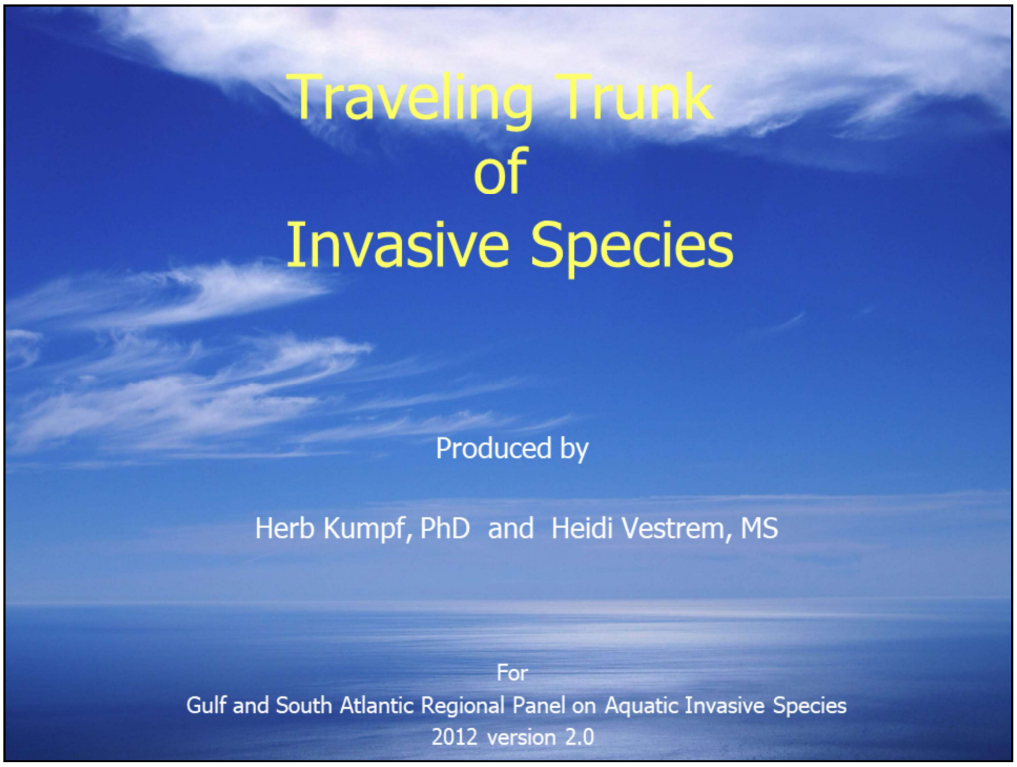
Traveling Trunk of Invasive Species

Herb Kumpf and Heidi Vestrem

2012 version 2.0


Traveling Trunk
of
Invasive Species
Produced by
Herb Kumpf, PhD and Heidi Vestrem, MS
For
Gulf and South Atlantic Regional Panel on Aquatic Invasive Species
2012 version 2.0

