- Suspended participation in Project Readiness until the current budget crisis is resolved, or until a special line item is put into the State budget for this cost for all law enforcement agencies currently participating in the program.

\$16,000 (Savings computed for FY 01/02)

- Based on 36 officer vacancies and the proposed funding change (change from state appropriated to “Drews Law” and Federal Boating) of 6 officers, the Division will see a reduction in the operating costs needed support these officers continued employment/funding with state appropriated or revenue funds.

\$108,000 (Savings computed for the last 6 months of FY 01/02)

2. The Law Enforcement Division has worked with other Divisions within DNR on several critical resources related issues. In an effort to obtain information on the location and number of high fence enclosures for deer, Law Enforcement and Wildlife and Freshwater Fisheries worked extensively together to document these facilities and make recommendations for legislative action. There was also extensive work done on gathering information on the use of coyotes in fox running pens. In addition to gathering information for proposed legislation to address this issue, extensive covert law enforcement activities were conducted to address illegal importation of coyotes. Since the acquisition of the Jocassee Gorges property, there has been an extensive effort between Law Enforcement and other Divisions to address numerous resource and user issues/concerns.

3. In an effort limit commercialization of our natural resources and to ensure compliance with existing applicable state and federal laws pertaining to commercial operations, the Division conducted two significant covert operations during this fiscal year. In regards to the importation of foxes and coyotes and the illegal possession of coyotes (during the time period that this activity was illegal), DNR conducted a yearlong covert investigation of these issues. During this time 6 DNR covert investigators along with DNR field officers and agents with the USFWS gathered intelligence, tracked illegal importation and sell of foxes and coyotes through North Carolina and the illegal possession of coyotes in South Carolina. A summary of cases made in this operation is as follows:

- 29 Possession of coyotes
- 4 Buying foxes unlawfully
- 3 Commercial fur license
- 4 No fur dealer license
- 1 Trafficking wildlife
- 2 Untagged furs
- 4 Trapping out of season
- 4 Conspiracy to possess coyotes
- 17 Other trapping violations
- Several other cases were made but are still pending, to include 6 Lacy violations.

In the other covert operation, 2 covert officers working with 2 field officers (working undercover also), worked with local field officers for approximately 6 months on the commercialization of shrimp caught in recreational waters. A summary of cases made in this operation is as follows:

- Twelve subjects charged
- 142 separate cases made
- 112 cases of unlawful taking of shrimp for commercial purposes
- 14 cases selling seafood without a wholesale dealer's license
- 1 case selling shellfish without a molluscan shellfish license
- 1 case of failure to obtain a saltwater commercial license
- 2 cases for offering seafood for sale without obtaining a wholesale dealer's license
- 1 case for providing false records of seafood sale
- 2 cases for removing catch from commercial fishing device without permission
- 2 cases for undersize blue crabs
- 1 cases for unlawful sale of saltwater game fish
- 4 cases for conspiracy to violate law
- 1 case for no shellfish permit
- 1 case for misidentification of shellfish
- 5 boat, motors, and trailers confiscated

4. As part of an ongoing process to utilize internal training resources and external resources to provide beneficial training to DNR officers and to improve officer professionalism, DNR Law Enforcement personnel attended the following classes: Detective Class, Photography Class, Mid-Level Management Class, First Line Supervisor Class, Sexual Harassment Training, Progressive Discipline training, Drug ID Class, and Basic Instructor Course. As part of our In-service Training Program, training classes were conducted on Boating Investigations, Hazardous Materials familiarization, Criminal Domestic Violence update, Low Speed Pursuit Driving, and Firearms certification. Again this year, Deputy Law Enforcement Officers attended in-service with regular salary officers.

5. With the exception of a few radios and walkie-talkies, all DNR law enforcement mobile radios and walkie-talkies have been programmed with SLED. The remaining units will be programmed prior to the close of the fiscal year. The ability to have both agency frequencies in our radios was proven to be useful not only for normal operations, but for emergency response missions as well.

6. The Division met all requirements found in the Joint Project Agreement FY 01-02 with National Marine Fisheries. Offshore patrols and fish house inspections were conducted in efforts to protect our fisheries resources in compliance with state and federal regulations. News releases were developed to educate the public in the importance of our fisheries resources along with the laws that protect those resources. Continued funding for this effort was obtained with the signing of a new project agreement for FY 02-03. For FY 01/02 DNR officers conducted 3,089 patrol hours, made 1,137 contacts with fishermen and made 188 cases.

7. A Victim Assistance Coordinator was hired under a 2001-2002 Victim's of Crime Act (VOCA) grant in June 2001 that was awarded to SCDNR by the SC Department of Public Safety (SCDPS). This grant covers salary and travel expenses and there is a volunteer in place in each of the nine SCDNR Law Enforcement Districts around the state to assist with the coordination of services provided to victims and their families. A second grant, 2001 State Victim Assistance Program grant (SVAP), was also awarded which enabled the purchase of a vehicle, cellular phone, pagers, radio equipment, computer equipment, and ten walkie-talkies for the nine volunteers and coordinator. The 2002-2003 VOCA grant has been awarded by SCDPS. The Victim Assistance Coordinator assists those victims and their families who have been involved in boating accidents, hunting incidents, marine theft, and other natural resource-related crimes by informing them of their rights as crime victims, keeping them informed of case status, helping with Victim's Compensation information, and walking them through the legal system. The Coordinator has assisted approximately 100 victims involved in boating accidents and/or drownings, 31 victims involved in hunting incidents, and she has assisted with 10 marine theft cases.

8. The warrant database has been completed and is active at this time. Warrants are now shown as separate charges on a particular individuals record and shows current status as to whether or not it is open, closed, subject arrested, or if a bench warrant as been issued, etc. This allows easy assess and verification for each individual warrant. As of 6/7/02, there were nearly

1,000 open warrants on the system.

9. District Office Audits have been completed by the Region Majors in all of the Law Enforcement Districts.

10. DNR officers actively work litter enforcement in fiscal year 2001/02. From 7/1/01 - 4/30/02 officers made 462 littering cases. Although littering cases have not been entered for the period 5/1/02 - 6/30/02, based on a review of the cases made for this time period there were approximately 224 cases made. The total for the year would be 686 littering cases. Again this year DNR lead the state in the number of citations issued for littering.

**Program Name:** County Fund Operations

**Program Cost:** State:  
Federal:  
Other: \$965,532 (Budget Proviso)  
Total: \$965,532

- 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:	\$374,672
Other:	\$132,197
Total:	\$506,869

- 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 "Long-Term Performance Measures"

1. Number of students certified. **(7,597)**
2. Number of hunting accidents. **(25)**
3. Number of fatal hunting accidents. **(1)**

**Program Name:** Boater Safety

**Program Cost:** State:  
Federal: \$1,083,529  
Other:  
Total: \$1,083,529

- 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 “Long Term Objective Measures”

1. Number of students certified. **(4,287)**
2. Number of boating accidents. **(129)**

3. Number of fatal boating accidents. **(19)**
4. Number of negligent operations cases. **(239)**
5. Number of boating accidents per 100,000 registered boats. **(35)**
6. Number of fatal boating accidents per 100,000 registered boats. **(5)**

## CONSERVATION EDUCATION & COMMUNICATIONS

### ADVISORY COMMITTEE

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Carolyn Fair Randolph	Columbia
Robert E. Livingston, III	Newberry
Charles L. Wyrick, Jr.	Charleston
Charles Harrison	Columbia
Caroline Stephenson	Columbia
Jessie D. McCollough	Kingtree
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 33 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

#### Program: Education

Strategic Plan Component: Action 5: Measures 1 & 2

Organizational Effectiveness Results: Emphasize the importance of education as a portion of every DNR employee's work responsibility.

DNR employees are encouraged to attend or, more importantly, actively participate in DNR Education and Outreach Events. These programs and events are scheduled during the year at various locations around the state. Employees are then presented with, and realize more ownership of, the various programs of the agency. These programs and events allow the employees of the agency to interact with the public that the agency is serving and increase their awareness of natural resources. Educational Programs include Project WILD, Aquatic Project WILD, Advanced Project WILD, Project Wet, Camp Wildwood, Envirothon, Aquatic Education, Becoming an Outdoors Woman, Take One Make One, as well as various writing and art competitions conducted through schools and

conservation districts. Outreach Events include Beach and River Sweep, Hooked on Fishing Rodeos, Marine Resources Fair and Open House, and the Palmetto Sportsmen's Classic. Recent reductions in funding will undoubtedly result in changes in agency program and outreach efforts. Until these reductions are implemented, we will be unable to determine the effects on current education and outreach programs.

**Program Education:**

Strategic Plan Component: Item 2 Goal 6

Organizational Effectiveness Results: To increase public awareness of the mission of the Department of Natural Resources.

In July of 1994, the agencies of Wildlife and Marine Resources, Land Resources and Water Resources were combined into the Department of Natural Resources. Since that time there has been a constant effort by the agency to ensure that the name of the agency can be identified by the public as the agency responsible for the protection and utilization of the state's natural resources. In a February 1994 survey, 28% of the respondents indicated that responsibility for managing and protecting fish; game, non-game and natural resources in South Carolina resided with either the South Carolina Wildlife and Marine Resources Department or South Carolina Wildlife (Department). Surveys done since the 1994 formation of the Department of Natural Resources asked the following: "To the best of your knowledge, which state agency is responsible for the management and protection of South Carolina's natural resources?" The results indicated that the percentage of respondents who correctly identified the Department of Natural Resources as the agency responsible for the management and protection of South Carolina's natural resources has increased slowly over time. This awareness rose steadily from 12.2% in Fall 1997 to 13.8% in Spring 1998, 14.4% in Spring 1999, and 16.5% in Fall 2000.

The DNR home page was created in 1994. It contains organizational and administrative information such as job postings, procurement solicitations and awards, hunting and fishing rules and regulations, and various research or fisheries and wildlife management initiatives of the Department. In addition, the DNR home page includes several sources of primary data including river and lake levels, precipitation and temperature station histories, and a series of GIS natural resources layers. There are numerous methods of measuring customer satisfaction and home page effectiveness. The DNR maintains several on-line forums, facts pages and email opportunities for user feedback. In addition, a customer satisfaction survey was conducted in May 2001 as part of an overall website evaluation. More than 140 users responded to the survey. The results indicate a 92% overall satisfaction with the website and their likelihood to re-visit the DNR home page. Public awareness is further enhanced through the 60,000 subscribers to the *SC Wildlife* magazine, approximately 375 statewide and regional news releases and public service announcements aired by approximately 200 radio and TV stations in the state.

Efforts by agency personnel to disseminate the name of the Department of Natural Resources have been effective by increasing the name recognition of the agency. Recent reductions in funding have caused the agency to discontinue participation in the South Carolina Broadcasters Association. Public service announcements link program and

activities to the name and slogan, "Working for you .... Naturally." It is anticipated that this will make it increasingly difficult to effectively continue this increase in recognition of the agency's name and mission.

### **Project WILD and Aquatic WILD**

Project WILD and Aquatic WILD are internationally known, award winning environmental education programs. Instructional material and workshops supplement any curriculum and support grades K-12 teachers, youth leaders and other types of groups. Each workshop participant receives the teaching manual that contains over 100 activities. Workshops are six hours in length and require a minimum of 15 participants. There are no charges for these programs. For the School year 2001-2002 there were 58 workshops with over 298 participants.

Workshops were conducted in 13 different counties throughout the year. There were 3 Advanced Project WILD workshops: Loggerhead Legacy, Wild and Crafty, Endangered Species at Riverbanks Zoo. A total of 68 people participated in these workshops. Partners included in this year's programs were: Riverbanks Zoo, Harry Hampton Memorial Fund, Forestry Commission, USC - Beaufort, PRT, and Wal-Mart.

**Camp Wildwood I, II, and III:** Camp Wildwood is designed for high school students and strives to increase their knowledge and experiences in natural resources. The camp uses Kings Mountain State Park and is open to all students in grades 10 through 12. Three different levels of the camp are available. Camp Wildwood was full again this year with over 135 campers. Partners included in this years programs were: Harry Hampton Memorial Fund, SC Forestry Commission, USC Beaufort, Parks, Recreation and Tourism (PRT), The Garden Club of SC, The SC Wildlife Federation & Edisto River Canoe and Kayak.

**Jr. Duck Stamp Contest Jr:** The Jr. Duck Stamp Contest is a cooperative effort between the US Fish and Wildlife Service and the Southeastern Wildlife Exposition. It is a way for students K-12 to express their interest in natural resources through the medium of art. There were over 500 entries in this year's competition. Support came from the SE Wildlife Expo, Harry Hampton Memorial Fund, US Fish and Wildlife, Kitchings Mill Social Club and several artists.

State winners are displayed at several events during the year. The Best of Show is entered into the national contest and is displayed with other state winners around the country.

**Aquatic Education:** The Aquatic Education program is a joint effort between the CEC Division and the W&FWF Division. It is a comprehensive program designed to increase awareness, appreciation, and use of our aquatic natural resources. There are many segments to this program including family seminars, school visits, Reel Art aquatic art competition and a youth program called "SC Reel Kids". Fishing seminars for families held during National Fishing and Boating Week were full classes at the maximum capacity of 30 each. Reel Art saw 568 entries in its third year. SC Reel Kids features

activities such as catching your first fish, participating in Reel Art (an aquatic art contest), visiting a fish hatchery and more. This program was introduced March 2000 at the Palmetto Sportsmen's Classic and now has over 800 participants. Several brochures and printed items were developed and distributed such as the Freshwater Fishrulers, Sportfish Identification Guides, Hatchery brochures and more. Fishing 101 became a popular class for the public after being introduced through BOW. There were more than 18 DNR sponsored fishing rodeos across the state, which are always popular. The Fishing Tackle Loaner Program has increased the number of sites having tackle available to the public by 3 sites. Sponsors of the aquatic education program include Sportfish Restoration, Shakespeare, Hawg Caller, Phoenix Graphix, Piggly Wiggly, and Bender-Burkot.

