SERTC
Southeastern Regional Taxonomic Center

NMFS Grant NA16FL1490

Final report for the period 10-01-01 through 09-30-06

Project Title: Southeastern Regional Taxonomic Center

Award Number: NA16FL1490

Principal Investigator: Elizabeth L. Wenner,
Marine Resources Research Institute (MRRI),
South Carolina Department of Natural Resources

The Southeastern Regional Taxonomic Center (SERTC) was established in 2001 with congressional funding from the National Marine Fisheries Service (NMFS) to the Marine Resources Research Institute of the SCDNR. The motivation behind establishing the SERTC was to improve and augment knowledge of biodiversity in the southeastern US, in particular the South Atlantic Bight (SAB) region, and to fill a void in the taxonomic resources of the region. The SERTC provides a regional focus for developing taxonomic expertise and skills, as well as supplying the infrastructure needed to support the taxonomic endeavors of the regional scientific community.

Staffed by SCDNR employees trained in taxonomy and biology, the aim of the SERTC is to operate as a regional taxonomic resource focused on the southeastern United States. Specifically, the goals are to provide taxonomic assistance, education and training; to collect, identify and catalogue marine and coastal invertebrate species from the region; and to disseminate this information to the people of South Carolina, the wider southeastern United States and globally through the Internet.

In the past five years, the SERTC has accomplished much: staff have provided taxonomic training, information and support for researchers, law enforcement officials, members of the public and the press; provided regional species information to global biodiversity initiatives; curated an extensive voucher collection of regional marine invertebrates; gained much support through collaboration with scientists from regional colleges and national institutions (such as the National Museum of Natural History, Smithsonian); produced educational material, identification keys and taxonomic guides to several taxonomic groups; and developed a website with a digital image catalogue of exceptional quality.

The goals and accomplishments of SERTC completed under grant NA16FL1490 are listed below.

Goal 1. Undertake the development and maintenance of a computerized and searchable reference collection of specimens housed in the collections of the Marine Resources Research Institute and Grice Marine Laboratory.

Accomplishments:

A 600 ft square laboratory space in the MRRI building became the SERTC laboratory and was organized with specific 'wet' and 'dry' areas designated, new shelving and free standing units added to increase storage space, specialized workstations created for sample sorting, dissecting, drawing and photography, and additional power supplies were added to meet requirements. A room dedicated for storing preserved specimens was also obtained and outfitted with appropriate shelving. Museum quality glassware was purchased for best possible storage of alcohol preserved specimens, An impact printer and specialized paper were purchased to produce long-lasting museum quality labels that are resistant to alcohol, but these were replaced with a thermal printer with a polyester tag medium labels when the previous labels began to show signs of fading. Four Nikon microscopes were purchased, three dissecting and one compound, with drawing tube attachments and photographic capabilities. Nikon Coolpix and digital SLR cameras were purchased, as well as software to enhance images, such as Adobe Suite programs and AutoMontage (developed to merge together images in different planes of focus).

The software package Specify (developed by the Informatics Biodiversity Research Center (IBRC), University of Kansas) was chosen for the SERTC collection database. SERTC staff liaised with IBRC development staff to produce a custom-made version of the Specify collections database. In total, 2470 lots of museum-quality invertebrate animals and 1926 separate collection events were entered into the catalogue. There are 730 different taxa included in the collection, three of which are represented by type specimens. Great effort was made to maintain the database with the most up-to-date taxonomic information. The hierarchy tree of the Integrated Taxonomic Information System (ITIS) provided a foundation for the taxonomic component of the SERTC database, but it was modified when necessary to reflect recently published taxonomic developments that were not yet incorporated into the ITIS tree.

With funding from SERTC, Dr. Antony Harold was able to undertake a 4-year project to identify and manage the fish specimens from the backlog in the College of Charleston's Grice Marine Laboratory (GML) collection. Under Dr. Harold's supervision, several graduate and undergraduate students identified, digitally catalogued (using Specify) and maintained the fish collection via paid assistantships. In total, 5543 lots of specimens and associated collection records were entered into the fish catalogue.

SERTC staff developed an association with the Ocean Biogeographic Information System (OBIS) network, part of the larger Census of Marine Life global taxonomic initiative. In order to share information from the SERTC digital catalogue, SERTC staff cooperated with OBIS personnel to develop a data transferal system. SERTC began sharing catalogue information (species distributions, specimen information etc.) with OBIS in August 2004 and has continued to update this information on a regular basis. SERTC was one of only two contributors of marine invertebrate species information from the southeastern United States. This is an extremely important accomplishment for SERTC.

Goal 2. Validate identifications of 'provisionally identified' specimens housed in the reference collections of the Marine Resources Research Institute and expand collections where needed.