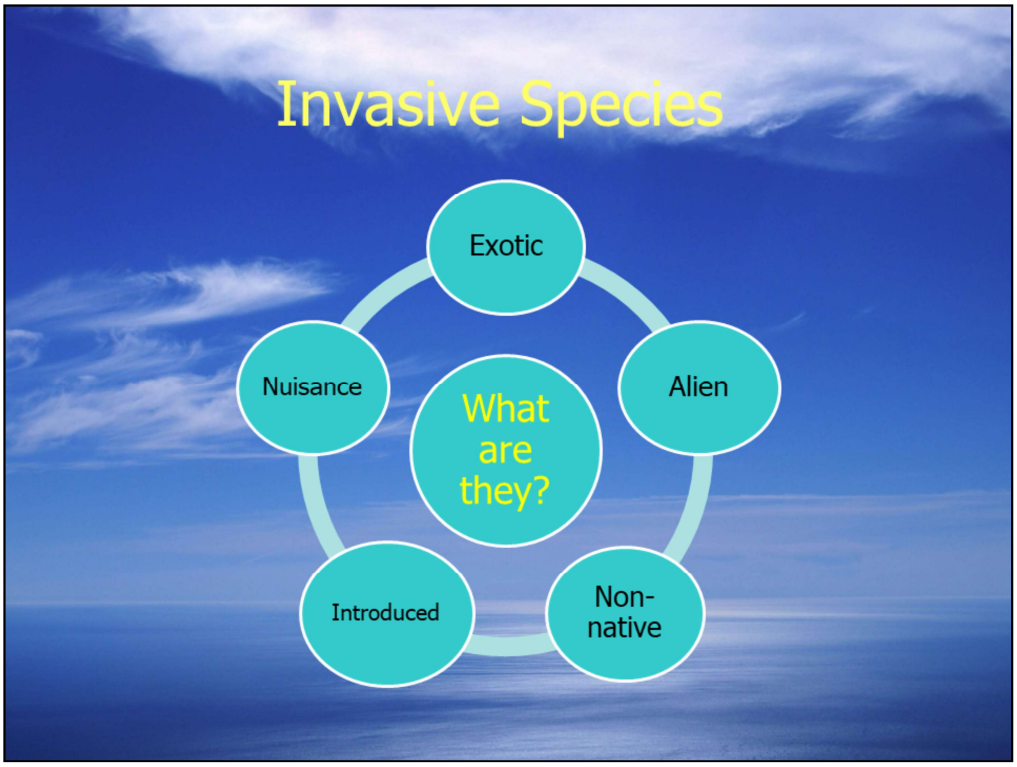
Content

Introduction

- It is because of our concern about the alarming numbers and impact of invasive species that we have compiled information and produced this "Traveling Trunk" for the Gulf and South Atlantic Regional Panel on Invasive Species.
- The "Trunk" serves as an outreach and an educational resource from the Panel.
- The "Trunk" consists of three sections:
  1. This manual of informative talking points.
  2. A PowerPoint presentation on compact disc (CD) of the manual contents.
  3. Samples of embedded and laminated invasive species specimens for "hands-on" use.

Introduction

- We suggest you review the check list of contents, preview the talking points, test the CD for projection, and familiarize yourself with the included examples.
- The material is appropriate for interested lay people, secondary school students and gifted programs.
- Suggestions and ideas will be very much appreciated. Your comments may be emailed to the Regional Panel at www.gsarp.org



• Exotic, alien, non-native, introduced, non-indigenous and invasives are all names used to describe species that:

- move into a geographic area in which they did not originate
- survive and reproduce without human assistance
- are not in their natural range and were introduced directly by people
- cause or likely to cause economic or environmental harm or harm to human, animal or plant health

• INVASIVE SPECIES can be all of the above.

•Intentional:

- Stocking: introduction for species control or fishing purposes
- Food Importation: live ethnic and gourmet food trade
- Aquaria/Pet Stores: in-person or Internet purchases
- Personal Releases: pet owners
- Property Development: horticulture, landscaping

•Non-Intentional:

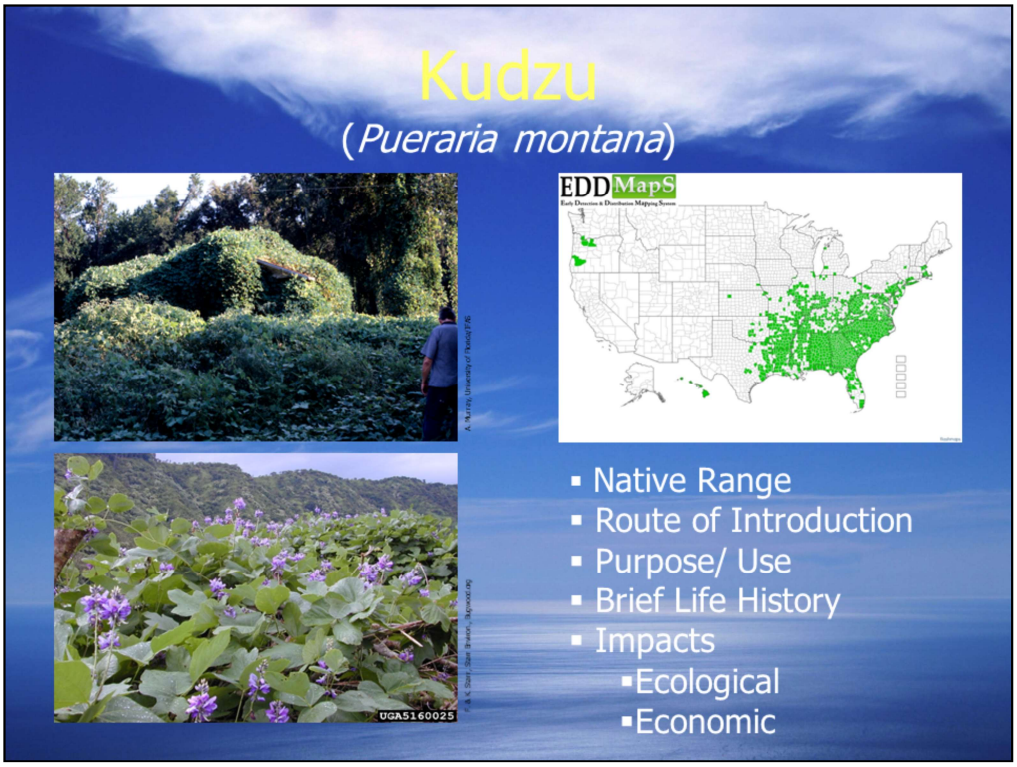
- Natural: Expansion by native organisms as carriers; air and water movements
- Shipping: live plant and animal packaging
- Boat Movement: recreational and commercial vessel movement
- Ballast water discharge: organisms found in stability tanks
- Aquaculture: accidental escape
- Public Institutions: public aquaria, zoos, arboreta, wildlife preserves

•See specific sources in the Species Profiles

• Ecological:
  - Habitat Degradation: occupying or altering suitable habitat and water quality
  - Food Chain Alteration: feed on native food sources
  - Compete With Native Species: for space or food supply; reduces species diversity

• Economic:
  - Increased Management Costs: control and eradication expenses
  - Economic Losses: potential reduction of fishery species, erosion, fouling of water structures, property damage, loss of recreational opportunities, disease carriers


Kudzu
Chinese Tallowtree
UGA0016202
Invasive Plants
Water Hyacinth
Hydrilla
Salyinia



•NATIVE RANGE: China

•ROUTE OF INTRODUCTION: Introduced in 1876 at Centennial Exposition in Philadelphia. Introduced into Florida in 1920. Promoted in 1930 by Federal Government.