**Conservation Education Programs:** The Conservation Education Program is designed to introduce students K-12 to the DNR. This program involves the use of live animals and enhances any curriculum and can be arranged to fit into any lesson plan. There is a \$50 charge per program. For the School year 2001-2002 there were 158 school visits (average 5 programs per day) with over 28,000 participants. Programs were conducted in 28 different counties throughout the year.

**Becoming an Outdoors-Woman: Becoming** an Outdoors-Woman (BOW) is in its 7th year and continues to draw over 300+ women per year to workshops that offer instruction in hunting, fishing, camping, boating, coastal activities, and other nature-related outdoor activities.

In 2001-2002 following events were held:

September 7-9, 2001	Weekend Workshop	96 participants	Clemson Outdoor Lab
May 17-19, 2002	Weekend Workshop	103 participants	Clemson Outdoor Lab
June 5, 2002	Ladies on the Lake	66 participants	Lake Murray
June 26, 2002	It's a Girl Thing	17 participants	Fish Hatchery
July 31, 2002	Paddling Edisto	21 participants	Edisto River
April 19-20, 2002	Bass Blast	12 participants	Lake Hartwell

BOW also supported the public draw hunts program of the Wildlife & Freshwater Fisheries division. The program offered the first "women only" hunts on Wildlife Management Areas to provide more opportunity for females to participate in these sports in a non-intimidating atmosphere.

In 2001-2002 the following hunts were held:

September 28-29, 2001	Deer Hunt	30 participants	Webb WMA
October 8, 2001	Deer Hunt	18 participants	Fant's Grove WMA
November 16, 2001	Deer Hunt	21 participants	Moultrie WMA
November 20-21, 2001	Waterfowl Hunt	14 participants	Samworth WMA

Staff promoted the BOW program at the Palmetto Deer Hunters Banquet and Palmetto Sportsman's Classic in Columbia, Southeastern Wildlife Expo and Harry Hampton Banquet in Charleston, Harry Hampton/SC Wildlife Officers Assoc. Banquet in Anderson, Harry Hampton Banquet in Spartanburg and various education programs

throughout the state. The BOW mailing list of over 4,016 women interested in outdoor activities was maintained. Staff continued to seek new sponsors for funding, equipment and supplies, class instruction and educational materials.

**Other Education Efforts:** Staff from the CEC Education Section offer tremendous support for the other divisions' education programs and agency efforts. Staff supported the DNR in programs such as ENVIROTHON, BOW, SC Conservation Workshop for Youth, Carolina Coastal Adventure, Hunter Education, Cadet Academy, Environmental Institutes for Teachers, Teacher's Wildlife Conservation Workshop, Project WET, Teaching KATE and all Marine Education Programs. Staff has worked with DHEC, SC Forestry Commission and PRT on combined education programs as well as Clemson, USC, SC State and many other colleges and universities. .

### **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* also 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 40 feature-length articles *SCW* published were numerous general-interest, outdoor-related features along with agency-support features that dealt with topics such as climate change and the Gap Analysis project, CARA funding for local wildlife conservation programs, study and management of shark populations along with response to the public's misperception of the danger from shark attacks, dove shoots and striped bass fishing, the Joint Enforcement Agreement (teaming up DNR and National Marine Fisheries to enforce laws in the Exclusive Economic Zone offshore), the effects of predators on quail populations in the Southeast, and the ways that DNR team members from all divisions work locally for our constituents. "Roundtable" articles – short features that highlight news, programs and projects of the DNR – included 13 for Wildlife & Freshwater Fisheries Division (including Wildlife Diversity Section), 5 each for Law Enforcement, Marine Resources and CEC divisions, 4 for Land, Water and Conservation Division, 3 for Administrative Services, and 2 for Migratory Waterfowl Committee.

SCW staff worked with DNR Boater Safety Education staff to produce 75,000 copies of a 16-page Boating Safety supplement, supporting the education arm of DNR Law Enforcement Division. These supplements were bound into the center of the July-August issues as well as made available for public distribution as stand-alone mini-magazines.

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 02/03 budget. Names of individuals provided by Parks have been offered special SCW subscription rates, and subscription promotion forms were printed by SCW and distributed by SCPRT at the most-visited state parks. Another cooperative agreement renewed between SCW and the South Carolina Aquarium continues to provide the opportunity for joint efforts in marketing and product development, and the DNR's beneficial partnership with the National Wild Turkey Federation was enhanced by SCW's publication of a Field Trip to NWTF's headquarters in Edgefield.

*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 third in the nation for 2001 by the Association for Conservation Information (ACI), which brings together journalists and educators from state and federal wildlife agencies nationwide. The magazine also won recognition for its feature writing and for color photography on a poster being sold in The Wildlife Shop. Funding 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. Lack of funding prohibited promotion of the magazine, and the events of 9/11 contributed to an overall reduction in subscription sales. However, 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.

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. Use of a digital camera provides technologically advanced possibilities for product presentation and posting of features on the SCW Web site.

The contracts for pre-press (color separation) and printing were re-negotiated and combined to substantially reduce the cost of magazine production, while maintaining quality. Schedules have been set up to allow readers to receive their magazines at least one week ahead of each issue's publication date. Layout and design capabilities were

enhanced by the art director's and editorial assistant's successful interaction with the printer via computer technology, and efforts are under way to refine these techniques and take advantage of further advances. (See a sampling of photographs and text from issues of *SCW* on its Web page at [www.scwildlife.com](http://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 was physically moved to the first floor lobby of the Dennis Building (from the second floor suite), and walk-in sales immediately tripled. 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. The increased walk-in traffic prompted the stocking and sales of lower-priced "impulse" items, which sold well.

*SCW*'s fall products catalog was again produced and distributed, increasing sales successes over those of last year. 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 holidays, offering employees at other state agencies the opportunity to shop in their own buildings. Staff began increasing their emphasis on customer service and up-selling to promote sales. A toll-free telephone number makes ordering more appealing to customers.

Staff participated actively in the license renew-by-mail effort, assisting to keep mailing costs to a minimum. A subscription offer was included on the form, which yielded nearly 2,000 subscriptions to *SCW*.

*SCW* again conducted its annual Young Outdoor Writers' Competition, encouraging fifth through twelfth graders to write essays imagining they were a plant or animal of South Carolina, discussing the needs of that species and adding a dash of creativity. The statewide winners and their sponsoring teachers were honored at a luncheon at the Palmetto Sportsmen's Classic in March. 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.

The magazine editor retired in January of 2002, and the managing editor was promoted to the editor's position, with the associate editor being named managing editor. With a hiring freeze in effect, the associate editor's position has remained vacant. This is the fourth vacancy on magazine staff that has been occurred through attrition and has had to be left unfilled.

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

An agency marketing section was formed utilizing existing CEC Division staff during FY 2001/2002. 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 acts as a member of the DNR Legislative Committee.

The section's first agency marketing project was to design and test a new multi-purpose license renewal form. The goal of the project was to determine if significant numbers of existing licensees wanted to renew by mail for convenience. The direct mail project was designed and mailed within a six-week window and the response reached almost 25 percent, very high by direct mail judging standards. From the test, a decision was made to market to the entire licensee database with a mass mailing in May of 2003. 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 newly formed 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 2002 Classic, in its 18th 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 encourages interaction, builds skills and generates 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 2002, kids could pot flower seeds to attract hummingbirds to their backyards, make decorator fish art from aluminum cans and perform a soil sedimentation test.

## COMMUNICATIONS SECTION

Over the past fiscal year the DNR Communications Office made significant advances 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 and improve communications for the upcoming fiscal year, but to do so with an eye toward maximum effectiveness for minimal expenditure.

The Communications Office within the Conservation Education and Communications 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 mail, fax, e-mail, ftp site and the DNR Web 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, coordinated and implemented agency-wide public relations, employee awareness training and media relations training;
- < Encouraged ethical and safe conduct a field among outdoors enthusiasts;
- < Informed constituents of agency services, application deadlines and points of delivery;
- < Provided information on outdoor recreational opportunities;
- < Transferred a public information specialist from the Columbia office to Clemson to serve public information and education needs in the Upstate and to plan, coordinate and implement public information and education programs on the DNR Jocassee Gorges property in Pickens and Oconee counties;
- < Informed constituents of meetings, pending department actions and opportunities for public input; and
- < Updated the public on state and federal laws and regulations.

**Staffing:** The DNR Communications Office includes six positions (public information and videography) in three offices: Columbia (headquarters), Clemson/Jocassee 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, voicers and 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. The communications director taught media relation's courses for agency employees and law enforcement and emergency response personnel statewide.

**Video:** Video staff produced numerous TV Public Service Announcements, educational, instructional, training videos and special projects. Significant video projects include, but not limited to, PSA's on Boating Safety, Palmetto Sportsmen's Classic, the Oyster Shell Recycling Project, Beech Sweep / River Sweep and National Hunting Fishing Day. Other promotional videos include: Camp Wildwood, Take One - Make One, Becoming an Outdoor Women, Jocassee Research program and DNR Agency Video.

**News Releases:** More than 340 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 site, fax and agency web site) 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. Important computer files such as this archive the news releases with indexes going back to 1992, and are regularly backed up to off-line storage on 2-gigabyte Jazz disks to guard against computer hard disk failure.

**Postage-Free News Releases:** With the October 22, 2001 weekly news package the DNR Communications Office began totally postage-free news release distribution as a cost-saving measure toward meeting new budget goals. This was done following prior notification of all current postal recipients and fine-tuning of the e-mail address and fax lists of all S.C. news media, as well as regional media with SC interest. Staff had been working for several years toward the goal of completely electronic news release distribution. This change is projected to save at least \$8,000 annually in postage costs alone. The only mailing of news releases each week is to 11 freshwater fishing report cooperators, who lack e-mail or fax.

**Digital News Photo Support:** The digital news photo system for providing images to the media by e-mail was maintained, 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 - are 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 disk).

**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 and letters of constituent response for the Executive Office.

**News On the Web Site:** Communications staff continued to improve the quality of the hypertext news release posted weekly on the DNR home page by providing better formatting and supplementary photos and captions. Each digital photo has a “thumbnail” introductory image supported by a second print quality 150-200 pixel per inch jpeg image file for downloading by news media. News releases prompted many requests from media for supporting digital images. Articles and digital photos were supplied to the Budget and Control Board for posting on the state’s web site at [www.myscgov.com](http://www.myscgov.com).

**News Clipping Archives:** Staff continued to log and file newspaper and publication clippings. Articles were entered into a searchable format supported by notebooks with date-based clippings going back into the late 1980s.

**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, the Lake Murray Boating Safety Fair, 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 Outdoor Woman Support:** Communications office 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. The staff videographer taught the photography class, provided sound system support and shot video for pending BOW video update.

**Jocassee Gorges Support:** Staff coordinated and edited two editions of DNR Jocassee Gorges newsletter "Jocassee Journal" and chaired the Jocassee Gorges Education and Outreach Working Group to communicate problems, issues and concerns with project partners and the general public. Communications staff providing text, digital photos, review and other content needs contributing to the maintenance of the Jocassee Gorges Web site. The site offers information on all aspects of Jocassee Gorges and allows them to request Jocassee Journal newsletter subscription and Jocassee brochure, with requests being routed to the editor in the Communications Office. A Transportation Enhancement Program grant for Jocassee Gorges Visitors' and Education Center at Keowee-Toxaway State Natural Area, applied in partnership with PRT and Pickens County, was approved by S.C. Department of Transportation. The \$100,000 grant will pay to renovate the existing Meeting House at Keowee-Toxaway, with work expected to begin in 2003. The newsletter editor worked with the Jocassee Gorges wildlife biologist and forest planner on a comprehensive map of Jocassee Gorges showing roads, campsites, trails and other related features. A grant application was also prepared and submitted for \$5.6 million to National Scenic Byways Program for Jocassee Gorges Visitors' and Education Center in June 2002.

**Media Fishing Tournament:** The Ninth Annual Media Fishing Tournament was coordinated and held by the Communications Office on Saturday, June 9, 2001 at the Lake Murray Marine Patrol Headquarters on Lake Murray. Over 45 statewide media representatives participated in the event, sponsored by Shakespeare Fishing Tackle,

Ducane Gas Grills, South Carolina Wildlife Magazine and the Harry Hampton Wildlife Memorial Fund.

**Communications Awards:** In July 2001, DNR gained national honors for its 2000 conservation information efforts at the Association for Conservation Information conference. The S.C. Department of Natural Resources (DNR) won six awards, ranking nationally in a variety of media and publishing fields. Communications Section staff received two of the six awards including radio and TV PSAs for boating safety, the SC Wildlife Shop and new Red Drum limits and regulations in state waters.

## **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 proofing, verifying and coordinating internal work flow. In addition to these positions, this unit includes four graphic artists, all of whom design, layout and assist in the production of agency publications and special projects. Three hundred eighty-four jobs were produced by this unit, supporting the Administrative Services Division with 83 jobs, Wildlife & Freshwater Fisheries with 141 jobs, CEC with 88 jobs, Land, Water and Conservation Districts with 24 jobs, Law Enforcement with 35 jobs, and the Marine Division with 13 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 and fishing and general natural resources enjoyment. 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.

