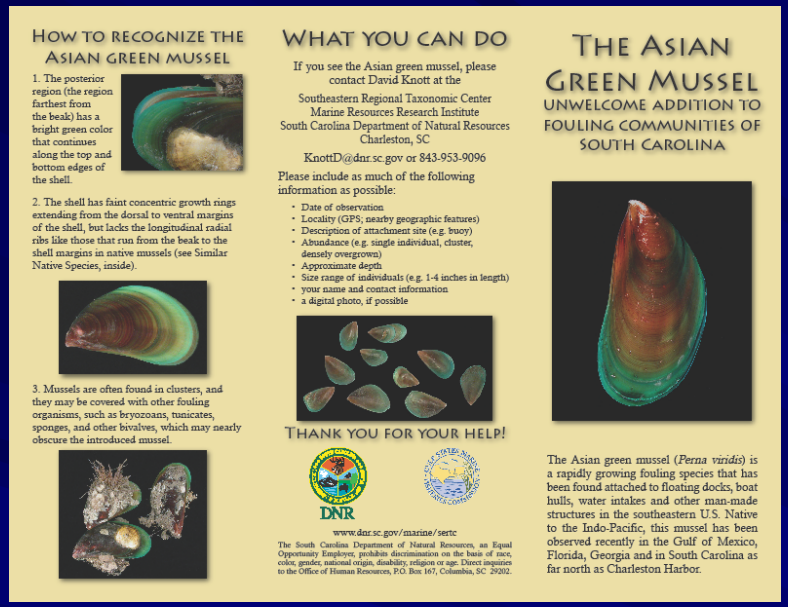
The Invasive and Nonindigenous Fauna of Coastal South Carolina

David Knott

SouthEastern Regional Taxonomic Center

Marine Resources Research Institute

DNR



How to recognize the Asian green mussel

1. The posterior region (the region farthest from the beak) has a bright green color that continues along the top and bottom edges of the shell.

2. The shell has faint concentric growth rings extending from the dorsal to ventral margins of the shell, but lacks the longitudinal radial ribs like those that run from the beak to the shell margins in native mussels (see Similar Native Species, inside).

3. Mussels are often found in clusters, and they may be covered with other fouling organisms, such as bryozoans, tunicates, sponges, and other bivalves, which may nearly obscure the introduced mussel.

What you can do

If you see the Asian green mussel, please contact David Knott at the

Southeastern Regional Taxonomic Center
Marine Resources Research Institute
South Carolina Department of Natural Resources
Charleston, SC

KnottD@dnr.sc.gov or 843-953-9096

Please include as much of the following information as possible:

- Date of observation
- Locality (GPS; nearby geographic features)
- Description of attachment site (e.g. buoy)
- Abundance (e.g. single individual, cluster, densely overgrown)
- Approximate depth
- Size range of individuals (e.g. 1-4 inches in length)
- your name and contact information
- a digital photo, if possible

Thank you for your help!

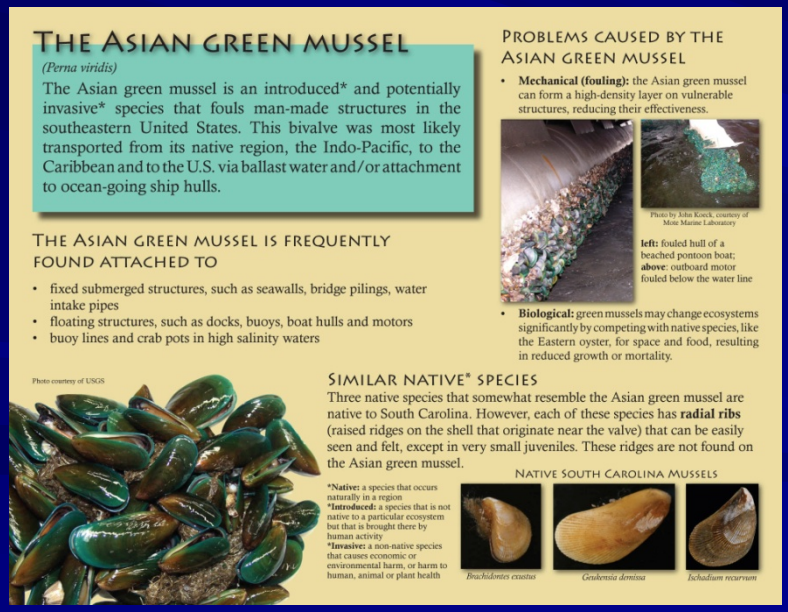
DNR

www.dnr.sc.gov/marine/sertc

The Asian Green Mussel

Unwelcome addition to fouling communities of South Carolina

The Asian green mussel (*Perna viridis*) is a rapidly growing fouling species that has been found attached to floating docks, boat hulls, water intakes and other man-made structures in the southeastern U.S. Native to the Indo-Pacific, this mussel has been observed recently in the Gulf of Mexico, Florida, Georgia and in South Carolina as far north as Charleston Harbor.