•PURPOSE: Erosion control. Considered originally a forage crop but was not accepted by livestock.

•BRIEF LIFE HISTORY: Terrestrial

Reproduces by runners, fragmentation, and seed

High seed production

Can grow up to a foot per day, may climb 100 feet in a single growing season

Drought tolerant

Massive taproots, up to 7 inches in diameter

•IMPACTS:

Ecological:

Threatens native timberland by reducing growth

Greatly reduces light availability for understory vegetation

Engulfs non-wooded areas

Economic:

Approximately $500 million spent nationally on control

Reduces productivity of native timbers

Threatens soy bean production as carrier of soy bean rust

•NOTES: Not good forage for cattle; goats and sheep used for limited control

•NATIVE RANGE: China and Japan

•ROUTE OF INTRODUCTION: Intentional import in late 1700's

•PURPOSE: Ornamental, Landscaping

•BRIEF LIFE HISTORY: Terrestrial and wetlands

Spread by seeds that can be dormant up to 100 years

Can mature in 3 years, may produce 100,000 seeds annually

Grows to 60 feet in height

Able to tolerate broad range of climatic conditions

•IMPACTS:

Ecological:

Transforms diverse native habitat into a single species forest

Reduces light availability to ground cover

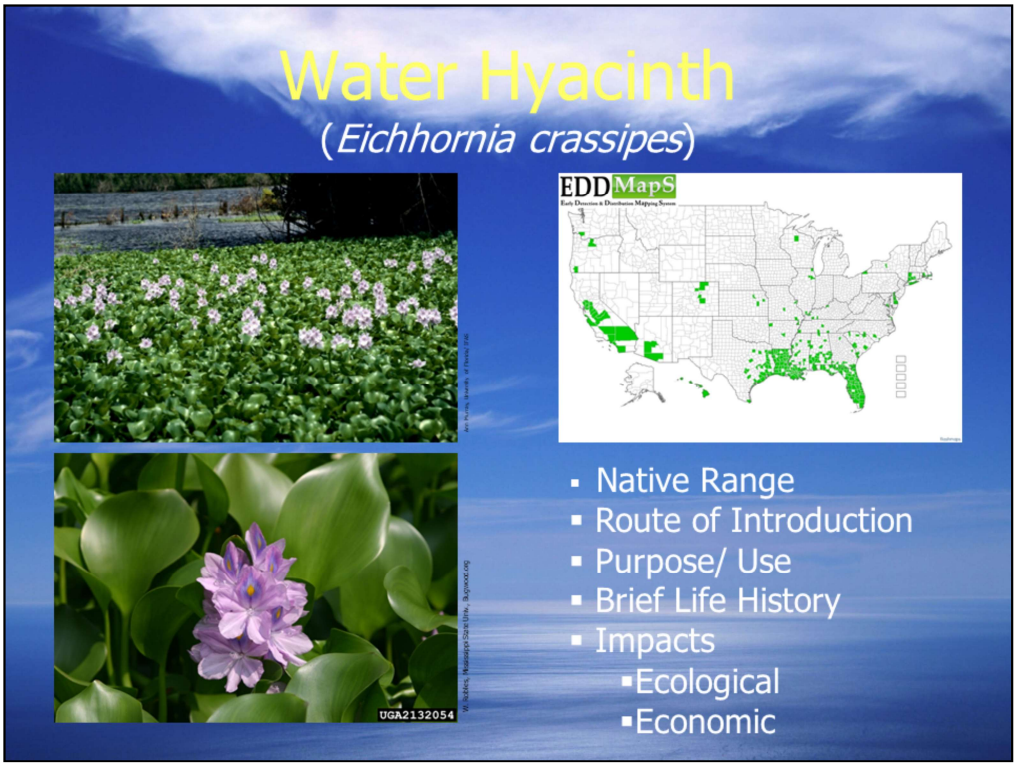
Decomposed fallen leaves create unfavorable soil for new growth

Economic:

Eradication is labor intensive and costly

Leaves, fruits and sap toxic to livestock

•NOTES: On Florida's Noxious Weed List, requires permit to move or possess. Re-introduced and cultivated by US Dept. of Agriculture in early 1900's for oil. Also known as the Popcorn Tree.



•NATIVE RANGE: Amazon River Basin

•ROUTE OF INTRODUCTION: Given to people attending the Cotton Exposition in New Orleans, 1885;

•PURPOSE: Ornamental. Farmers thought it would make good cattle fodder.

