

Baseline Port Surveys for Invasive Marine Species in the South Atlantic Bight



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Marine Extension Service



American Association of Port Authorities 2003 Port Rankings (TEUs)

Wilmington NC 34th

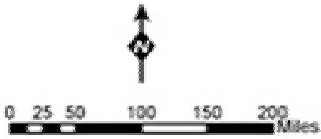
Charleston SC 5th

Savannah GA 10th

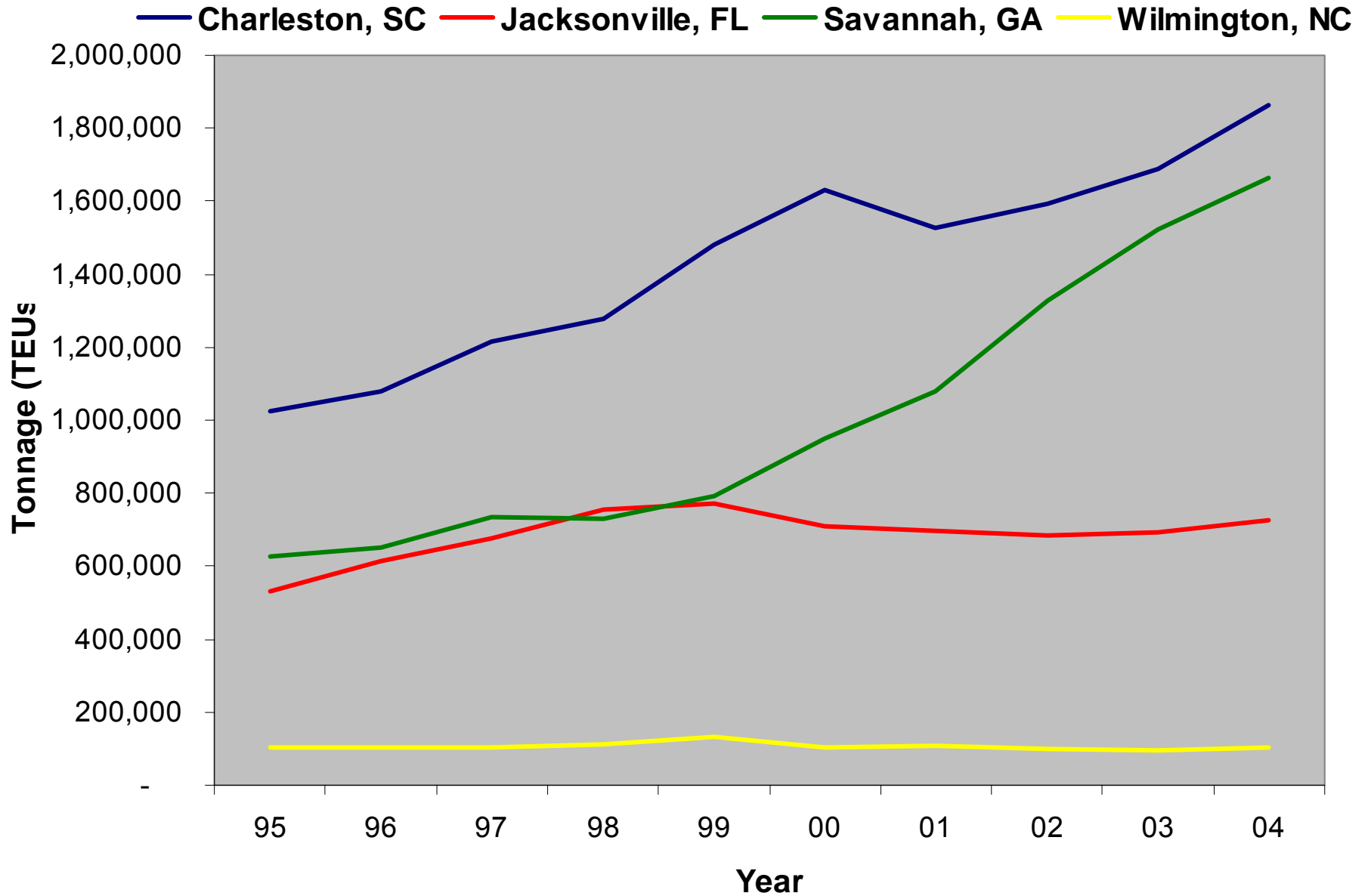
Jacksonville FL 17th



Image credit: Southeastern Regional Taxonomic Center
<http://www.dnr.sc.gov/marine/serc/about.html#>



