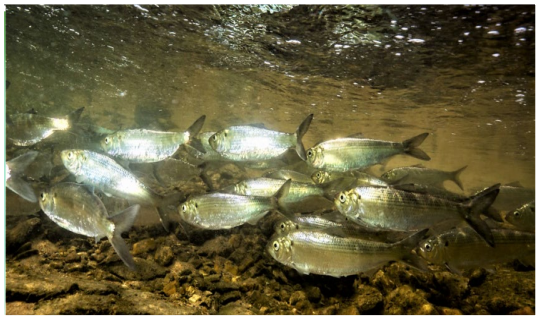







Aquatic Invasive Species of the Catawba-Wateree

Brett Hartis, PhD – Lead Scientist

DUKE ENERGY®

Native or Non-native???

Bluegill

Warmouth

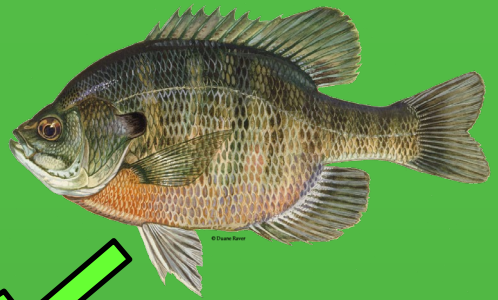
Redear Sunfish

Pumpkinseed

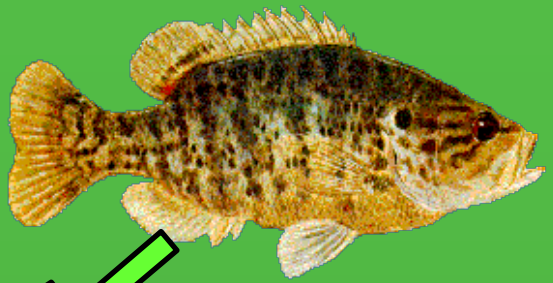
Green Sunfish

Redbreast Sunfish

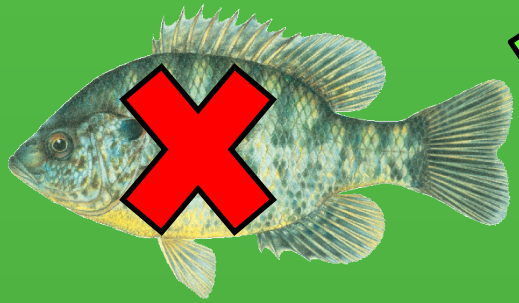
Native or Non-native???



Bluegill

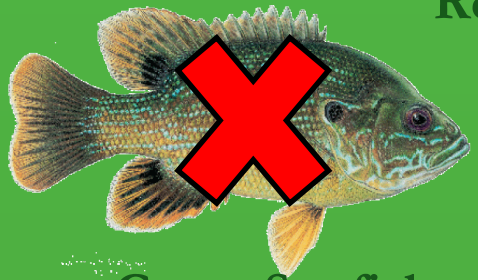


Warmouth



Redear Sunfish

Pumpkinseed

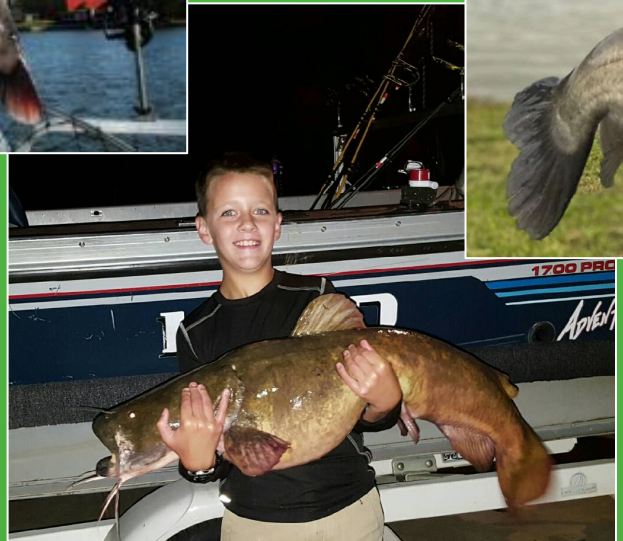


Green Sunfish

Redbreast Sunfish

Native or Non-native???

Blue Catfish
(Wateree)



Flathead
Catfish
(James)

Channel Catfish
(Wylie)

Native or Non-native???

Blue Catfish
(Wateree)

Flathead
Catfish
(James)

Channel Catfish
(Wylie)

Native or Non-native???

White Catfish

Bullhead

Native or Non-native???

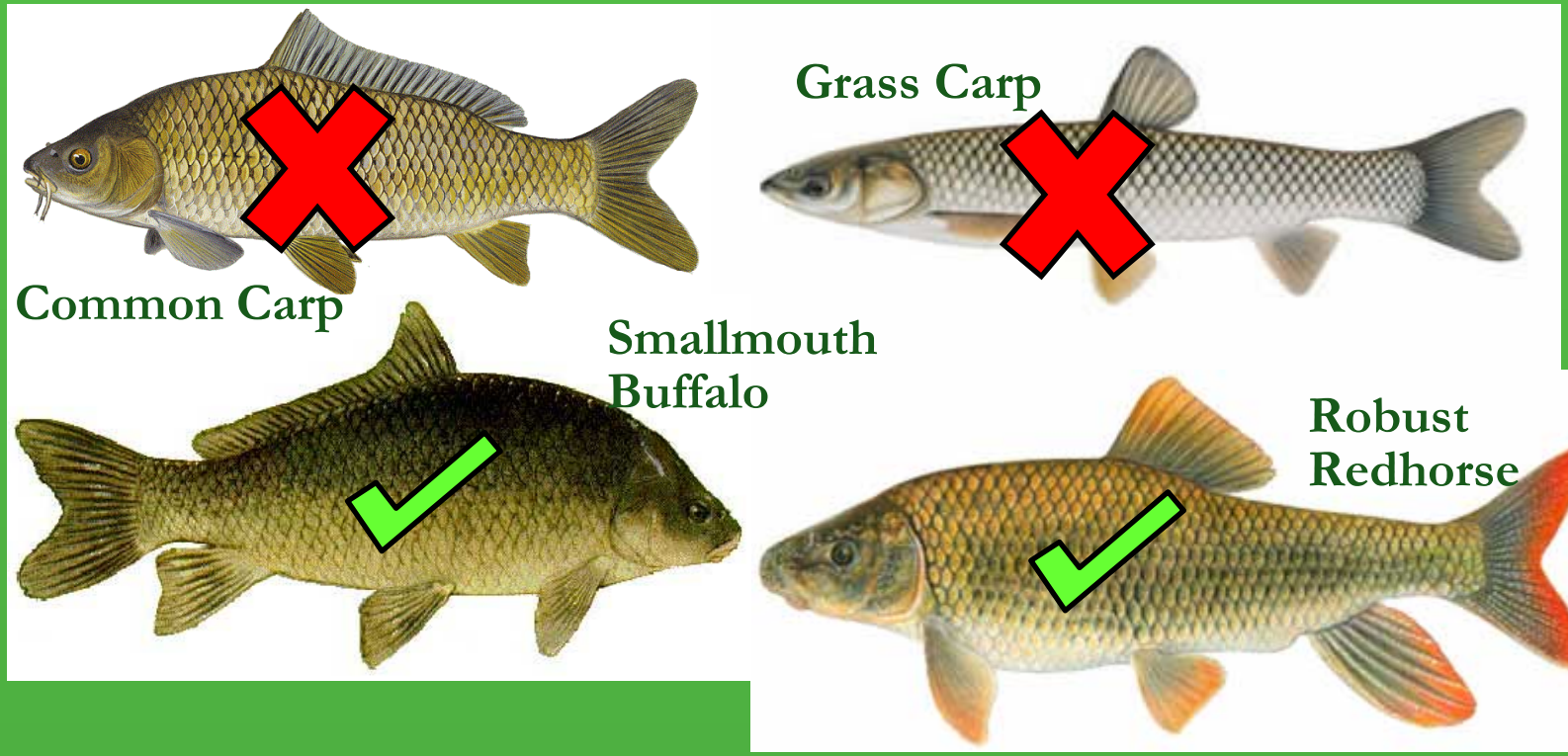
Common Carp

Grass Carp

Smallmouth Buffalo

Robust Redhorse

Native or Non-native???



Does Non-native = Invasive?

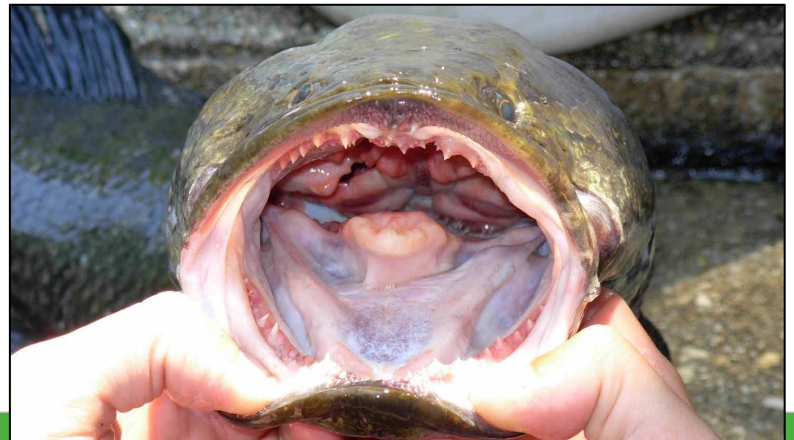
- Non-native species does not always mean invasive



- Less than 2% of introduced species become invasive……. BUT
- Those 2% = $Billions in damage and loss

Invasive vs. Native

- Non-indigenous
- Adversely affects habitats
- No natural enemies
- Ecological or environmental impact