The Asian green mussel

(Perna viridis)

The Asian green mussel is an introduced* and potentially invasive* species that fouls man-made structures in the southeastern United States. This bivalve was most likely transported from its native region, the Indo-Pacific, to the Caribbean and to the U.S. via ballast water and/or attachment to ocean-going ship hulls.

The Asian green mussel is frequently found attached to

- fixed submerged structures, such as seawalls, bridge pilings, water intake pipes
- floating structures, such as docks, buoys, boat hulls and motors
- buoy lines and crab pots in high salinity waters

Photo courtesy of USGS

Problems caused by the Asian green mussel

- **Mechanical (fouling):** the Asian green mussel can form a high-density layer on vulnerable structures, reducing their effectiveness.

Photo by John Koeck, courtesy of Mote Marine Laboratory

left: fouled hull of a beached pontoon boat; **above**: outboard motor fouled below the water line

- **Biological:** green mussels may change ecosystems significantly by competing with native species, like the Eastern oyster, for space and food, resulting in reduced growth or mortality.

Similar native* species

Three native species that somewhat resemble the Asian green mussel are native to South Carolina. However, each of these species has **radial ribs** (raised ridges on the shell that originate near the valve) that can be easily seen and felt, except in very small juveniles. These ridges are not found on the Asian green mussel.

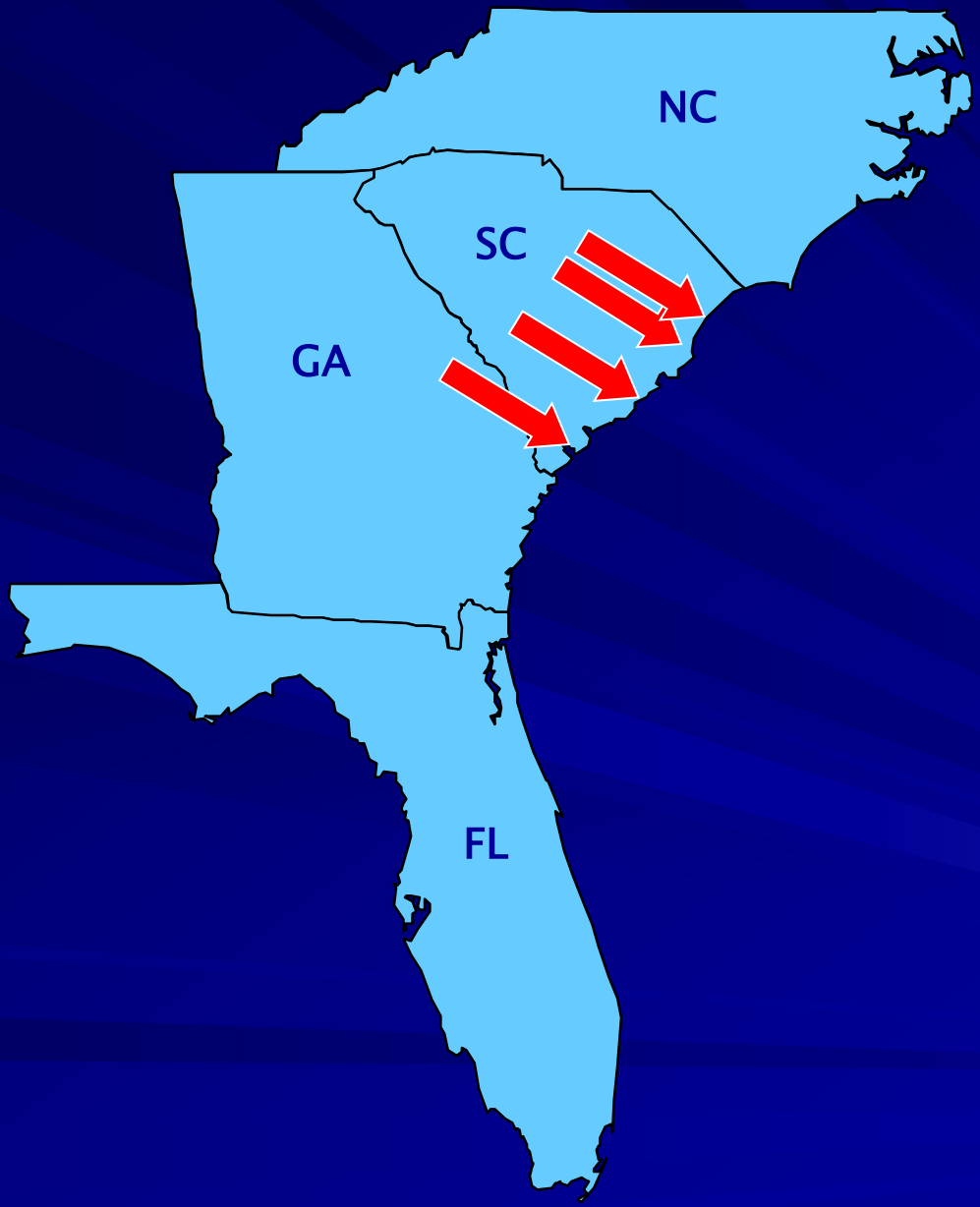
*Native: a species that occurs naturally in a region
*Introduced: a species that is not native to a particular ecosystem but that is brought there by human activity
*Invasive: a non-native species that causes economic or environmental harm, or harm to human, animal or plant health