Accomplishments:

Some of the confirmation of specimen identifications was done in collaboration with experts from regional colleges and institutions such as the Smithsonian Institution. SERTC staff collaborated with Dr. Richard Heard (University of Southern Mississippi, Gulf Coast Research Laboratory) to confirm and correct the identifications of numerous peracarid and decapod crustacean taxa. Examination of the collections revealed several species range extensions, and new undescribed species were discovered in the deeper-water collections taken on the NOAA Ocean Explorer Cruise. Portions of the polychaete collection at SERTC were examined and identified by Jerry McLelland (GCRL). A large section of the SERTC amphipod collection was examined and identified by Sara LeCroy (GCRL), Museum curator of the GCRL and author of a comprehensive guide to the

marine amphipods of Florida. Within this material, Ms. LeCroy documented range extensions for many species, as well as a number of probable undescribed species. Dr. David Pawson (Smithsonian Institution) was contracted to assist staff with identifying numerous echinoderm species form the SERTC collection. Dr. Dale Calder (Royal Ontario Museum) identified cnidarian species from the SERTC collection as part of his subcontract work with SERTC. Dr. John Olney identified over 800 lots of larval fish from SERTC plankton collections.

Dr. Lucia Fransozo, a scientist at Universidade Estadual Paulista, Instituto de Biociências, Sao Paulo, Brazil, became interested in working on the plankton samples held by SERTC. She traveled to Charleston in 2004 to complete a 6-8 month research visit to study decapod larvae in the plankton samples. She was able to rear estuarine decapod larvae to juvenile stages and describe their different morphological growth stages. This work has been presented at several conferences and is being prepared for publication.

Some of the specimens identified by SERTC during this work are noteworthy because they new species or document substantial range extensions. In the course of examining specimens for the SERTC taxonomic guides seven new species of tanaids and one new species of thalassinidean shrimp (soon to be published) were recognized. At least ten new species of amphipods across several families (Leucothoidae, Ampeliscidae, Melitidae) were also found in the collections. Significant range extensions were also recorded: two species of gastropods, *Calliostoma torrei* and *Bayerotrochus midas*, collected by SERTC staff on the Ocean Explorer cruise in 2004 were identified and sent to Dr. Jerry Harasewych, curator of molluscs at the NMNH, Smithsonian Institution.

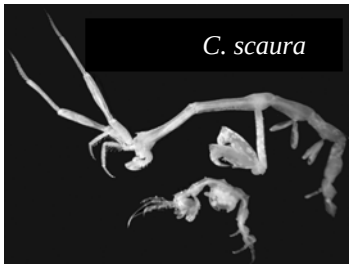
Calliostoma torrei

Bayerotrochus midas

The two specimens of *C. torrei* held by SERTC are the only specimens of that species that have been discovered, aside from the badly damaged type specimen held at the Smithsonian Institution. The collection of *B. midas* represented a significant range extension from the Caribbean to the eastern United States. A specimen of each of these molluscan species was donated to the NMNH collection by SERTC. As well, specimens of two ellobiid snails, *Creedonia succinea* and *Microtralia ovula*, for which a range-extension publication is currently in press, were also deposited in the NMNH.

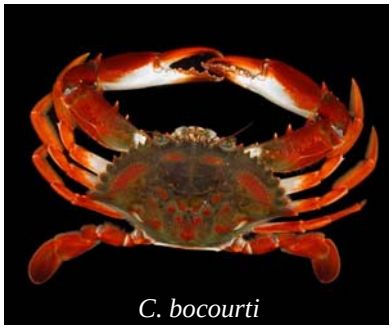

Creedonia succinea


Microtralia ovula


C. scaura

Range extensions attributable to the work of SERTC have also been published for the amphipod *Caprella scaura* and the mysids *Amathimysis brattegardi*, *Brasilomysis castroi* and *Heteromysis beetoni* (the later of which is recorded for the first time since its original discovery in 1984). The SERTC collections also include recently collected specimens that document the unusual presence of two tropical species of swimming crabs, *Callinectes exasperatus* and *C. bocourti*, both of which were found in South Carolina during the fall of 2002 and 2003.


C. exasperatus


C. bocourti

Several non-indigenous species were collected from the SAB region or identified in archived samples where they were previously unrecognized as non-native species. Among them were the anemone *Nematostella vectensis*, the freshwater snail *Bellamya japonica*, the isopods *Synidotea laticauda* and *Paradella dianae*, the tanaid *Sinelobus stanfordi*, and the decapod crustaceans *Macrobrachium olfersii*, *Petrolisthes armatus*, *Cardisoma guanhumi*, and *Charybdis hellerii*. Occurrence and distributional data about

these species will be submitted to a national database on non-indigenous species maintained by the United States Geological Survey.

Expansion of the collection was also a priority for SERTC staff. Specimens were obtained from a wide variety of donors. The Southeast Area Monitoring and Assessment Program (SEAMAP) provided a diverse collection of benthic megafauna from shallow

water trawl surveys. The Marine Resources Monitoring, Assessment, and Prediction (MARMAP) program also provided specimens from offshore trawl and plankton surveys. The Artificial Reef Section of the Marine Resources Division provided samples from diving trips on the shallow continental shelf, and portions of the reference collection of estuarine decapods from the ACE Basin NEERS program were also incorporated into the SERTC collection. Specimens were also obtained from commercial fishermen and the Crustacean Monitoring Program of MRRI. SERTC staff also conducted field sampling to obtain specimens, (SCUBA collection, dip netting, trawling, and hand collecting in the intertidal zone). In addition, benthic and plankton samples were collected on the Charleston Bump during several expeditions (2002-2005), which provided specimens of taxa representing the meso- and macroplankton, including larval and adult stages. A large mollusk collection was also obtained from the University of Georgia's Marine Extension Service. Specimens examined during the preparation of the various SERTC taxonomic guides were borrowed from a number of institutions, including the NMNH, the Duke Marine Laboratory, the Grice Marine Laboratory, and NOAA's National Benthic Inventory specimen repository in Charleston, SC. Previous identifications of much of this material were confirmed, taxonomically updated, carried to a more precise level, or corrected. Numerous lots of fish specimens were also obtained from collections made by College of Charleston and GML staff and students, and others were gifts from the South Carolina Department of Natural Resources and the Florida Fish and Wildlife Commission.