Ten-Year Tonnage Trends



Nonindigenous Aquatic Species in the South Atlantic Bight

FRESHWATER

15 Crustaceans

e.g. Crayfish, *Orconectes* & *Procambarus* spp.

8 Mollusks

e.g. Asian Clam, *Corbicula fluminea*

MARINE

20 Crustaceans

e.g. Green Porcelain Crab, *Petrolisthes armatus*

11 Mollusks

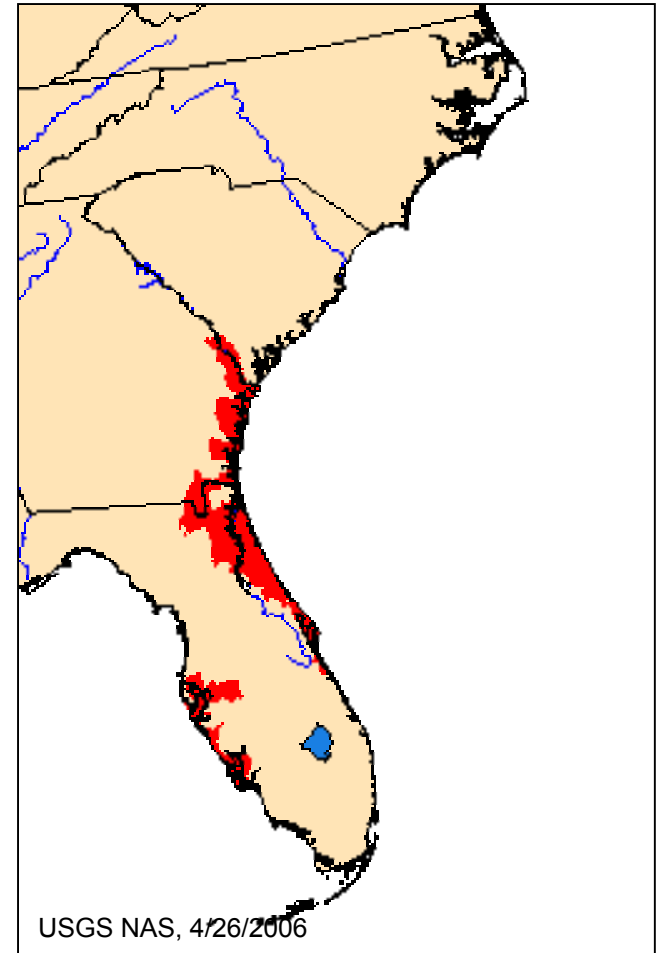
e.g. Green Mussel, *Perna viridis*

1 Polychaete

i.e. *Hydroides elegans*

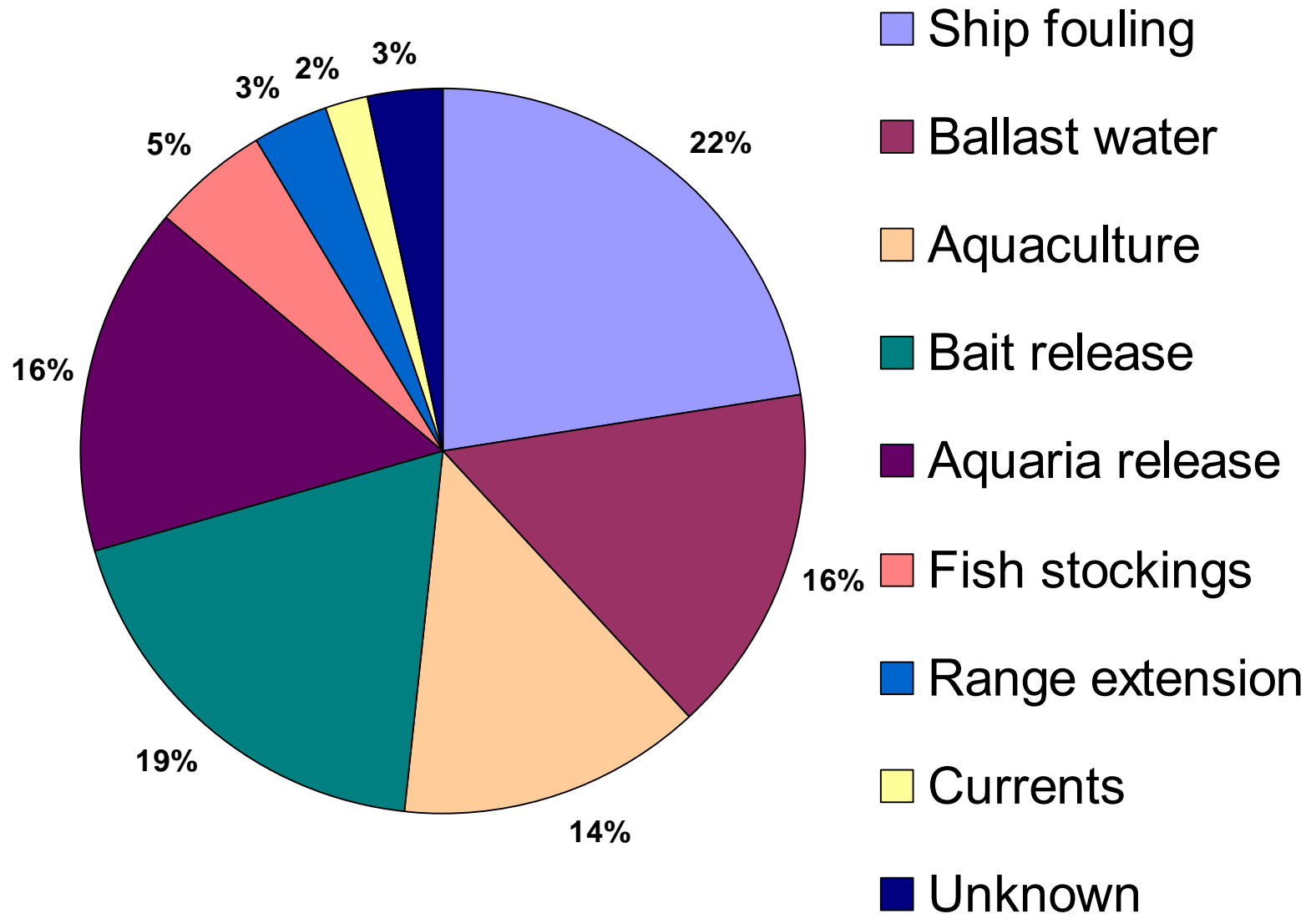
POTENTIAL INVADERS

Dreissena polymorpha, *Eriocheir sinensis*, *Rapana venosa*



Green Mussel Distribution in the SAB

Identified Pathways for the SAB Region



Baseline Port Surveys for Invasive Marine Species in the SAB Region

- Literature review
- Port descriptions (history, hydrography, geology and shipping movements)
- Port surveys
- Native biodiversity and non-indigenous species (mollusks, crustaceans, and polychaetes)
- Identify priority invasive species
- Determine differences in community structure, sediment size, and water quality parameters
- Integrate data with GIS



0 of 1738 selected

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New Open Add

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 Attributes of Points.shp
 Attributes of Polys.shp
 references.dbf
 sightings.dbf
 species.dbf

