

An Overview of Aquatic Invasive Species in South Carolina

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A Little History

- MIT's Centennial Slogan – “We never look back”
- Most Important Consequence of 1492 was the transfer of plants and animals between the Old and New World.

US Agriculture

- Native Animals – Turkey, Muscovy Duck and A Latin American Chicken
- Native Plants – Corn, potatoes, some beans, squash, sweet potatoes and berries
- Even the HONEY BEE is introduced

Most Beneficial Introductions

- Terrestrial Plants and Animals
- Agriculture-related
- Domesticated
- “Beneficial” – still transformed forests to fields, caused erosion

Aquatic Invasive Species

- Plants
- Animals
- Diseases/Pathogens



Concerns of Aquatic Invasive Species

- Change ecosystem diversity
- Replace native species
- Genetic manipulation/hybridization
- Diseases/Pathogens

Non-native Introductions

- Intentional or accidental results of human activities (wildlife plantings, boating, fisheries enhancement, aquarium dumping, water gardens, dredging, mechanical harvesting, aquaculture, transportation)
- Animals (wading birds, aquatic mammals)
- Water movement (tides, currents, waves)
- Transport by wind and rain
- Global warming?

“Escaped” Species

- No escaped biological species has come to be considered beneficial

The Technological Fix

- Whatever is wrong can be fixed with technology
- If we do something wrong with the environment – we can fix it.
- It's very difficult to put toothpaste back in the tube.

Beneficial Non-agricultural Species

- Ring-necked pheasant
- Chukar partridge
- Striped bass – East to West Coast

Aquatic Fisheries and Aquaculture **Introductions with Mixed Reviews**

- Brown Trout
- Pacific Oyster
- Manila Clam
- Common Carp
- Grass Carp

Flathead Lake-Glacier National Park

- Introduced freshwater shrimp – food for salmon
- Salmon introduced as food for bald eagles
- Freshwater shrimp ate zooplankton
- Caused salmon decline

Great Lakes – 1912

- Smelt introduced as food for Pacific salmon
- Salmon Introduced to replace Atlantic salmon
- Lake whitefish and lake herring populations declined because smelt ate the same food

US Fish Introductions - 1991

- 69 non-native species – open waters
- 168 species have established beyond US range

International Agreements

- ICES Protocol – International Council for the Exploration of the Seas -Code of Practice – 1973 revised in 1979, 1990, 1994 and 2004
- OIE – World Organization for Animal Health

Federal Regulations

- Federal Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990
- USDA Regulatory - APHIS
- EPA
- USFWS - Lacey Act