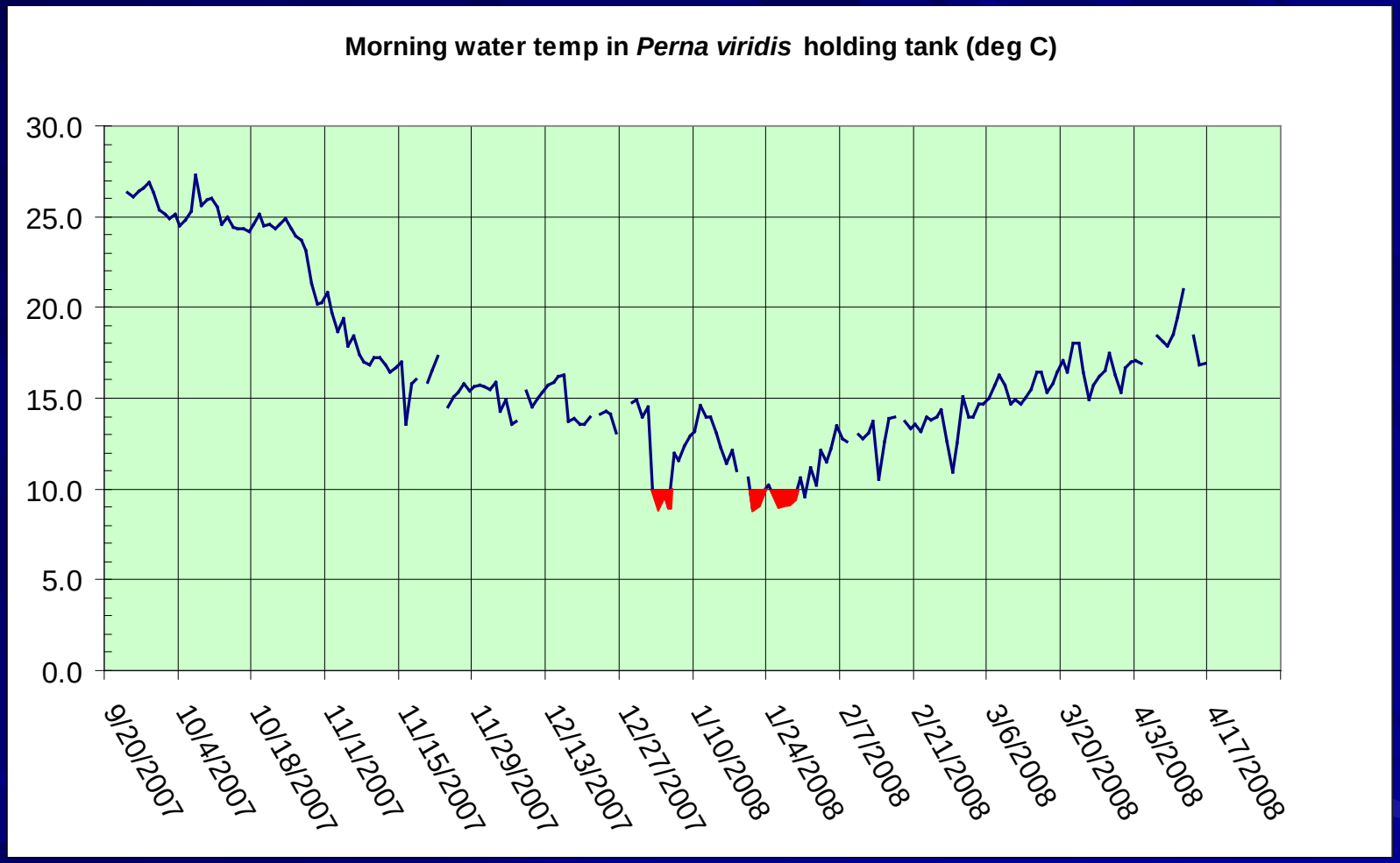
Native South Carolina Mussels