Views
 Tables

references.dbf

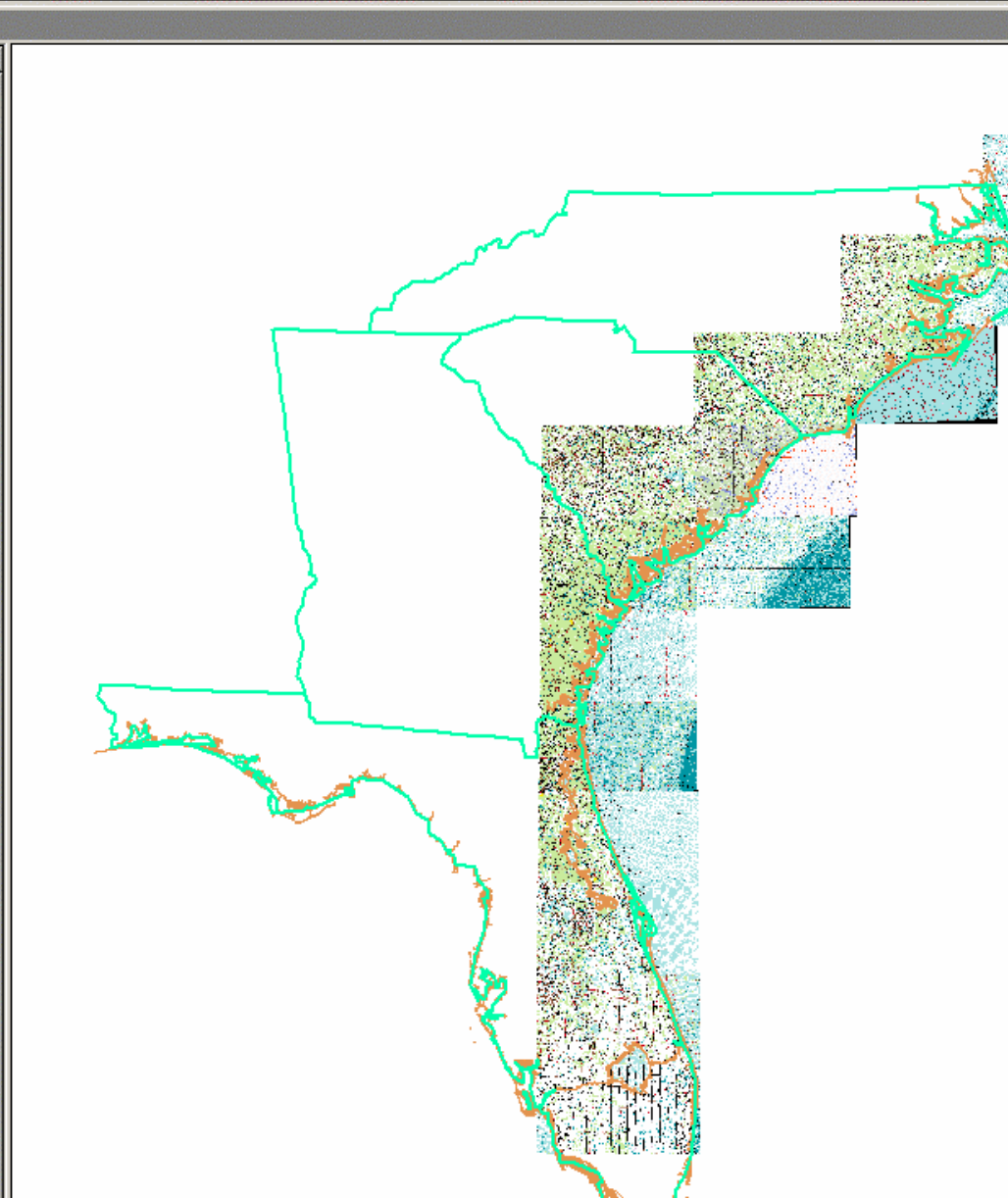
Ref_id	Reference
Abele1973	Abele, L.G. 1973. Taxonomy.
Avent1977	Avent, R.M., King, M.E., Gore,
Bearsbluff1965	Anderson, W.W. 1965. Biolog
Biffar1970	Biffar, T.A. 1970. New specie
Bishop1960	Bishop, S. H. 1960. Outer Be
Brett1963	Brett, C. E. 1963. Relationship
Cain1972	Cain, T.D. 1972. Additional ep
Caine1987	Caine, E.A. 1987. Potential ef
Calder1977	Calder, D.R., Boothe, B.B. Jr.,
Cerame-Vivas1966	Cerame-Vivas, M.J., Gray, I.E.
Clench1956	Clench, W.J., Turner, R. D. 19