Goal 3. Establish and maintain a centralized, updated library of taxonomic references and literature that are relevant to the collection holdings at MRRI and GML.

Accomplishments:

The establishment of a library of taxonomic references and literature was an early priority. Two separate literature collections were established by the SERTC: one consisting of marine invertebrate literature, housed at MRRI and the other comprising fish literature, housed at GML. Both collections were referenced using ProCite software.

In ProCite, the databases are fully searchable under a number of key subjects such as author, title, and various taxonomic classification hierarchies. Reference and bibliographical lists composed of selected reference items can also be easily produced.

Staff solicited and received reference material from many sources, both from institutions and personal collections. When more than one reprint of an article was obtained, it was put into a duplicate reference collection, which was established for gift or exchange with co-operating scientists. More than 3200 references were catalogued in the marine invertebrate literature collection and 1400 comprise the fish literature collection.

Goal 4. Identify and catalogue ichthyoplankton housed at the GML and new material obtained from ongoing plankton sampling.

Accomplishments:

The SERTC possesses a significant collection of regional plankton samples taken mainly offshore from 2001-2006. Additional nearshore samples were also taken during SERTC cruises on the R/V *Lady Lisa* and NOAA vessel *Nancy Foster* between 2004 and 2006.

During 2003, staff identified fish larvae that were collected during 2001 and 2002 by the NMFS-funded Charleston Bump project. A total of 8,422 fish larvae were removed from the 2001 plankton samples and 781 fish larvae were identified. More than 10,100 fish larvae were removed from the 2002 samples, with 961 being identified. Photographs of a number of taxa, including swordfish, billfish, mackerel, grouper, dolphin, gray triggerfish, tilefish, greeneye, flying gurnard, butterfly fish, jack, and lantern fish, were taken for the SERTC image library.

A larval fish identification workshop was held in January 2005, under the direction of instructors Dr. John Olney (Virginia Institute of Marine Science), Dr. John McGovern (NMFS) and Dr. Joanne Lyczkowski-Shultz (NMFS). The workshop trained regional scientists and students, as well as SCDNR biologists, and contributed further to the identification of material in the SERTC collection.

Dr. McGovern, who initially was tasked to identify and photograph larval fish for SERTC as and employee of SCDNR, left employment there in 2004. Since no other SERTC or MRRI staff members were qualified to identify larval fish, SERTC continued the larval fish identification project through collaborative work undertaken with Dr. Olney. In 2006, larval fish were removed from 200 samples (from 2003-2005 collections) for identification and inclusion in the SERTC larval collections. Dr. Olney visited the SERTC lab in May 2006 and sorted, identified and photographed larval fish, and also trained SERTC staff in these techniques. Dr. Olney identified 841 lots of specimens, most to species level, and arranged them into 66 family groups for shelving purposes. The SERTC larval fish collection is now one of the largest regional larval fish collections, and most significantly, the material is suitable for use in molecular analyses, since it is preserved in 90% ethanol. The collection will ultimately be stored within the College of Charleston's GML collections.

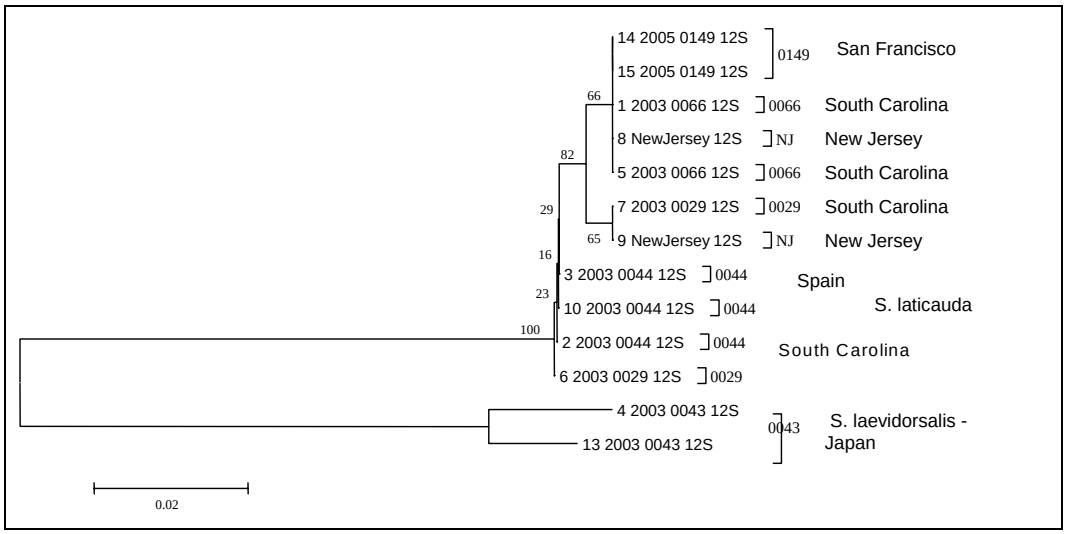
Goal 5. Develop a repository of tissue for genetic differentiation of species (in conjunction with NIST, the Cooperative Institute of Fisheries Molecular Biology [NMFS/FISHTEC], and the genetics program of the Hollings Marine Laboratory).