•BRIEF LIFE HISTORY: Freshwater; floating

High reproductive rate and can double in surface area in 2 weeks

Reproduces vegetatively

Forms dense mats

Can grow 3 feet in height

•IMPACTS:

Ecological:

Dense cover restricts sunlight in water column and reduces useable habitat for other aquatic plants

High respiration rate reduces oxygen levels affecting water quality

Reduces available phosphorus

Economic:

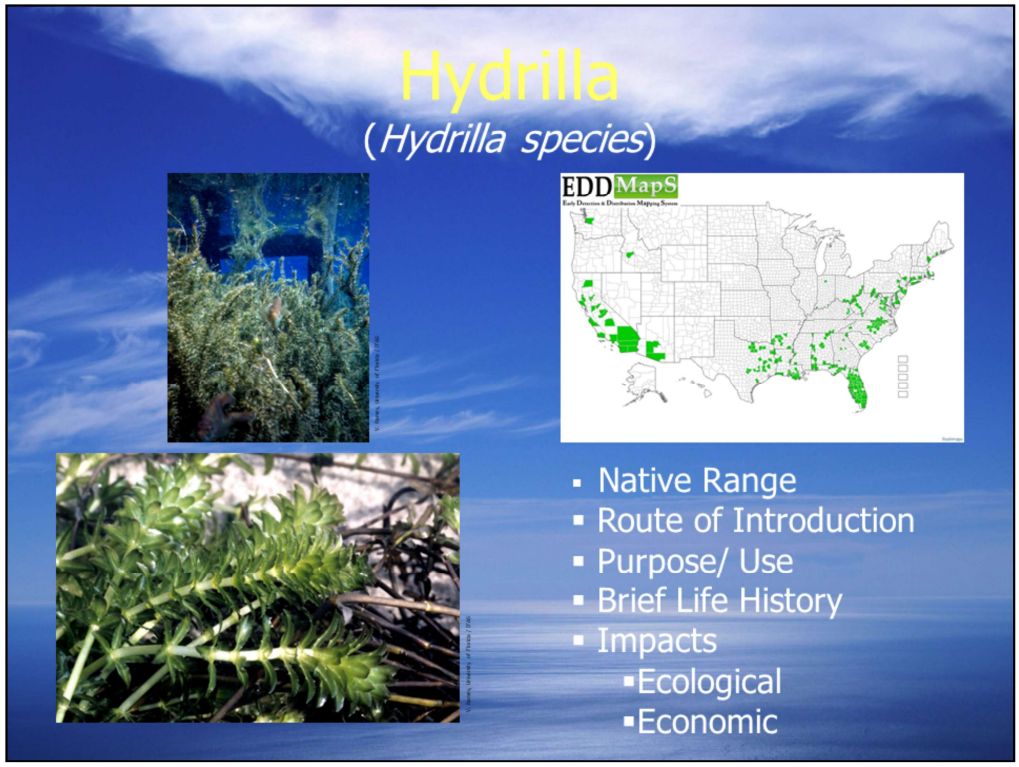
Disruption of boat traffic for recreational boating and fishing

Density is so great, mechanical removal inadequate

Herbicidal cost high

Increased flood potential

Control/management costs for states range from $17 - $27 million.



•NATIVE RANGE: Sri Lanka

•ROUTE OF INTRODUCTION: Aquarium and unintentional supplier releases. Now widely distributed in warm waters of Africa, Asia, South and Central America.

•PURPOSE: Aquarium plant

•BRIEF LIFE HISTORY: Freshwater; submerged plant

Rapid growth, can grow up to 1 inch per day

Able to photosynthesize at low light levels

Tolerates moderate salinity levels

Forms dense surface mat

•IMPACTS:

Ecological:

Reduces light penetration

Alters surface oxygen transfer

Reduces water circulation

Native bottom vegetation is shaded out/reduced

Economic:

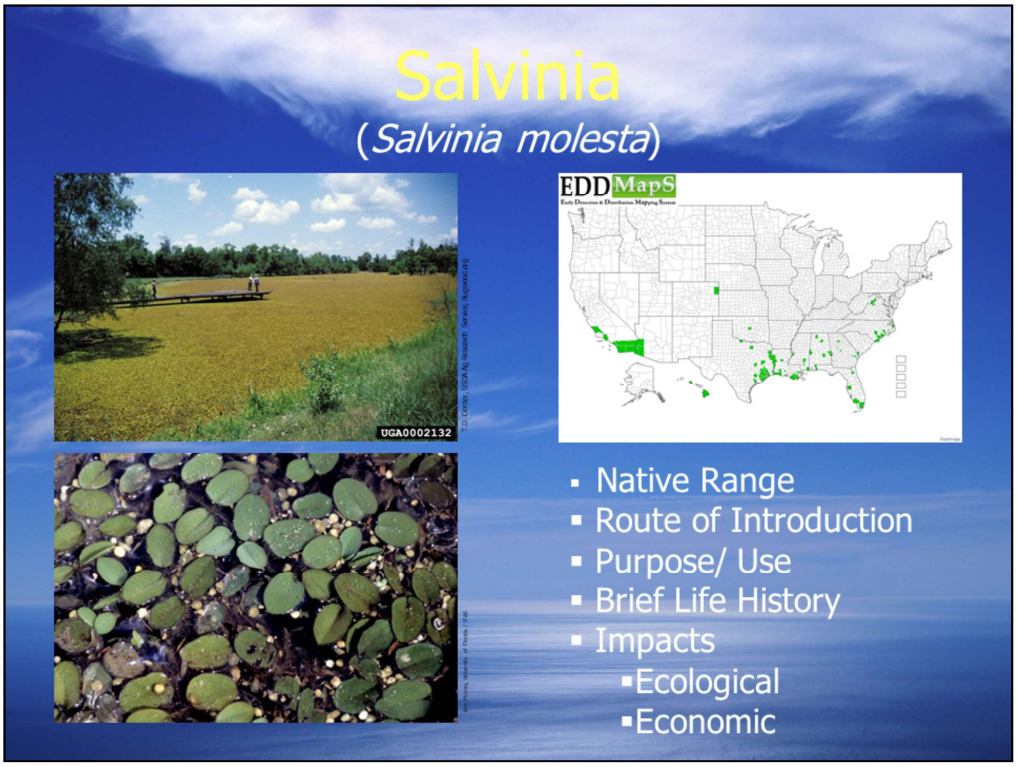
Reduced recreational fishing activity when very dense

Cost of control: stocking triploid grass carp, physical removal, herbicides

Blocks water intakes resulting in reduced irrigation supply

Interferes with boating and swimming use

•NOTES: Annual economic contribution of recreational fishing to a Florida lake community was $11 million. When hydrilla was excessive, the sport fish economic benefits were greatly reduced.



•NATIVE RANGE: South America (Brazil)

•ROUTE OF INTRODUCTION: Cultivated aquarium and water garden plant. In the Florida commercial market in 1983

•PURPOSE: Ornamental aquatic fern in water gardens

•BRIEF LIFE HISTORY: Freshwater (<4 ppt)

Reproduces by budding or broken stems

Thrives in high nutrient, warm, slow moving water

Can double in area in 7 days or less

Resistant to periods of low water and low temperatures

•IMPACTS:

Ecological:

Floats and shades out native species

Reduces oxygen levels when decaying

Impedes movement for water exchange

Economic:

Hinders recreational fishing, swimming and boating

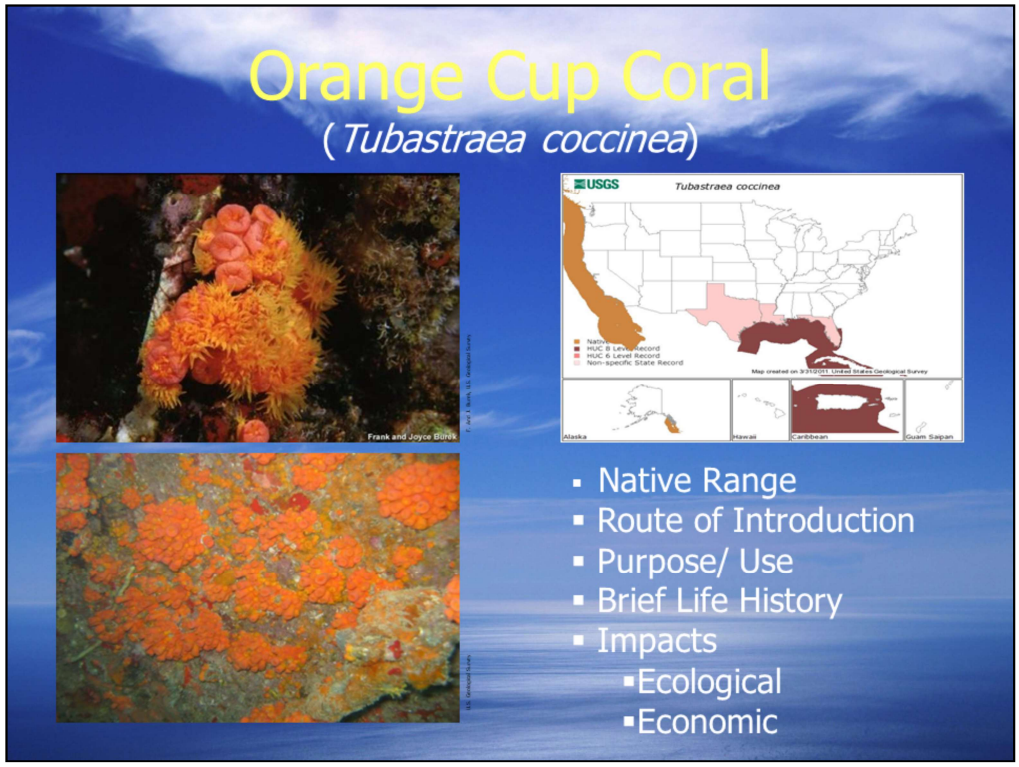
High cost of control

Clogs intake pipes for irrigation

•NOTES: Listed as a federal noxious weed. Called the "World's worst aquatic weed." Can be identified by egg beater shaped hairs on the leaves.