species.dbf

Family	Species
Aciculata	Americanuphis magna
Actoetidae	Polyodontes lupina
Ampharetidae	Amage auricula
Ampharetidae	Ampharete americana
Ampharetidae	Ampharete parvidentata
Ampharetidae	Amphicteis gunneri
Ampharetidae	Melinna maculata
Ampharetidae	Mellina cristata
Amphinomidae	Amphinome rostrata
Amphinomidae	Hermodice carunculata
Amphinomidae	Pseudeurythoe ambigua
Ampithoidae	Synamphithoe pelagica
Aphroditidae	Aphrodita aculeata
Aphroditidae	Aphrodita hastata
Aphroditidae	Laetmonice filicornis
Arenicolidae	Arenicola cristata

InvasiveSpecies

- Points.shp
- Lines.shp
- Polys.shp
- State.shp
- Coastline.shp
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- C35076a1.tif
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- C32078a1.tif
- C31080a1.tif
- C30080a1.tif
- C29080a1.tif
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- C26080a1.tif



ArcView GIS 3.2

File Edit Table Field Window Help

1 of 1736 selected

RealLap

New Open Add

Attributes of Lines.shp
Attributes of Points.shp
Attributes of Polys.shp
references.dbf
sightings.dbf
species.dbf

references.dbf

Ref_Id	Reference
Fox1985	Fox R.S., Ruppert E.E. 1985
Foxe2003	Foxe A., Walker R., Foxe
Presant2002	Presant R.S., Tol R.B., Rolfe
Calder1977	Calder D.R., Boothe B.B. Jr.
Mason1996	Mason W.T. Jr. 1996. Macro
Nelson1982	Nelson W.G., Casen K.D., Va
Wendt1990	Wendt P.H., Van Dolah R.F.
Kensley1995	Kensley B., Nelson W.G., Sof
Kirby-Smith1971	Kirby-Smith W.W., Gray I.E. 1
McDougall1943	McDougall K.D. 1943. Sessil
Wells1961	Wells H.W. 1961. The fauna

species.dbf

Family	Species
Comphidae	Comphium leucanthemum
Aciculate	Americanophis magna
Actoetidae	Polyodontes lupina
Ampharetidae	Ampharete auricula
Ampharetidae	Ampharete americana
Ampharetidae	Ampharete parvidentata
Ampharetidae	Ampharete gunneri
Ampharetidae	Melinna maculata
Ampharetidae	Melinna cristata
Amphinomidae	Amphinome rostrata
Amphinomidae	Hemodice carunculata
Amphinomidae	Pseudeurythoe ambigua
Amphitoidae	Synamphitoe pelagica
Aphroditiidae	Aphrodita aculeata
Aphroditiidae	Aphrodita hastata
Aphroditiidae	Laetmonice filicornis

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- C26080a1.tif

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Survey Design

Hewitt, C.L. and R.B. Martin. 2001. Revised protocols for baseline port surveys for introduced marine species: survey design, sampling protocols and specimen handling. Centre for Research on Introduced Marine Pests. Technical Report No. 22. CSIRO Marine Research, Hobart. 46 pp.