Accomplishments:

The SERTC remains committed to providing specimens that is available for use for a variety of systematic techniques, and molecular analysis is one of them. As such, most of the collection was, wherever possible, preserved in 95% ethanol, without the use of fixatives. Fixatives like formalin break down cells, thus making it hard to isolate DNA. Fresh material collected by SERTC was most often preserved directly in 95% ethanol. Material that was dead or degraded prior to preservation was placed into 70% ethanol, a standard museum preservative that can be used for DNA extraction, although with a much lower likelihood of success.

Specimens of black corals (*Leiopathes* sp., *Bathypathes* sp. *Chrysopathes* sp. *Stichopathys* sp. and *Tanacetipathes* sp.) from the SERTC collection were sent to Mercer Brugler, a graduate student at the University of Louisiana at Lafayette, who used them as part of his thesis work: a genetic analysis of black corals regarding their systematics and classification. Suitable genetic material representing 12 different species held in the SERTC collection was also provided to eight additional research teams in seven different countries.

SERTC staff also undertook an internal project that involved producing sequences of an isopod identified alternatively as *Synidotea laevidorsalis* or *S. laticauda* by different researchers. With the assistance of Dr. Amy Ball (SCDNR), populations of this species from 6 different sites (4 within the United States, 1 from Japan, 1 from Spain) were sequenced, in an effort to identify the species and to understand whether populations of this species recently found in South Carolina and Delaware were introduced from Japan or from other locations. Preliminary results indicate that the US and European species is actually *Synidotea laticauda* and that Japanese specimens, clearly genetically distinct (15% different using raw sequence differences), are *S. laevidorsalis* (see phenogram below).



Phenogram of 12S sequences for 6 populations of *Synidotea laevidorsalis/ S. laticauda*.

Goal 6. Prepare illustrated keys to some groups (eg. cumaceans, mysids, isopods, tanaidaceans, thalassinideans), including taxonomic descriptions and illustration of new species from the study region.

Accomplishments:

'A taxonomic guide to the mysids of the South Atlantic Bight' – the first published guide produced by SERTC, in collaboration with taxonomic experts – was published as part of the NOAA Professional Papers Series. At 37 pages, the guide includes an introduction to mysids (their general morphology, classification, distributional records), an illustrated key, an annotated species list and a comprehensive reference list of the 18 species known from the South Atlantic Bight. A comparable guide to the thalassinidean decapod crustaceans, detailing 14 species and presenting an illustrated key and species notes, was sent for review to the NOAA Professional Papers Series in 2006 and will be published in 2007. A manuscript describing the tanaids of the South Atlantic Bight required additional revision after a recent taxonomic re-classification. This extensive manuscript, describing 23 species, includes an overview of tanaid morphology, classification and ecology and includes an illustrated key and species discussions. The manuscript was not finished by the end of the grant, but is expected to be completed in 2007. An interactive web based guide to the octocorals of the South Atlantic Bight was prepared by SERTC staff and is soon to be uploaded to the SERTC website. The guide covers 26 species over 11 families in 2 different orders (Gorgonacea and Pennatulacea). A key and notes on each species were also produced for this work.

SERTC staff collaborated with Dr. David Pawson and his assistant Doris Vance (NMNH, Smithsonian) to produce manuscripts for a regional guide to the approximately 150 species in the five classes of echinoderms. Dr. Pawson and Ms Vance visited the SERTC laboratory several times, identified all of the SERTC and GML echinoderm material, examined regional fauna in the NMNH collections and other regional collections, created a regional species list, and prepared an extensive laboratory manual detailing species that were used in the SERTC echinoderm identification workshop that was held in Charleston in May 2005.