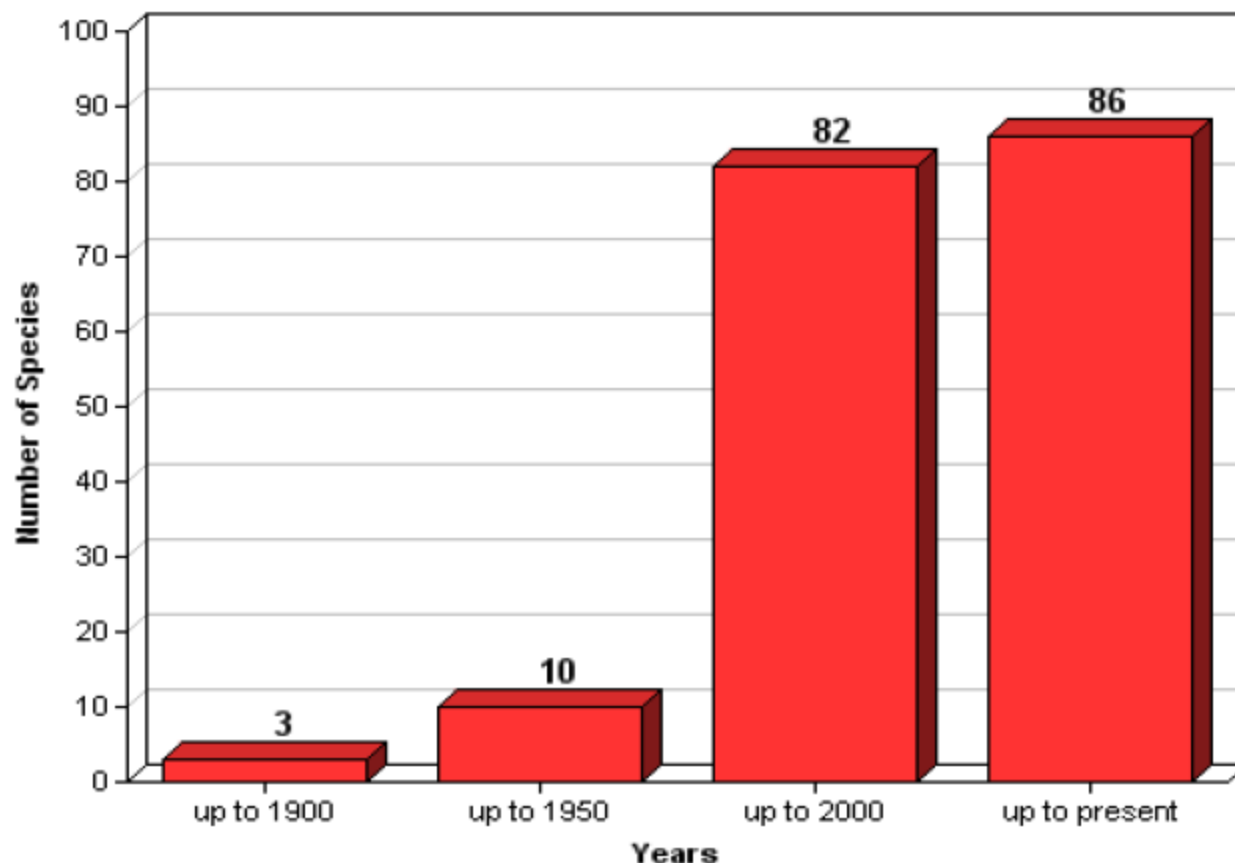
State Regulations

- SC DNR
- SC Dept. of Ag
- SC Dept. of Plant Industries
- SC State Vet

SC Aquaculture Enabling Act

- "Nonindigenous species" means a species, strain, or variety not native to this State and not established in the wild in this State.

Introduced Species in SC

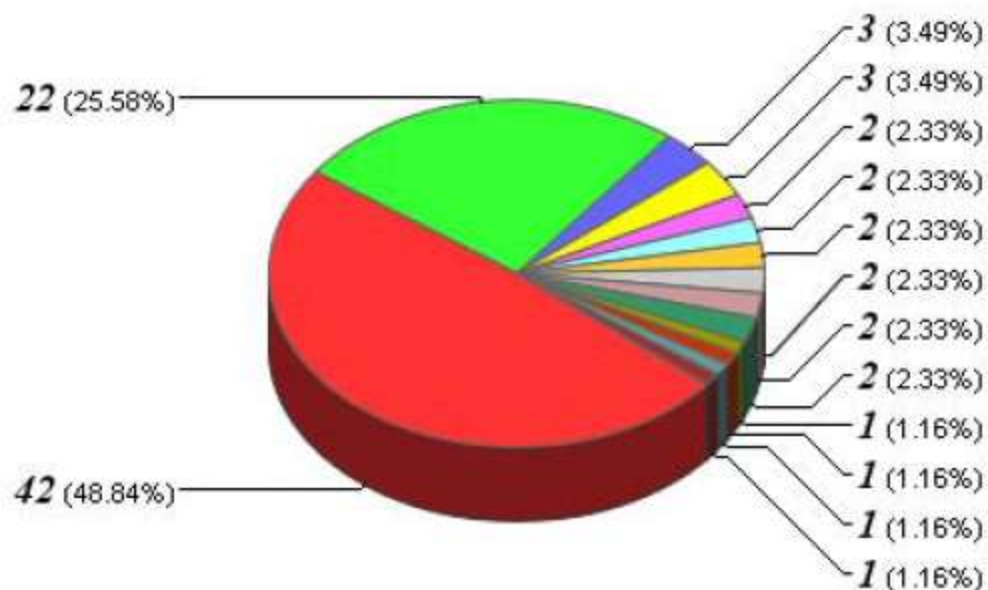


(graph created: 9/7/2007 by the United States Geological Survey)

Figure 1.