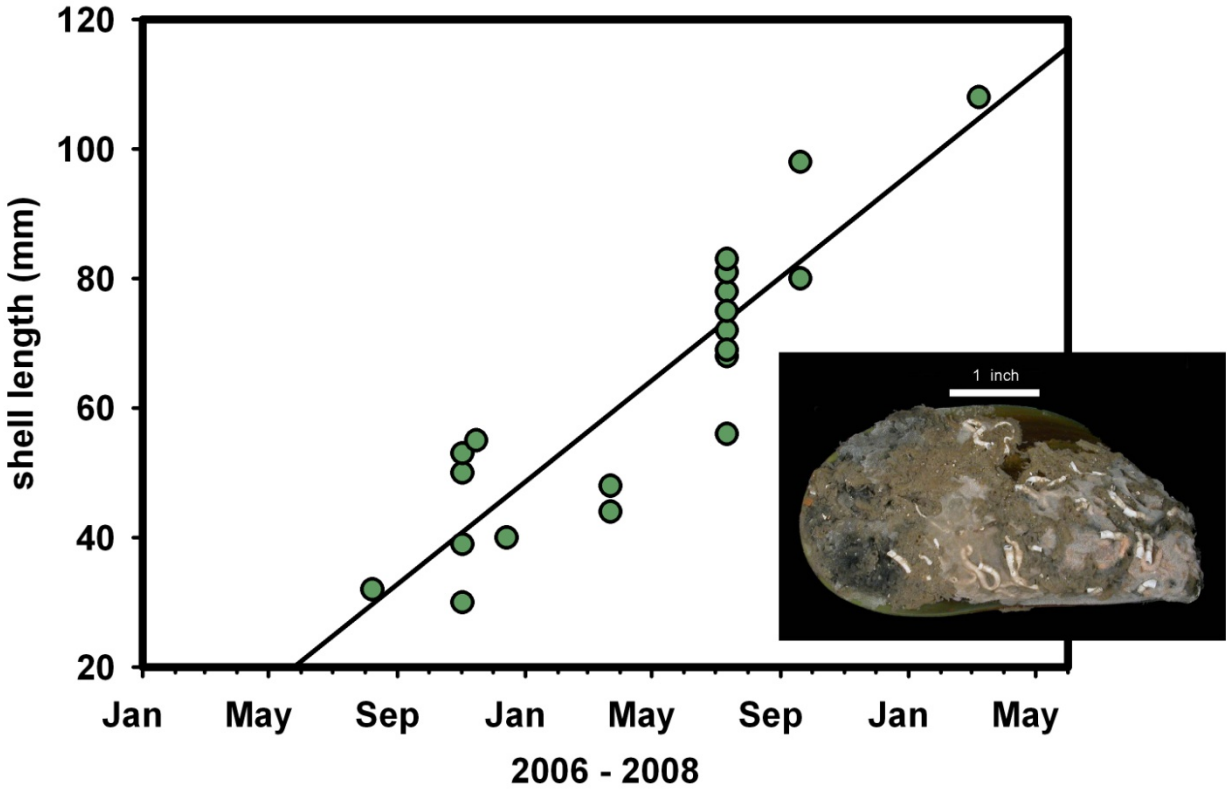
Brachidontes exustus — *Geukensia demissa* — *Ischadium recurvum*