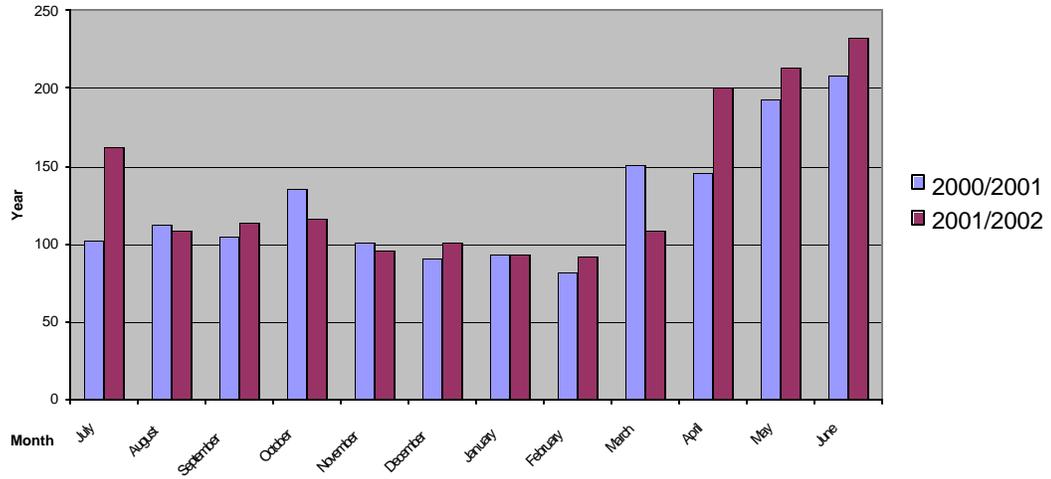
**Duplicating and mail services:** The duplicating and mail services center is staffed by two full-time employees with one hourly employee. Duties include all in-house duplicating, mail processing/distribution, and courier services. Staff processed approximately \$147,264 in postage from the Dennis Building and ran over 1,411,201 impressions on its AB Dick presses.

**Statistical Data**

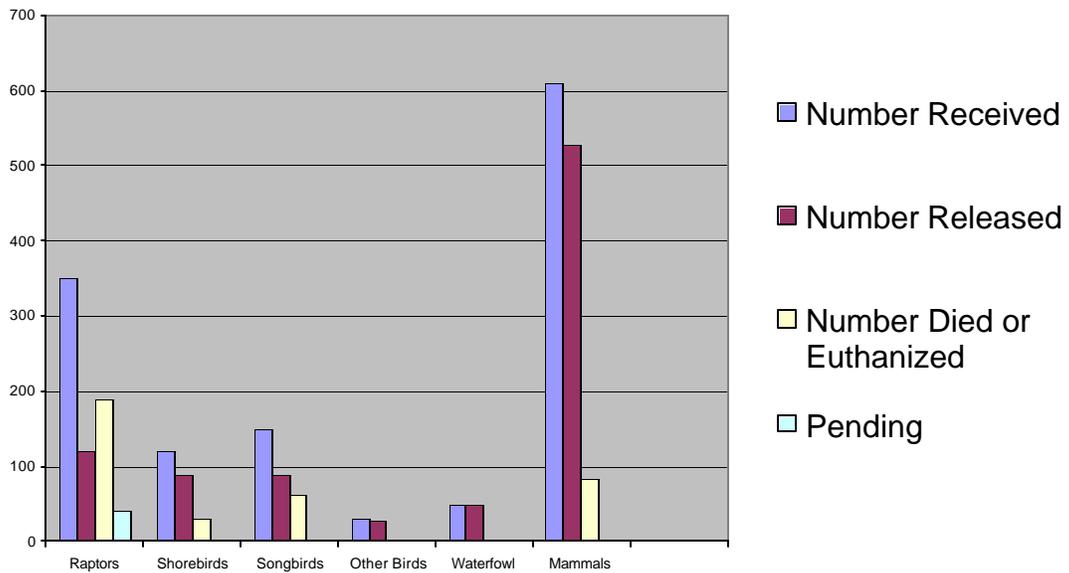
**SC Department of Natural Resources**

**June 30, 2002**

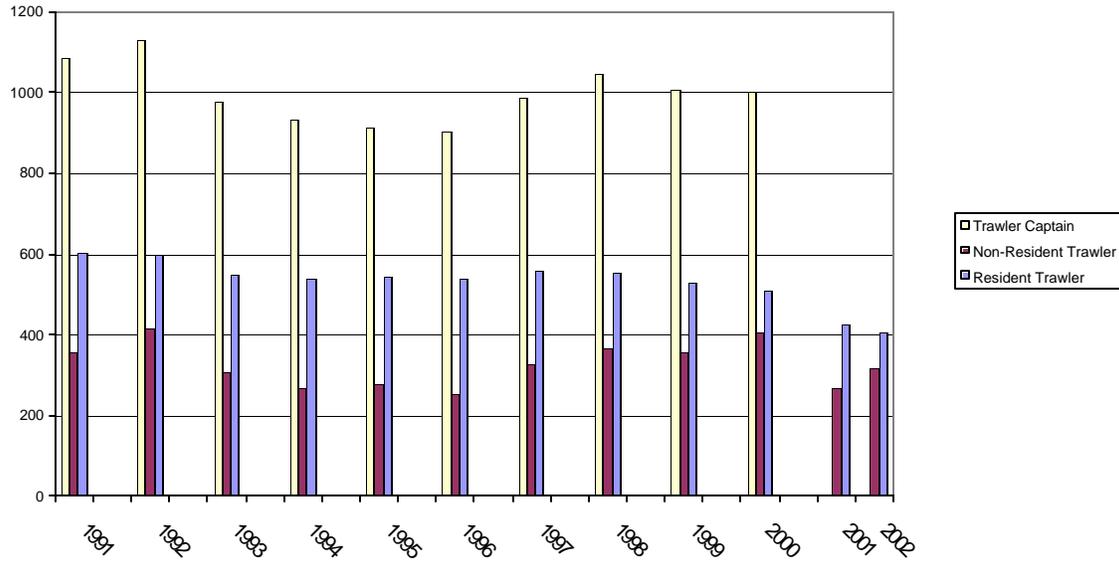
**Seasonal Abundance and Volume of Wildlife Assistance Calls FY 2001-2002  
In the Wildlife Assistance Office, Charleston, SC**



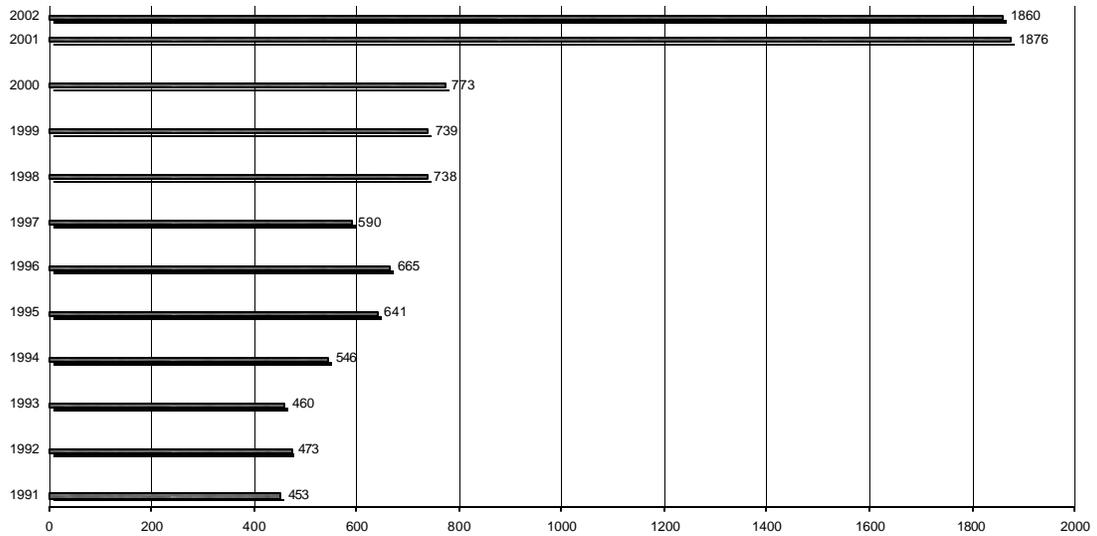
**Rehabilitation Success for Coastal Wildlife Species FY 2001-2002**



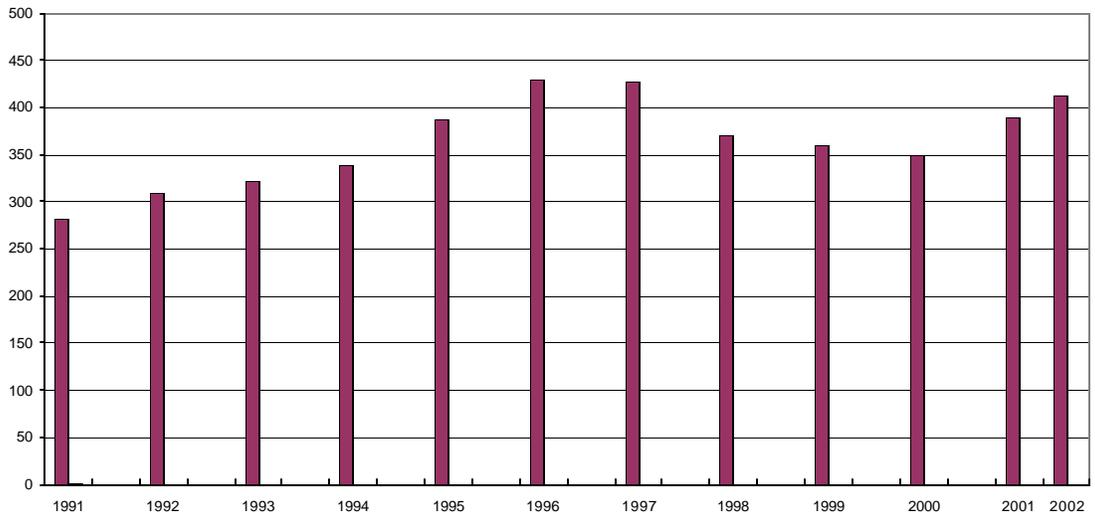
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1991-2002**



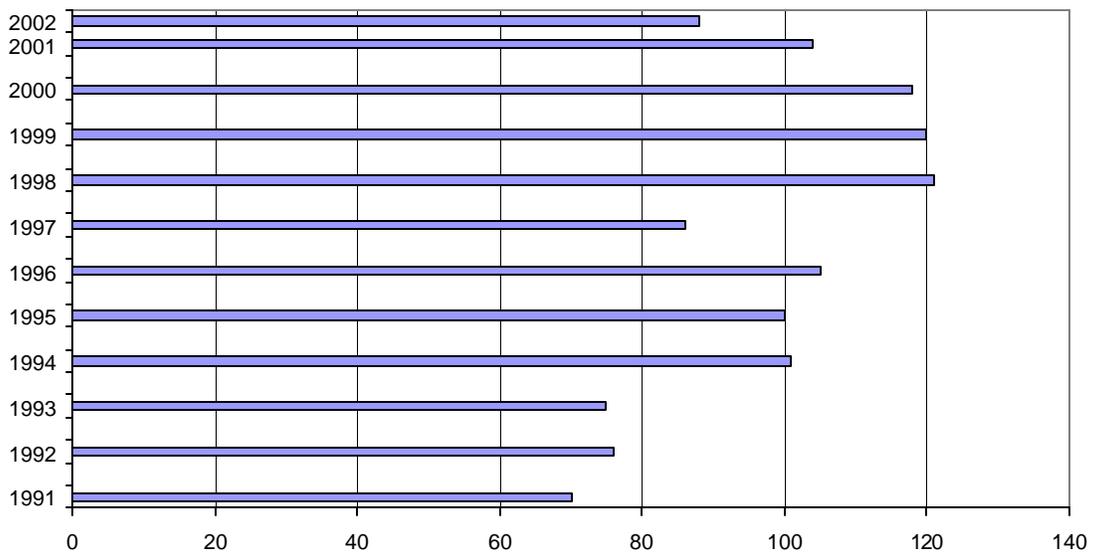
**Marine Commercial License - Land and Sell  
1991-2002**



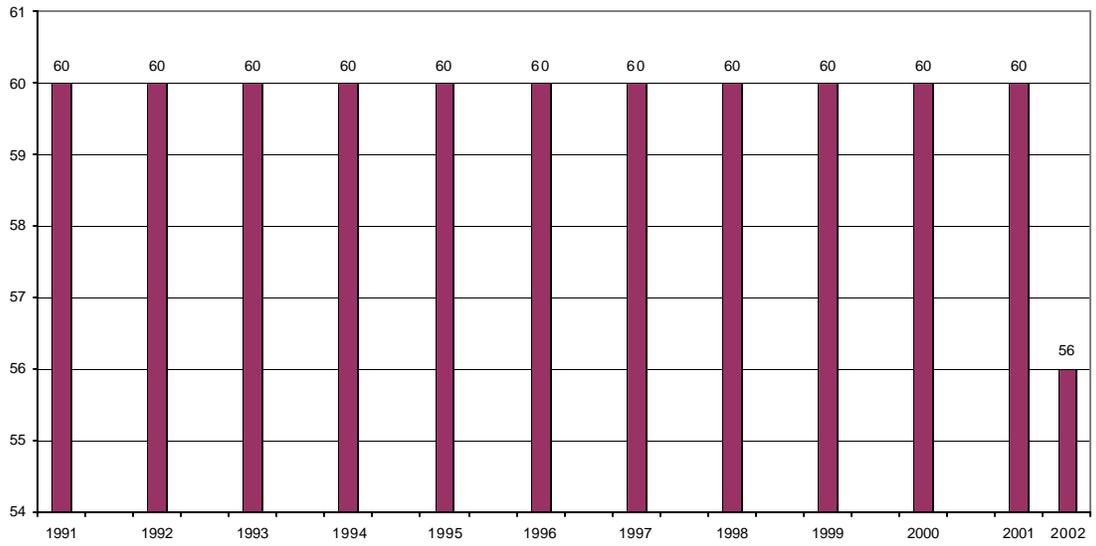
**Marine Commercial Licenses - Crab Pots  
1991-2002**