- August-September 2003
- Sampling in three zones
- 13 replicates/gear type/zone/port
- Site cluster analysis
- Bray-Curtis Dissimilarity Indices



Jacksonville, Florida



Savannah, Georgia



Charleston, South Carolina



Wilmington, North Carolina

Trawling



- 5 minute tows
- Speed less than 0.5 meters/second



Trapping

- Crab traps 24x24x24", 1.5" mesh
- Minnow traps 16" long, 0.25" mesh
- Locally available menhaden bait
- Overnight soak (~18 hours)



Sediment Cores



- Triplicate core samples
- 10cm diameter, 15cm depth
- 1mm sieve wash
- Additional sample taken for organic carbon and particle size analysis





Scrapings

- Collected in port zone only
- Approximately 1m² scraped



Fouling Plates



- Placed in port zones only
- Suspended from docks/anchored
- 3 month deployment

Balanus trigonus



Gulf States Marine Fisheries Commission

Apocorophium lacustre



University of Illinois at Urbana-Champaign College of Agricultural,
Consumer and Environmental Sciences

Balanus amphitrite



San Francisco Guide to Exotic
Species of San Francisco Bay

Ligia exotica



Bishop Museum and University of Hawaii

Petrolisthes armatus



Southeastern Regional Taxonomic Center

Survey Limitations

- Hester-Dendy plates problematic
- One time sampling event
- Sample processing labor intensive
- Not include all fauna (e.g. fish)
- Not identify all non-indigenous species present
- Final Report available early June

www.marex.uga.edu/shellfish

Upcoming Projects

- Port Surveys for Invasive Marine Species in Coastal Georgia
- Preventing the Introduction and Reducing the Spread of Invasive Aquatic Species in Coastal Georgia Through a Public Awareness and Monitoring Campaign

Have You Seen Me?

The green mussel *Perna perna* is an invasive species from the Indo Pacific region. It was introduced to Georgia during 2003. If found please record as much of the following information as possible and send to Dr. Alan Power, University of Georgia Marine Extension Service, Shellfish Research Laboratory, 20 Ocean Science Circle, Savannah, GA 31411, Telephone: (912) 598 2348; Fax: (912) 598 2399; Email: alanpower@uga.edu

Date:

Location (GPS if available):

Number of Living/Dead Mussels:

Attached to:

Approximate Depth:

Water Temperature & Salinity:

Shell Length(s):

Collectors Name & Contact:




The University of Georgia
Marine Extension Service


Sea Grant
Georgia


Georgia Department of Natural Resources

Photo Credit: Dr. Richard Grimes
Coastal Technical Institute National Resource Research Project

AQUATIC INVADERS

**Aquatic Invasive Species Outreach:
A Tool Kit for Educators in American Zoo and Aquarium Association Member Institutions**

Sea Grant Aquatic Invasive Species Research & Outreach Program

American Zoo & Aquarium Association; Sea Grant Program; Southeast Aquatic Resources Partnership; Institute for Learning Innovation; UGA Marine Extension

National Invasive Species Council's National Management Plan 2001:

“The prevention and control of invasive species requires modifying the public’s behaviors, values and beliefs, and changing the way decisions are made”.

Project Goal

To provide a comprehensive package for educators to present an innovative, theatrical-style educational program that will allow AZA audiences to understand basic components of the invasive species problem and promote awareness of practices that prevent and reduce their further spread.

Acknowledgements

NOAA's National Sea Grant Aquatic Nuisance Species Program, University of Georgia Marine Extension Service, University of North Carolina at Wilmington, Georgia and North Carolina Ports Authorities, Coast Guard, Georgia, South Carolina, North Carolina and Florida Department of Natural Resources, Army Corps of Engineers, Marine Patrol, Southeastern Regional Taxonomic Center, United States Geological Survey, University of Florida, Jacksonville Shell Club, Skidaway Institute of Oceanography, Guana Tolomato Matanzas National Estuarine Research Reserve, American Museum of Natural History, Sapelo Island National Estuarine Research Reserve, Nature Conservancy



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<http://www.marex.uga.edu/shellfish>