Orange Cup Coral
Green Mussel
Zebra Mussel
Invasive Animals
Burmese Python
Pacific Lionfish
Nutria


Invasive Invertebrates
• Orange Cup Coral
• Green Mussel
• Zebra Mussel



•NATIVE RANGE: Indo-Pacific, endemic in Galapagos Islands

•ROUTE OF INTRODUCTION: Introduced through Panama Canal as a fouling organism. Found in Curacao and Puerto Rico in 1943. Now throughout the Caribbean and Northern Gulf of Mexico.

•PURPOSE: Available in the aquarium trade

•BRIEF LIFE HISTORY: Marine

Non-reef building coral, no symbiotic zooxanthellae

Not sunlight dependent, can be found down to 200 foot depth

Produces both male and female gametes in abundance

Wide salinity and temperature tolerance

Growth rate high in juvenile colonies

Produces bioactive compounds (toxic to adjacent species)

•IMPACTS:

Ecological:

A suspension feeder, competes with native species for food

Natural range predators absent from Gulf of Mexico

Found on natural and artificial substrates

Competes for space with native fauna

Bioactive compounds produced deter or prevent native coral growth

Economic:

Of concern to fishery managers because of potential reduction of suitable substrate for habitat dependent commercial and recreational species

•NATIVE RANGE: Indo-Pacific Region, Hong Kong estuaries.

•ROUTE OF INTRODUCTION: Identified in Trinidad in 1990. Found in Tampa Bay (Florida) Electric Company cooling pipes in 1999. Subsequently found in St. Augustine, Florida, and coastal Georgia and South Carolina. Can be distributed as larvae in ballast water or by hull fouling

•PURPOSE: Ethnic Oriental food. Prized food in China and Malaysia.
Harvested wild and an aquaculture product

•BRIEF LIFE HISTORY: Ranges from brackish to marine
Pelagic larvae, filter feeder, grows rapidly (up to 4 inches)
Wide salinity tolerance
Can survive atmospheric exposure
Exists in turbid waters

•IMPACTS:
Ecological:
Filter feeding removes plankton as potential food for larval fish
Competes for attachment space with attachment threads (byssi)
Forms benthic mats
Economic:
Blocks cooling pipes and fouls pumps (Tampa Bay Electric)
Requires routine, costly removal resulting in higher production costs
Overgrowth can sink floating structures (floating docks and buoys)

•NATIVE RANGE: Caspian and Black seas

•ROUTE OF INTRODUCTION: Ballast water discharge in Great Lakes

•PURPOSE: None

•BRIEF LIFE HISTORY: Freshwater

Planktonic filter feeder

Larval settlement: found on vertical, horizontal, and shifting substrate

Reproductive level exceeds predation

Temperature/salinity tolerance- increases distribution

•IMPACTS:

Ecological:

As adult, removes plankton that serves as food for growth of native species

Outcompetes for space with other attached species

Economic:

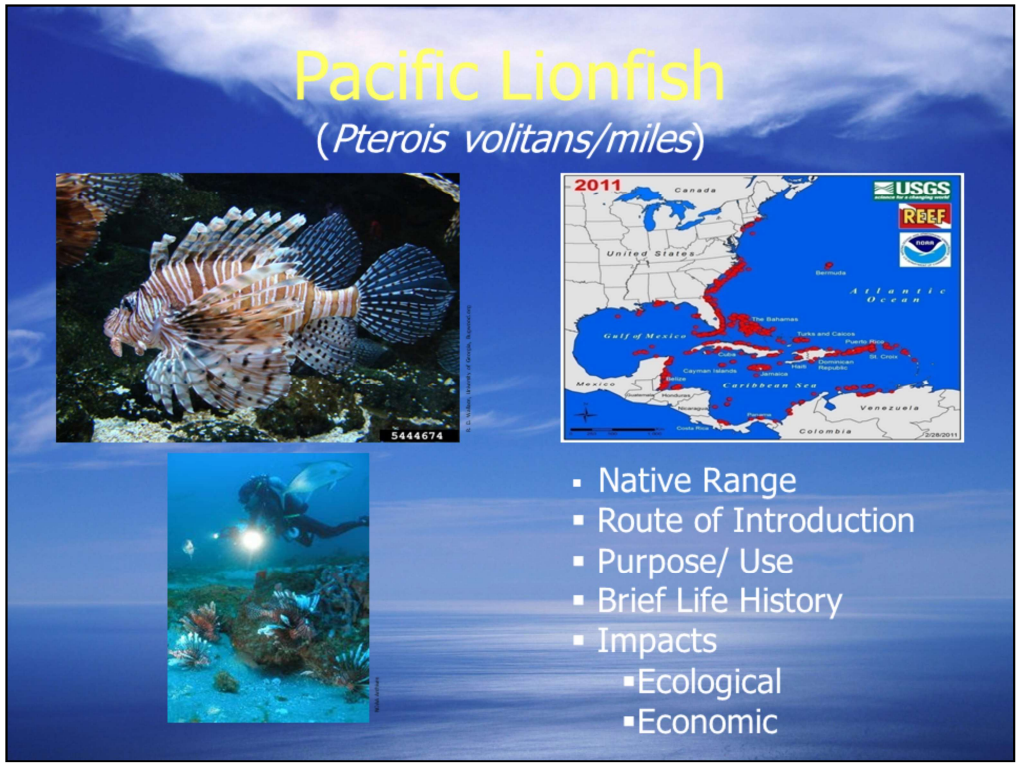
Clogs intake pipes, pumps, costly removal, impedes water flow