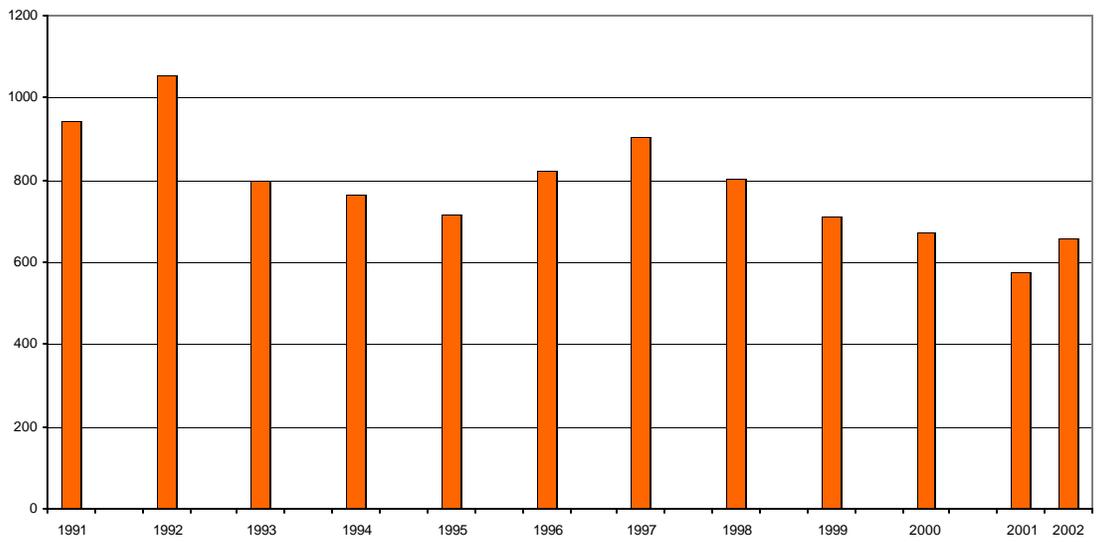
**Marine Commercial License - Bait Dealer  
1991-2002**



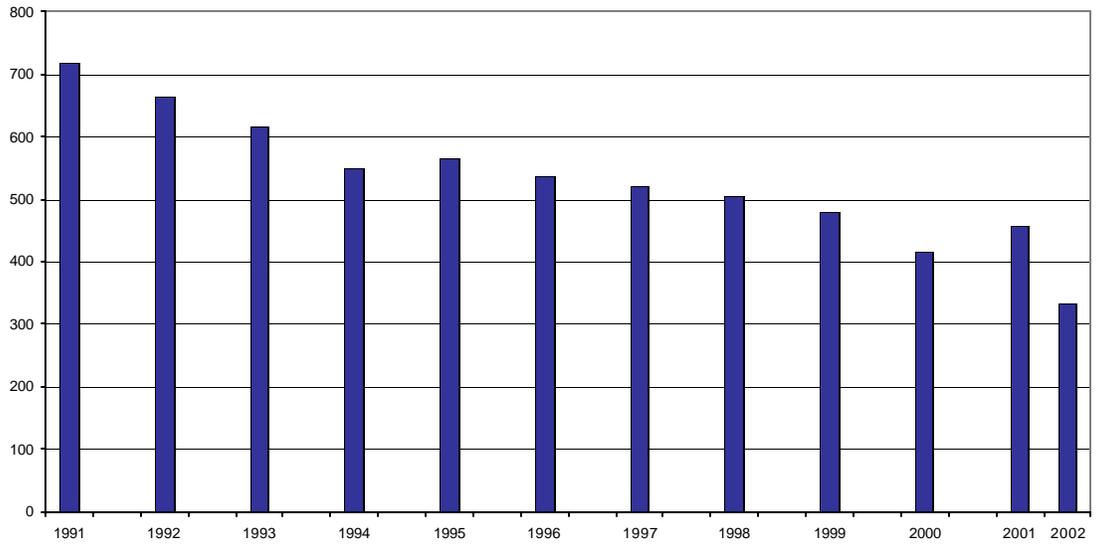
**Marine Commercial License - Channel Nets  
1991-2002**



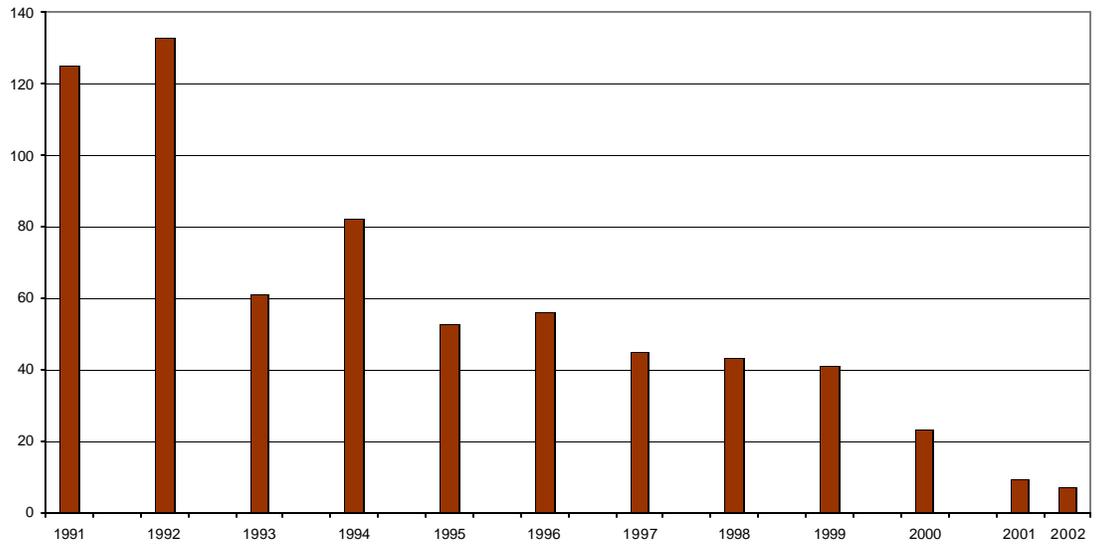
**Marine Commercial License - Shad Nets  
1991-2002**



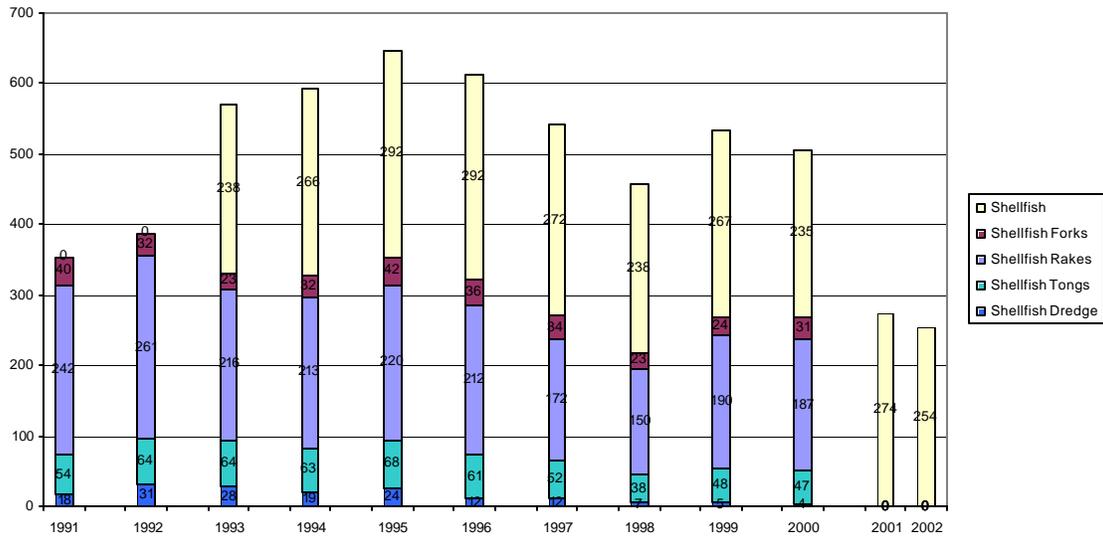
**Marine Commercial License - Gill Nets  
1991-2002**



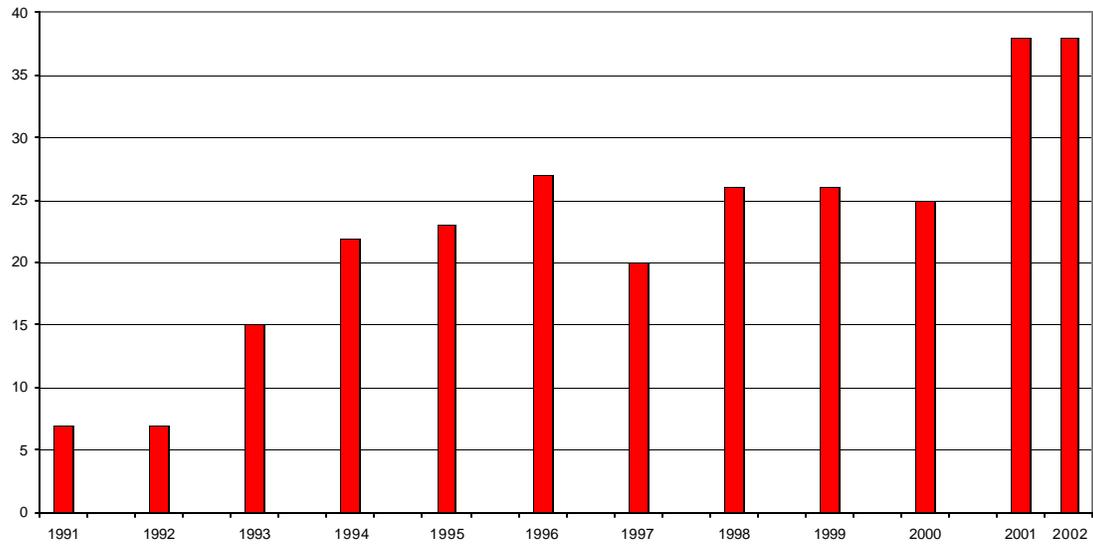
**Marine Commercial License - Seines  
1991-2002**



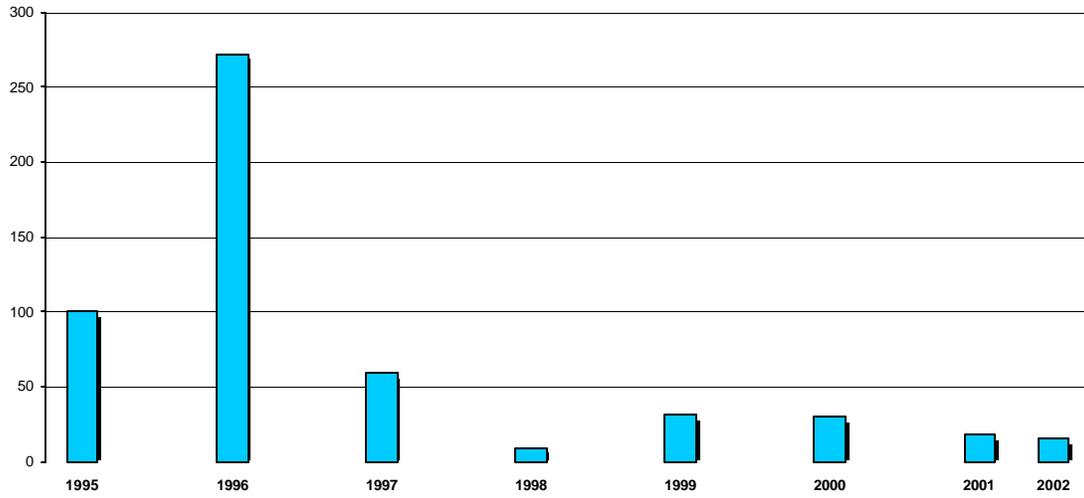
**Marine Commercial License - Shellfish  
1991-2002**



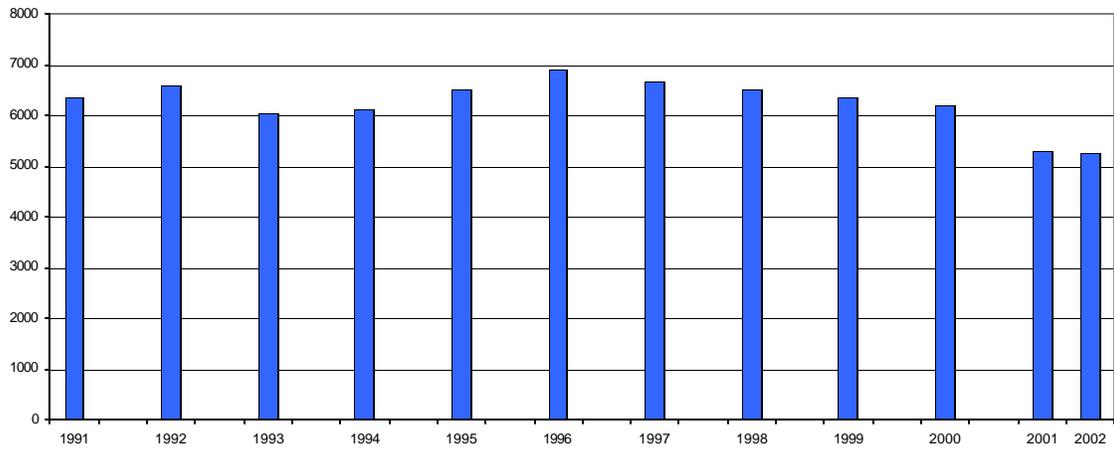
**Marine Commercial License - Peeler Crabs  
1991-2002**