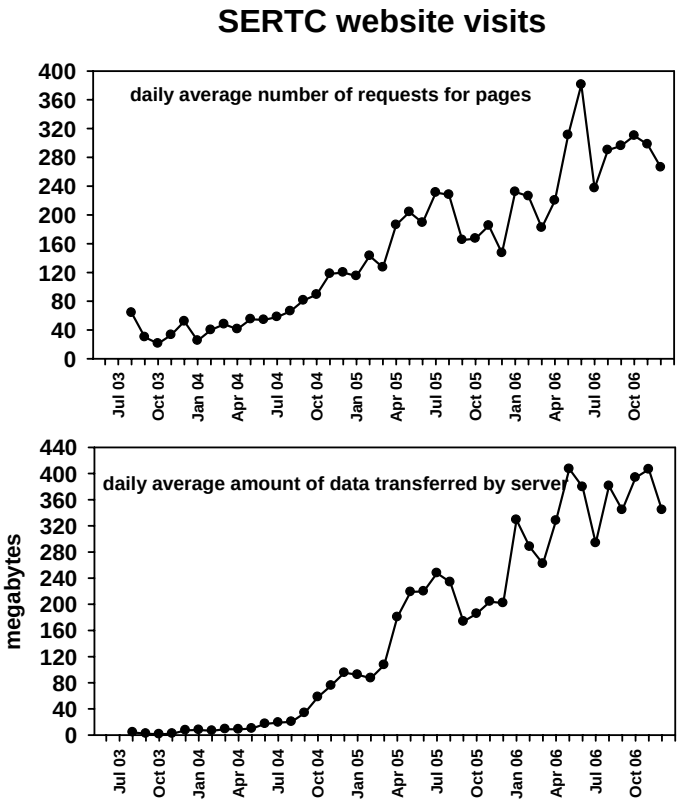
Dr Dale Calder (Royal Ontario Museum) produced a regional guide to jellyfish as part of a subcontract on the SERTC grant. He examined regional collections, material in the Royal Ontario Museum in Toronto and the NMNH in Washington, DC, as well as his personal collection in Ontario, and he prepared a regional species list and identification key with original illustrations of each species. The guide was finished in 2006 and is expected to be published shortly.

Master's student Jana Thoma (University of Southern Mississippi) produced a guide to the parasitic bopyrid isopods of the South Atlantic Bight as part of collaborative work with SERTC. She examined many specimens from the SERTC collection and is expected to publish her work, which will include species descriptions, illustrations and a key, in 2007.

Goal 7. Construct and maintain the SERTC website, which provides online profiles of selected species identified from the project region, as well as morphological illustrations and online interactive identification keys to the groups identified.

Accomplishments:

The SERTC website (http://www.dnr.state.sc.us/marine/sertc/), an important project objective for SERTC, was launched at the end of Year 2. It was planned and designed by SERTC staff and was then continually maintained and updated regularly. The website was designed to provide an overview of SERTC's mission to a varied audience and it has continued to attract increasing numbers of visitors since its inception.



Staff accomplishments, collaborative efforts, lab news and participation in outside projects, services available, workshop offerings, and taxonomic products and resources such as keys and guides and links are provided on the website. There is also an extremely popular photo gallery that presents high quality images of some of the collection specimens and their habitats, encompassing 29 major taxa of invertebrates from the SAB,.

Goal 8. Establish a digital image library.

Accomplishments:

The SERTC staff has built an extensive digital image library that consists of more than 16,000 marine invertebrate and larval fish images. The library is showcased on the SERTC website in a photo gallery that offers selected thumbnails (http://www.dnr.sc.gov/marine/sertc/gallery%20intro.htm). The image library has been

very popular with researchers and the public, and SERTC has received innumerable requests for permission to include these images in publications such as The New York Times, the New Scientist Magazine, various educational textbooks, as well as on websites and in brochures (see appendix A). Specimen images from almost all the major invertebrate phyla are included in the digital image library, as well as various habitat (hard bottom, artificial substrates, sand bottom, marsh) and *in situ* specimen images and 400 scanning electron microscopy (SEM) images of octocorals.

Goal 9. Promote, encourage and provide training in systematics through various activities such as the presentation of workshops and production of educational pamphlets and posters.

Accomplishments:

The SERTC successfully hosted its first taxonomic workshop on decapod crustaceans of the South Atlantic Bight region from January 21-23, 2004. Twenty-five people from six eastern US states (Virginia, North Carolina, South Carolina, Georgia, Florida and Pennsylvania) took part. Attendees were given a general overview of decapod systematics, various taxonomic procedures and the morphology of decapod crustaceans. They also took part in a collection cruise in the vicinity of Charleston Harbor, after which they sorted and identified fresh and preserved regional decapod material, using published literature and a workshop manual with updated taxonomic classifications and keys. They were able to closely examine and dissect diverse groups of decapods, while learning to interpret keys and descriptions from publications.

From July 13-15, 2004, the SERTC held a well-received workshop on the taxonomy and identification of marine fishes, with Dr. Antony Harold of the GML as organizer and main instructor and several SCDNR biologists assisting. This workshop, with an emphasis on western North Atlantic species, served to train advanced students, educators, and scientists in the systematics and identification of marine fishes of the southeastern United States. 15 enthusiastic participants from South Carolina, North Carolina and Georgia attended the workshop.

In August of 2004, SERTC staff developed a credited undergraduate independent study project with Dr. Chip Biernbaum of the College of Charleston for an undergraduate student's year-long Bachelor's Essay project. The project was a taxonomic review of six species of isopods (*Chiridotea* spp.) from the South Atlantic Bight region that included taxonomic revisions of species, scientific illustrations and an identification key to the genus. A manuscript based on this work will be published in February of 2007 in the Journal of Crustacean Biology.