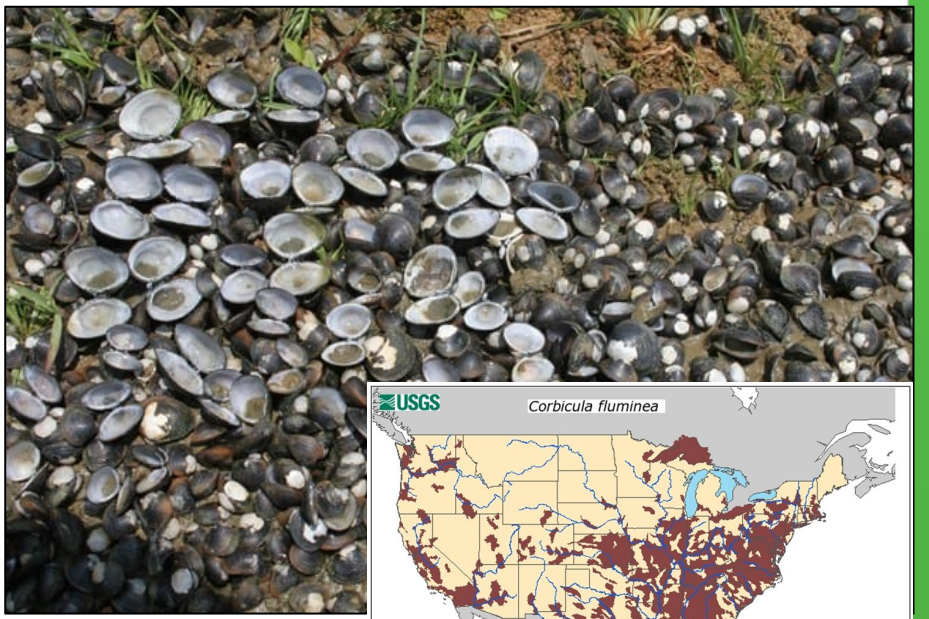


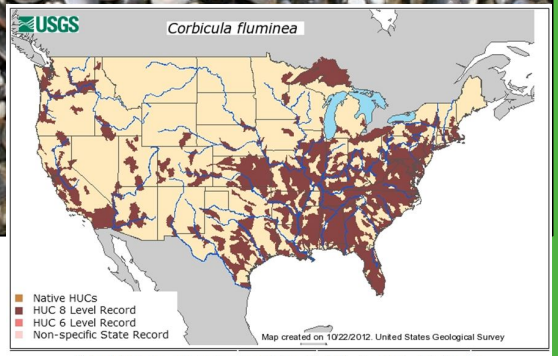
- Endemic
- Occurs naturally
- Part of ecosystem
- Natural enemies
- “Relative to location”

How are they introduced?

- Accidental introduction
- Improperly vetted control or mitigation strategy…
- Ornamental or economic value
- Imported species as “pets”

Notable AIS of the C-W

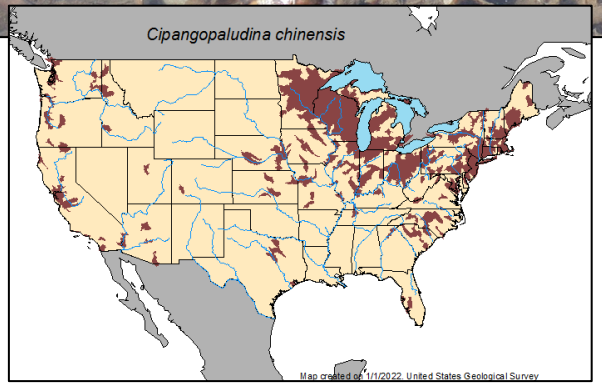




National distribution of Asian Clam as of October 22, 2012__Map: US Geological Survey

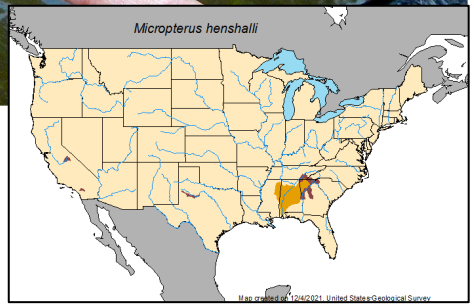
Asian Clam (*Corbicula sp.*)