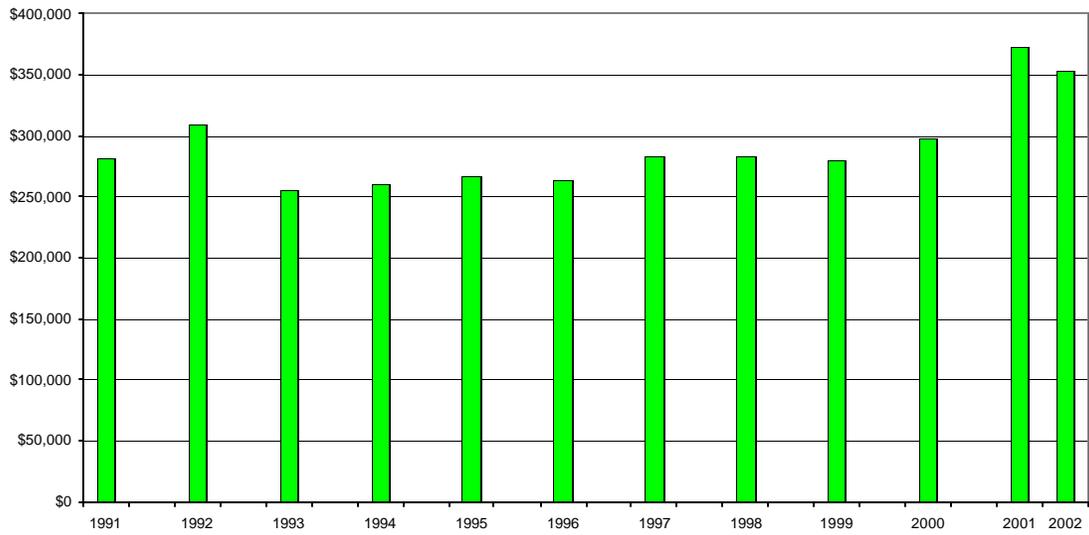
**Marine Commercial License - Fyke Nets  
1995-2002**



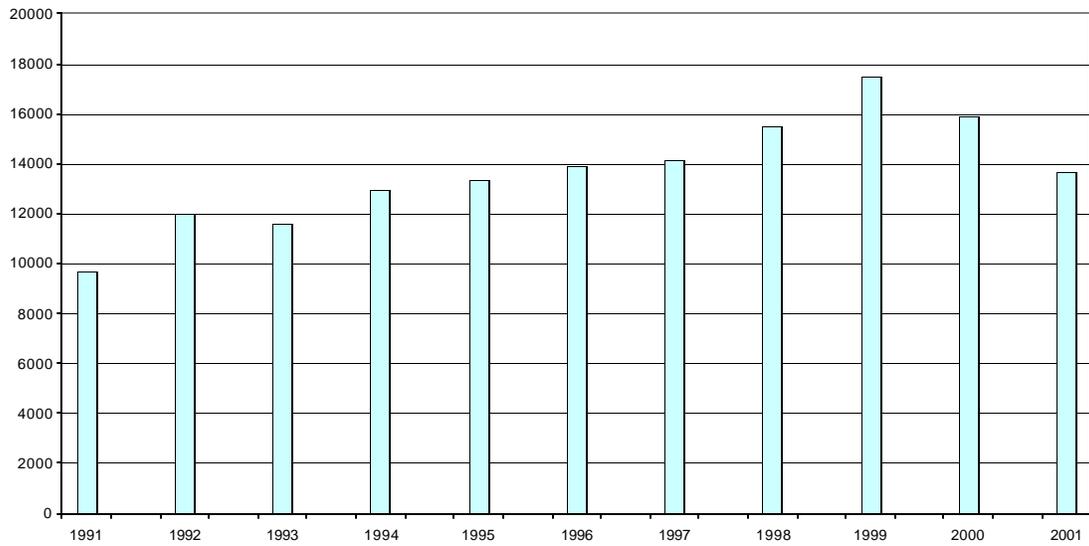
**MARINE COMMERCIAL TOTAL LICENSES  
1991-2002**



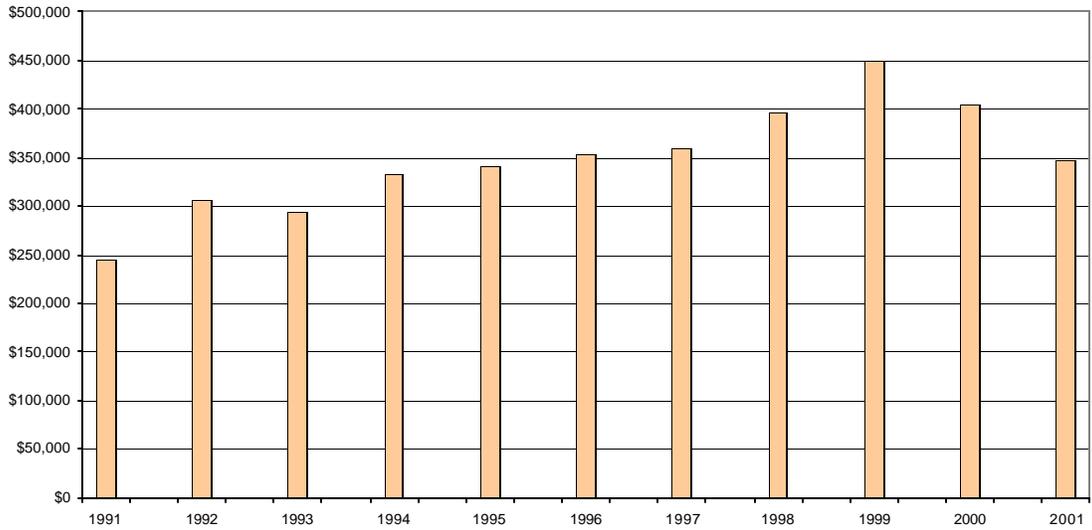
**Marine Commercial Licenses Revenue  
1991-2002**



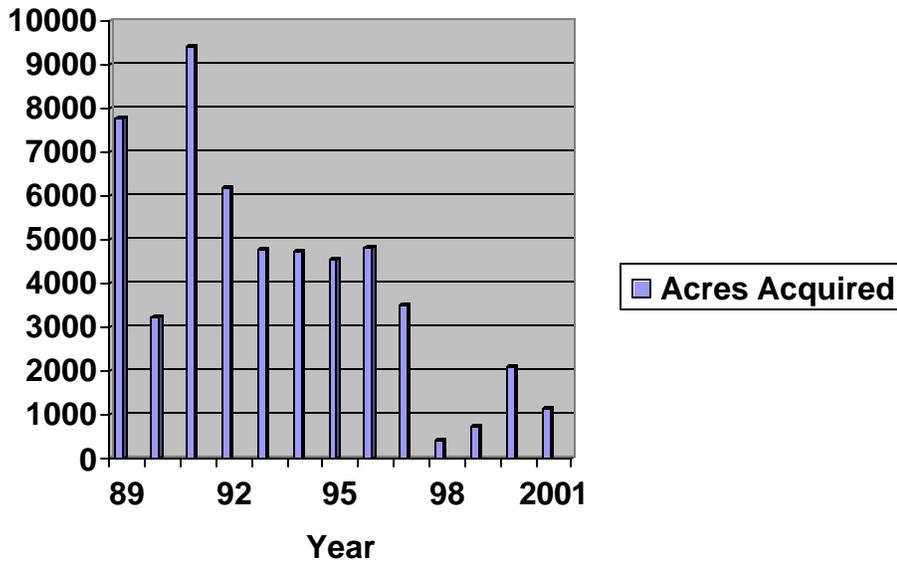
**Shrimp Baiting Permits Sold  
1991-2001**



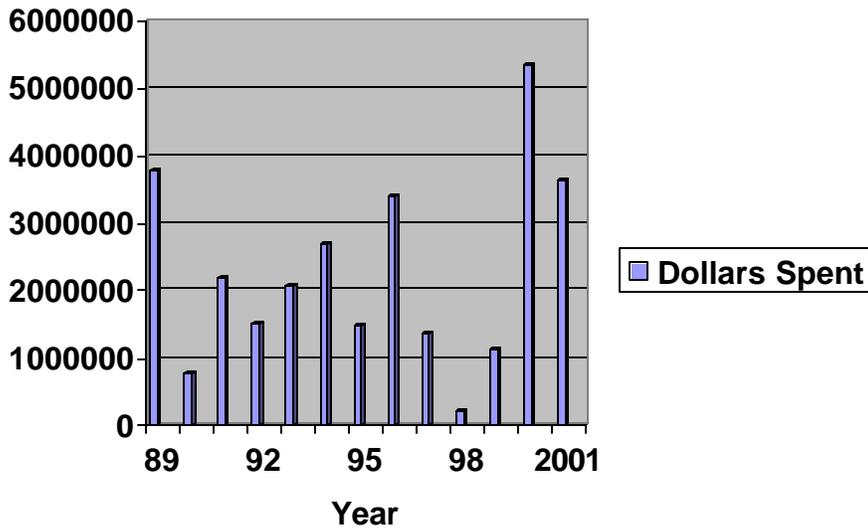
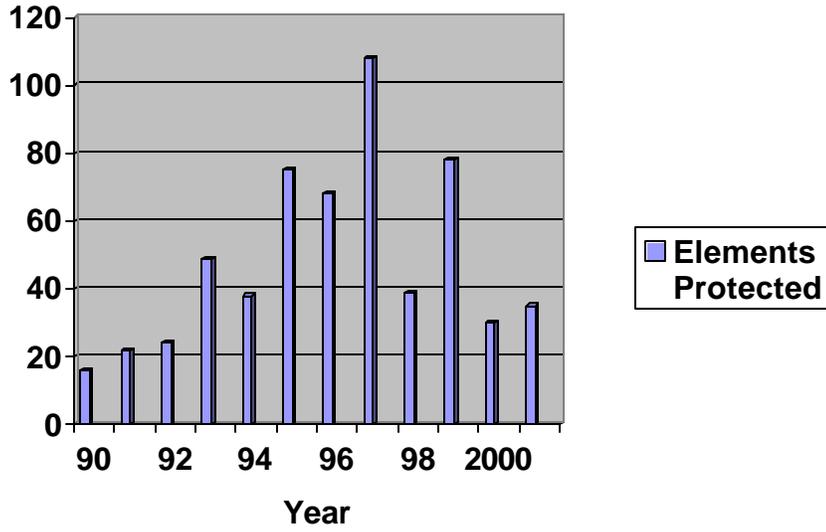
**SHRIMP BAITING PERMIT REVENUE  
1991-2002**



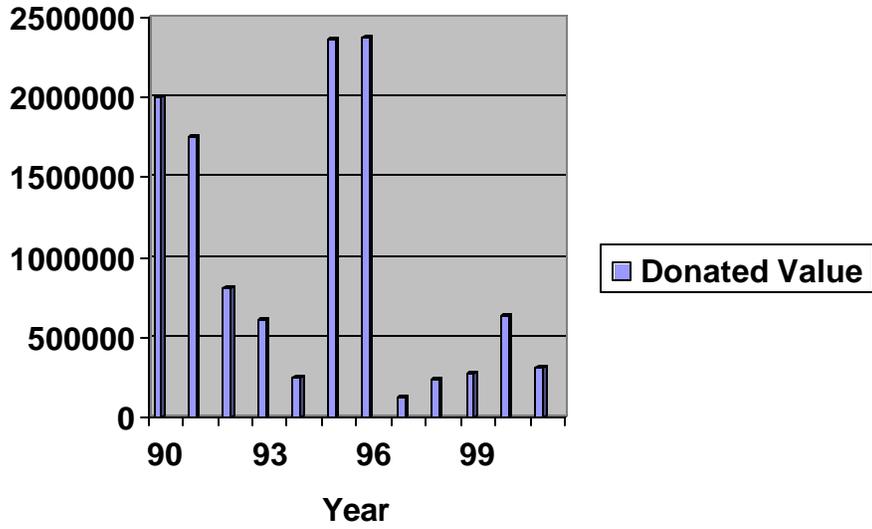
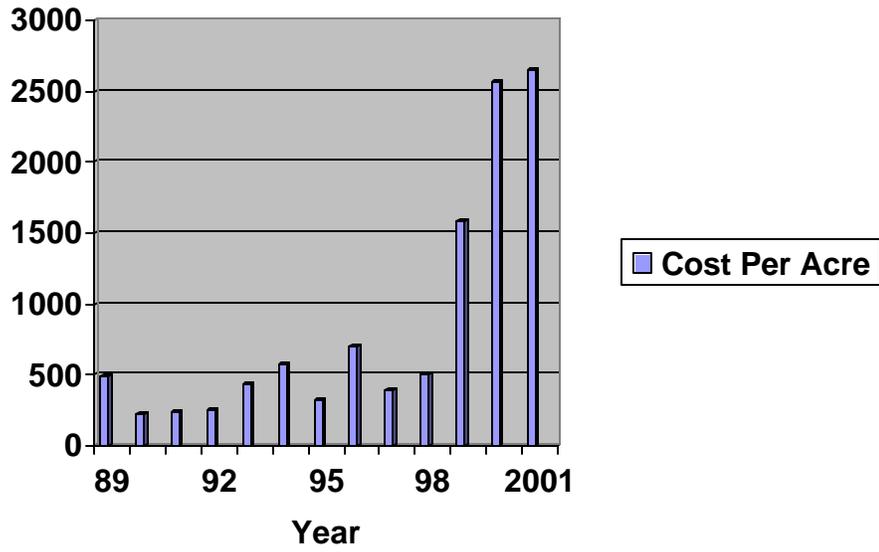
**Heritage Trust**