A third SERTC workshop was held at the MRRI from October 25-29, 2004. This was the sixth in a series of international DELTA training workshops. This workshop was designed to train students and scientists (international and regional) in the DEscriptive Language for TAxonomy software system.. DELTA is a Windows-based program that stores large amounts of morphological data, which can be used to automatically produce illustrated interactive keys, species descriptions for taxonomic work and nexus files for phylogenetic analysis. As such, it is an extremely useful tool for modern morphological taxonomists. Dr Jim Lowry (Australian Museum) and Dr. Terry Macfarlane (Western Australian Herbarium) were the instructors. Attendees came from Southampton, England; Cork, Ireland; University of Southern Mississippi and there were also several SCDNR scientists.

SERTC conduted a workshop on the taxonomy of larval fish from January 11-14, 2005. This workshop trained advanced students, educators, and scientists in the systematics and identification of larval fish of the southeastern United States. Over four days, participants were instructed on the identification of larvae of regional fish families, with emphasis on the use of keys. Students were also taught dissecting, staining and preservation techniques and given an overview of current teleostean systematics. The instructors were Dr. John Olney (Virginia Institute of Marine Science), Dr. John McGovern (National Marine Fisheries Service, NOAA), and Dr. Joanne Lyczkowski-Shultz (National Marine Fisheries Service, NOAA). Participants came from various laboratories and institutions in Florida, Alabama, Texas, North Carolina and South Carolina. All were provided with an extensive manual that included notes and keys to regional teleostean family groups.

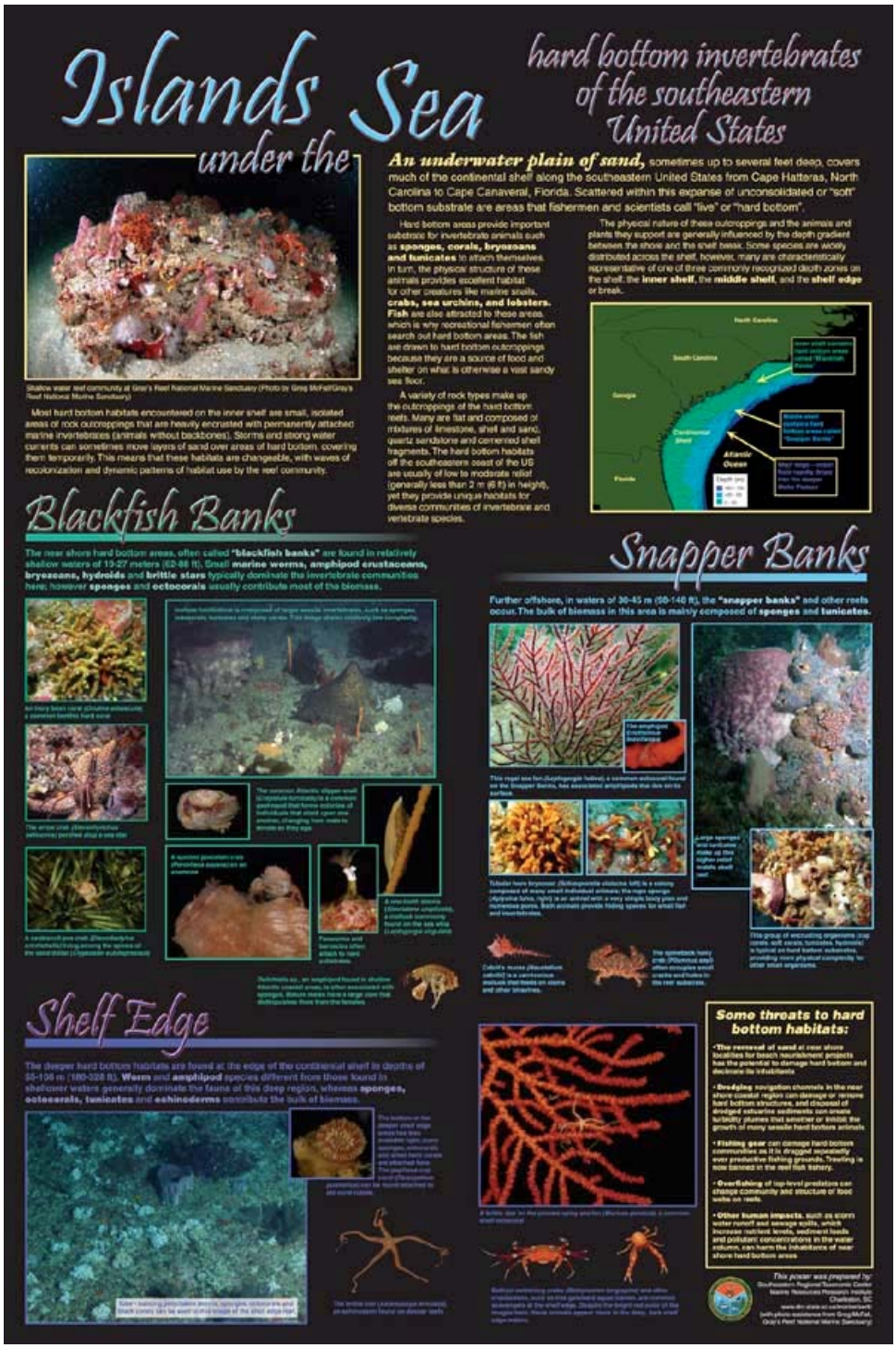
An echinoderm taxonomy workshop was held at the MRRI from May 2-4, 2005, training 18 students and scientists in the systematics and identification of sea stars, sea lilies, sea cucumbers, urchins, and brittlestars from the southeastern United States. Diagnostic morphological characteristics and the use of dichotomous keys were emphasized by instructors Dr. David Pawson (National Museum of Natural History, Smithsonian Institution) and Dr. Stephen Stancyk (University of South Carolina). Participants gained practical knowledge in the identification of echinoderms and a grasp of their diversity, systematics, ecology and reproductive biology over the course of the 3-day workshop. Attendees came from Massachusetts, Washington, D.C., North and South Carolina, Georgia, Alabama, Florida, and Korea, and there were also several SCDNR scientists enrolled.