Reduces early stages of sport fishes through food competition

•NOTES: International ballast water exchange regulations now in effect

US Coast Guard monitoring in place


Invasive Vertebrates
• Pacific Lionfish
• Burmese Python
• Nutria



•NATIVE RANGE: Western Pacific, Micronesia, Southern Japan and Korea

•ROUTE OF INTRODUCTION:

Aquarium releases

Widespread along Atlantic Coast, Bahamas, Caribbean (see distribution map)

•PURPOSE: Aquarium trade

•BRIEF LIFE HISTORY: Marine

Venom glands are located along dorsal and pelvic spines

Reproduction: mature within 2 years, spawns multiple times per year

Found from shallow waters to depths of 300 feet

Can reach over 1 foot in length

Larvae spread by ocean currents

•IMPACTS:

Ecological:

Competes with native fishes for food sources

Active predator, consumes juvenile reef fish

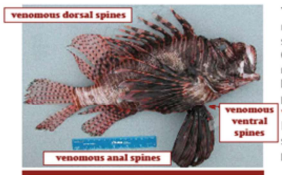
Economic:

Health hazard: venomous spines

Consumes recreationally and commercially important fish species, some crustaceans

•NOTES: Food fish in native range. There is a new program promoting the use of lionfish as a food fish in US waters.

Have You Seen Me?



The venomous Indo-Pacific 'Lionfish'is regularly observed in habitats within the southeast region (Florida to North Carolina) and the Bahamas. These fish are not native to Atlantic waters and may have a negative impact on native fish populations. All of their spines are venomous and can cause extreme pain! If stung, immerse wound in hot water and seek medical attention as soon as possible.

Identification:

- Lionfish have distinctive red, maroon, and white vertical stripes;
- Fleshy tentacles above eyes and below mouth;
- Fan-like pectoral fins;
- 13 long separated dorsal spines;
- 10-11 dorsal soft rays;
- 3 anal spines;
- and 6-7 anal soft rays;
- An adult lionfish can grow as large as 18"

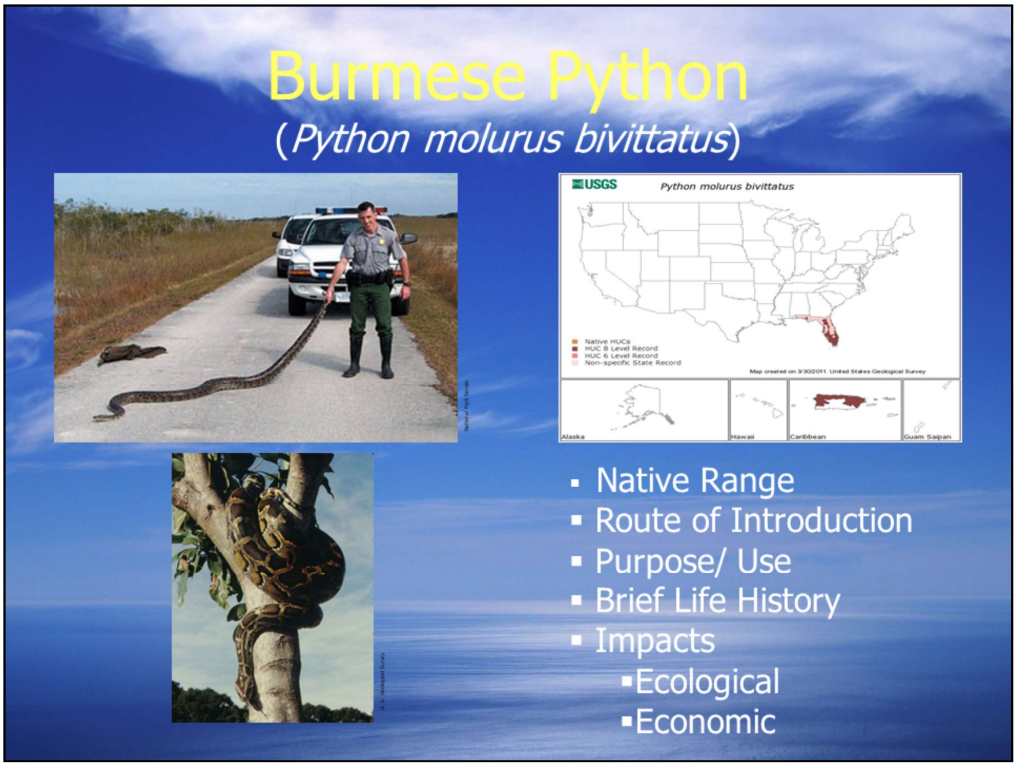
Geographic Location and Habitat:
Lionfish are native to Indo-Pacific waters and are now being reported primarily by Scuba divers from the Bahamas to Cape Hatteras NC in water depths from 5 to 300 ft on hard bottom, coral reef and artificial substrates. Lionfish can also be caught by hook and line. NOAA requests information about all Lionfish collected by hook and line. Location information such as lat/long, depth and type of bait and tackle are encouraged.