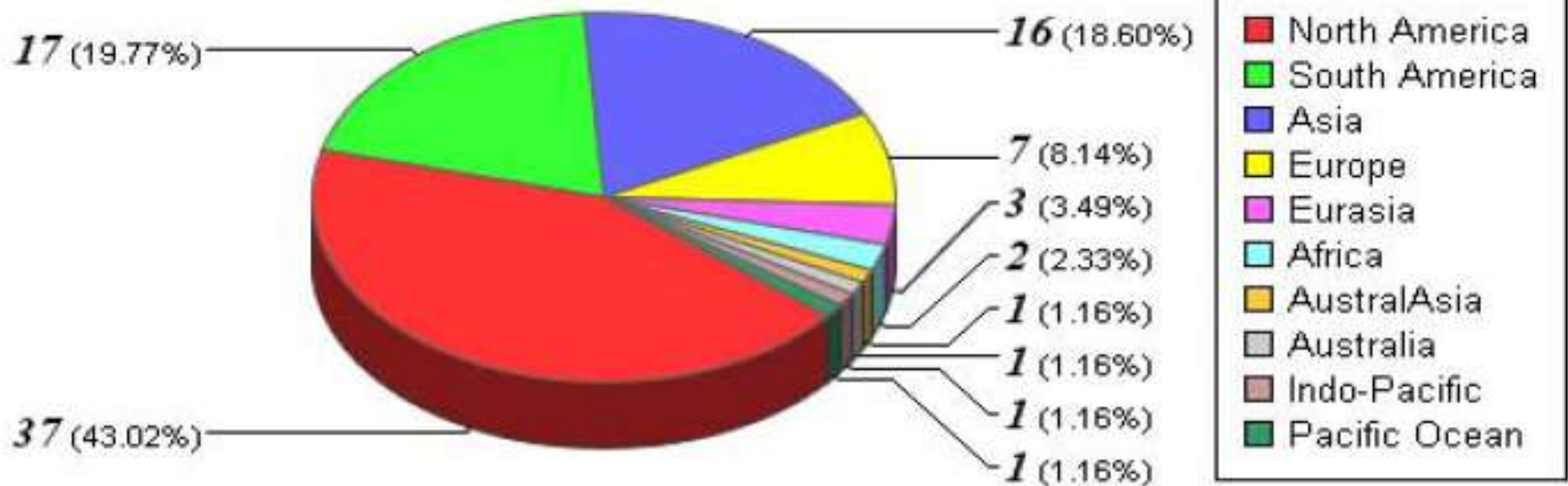
*Several introduced invertebrates have not been added yet to the USGA database.

Groups Introduced into SC

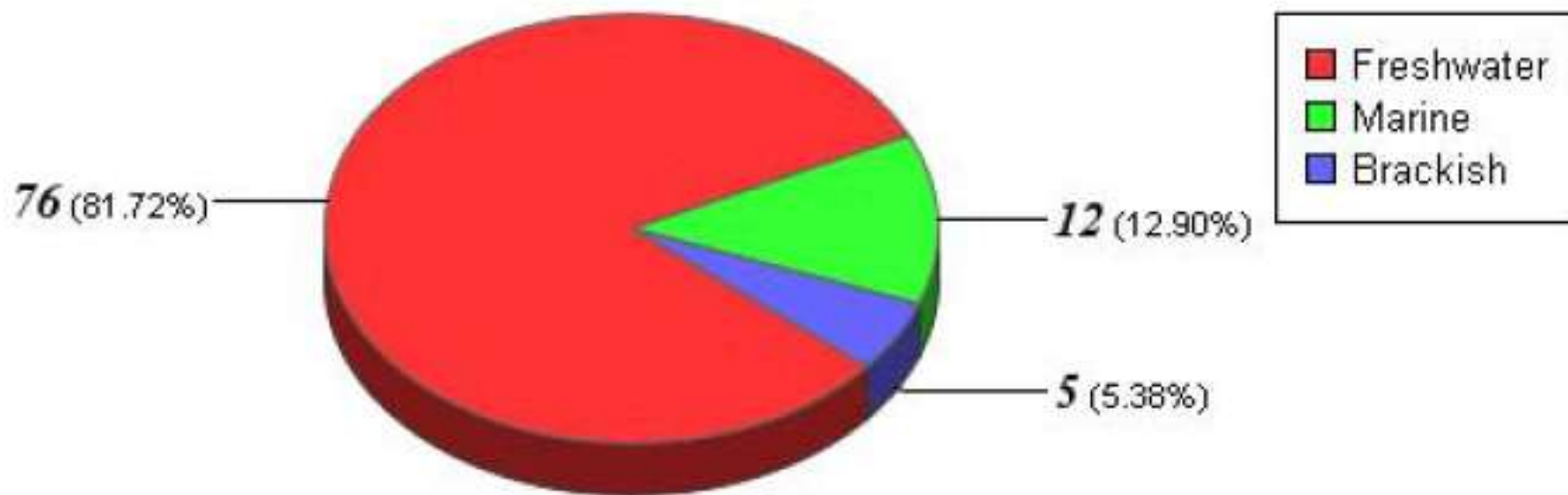


- Fishes
- Plants
- Crustaceans-Shrimp
- Crustaceans-Crabs
- Crustaceans-Crayfish
- Crustaceans-Isopods
- Mollusks-Bivalves
- Coelenterates-Hydrozoans
- Crustaceans-Barnacles
- Reptiles-Turtles
- Crustaceans-Cladocerans
- Crustaceans-Copepods
- Coelenterates-Scyphozoan
- Mollusks-Gastropods