Notable AIS of the C-W



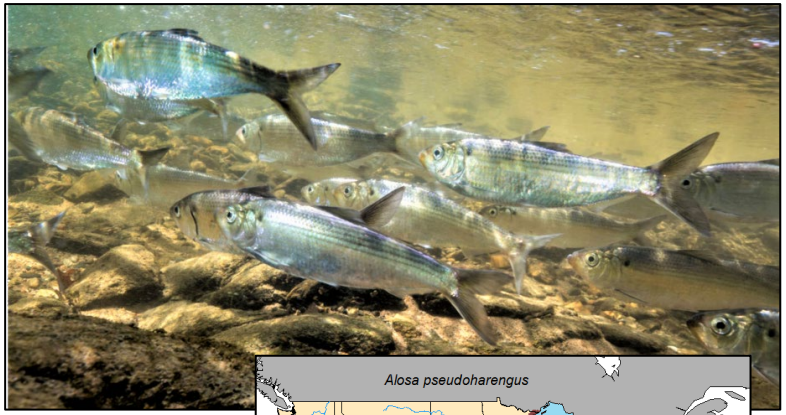
Mystery Snail

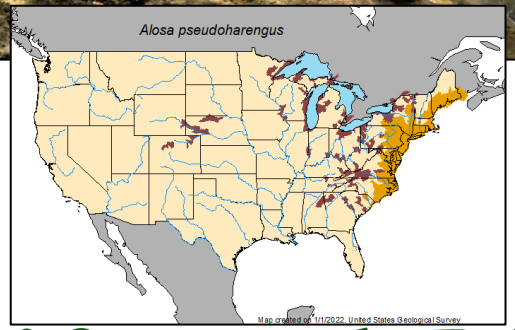
Notable AIS of the C-W



Alabama Bass

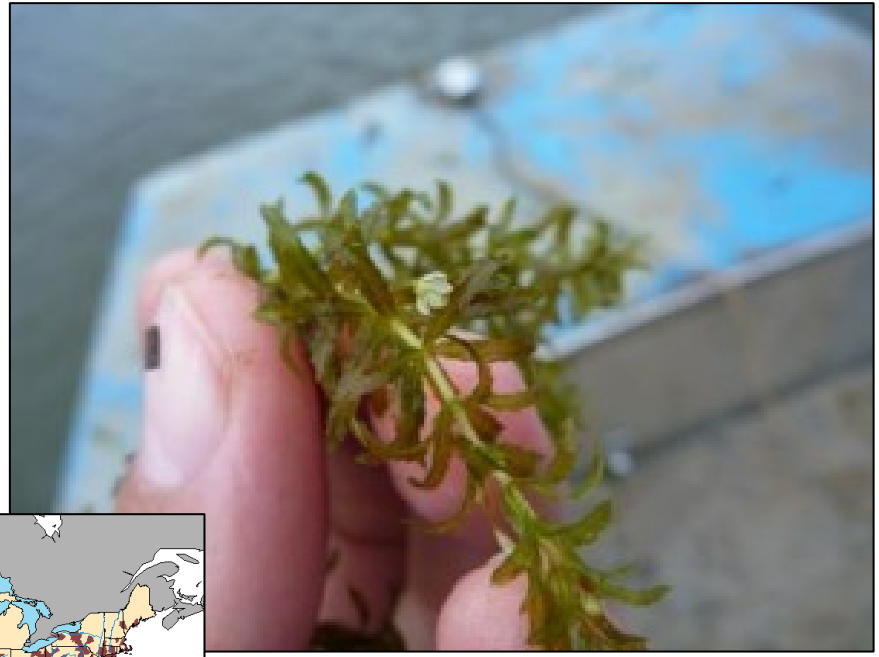
Notable AIS of the C-W

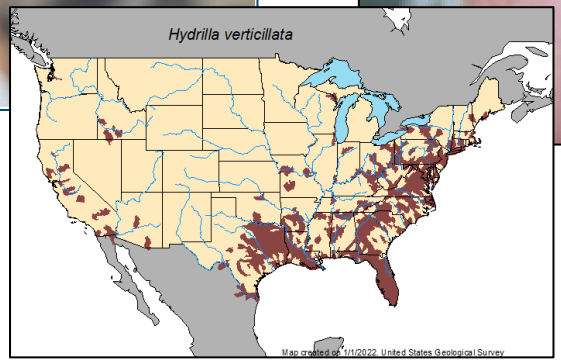




Alewife and Blueback Herring

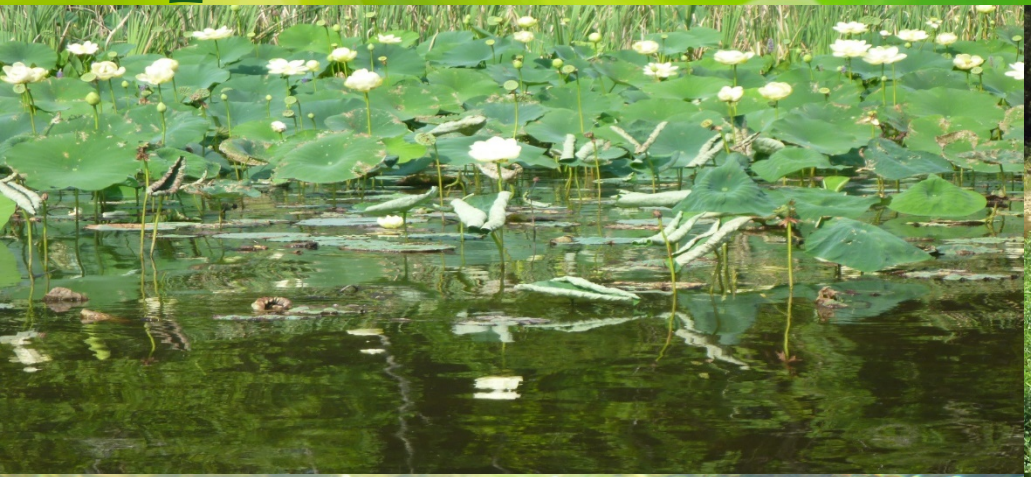
Notable AIS of the C-W



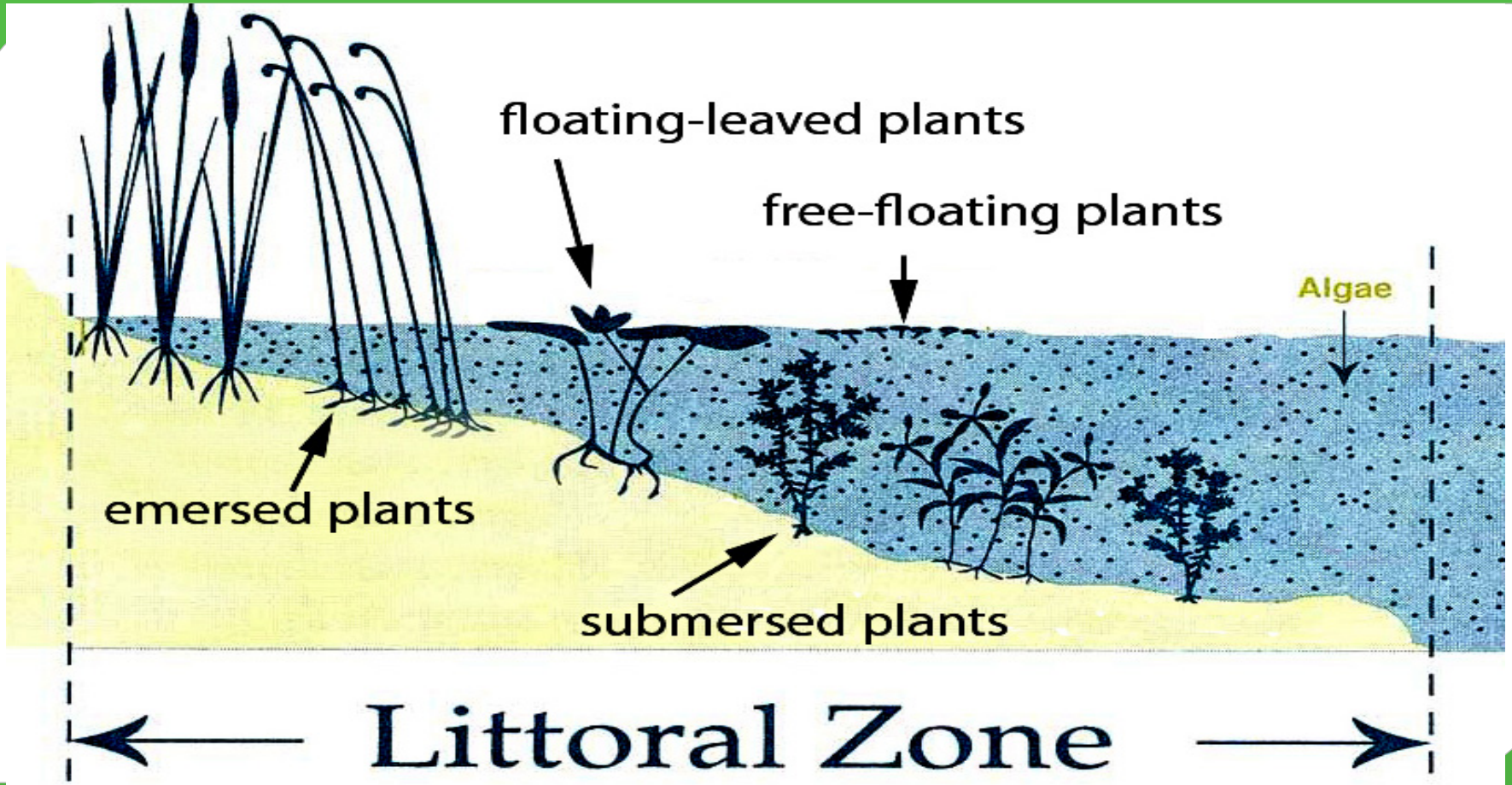


Hydrilla

Aquatic Plants in the C-W



Aquatic Plant Community



Emergent

Cattail

- Entire plant edible
- Light/ Insect Repellent
- Shaped into Decoys
- Floatation Device
- Medicinal Uses:
  - ✓ Kidney Stones
  - ✓ Whooping Cough
  - ✓ Sprains
  - ✓ Wounds

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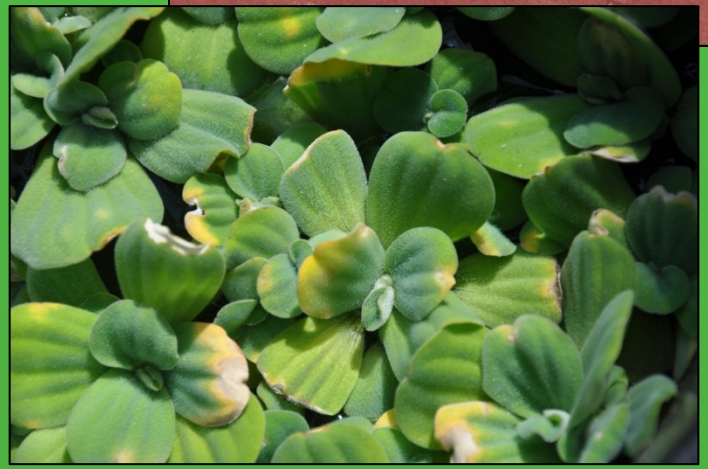
  - ✓ Wounds

Floating Leaf

American Lotus

- Largest native flower
- Common in flower arrangements
- Seeds viable for hundreds of years
- “Swamp Candy”

Free Floating



Duckweed, Watermeal

- Smallest flowering plants in the world
- Rapid growth!
- Useful as biofuel
- Serves as a natural filter
- Powerfood

Submersed

Bladderwort

- “Meat Eater”
- 100x faster than flytrap
- Efficient with it’s genes
- Uses acid to digest it’s prey

Why Aquatic Plants?

- Food, shelter, and breeding habitat for fish and wildlife
- Stabilization
- Oxygenation
- Aesthetics

Common Invasive Aquatic Plants

- **Hydrilla**

- **Water Hyacinth**

- **Eurasian Watermilfoil**


BIRD SHOALS
TRADING CO.
BIRD SHOALS
AQUATIC NURSERY
Pond Plants & Products

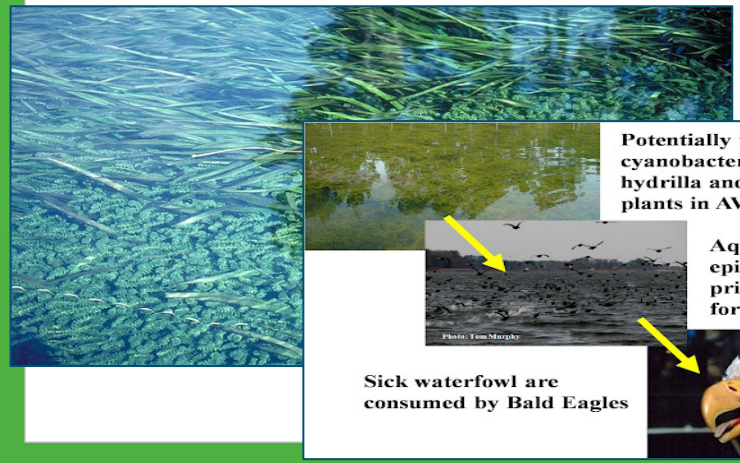
How Do Aquatic Plants Spread?

- Fragmentation
- Water movement, wind
- Animals (wading birds, aquatic mammals)
- Human activities


EXE

What's the Big Deal?

- Outcompetes Native/ Beneficial Species
- Fluctuations in Water Quality
- Alters Habitat and Food Web
- Clogs/ Damages Water Control Structures
- Reduces/ Halts Public Use
- Impact Local Economy



Why so invasive/noxious in reservoirs?

- Clear, shallow water
- High levels of nutrients
- No enemies
- Competitive advantage

St. Stephens Hydro (1991)…

- Hydrilla mats from Lakes Marion/ Moultrie
- 900+ loads hand removed
- Four-month outage
- $5 Million in losses/ damage