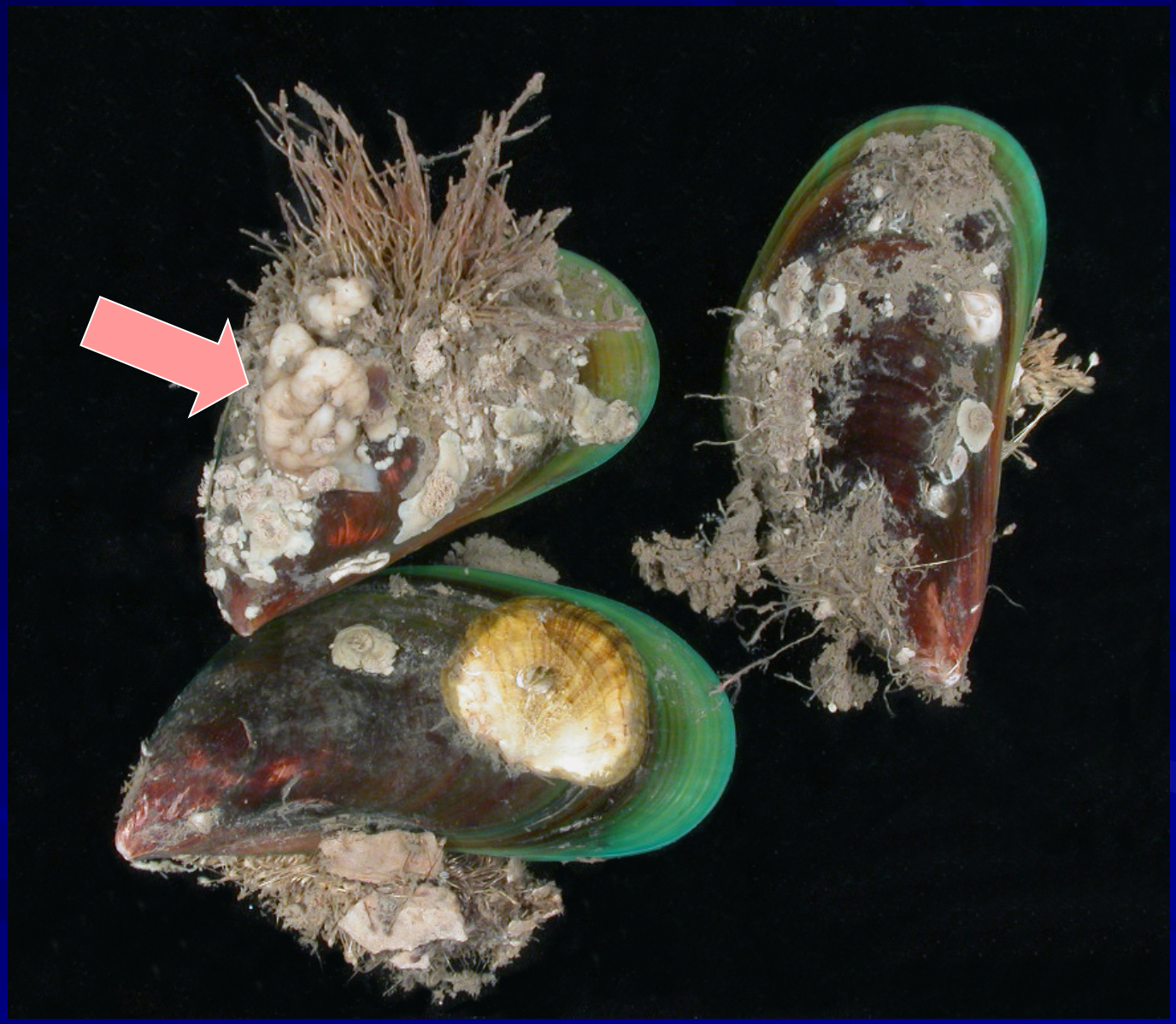
Asian Green Mussel Brochure

- $1000 GSMFC grant
- 2500 produced
- 2250 distributed
- Variety of venues


NC
SC
GA
FL


Morning water temp in *Perna viridis* holding tank (deg C)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
9/20/2007
10/4/2007
10/18/2007
11/1/2007
11/15/2007
11/29/2007
12/13/2007
12/27/2007
1/10/2008
1/24/2008
2/7/2008
2/21/2008
3/6/2008
3/20/2008
4/3/2008
4/17/2008


all known records of live collected Asian green mussels in SC
shell length (mm)
120
100
80
60
40
20
Jan
May
Sep
Jan
May
Sep
Jan
May
2006 - 2008
1 inch



the solitary tunicate *Styela plicata* - 6 month growth, Port Royal Sound, SC

42 non-indigenous aquatic invertebrates from SC reported at GSARP Charleston meeting in 2006

Cnidarians

Anemones……*Nematostella vectensis*
Haliplanella lineata

Hydrozoans……*Blackfordia virginica*
Cordylophora caspia
Maeotias inexspectata
Moerisia lyonsi