**Heritage Trust (cont)**

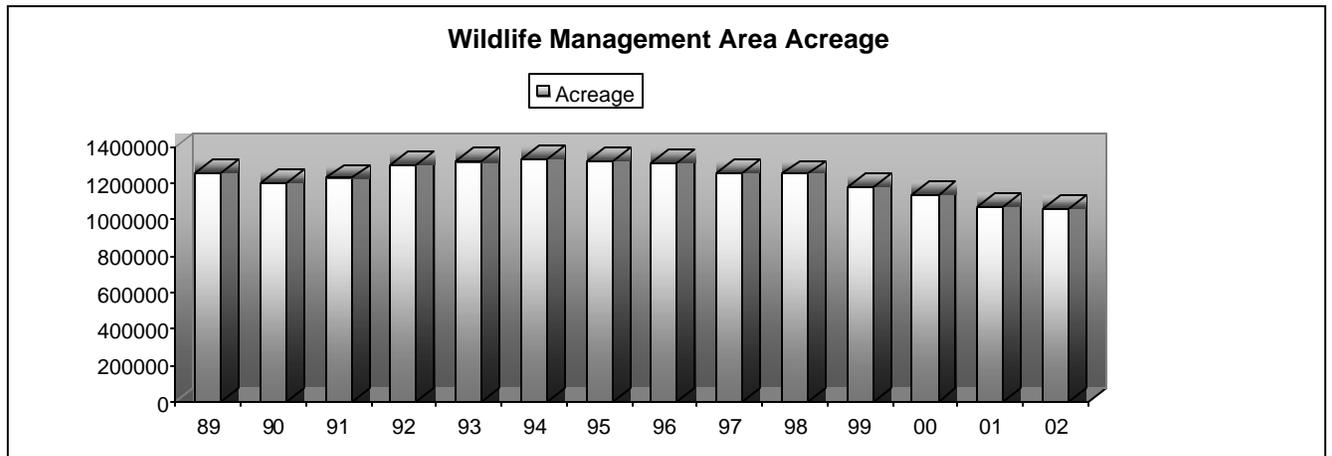


### Heritage Trust (cont)

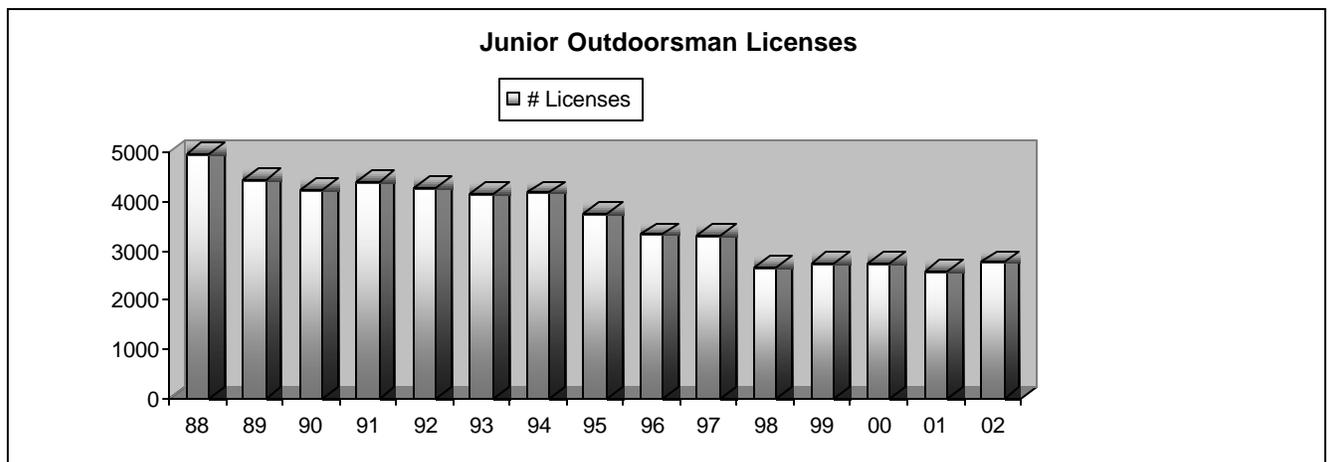


## WILDLIFE MANAGEMENT

### WMA Program Acreage (1989-2002)

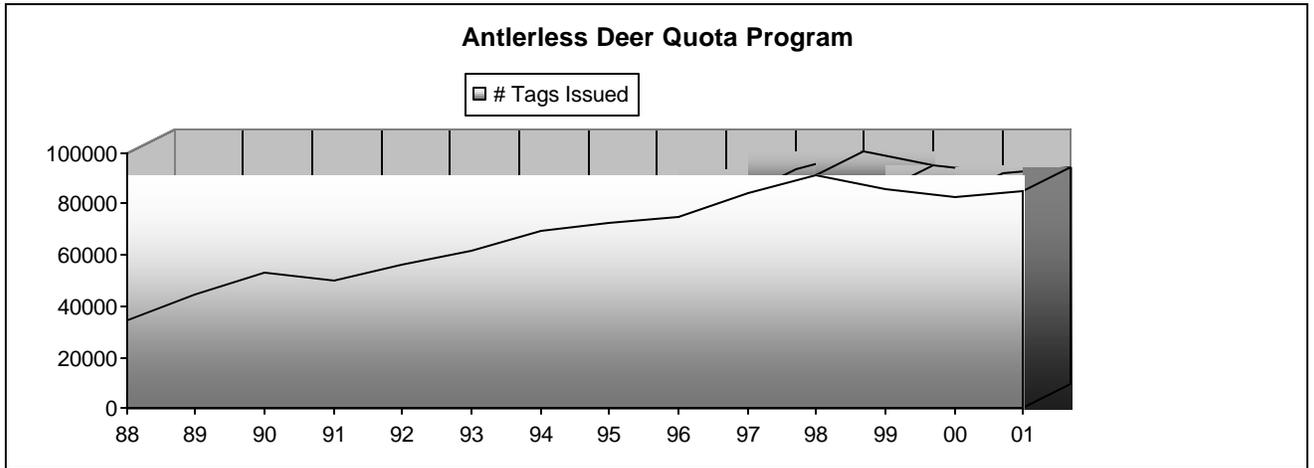


### Junior Outdoorsman License Sales (1988-2002)

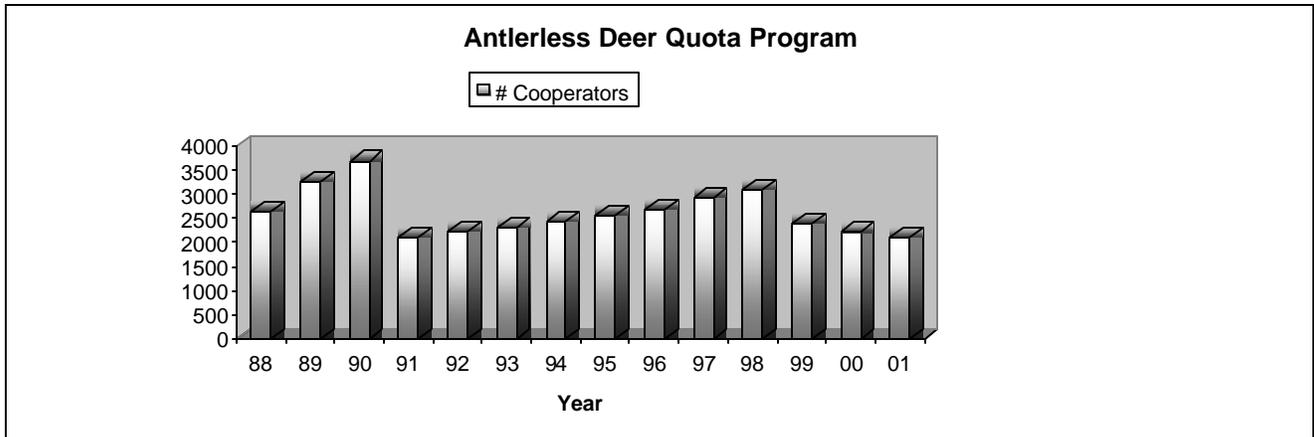


**Wildlife Management (cont'd.)**

**Antlerless Deer Quota Program Tags Issued (1988-2001)**

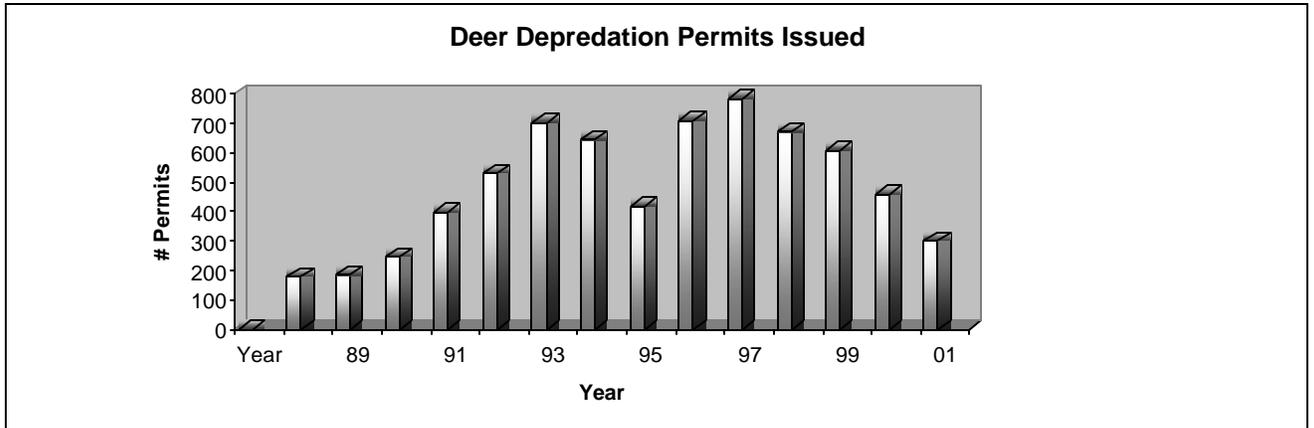


**Antlerless Deer Program Cooperators (1988-2001)**

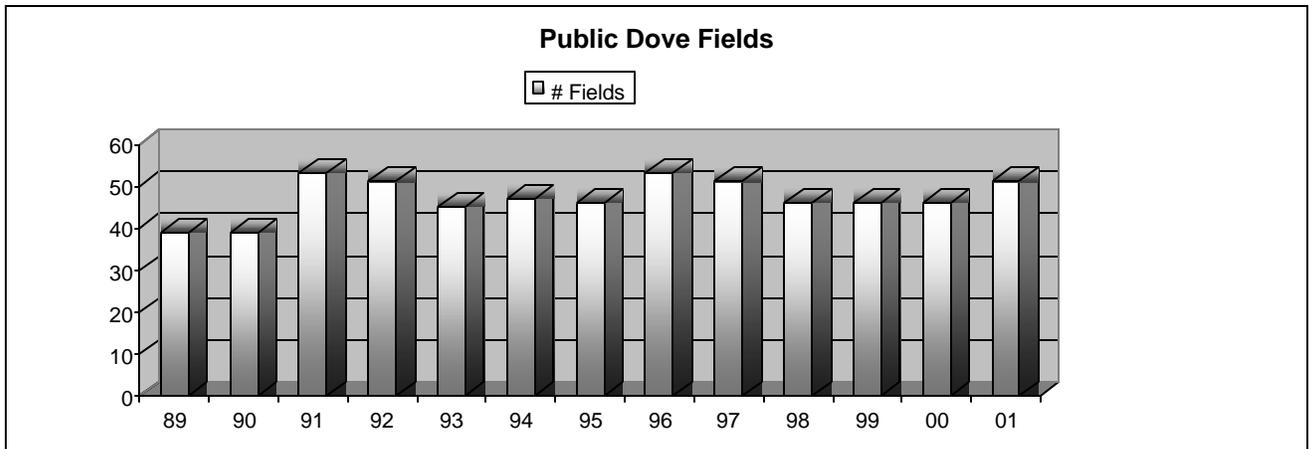


## Wildlife Management (cont'd.)

### Deer Depredation Permits Issued (1988-2001)

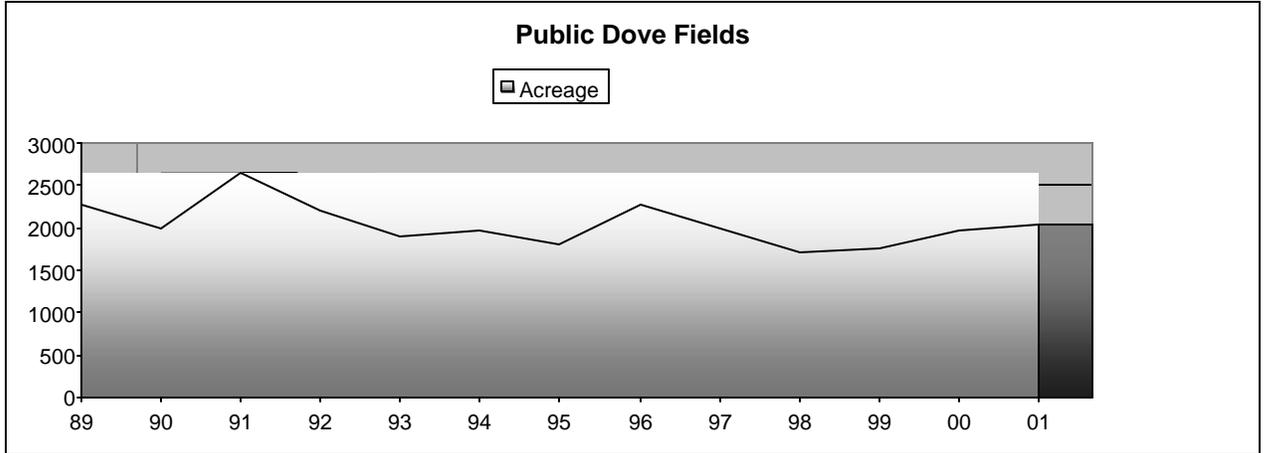