Browns Ferry Nuclear (2018-?)…

Hydrilla

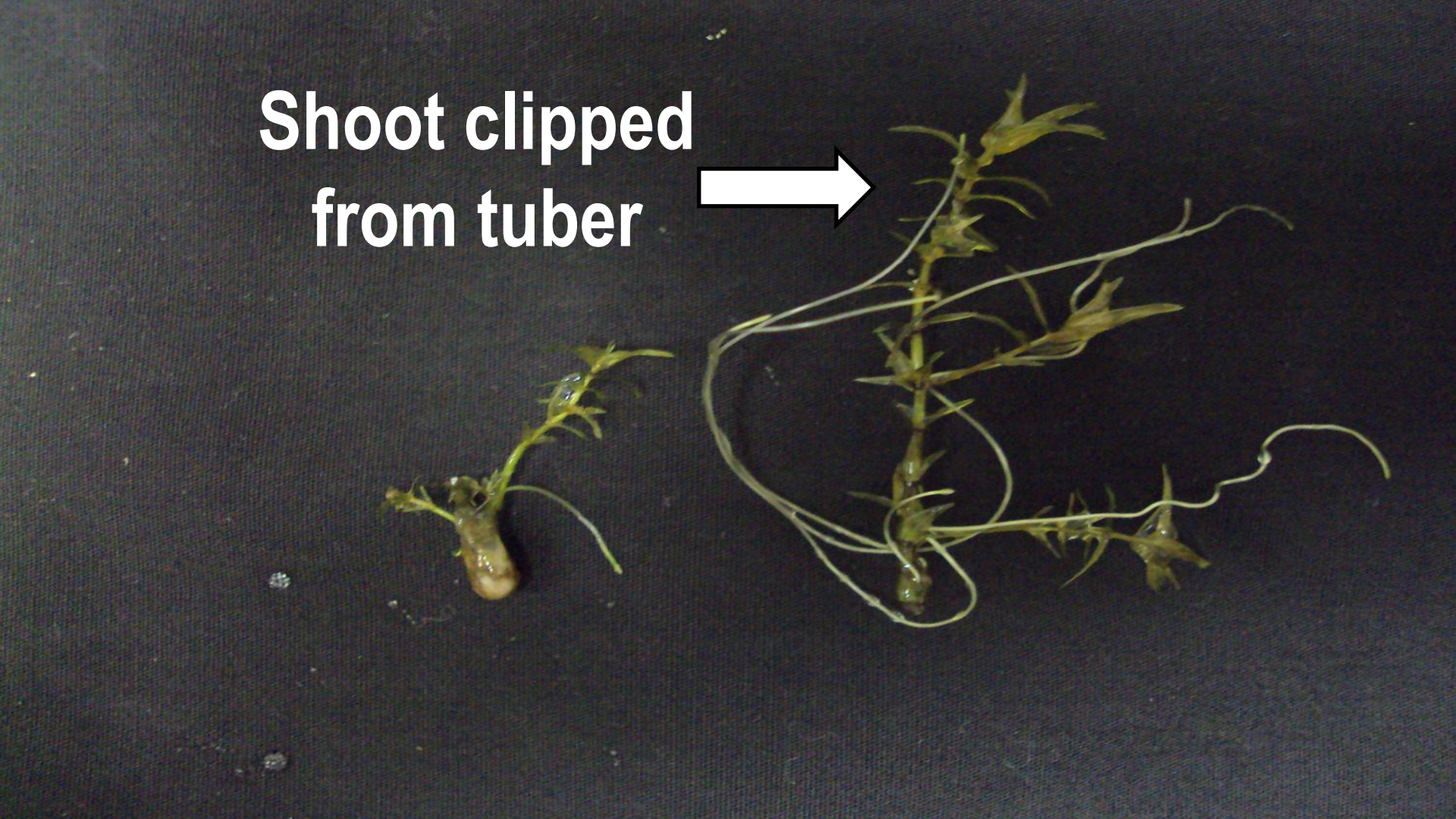
The “perfect aquatic weed”

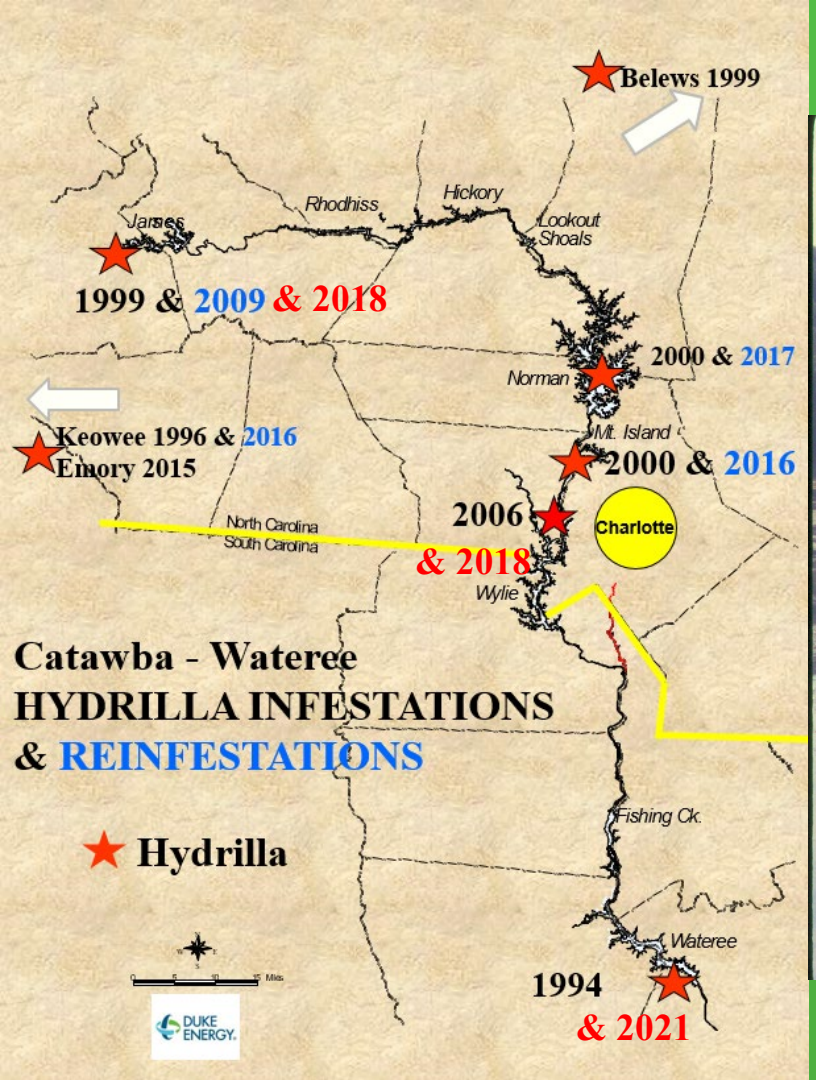
- **#1 Problem Aquatic Weed in U.S.**
- **98% water (very hardy)**
- **Grows in wide range of conditions (salinity, temperature)**
- **Reproduces via Fragmentation, Tubers and Turions**
- **Tubers can remain in sediment for 8+ years**
- **Very shade tolerant (low light affinity)**
- **> *1 (+) inch per stem per day**

The Unseen Problem: TUBERS

Let’s Clip the Sprouts and…

Watch Them Sprout Again…


Shoot clipped
from tuber


Belews 1999
Rhodhiss
Hickory
James
Lookout Shoals
1999 & 2009 & 2018
2000 & 2017
Norman
Keowee 1996 & 2016
Emory 2015
Mt. Island
2000 & 2016
2006
& 2018
Charlotte
North Carolina
South Carolina
Wylie
Catawba - Wateree
HYDRILLA INFESTATIONS
& REINFESTATIONS
Fishing Ck.
Hydrilla
Wateree
1994
& 2021
DUKE ENERGY.


DUKE POWER MOSQUITO CONTROL (704) 382-0160

All about partnership…

14.4 Aquatic Weed Management – For the term of the New License, the Licensee shall continue to work cooperatively with its partners to manage invasive aquatic weeds in Project reservoirs by, among other things … e aquatic weed managem… nical assistance. Th… ssist in the developm… the funding of aqua… ment strategies approved … resource agencies a… ents, which shall include th… management cost-s… onsored by the North Carolina Depa… ment of Environment and Natural Re… ources (NCDENR) and the SCDNR. Due to the v… iability of aquatic weed infestations f… om year-to-year and res… asis, the Pa… rticles co… ge long-te… License will be… term of the Ex… ection 32.0.

NC Environmental Quality

South Carolina Department of Natural Resources

Charlotte Water

Lake Norman Marine Commission

Duke Energy

Lake Wylie Marine Commission

City of Statesville North Carolina

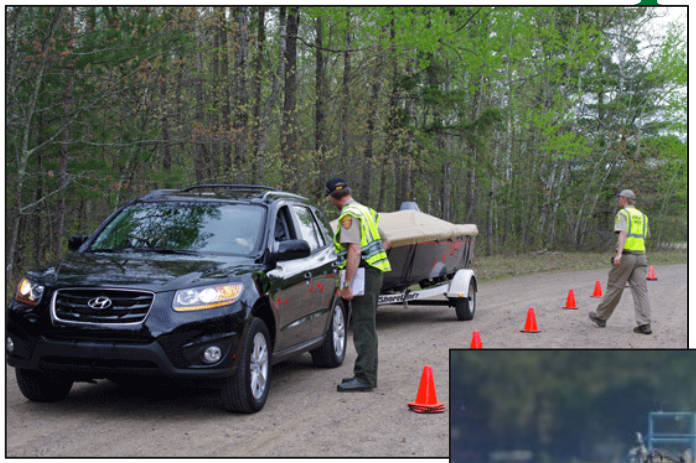
Gastonia NC — Great Place. Great People. Great Promise.

Charlotte-Mecklenburg Storm Water Services

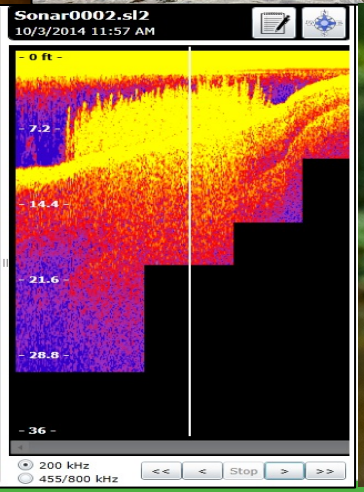
Catawba Wateree Water Management Group

Control Options

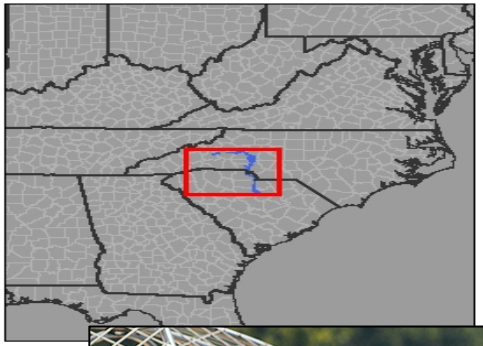
- Cultural
- Mechanical/Physical
- ***Biological***
- **Chemical**
- **Prevention/EDRR**