Scyphozoans……*Drymonema dalmatinum*

Annelids

Polychaetes……*Fabricia sabella*

Mollusks

Est. Gastropods……*Creedonia succinea*
Microtralia ovula
Myosotella myosotis

Fresh. Gastropods……*Bellamya japonica*
Viviparus georgianus
Viviparus subpurpureus

Bivalves……*Perna viridis*
Corbicula fluminea
Rangia cuneata

Crustaceans

Cladocerans……*Daphnia lumholtzi*

Barnacles……*Amphibalanus amphitrite*
Balanus trigonus
Loxothylacus panopaei

Copepods……*Eurytemora affinis*
Skistodiaptomus pallidus
Elaphoidella bidens bidens

Tanaid……*Sinelobus stanfordi*

Isopods……*Ligia exotica*
Paradella dianae
Sphaeroma terebrans
Synidotea laevidorsalis

Amphipods……*Caprella scaura*
Stenothoe gallensis

Fresh. Decapods……*Macrobrachium olfersii*
Cambarus longirostris
Procambarus clarkii

Est./Mar. Decapods……*Litopenaeus stylirostris*
Litopenaeus vannamei
Penaeus monodon
Petrolisthes armatus
Callinectes bocourti
Callinectes exasperatus
Charybdis hellerii
Cardisoma guanhumi

Non-indigenous Aquatic Invertebrates in South Carolina

added to list since last SC update
anticipated future arrivals

Algae

Chlorophyceae……*Codium sp. (? scandinavicum)*
Codium fragile var. *tomentosoides*

Rhodophyceae……*Polysiphonia breviarticulata*

Protozoans

Haplosporidians……*Haplosporidium nelsoni*
(oyster disease MSX)

Cnidarians

Hydrozoans……*Garvia franciscana*

Scyphozoans……*Craspedacusta sowerbyi*
Phyllorhiza punctata

Monogeneans (flukes)…*Pseudodactylogyrus bini*
Pseudodactylogyrus anguillae
? Gyrodactylus anguillae

Nematodes……*Anguillicola crassus*

Annelids

Polychaetes……*Ficopomatus enigmaticus*
Ficopomatus miamiensis

Mollusks

Fresh. Gastropods .....*Pomacea insularum*

Bivalves……*Mytella charruana*
Teredo navalis

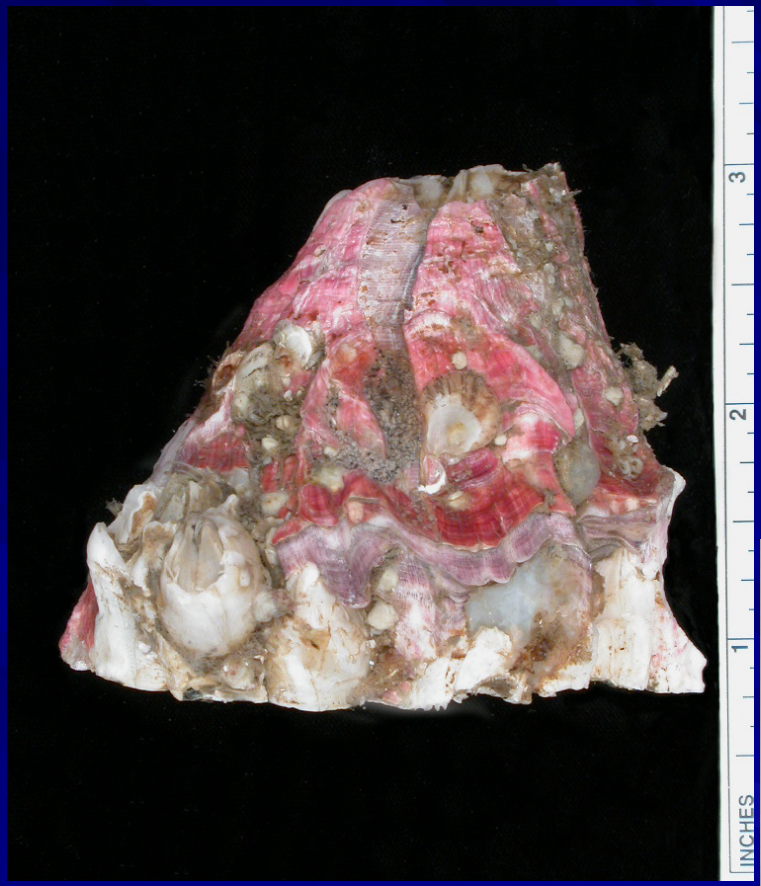
Barnacles……*Megabalanus coccopoma*
Megabalanus tintinnabulum