### Public Dove Fields (1989-2001)

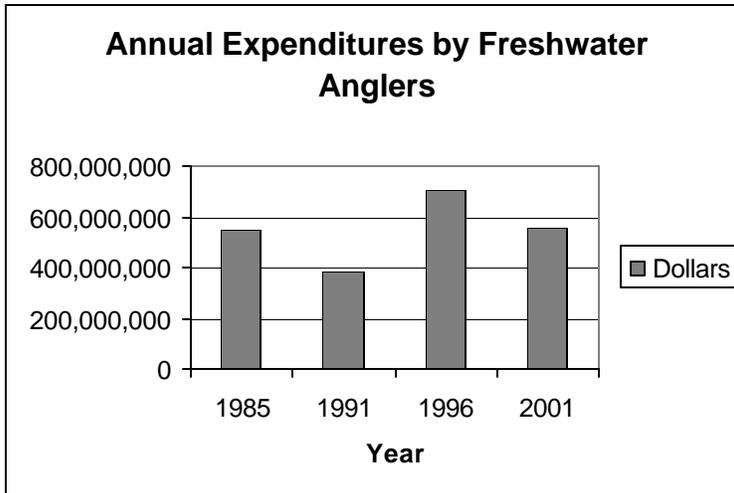


## Wildlife Management (cont'd.)

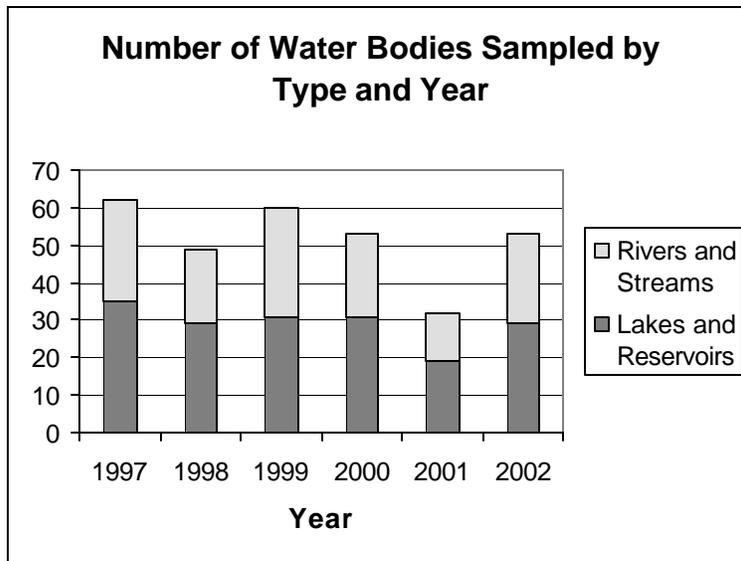
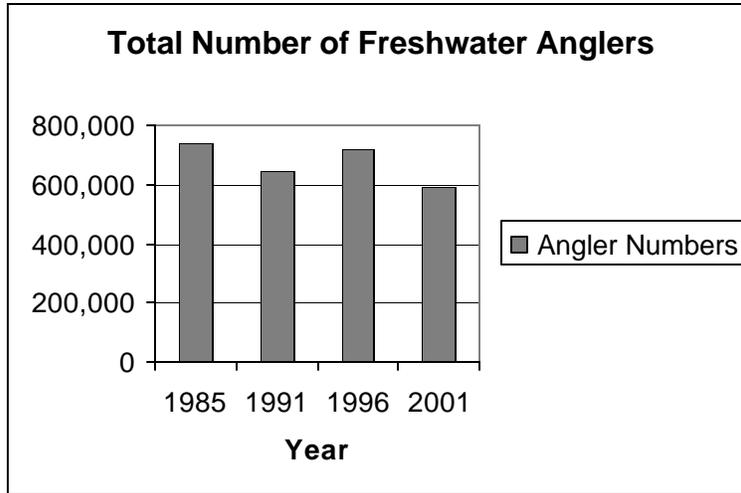
### Acreage in Public Dove Fields (1989-2001)



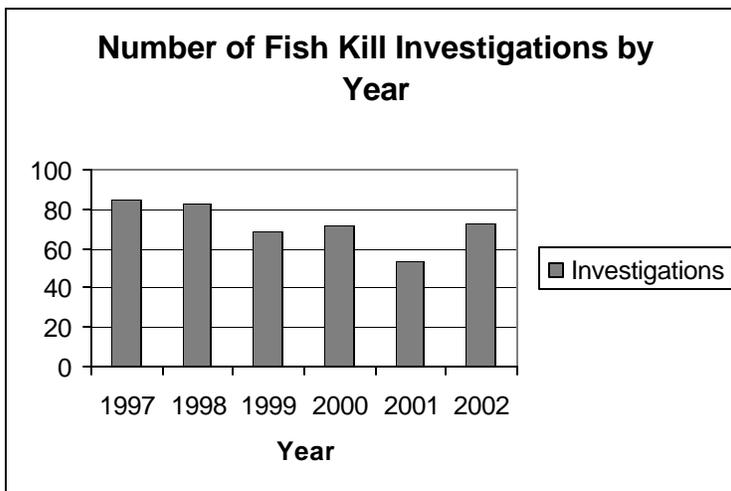
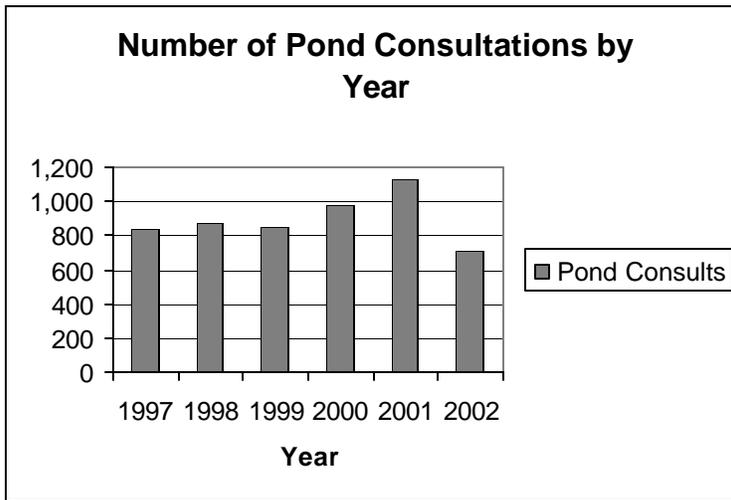
## Freshwater Fisheries



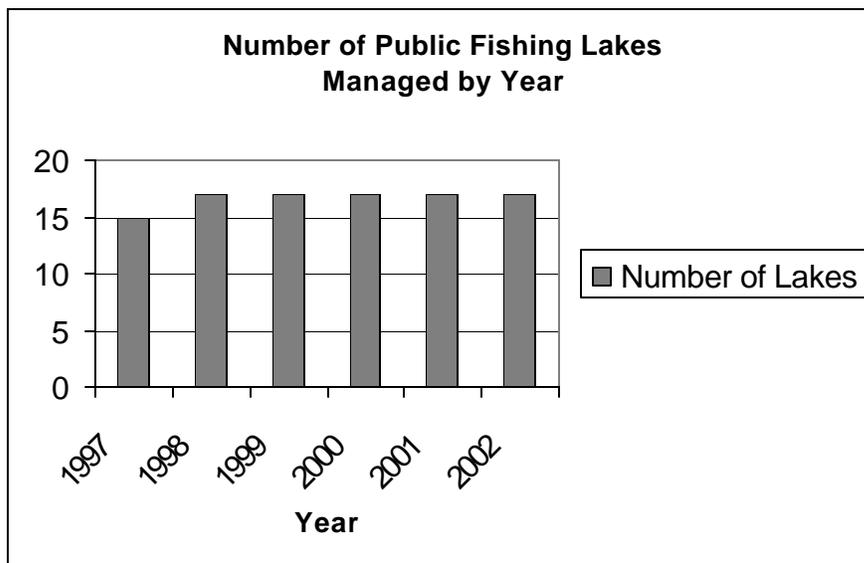
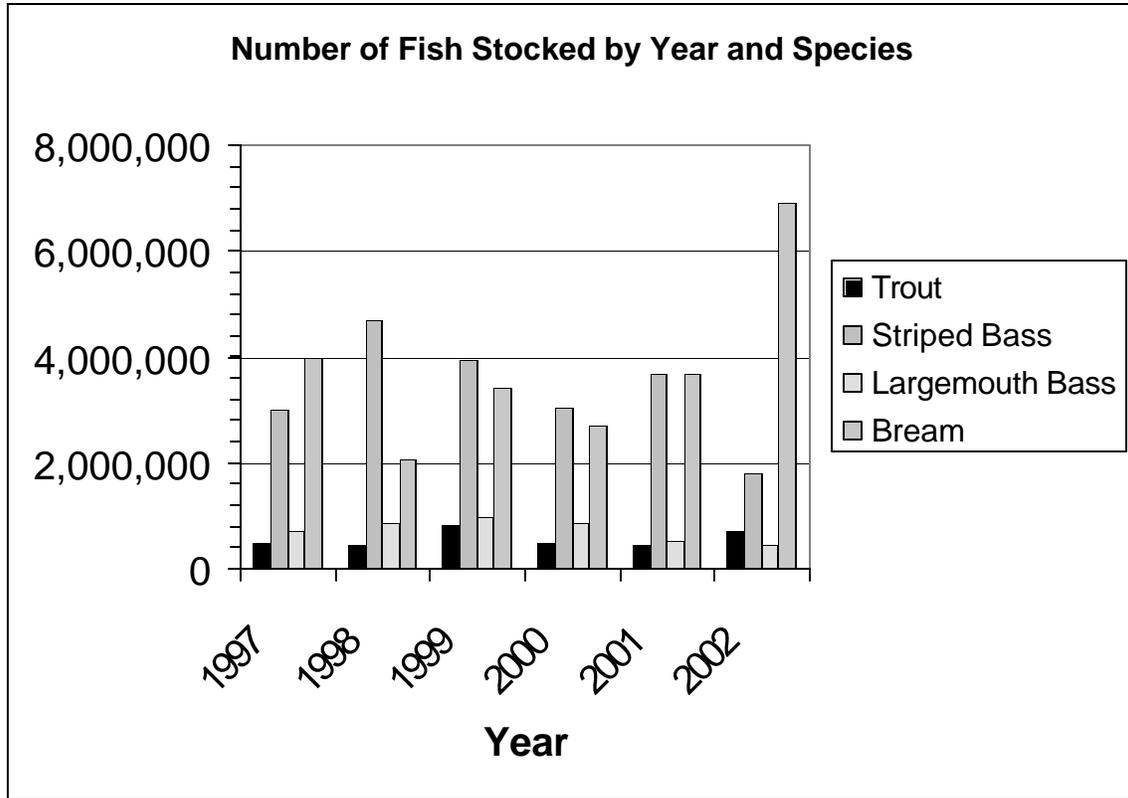
Freshwater Fisheries (cont'd.)



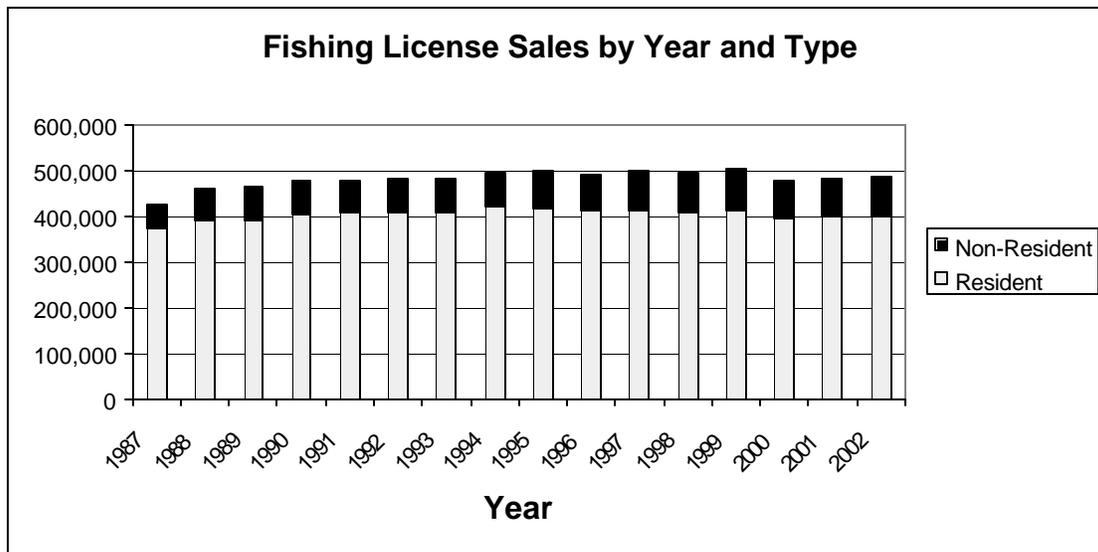
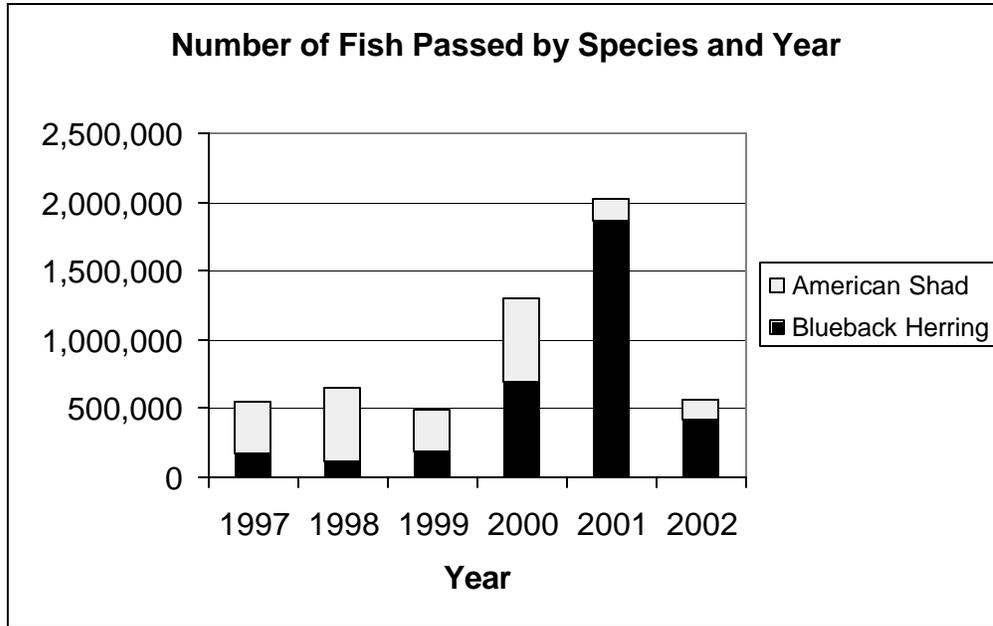
Freshwater Fisheries (cont'd.)