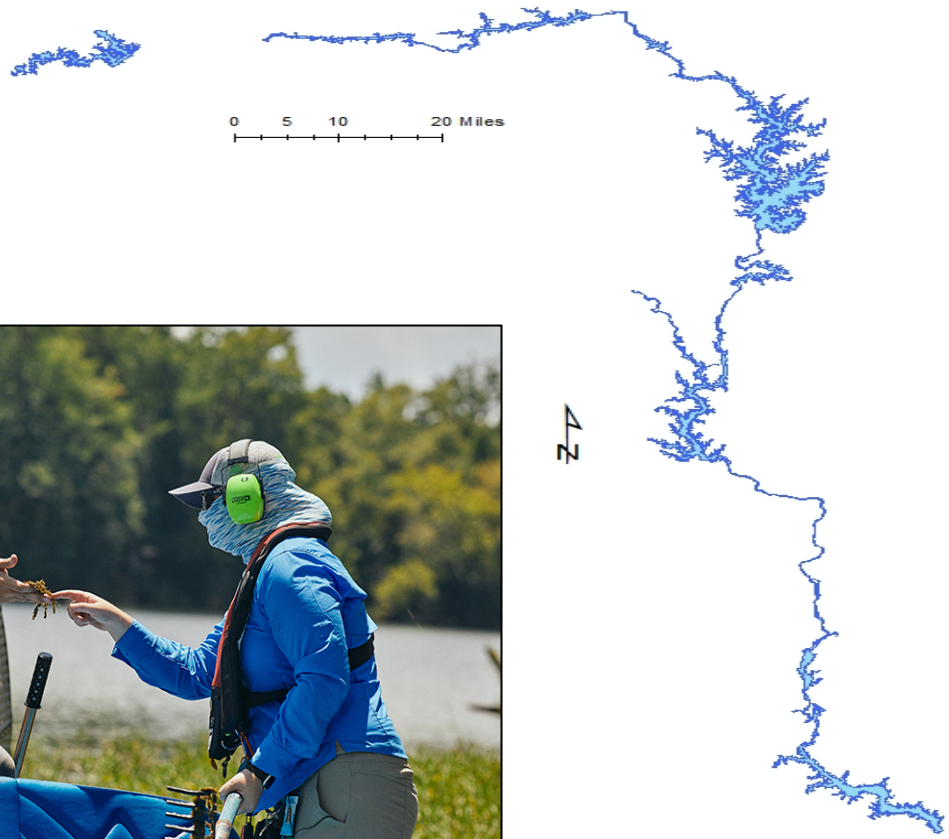


Prevention/EDRR

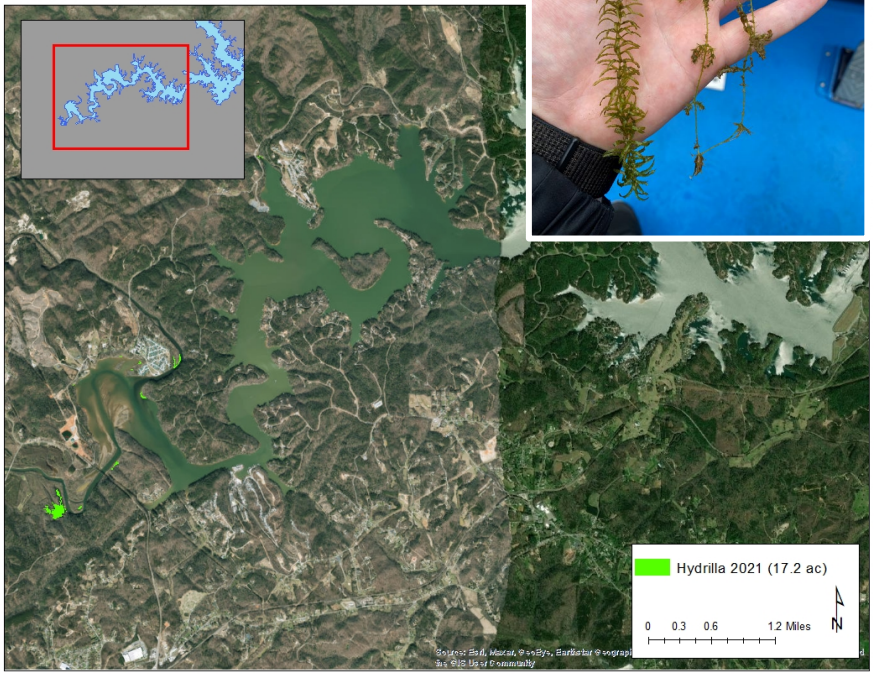


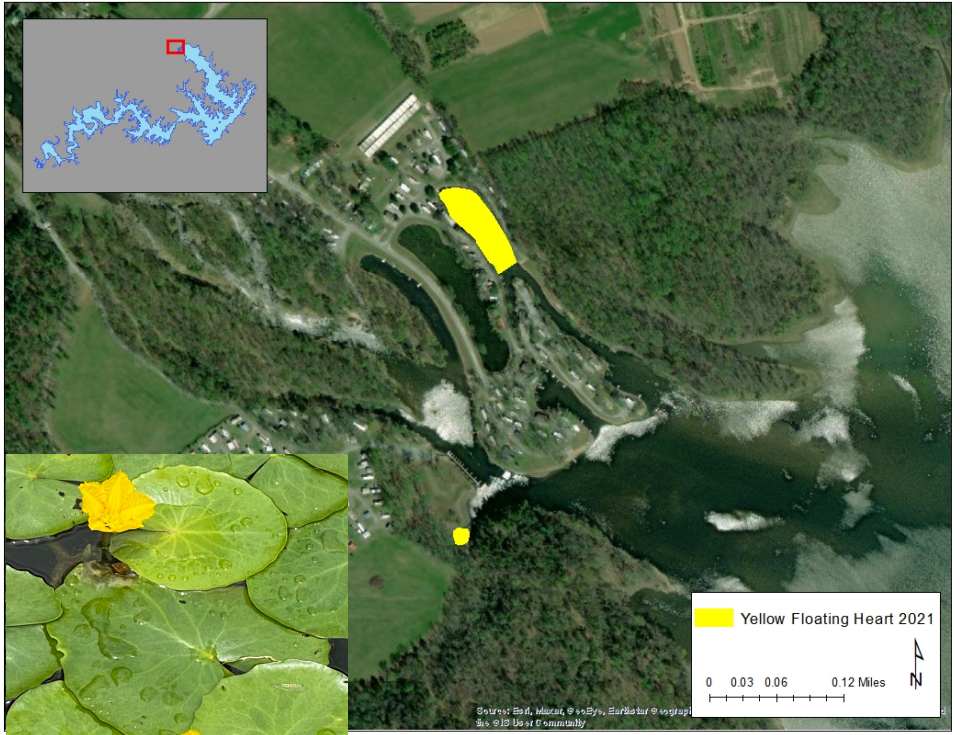
2021 Catawba Survey

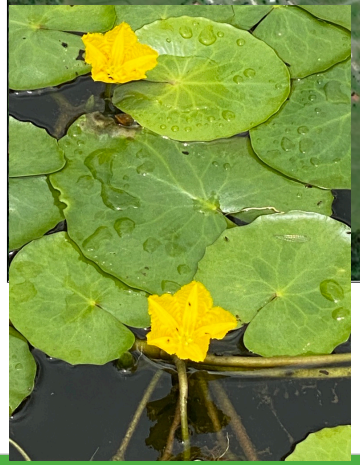




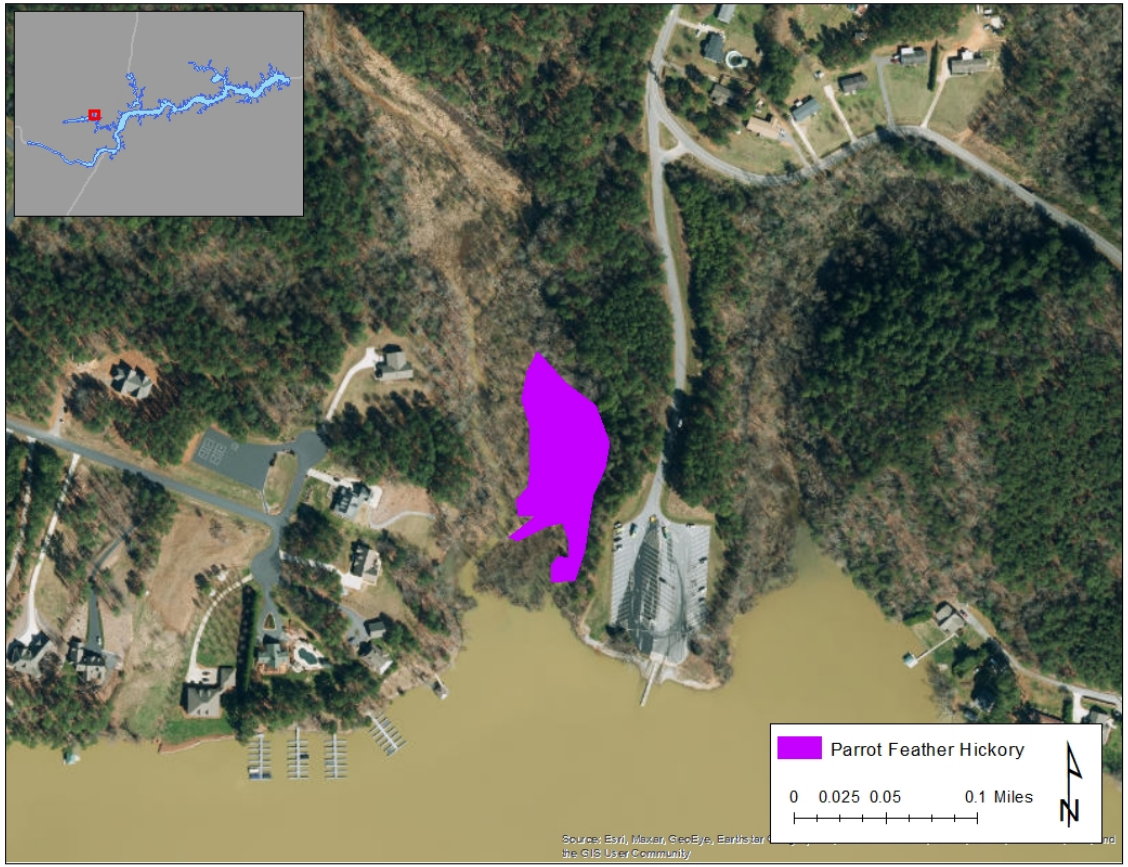
Lake James


Hydrilla 2021 (17.2 ac)
0 0.3 0.6 1.2 Miles
N

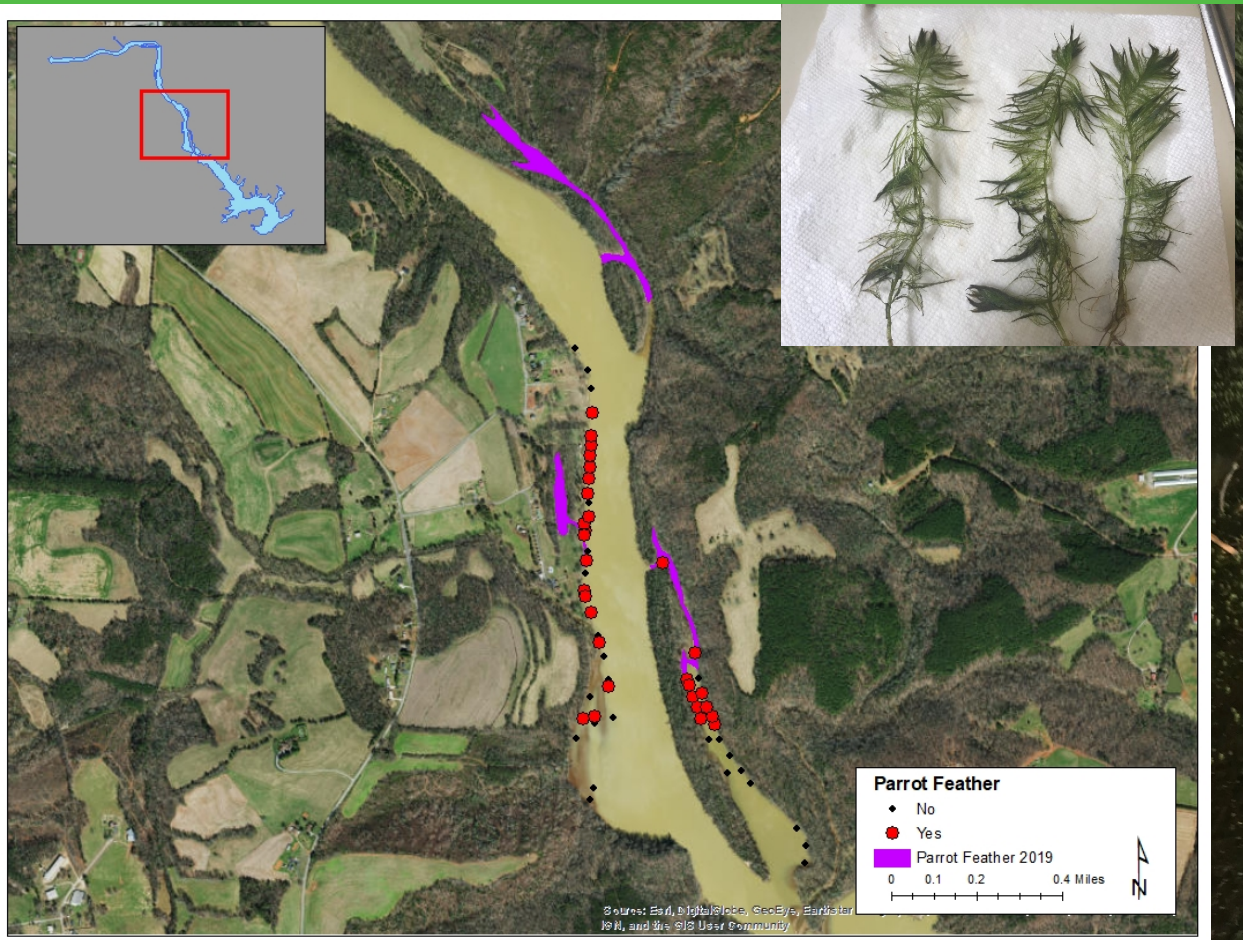

Yellow Floating Heart 2021
0 0.03 0.06 0.12 Miles
N



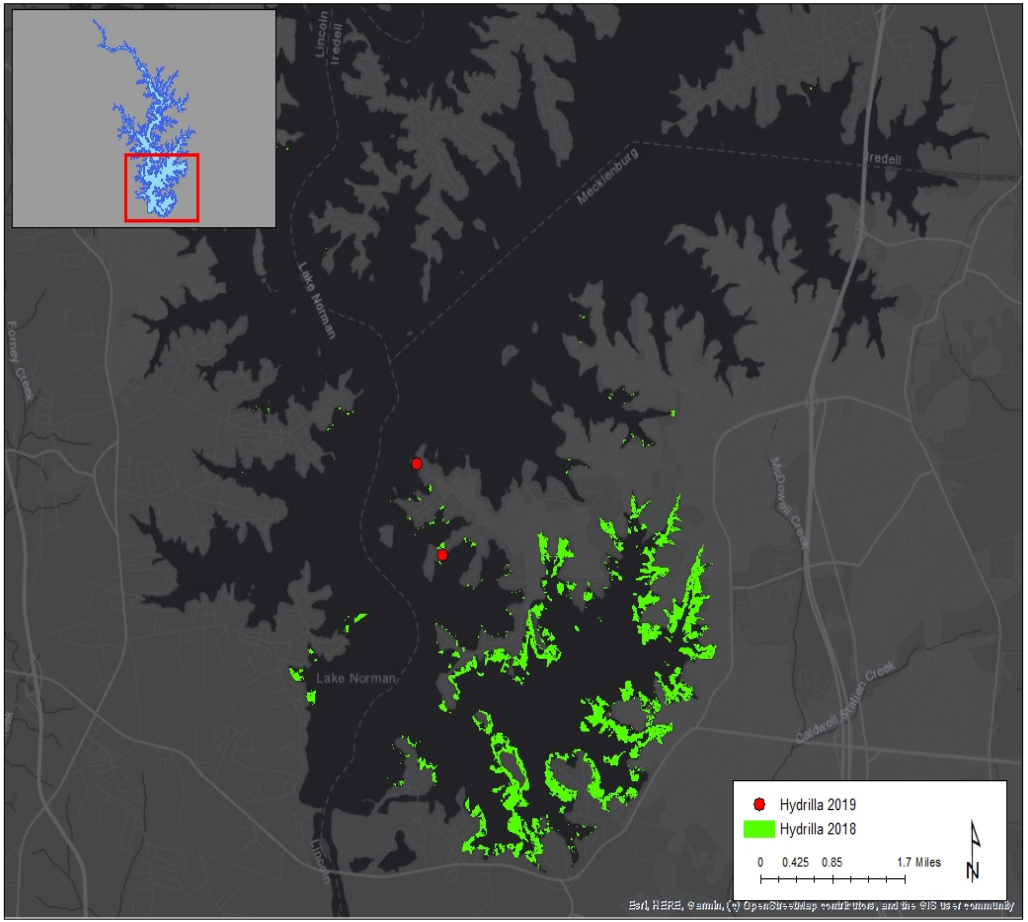
Lake Hickory

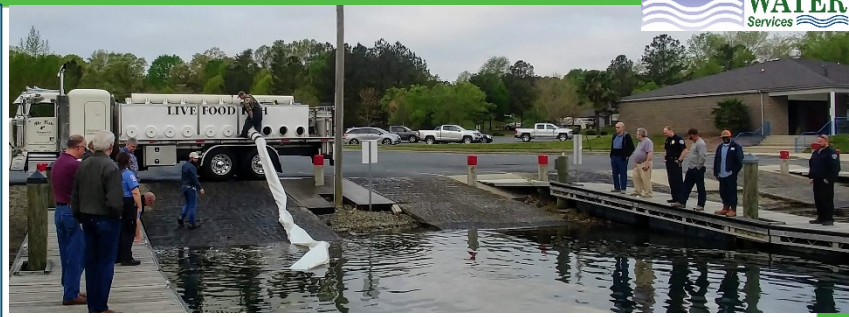


Lookout Shoals