Origins of Species Introduced into SC

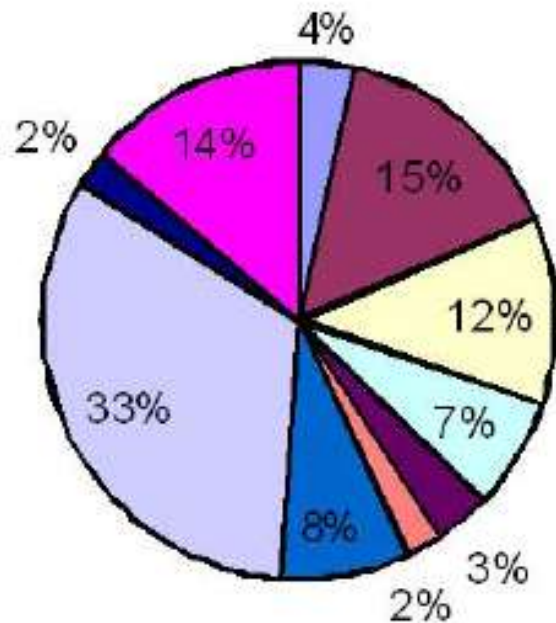


Marine versus Freshwater Introductions in SC



Total species/introduction combinations (n) = 344*
(an individual species may be introduced into more than one water salinity)

Primary Pathways for Non-native Aquatic Plant and Animal Introductions to South Carolina



- Aquaculture
- Aquarium
- Aquascaping
- Bait
- Hitchhiker
- Pet releases
- Shipping
- Stocking
- Other
- Unknown



1960-1980

Golden Age of SC Fisheries

Introductions

- Channel, Blue and Flathead Catfish
- Walleye
- Rainbow Trout
- Brown Trout
- Hybrid Striped Bass
- Tilapia
- Grass carp

1970 -1990

Golden Age of The Blue Revolution

- Common carp
- Goldfish
- Tilapia
- Grass carp
- Pacific white shrimp
- Tiger shrimp
- Caribbean white shrimp
- Pacific blue shrimp
- Freshwater prawns
- Red swamp crawfish
- White river crawfish
- Hybrid striped bass
- Silver carp
- Black carp
- Pacific oyster
- Manila clam
- Pacific salmon
- Asiatic clams
- Northern snakeheads

Red Swamp and White River Crawfish



Giant Black Tiger Prawns



1990-Present

Golden Age of Transportation

- Northern snakehead
- Giant salvinia
- Island apple snails
- Green Mussels
- Lionfish
- Zebra Mussels
- Quagga Mussels

Island Apple Snails



SC Illegal Aquatic Plant List

- Alligatorweed
- Brazilian elodea
- Common reed
- Eurasian water milfoil
- Hydrilla
- Purple loosestrife
- Slender naiad
- Water chestnut
- Water hyacinth
- Water lettuce
- Water primrose
- Water spinach
- African oxygen weed
- Ambulia
- Arrow-leaved monochoria
- Duck-lettuce
- Exotic bur-reed
- Giant salvinia
- Med. Caulerpa
- Melaleuca
- Miramar weed
- Pickerel weed
- Mosquito fern
- Rooted water hyacinth
- Wetland nightshade

Phragmites



Diseases/Pathogens

- White Spot
- Yellowhead
- Taura
- IHHN
- Crayfish Plague
- Spring Viraemia of Carp
- Whirling Disease
- Bonamia
- Dermo

White Spot Virus



State, Regional and Federal Task Forces

- 1980 SC Aquatic Plant Management Council
- Federal Aquatic Nuisance Species Task Force
- Gulf and South Atlantic Regional Panel on Aquatic Invasive Species
- 2005 SC Aquatic Invasive Species Task Force – SC ASMP

Interagency Cooperation

- Regulation through Education and Cooperation
- Early Detection – Rapid Response

Salvinia molesta

- World's worst weed
- Pineland Plantation, Colleton County, SC
- County Agent
- Aquatic plant introduction
- ACE Basin



WHY?

And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth.

Genesis 1:26

WHY?

And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.

Genesis 1:28