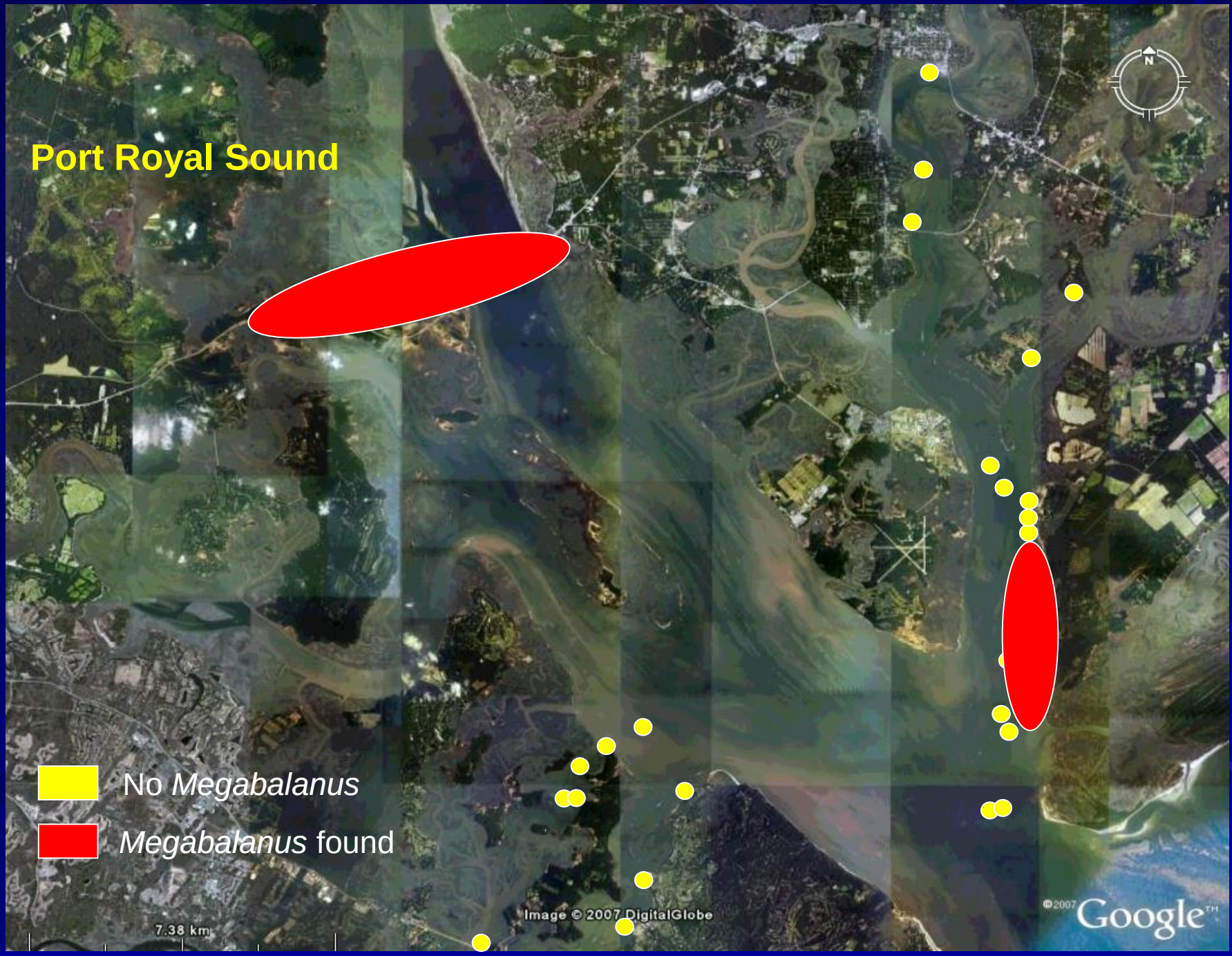
Ascidians……*Styela plicata*
Styela conopus [was *S. partita*]
Molgula manhattensis
Diplosoma listerianum