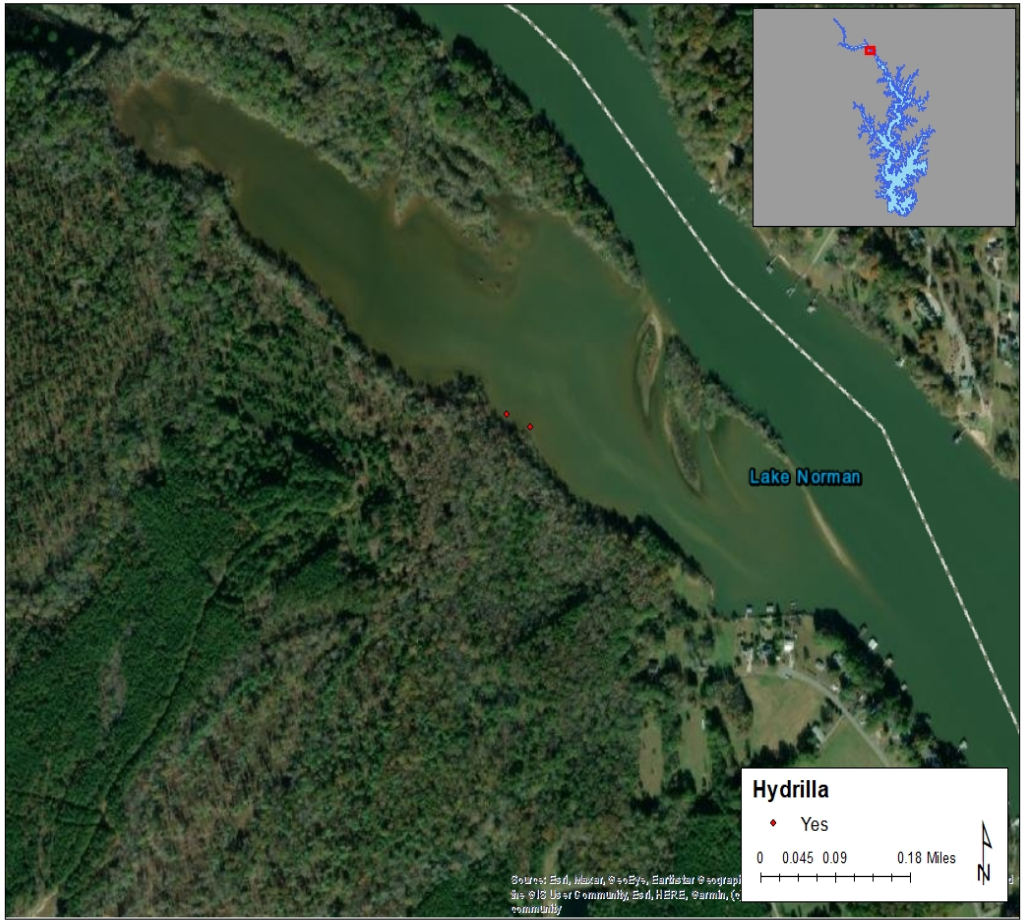
Lake Norman

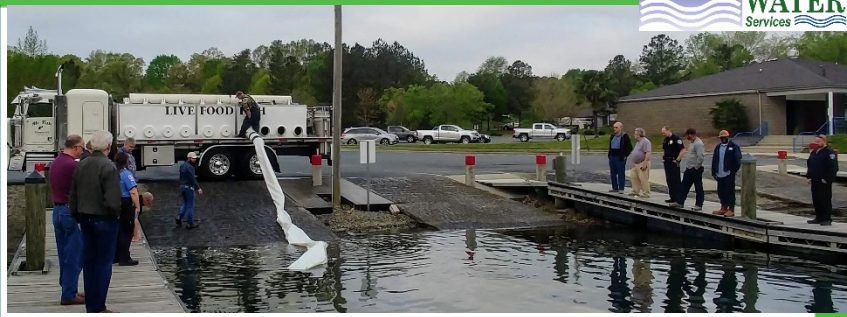




- Est. 510 ac (fall 2017)
- 10,200 TGC (spring 2018)
- Est. 640 ac (fall 2018)
- 12,330 TGC (spring 2019)
- Est. ~0 ac (fall 2019)
- 750 TGC (spring 2020)
- Continued Survey Work

Lake Norman





- New isolated population discovered in 2021…

Mountain Island

- 94 ac (fall 2016)
- 610 TGC (2017)
- 730 TGC (2018)
- 144 ac (fall 2018)
- 1500 TGC (2019)
- 45 ac (fall 2019)
- 15 ac (fall 2020)
- 6 ac (fall 2021)