Freshwater Fisheries (cont'd.)

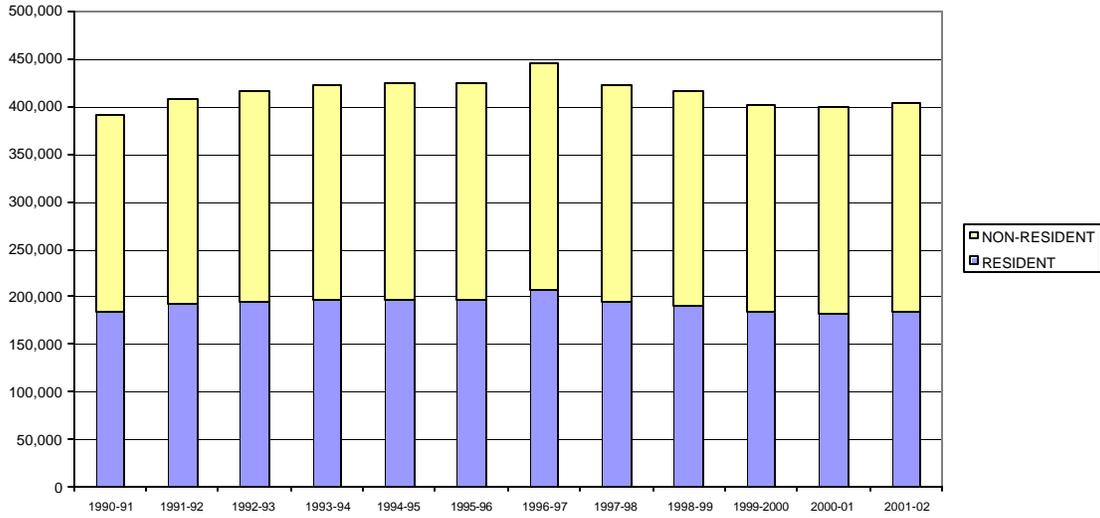


Freshwater Fisheries (cont'd.)

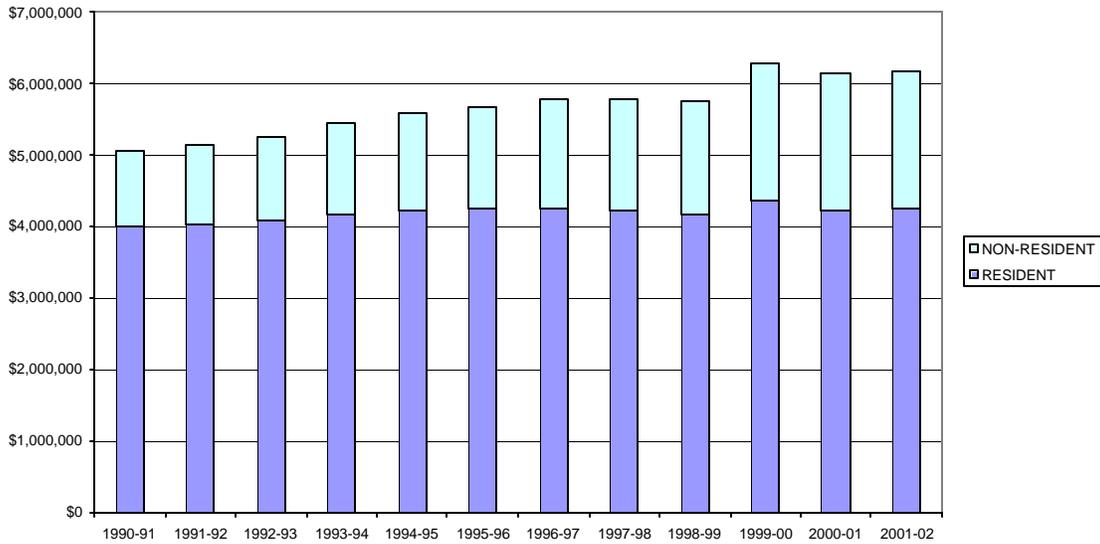


# Licenses

## Hunting Licenses Sold 1990-2002

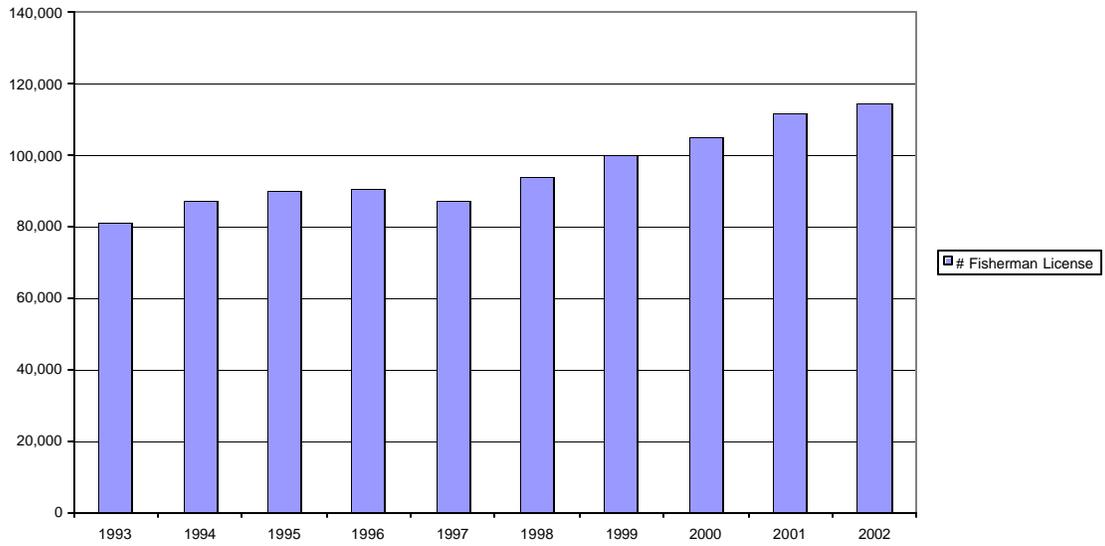


## Revenue from Hunting Licenses 1990-2002

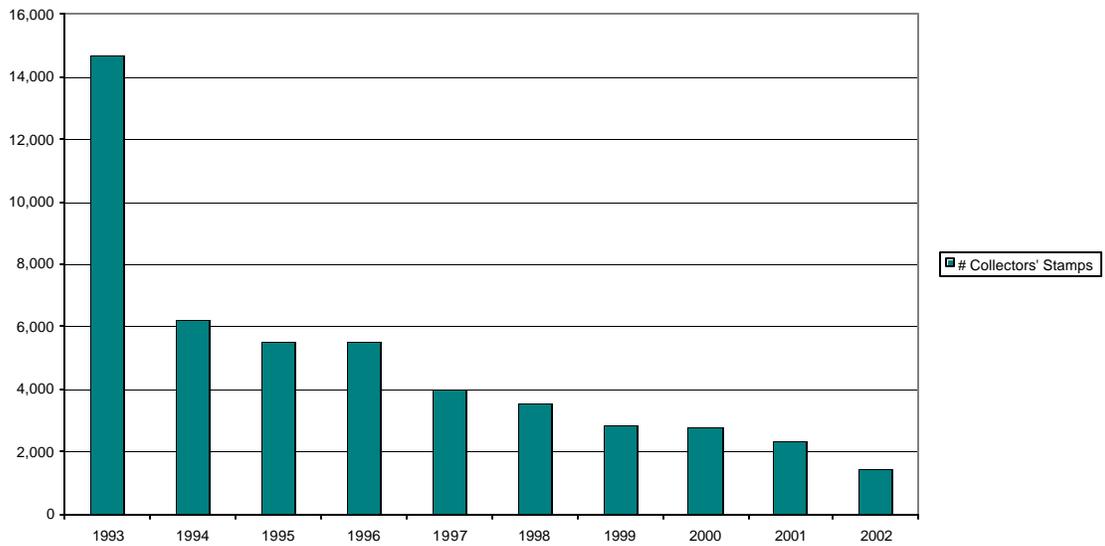


Licenses (cont'd.)

**Saltwater License  
1993-2002**

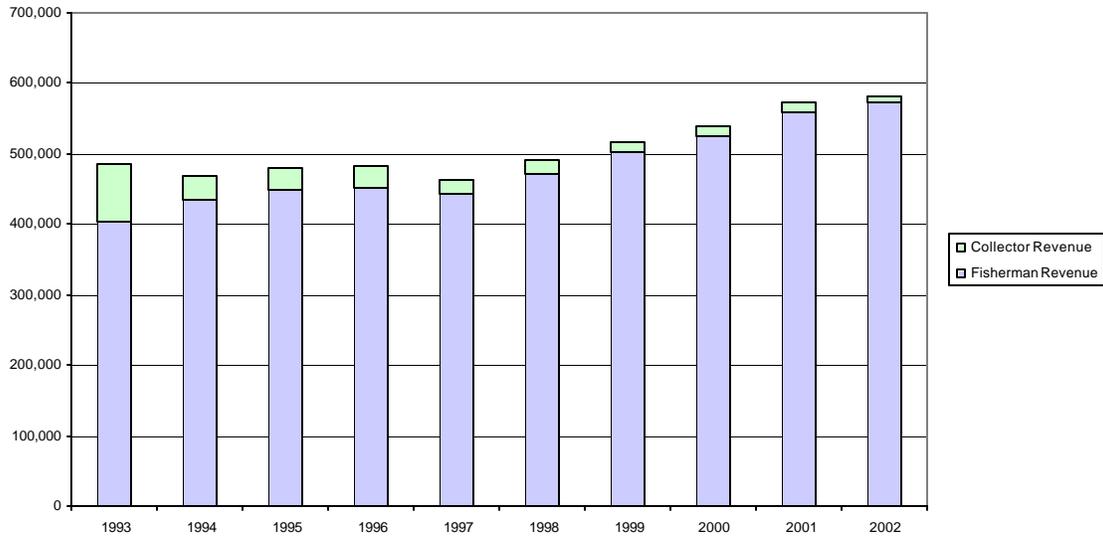


**Saltwater Stamps  
1993-2002**



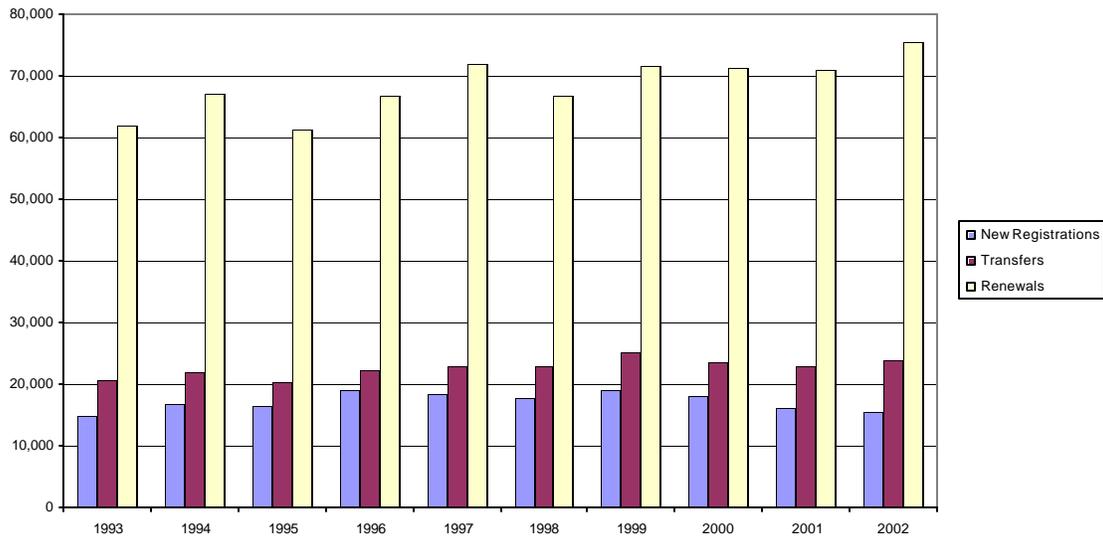
Licenses (cont'd.)

**Saltwater Stamp Revenue  
1993-2002**



Boating

**New Registrations, Transfers and Renewals  
1993-2002**



Boating (cont'd)

Active Boats Registered  
1993-2002