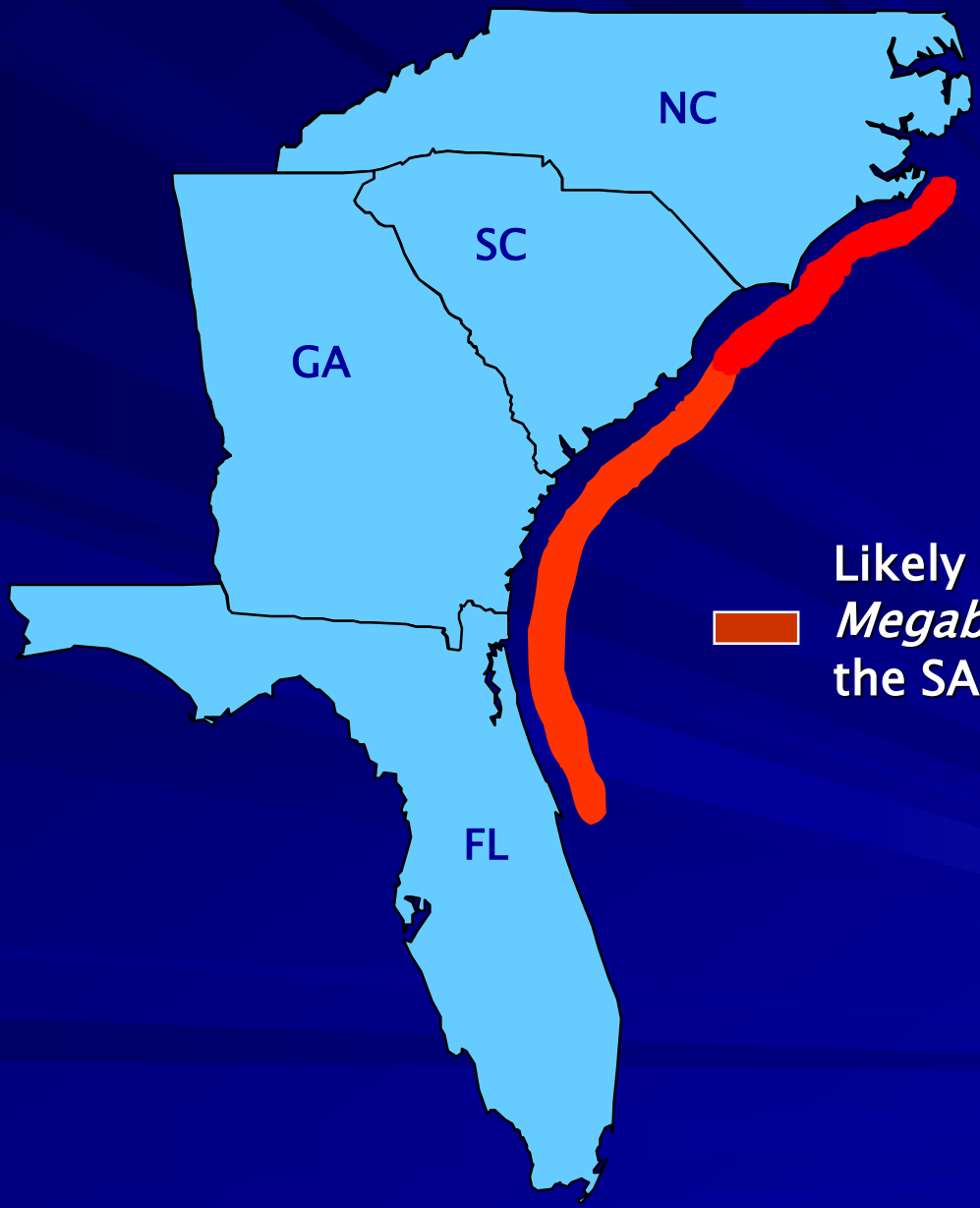
Objectives of the South Carolina Aquatic Invasive Species Management Plan

- Educate public and private stakeholders about impacts and how they can help
- Identify and implement needed research
- Monitor occurrence and spread of AIS

Megabalanus coccopoma, the titan acorn barnacle




Port Royal Sound
No *Megabalanus*
Megabalanus found
7.38 km
Image © 2007 DigitalGlobe
©2007 Google™



Likely established range of *Megabalanus coccopoma* in the SAB since 2005

Megabalanus tintinnabulum

Viviparus georgianus

Viviparus subpurpureus

Bellamya japonica

Penaeus monodon, the Asian tiger shrimp

Photo by Lisa Moore, NC Dept Envir Nat Res
from Pamlico Sound, NC

Aquaculture escapement?
Source? (DNA analysis)
Breeding population in SAB?

Photo by Robert Overton, GA Marine Ext Serv
from off St. Augustine, FL