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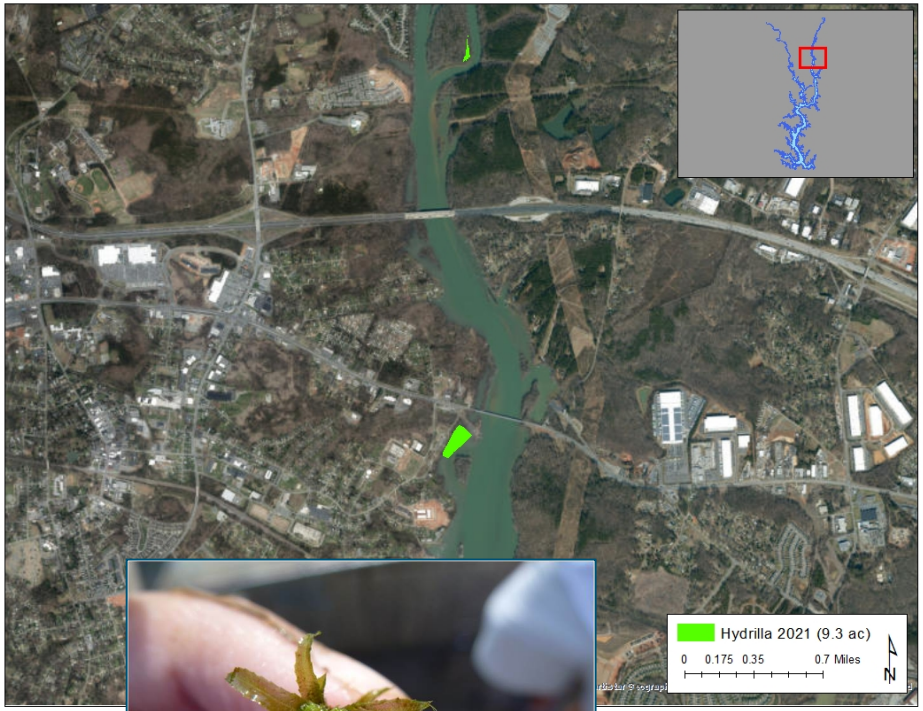
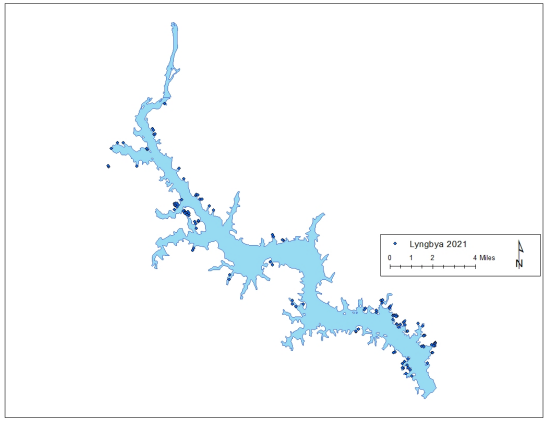
- 15 ac (fall 2020)
- 6 ac (fall 2021)

Lake Wylie

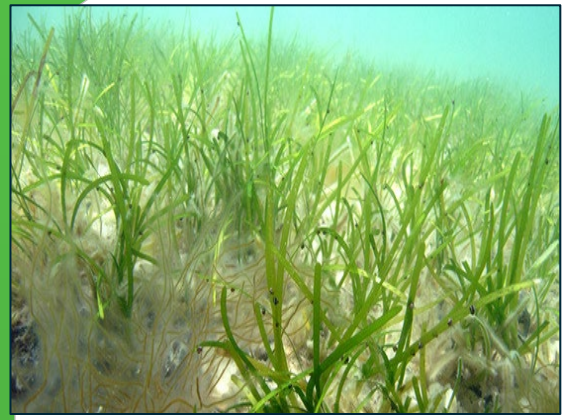

Gaston
Mecklenburg
SOUTH CAROLINA
NORTH CAROLINA
Wylie Alligatorweed 2017
0 0.5 1 2 Miles
N
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS User Community


Hydrilla 2021 (9.3 ac)
0 0.175 0.35 0.7 Miles
N

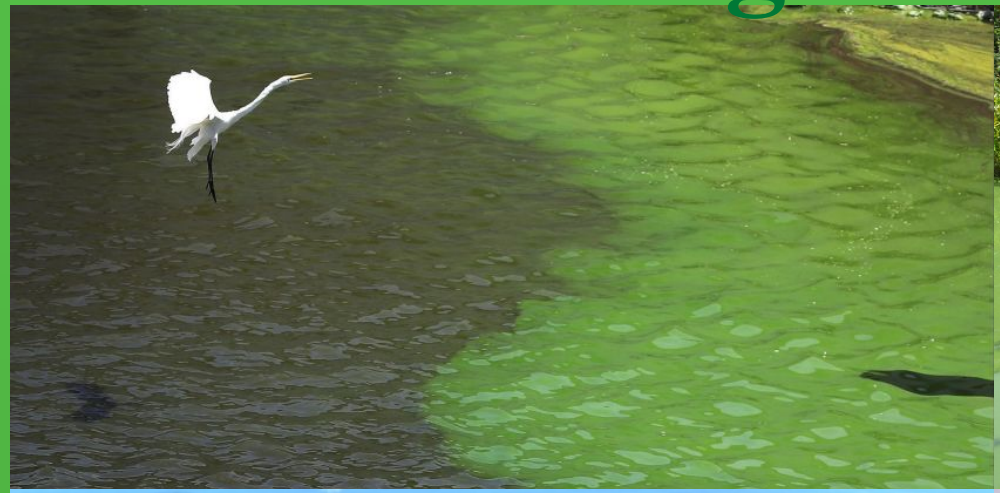
Lake Wateree



Native Species



Harmful Algal Blooms (HABs)