The final SERTC workshop was on amphipod taxonomy, and it was held from October 10-13, 2005. This workshop served 15 advanced students, educators, and scientists that were interested in the systematics and identification of amphipods of the southeastern United States. Over four days, each participant improved their knowledge and expertise on the biology, ecology, and behavior of this diverse and abundant peracarid crustacean group, through a series of presentations, demonstrations, and hands-on exercises. The instruction methods of Dr. James Thomas (Nova Southeastern University, FL), Dr. Richard Heard and Ms. Sara LeCroy (Gulf Coast Research Laboratory, University of Southern Mississippi) emphasized a blend of traditional taxonomic methodology with the tools of modern technology. Participants, who came from laboratories and institutions in Florida, Georgia, North Carolina, and South Carolina, were provided with an extensive manual that included notes and keys to the regional amphipod fauna.

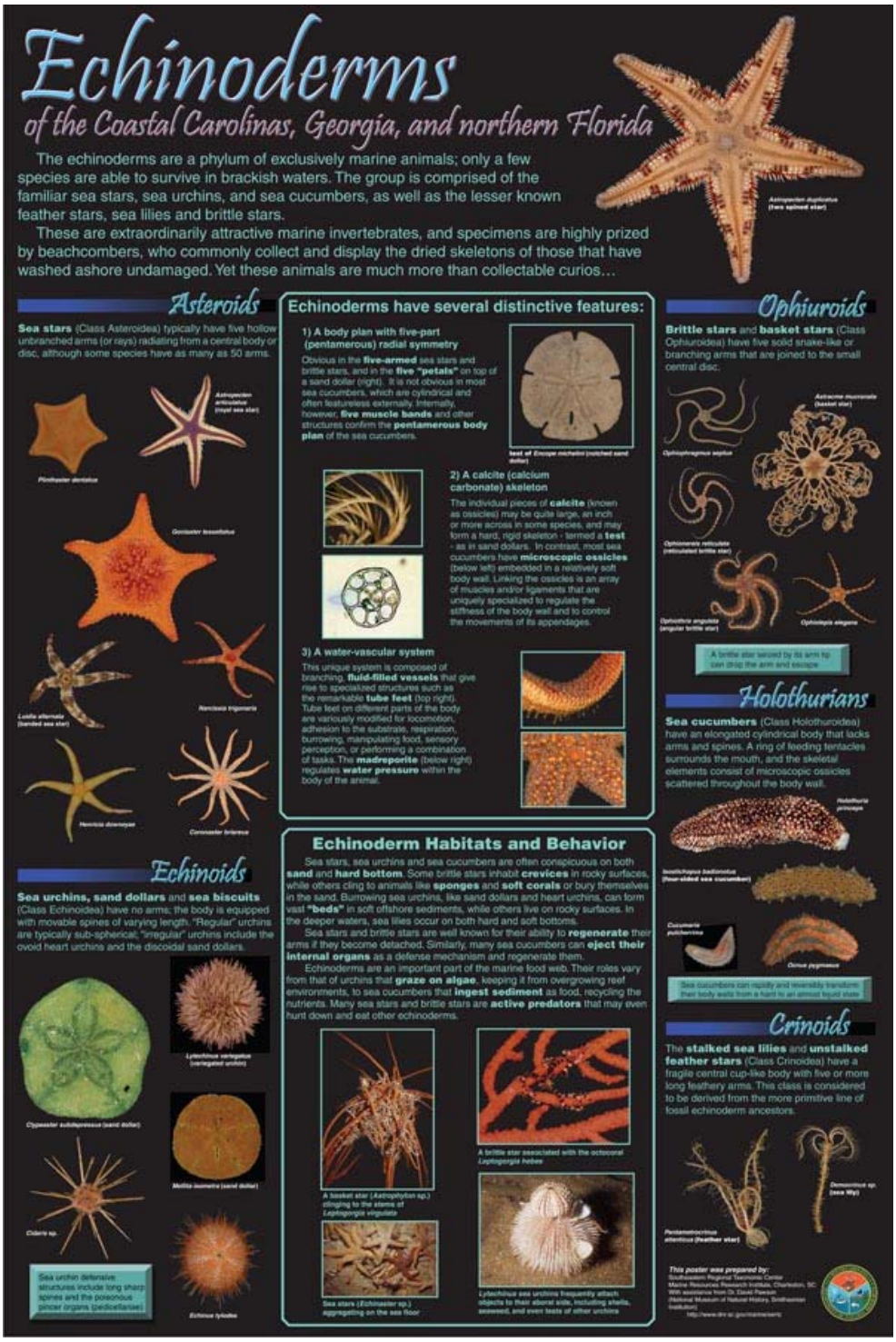
The accomplishment that brought perhaps the most focused public attention on SERTC was the preparation of three educational posters for public distribution. The professionally prepared and printed 24x36” posters depicted the wide variety of invertebrate animals living in different habitats of the southeastern United States. Explanatory text on the posters was aimed at educating students at the secondary school and undergraduate college level. About 8000 posters were printed for distribution to educators in schools, teacher training programs, marine educator’s conferences, public