Lionfish underwater

Recommendation: If you catch a lionfish be extremely careful, do not come in contact with the dorsal, anal or ventral spines. If fish must be handled, thick PVC gloves or a gaff is recommended. Please do not throw lionfish back in the water! NOAA is interested in all lionfish specimens and reports. Put lionfish on ice and report any lionfish catches to NOAA at (252) 728-8714 or email reportlionfish@noaa.gov

Report online at http://www8.nos.noaa.gov/nccos/ccfhr/lionfishreport.aspx

For more information and to print out additional flyers go to:
http://coastalscience.noaa.gov/education/lionfish.html
http://lionfish.eisf.org
or google"lionfish outreach"



•NATIVE RANGE: NE India to southern China, southeast Asia

•ROUTE OF INTRODUCTION: Pet trade. Intentional releases by pet owners in South Florida. Found abundantly in South Florida, Everglades National Park

•PURPOSE: Available in the pet trade

•BRIEF LIFE HISTORY: Terrestrial and aquatic

Constrictor group- sit and wait predator

Can grow to 20 feet in length

Climate controlled distribution

Reproduction: mating in Feb – March. On average clutch size is 40 – 50 eggs, may produce up to 100 eggs per cycle.

Hatchling size 18 to 24 inches.

Life span: up to 25 years

•IMPACTS:

Ecological:

Competes with native fauna for prey

Eats endangered species

Stomach content analysis includes small mammals, birds, pets

Economic:

Control is labor intensive

•NOTES: Pythons regulated in Florida. Several other large constrictor species have been found in Florida since the 1990's. Included are the African Rock python (*Python sebae*) and Reticulated python *(Python reticulatus),* and Anacondas : Green (*Eunectes murinus*) and yellow (*Eunectes notaeus*). Available in the pet trade.

•NATIVE RANGE: South America (Argentina, Southern Brazil)

•ROUTE OF INTRODUCTION: In the late 1930's (1937-39) imported to southern Louisiana. Has been introduced to coastal Mid-Atlantic

•PURPOSE: Fur trade! Marsh vegetation control

•BRIEF LIFE HISTORY: Freshwater/ brackish marshes

Reproduction: Sexual maturity: 3- 8 months. Gestation: 4 months, Litter size: 4-5 (avg.) to 10, Females may have 2-3 litters per year

Animals weigh up to 25 pounds, usually 12- 16 pounds

24 inches in body length with 13 inch tail

Herbivorous, nocturnal feeder

•IMPACTS:

Ecological:

Burrows and consumes marsh vegetation causing coastal erosion

Animal consumes 25% of body weight daily

Young can feed on marsh plants within hours of birth

Destroys nursery grounds for estuarine dependent species

Economic:

Damages to rice, sugar and soybean crops in coastal areas

Causes loss of wetlands natural productivity

May carry diseases and parasites

•NOTES: Higher nutritional value than beef and chicken. Gourmet food market in Europe. Sausage available in Louisiana.

•Prevention: The Most Effective Action!

- Do not utilize invasive species/only purchase native species
- Remove invasives from boats, trailers and equipment
- Dispose properly/turn-in unwanted specimens
- Seal and freeze unwanted invasives for 24 hours and discard in the trash
- Do not release invasives into local waters

•Educate Ourselves:

- Learn to identify native species and invasive species to note changes
- Be aware of controlled/prohibited species (refer to Natural Resource agencies)

•Observe and Report:

- Be aware of new, unusual species
- Report occurrences to Natural Resource agencies (state or local)

Web Sites:

Regional Panel:	www.gsarp.org
National Invasive Species Council:	www.invasivespecies.gov
US Geological Survey:	nas.er.usgs.gov
NOAA Sea Grant:	www.iiseagrant.org/NabInvader
Center for Invasive Species:	www.invasive.org
	www.bugwood.org
	www.eddmaps.org

Acknowledgements

- In designing, developing and assembling such a project of far-ranging subject matter, the involvement and the cooperation of many individuals was essential to the outcome of our efforts. The participation of members of the Gulf and South Atlantic Regional Panel on Aquatic Invasive Species (GSARP) and the organizations they represent was a key element to our success.

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Acknowledgements

- In addition, numerous individuals and organizations provided specimens for the "hands-on" portion of the "Trunk". We recognize and appreciate the following for supplying these critical materials:

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