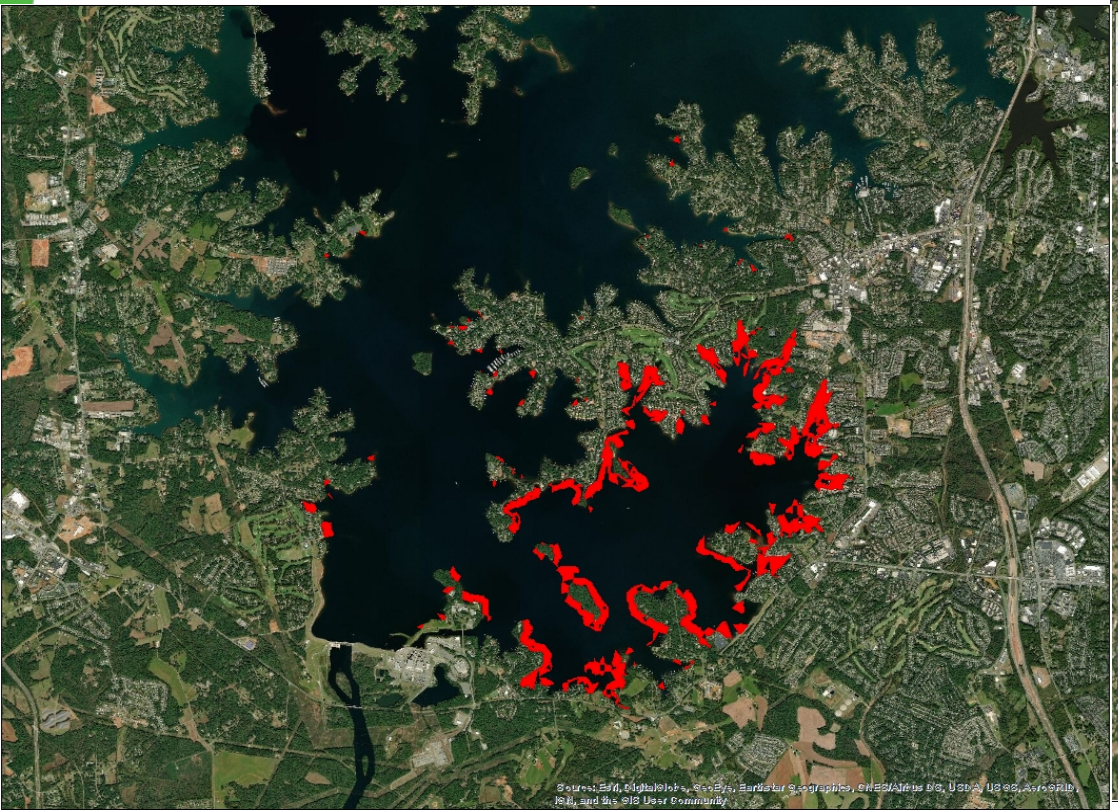


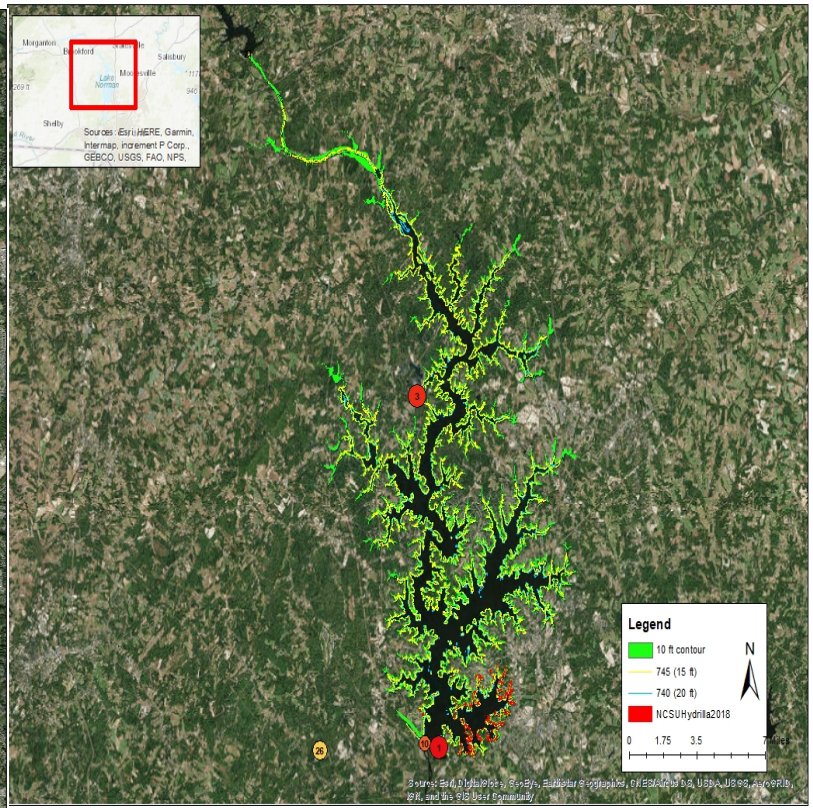
NOT Harmful Algal Blooms (HABs)

NO

Potential Hydrilla Habitat

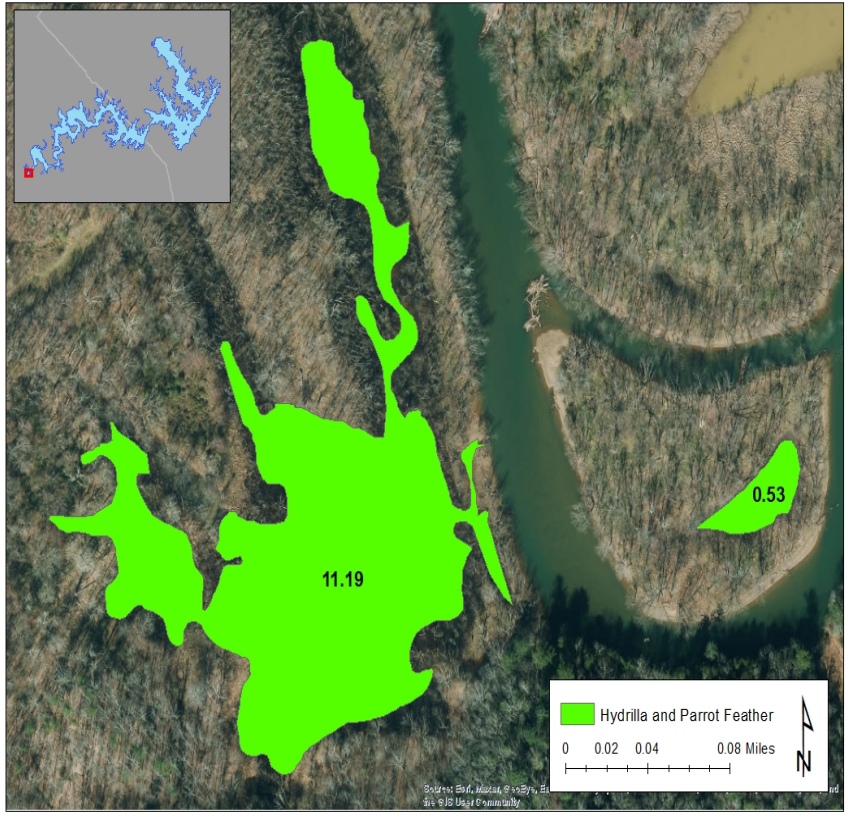
Lake Norman Potential Acreage = 8,000+ of 32,339

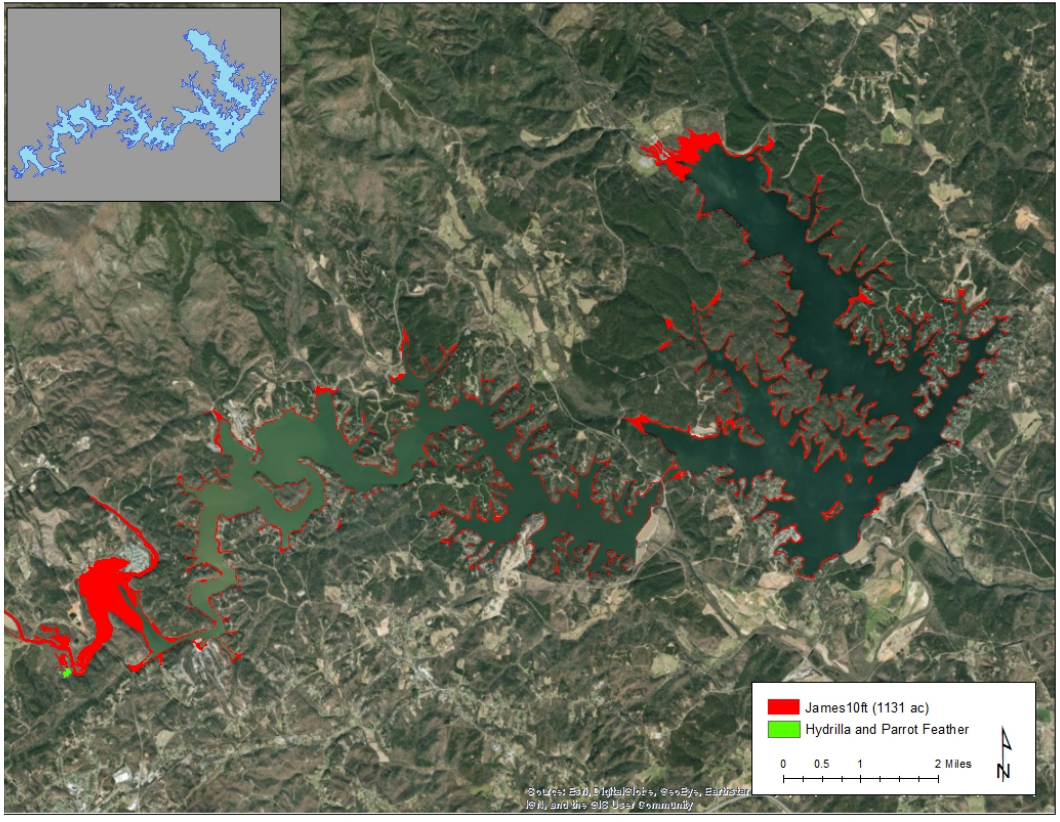




Potential Hydrilla Habitat

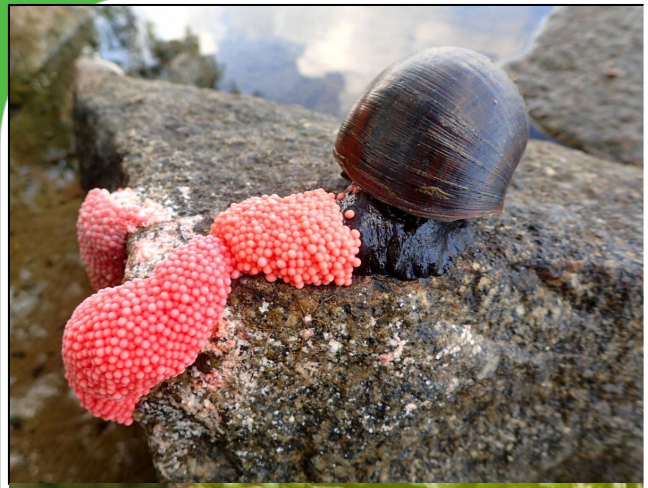
Lake James Potential Acreage = 1,200+ of 6,754





Hydrilla Habitat

A Never-ending Battle….



High Risk Species Not Currently in NC:

Apple Snail (*Pomacea insularum* and *P. canaliculata*)
Giant Salvinia (*Salvinia molesta*)
Marbled Crayfish, Marmokrebs (*Procambarus fallax virginalis)*
Silver Carp (*Hypophthalmichthys molitrix*) and Bighead Carp (*H. nobilis*)
Snakeheads (*Channa spp.*)
Zebra Mussel (*Dreisenna polymorpha*)

How to Help

- See something strange, let someone know!
- Clean, drain, dry…
- Management is not DIY

Questions?

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