aquaria, museums, nature centers, conservation groups, and government agencies. The first poster, depicting more than 30 marine invertebrates living within intertidal oyster reefs in South Carolina, provided a look at the diversity of the resident community of a habitat that is readily accessible to teachers and students in southeastern US coastal states.

The second poster, ‘Islands under the Sea’ describes three different types of hard bottom areas that lie off the South Carolina coast on the continental shelf, and thus are less likely to be familiar to most of the general pubic. The poster was organized into categoriies based on depth, and included images of individual specimens and several showing the biotic complexity of these habitats.



The third poster illustrates the diversity of the echinoderms of the South Atlantic Bight, featuring both the morphological differences and the functional similarities of the five classes in the phylum.



Appendix A. Use of images from the SERTC digital image library, 2004-2006

Date:	Image:	Permission granted to:	Institution/Employer:	Purpose:
September 2004	Worm: *Proceraea fasciata*	Kathleen Olsen	Wadsworth Group/Brooks/Cole publishing	Image for scientific publication
September 2004	Various images	SCDNR	SCDNR	SCDNR website images
October 2004	Various images	Brandon Smith	Brevard County Parks and Recreation Environmental Program	Website images
October 2004	Various images	Leslie Sautter	College of Charleston, SC	For cover of CD for marine related activities, COASTeam program
October 2004	Stone crab, blue crab	Jenn Loder	Graduate student at Florida International University in the Environmental Studies Department	Development of marine conservation exhibits for a local nature center
February 2005	Anemone: *Nematostella vectensis*	Verity Greenwood	ARKive, UK	ARKive website
February 2005	Snapping shrimp: *Alpheus* sp , *Alpheus heterochaelis*, *Alpheus armillatus*, and *Charybdis hellerii*	Andrew Spencer	The Lincoln Library Press, OH	Image for mythology textbook/website
March 2005	Fiddler crab: *Uca pugilator*	Madeleine Lapointe	University of Arizona	Image for web page for The Biology Project
June 2005	Anemone: *Nematostella vectensis*	John Forbes	The New York Times, Science Times section	To use our image for a story on jellyfish evolution
July 2005	Sea star: *Luidia clathrata*	Diana Strommen	Georgia Aquarium	Georgia Aquarium website
August 2005	Isopod: *Synidotea laticauda*	Rob Gough	Salem Sound Coastwatch	images for an identification card of introduced marine species
August 2005	Anemone: *Nematostella vectensis*	Laura Edwards	UK Environment Agency	brochure
October 2005	Stomatopod: *Squilla empusa*	Judy Gregoire and Kit VanWagner	Environmentally Endangered Lands (EEL) Brevard County Park Parks and Recreation Department	Digital Media Exhibit

November 2005	Anemone: *Nematostella vectensis*	Ludivine Morel	New Scientist magazine, UK	Use in magazine
December 2005	Images of *Nereis succinea, Zaops ostreum* and *Styela* sp.	Rachel Bullene	Virginia Coastal Program Department of Environmental Quality	For use in their oyster garden publication
December 2005	*Uca pugilator*	Laura Monticelli	European project ISSUE	For presentation
February 2006	*Synidotea laticauda*	Adelaide Rhodes	University of Washington	For use in paper regarding invasive species
February 2006	Various images	Mike Berkowitz	Retired teacher	Images for teaching materials
February 2006	Crab: *Callinectes bocourti*	Jolee West	Wesleyan University	For conservation website
March 2006	*Scyllarus chacei* and *S. americanus*	Kari L. Lavalli	Boston University	For presentation
March 2006	*Renilla reniformis*	Andy Loening	Stanford University	For presentation
March 2006	*Amphitrite ornata*	Bradley E. Sturgeon		For presentation
March 2006	phyllosoma larvae	John F. Hughes	Empire State College	
April 2006	Ghost shrimp	Jennifer Martin	Wyland Worldwide	For teaching curricula development
May 2006	*Astracme*	Laura Graedel	McDougal Littell	High school biology textbook
July 2006	*Physalia physalis*	Peg Van Patten	Connecticut Sea Grant	Website informational piece
August 2006	Echinoderms: *Echinaster spinulosus, Melita isometra, Encope michelini and Luidia clathrata*	Stephen Lipuma	McGraw-Hill	Grade 1 Science text book
August 2006	*Menippe mercenaria, Alpheus heterochaelis,* and *Callinectes sapidus*	Steve Carbol	The Conservancy of Southwest Florida	For a guide